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From the Editor: Novelties to academia from JEGYS

Abstract
Scientific journals should contribute to the creation of new academic fields as well as publishing original articles. JEGYS continues to be the platform that enables the development of the new academic field it has created with particular issues and congresses. Original articles from six different countries were published in this issue. Gifted young scientist education invites authors to develop their academic field.
Keywords: Gifted young scientist education, new academic field, JEGYS, ICGYSE congress, Special Issue: STEM for Gifted

Dear Authors, Readers, Reviewers, Editors

One of the most important issues in academic publishing is to create a new academic field. Because all disciplines are now changing and evolving. We recognize that even the old journals have changed their titles. It is no surprise to see subtitles become a new journal-title.

We always emphasize that JEGYS is an academic journal that creates a new academic field by combining the fields of science education and gifted education. Our authors, referees, and editors are aware of this difference. For that, I am grateful to them.

The fact that science is the product of scientists with Kuhn's explanations, that it is affected by his feelings, thoughts, ideas, and beliefs, has made it accepted that it is subjective. Academic journals should contribute to the development of this aspect of science. JEGYS supports authors in these matters. We indicate that we do not want to publish articles in which known models or theories are tested. We invite research that contributes to the creation of new fields.

STEM research is the study that took place in gifted education 10-15 years ago (Van-Tasselbaska & Wood, 2010). Any attempt to apply STEM practices to all students (nongifted) will fail because not every student can be successful in engineering and science fields. This is obvious that interdisciplinary teaching is not a new instructional approach. Therefore, it is seen that the STEM approach is very suitable for gifted education. As JEGYS editorial board, we decided to publish a Special Issue to support this academic field. We invite all authors studied in this field to this special issue.

Our congress, which will be held for the second time this year, will continue to be the meeting point of researchers in the fields of gifted education, science education, and sustainability of education, as well as all educational sciences. The congress will also contribute to the development of this new academic field, which is an important aspect of JEGYS being a widely read and cited academic journal. We invite all our authors to the 2nd International Congress on Gifted Youth and Sustainability of the Education (ICGYSE).

Table 1.
June 2021 Issue Article Review Process Data

Articles ID	Reviewers number	Review Time (Average)	Contributions to Field	Countries
849063	3	85 days	STEM	Thailand
862904	2	90 days	Cognitive science	Bahrain
696491	2	360 days	Early Childhood	Turkey
864037	2	60 days	Parenting	Turkey
857911	2	130 days	Program Model	US
908540	2	70 days	Self-regulation	Turkey
846480	4	70 days	Differentiation	Afghanistan
901622	2	80 days	Sustainibility	South Africa
874050	2	115 days	Sustainibility	South Africa
Total	At least 2 reviewers	118 days	Gifted education	6 different contries

As seen in Table 1, articles from 6 different countries were published in the June 2021 issue, with at least 2 referee evaluations and review processes that lasted an average of 118 days, all of which would contribute to the

topics in gifted education. Thanks to our referees in this review process. Academicians who want to work as referees can send an e-mail to editorjegys@gmail.com or click the reviewer request button on web site. The late referee turnaround times are 25 days and the response rate of the appointed referees is 70%.

In this issue, Songwut Egwutvongsa from Thailand contributed his article "Toys for children with the concept of STEM: the study of the result from children's playing activities". Eid Abo Hamza and Ahmed Helal from Bahrain contributed their article "Examining the stress, depressive thoughts, and working memory capacities of the university students". Gamze Inci contributed from Turkey with her article "The analysis of research about gifted and talented children at early childhood in Turkey: a study of meta–synthesis". Sumeyye Yıldız and Naime Altay contributed from Turkey with their article "The parenting attitudes and effects on their gifted children: a literature review". Contribution from Mashael Alhibs, US, with the article "The schoolwide enrichment model for reading (SEM-R) framework". Oğuzhan Yavuz and Müge Yukay Yüksel contributed from Turkey with the article "The mediating role of emotion regulation in the relationship between executive functions and self-regulation of gifted and nongifted students". Aminuddin Hashemi contributed from Afghanistan with the article "The effects of using games on teaching vocabulary in reading comprehension: a case of gifted students". Johannah Bopape, Awelani V Mudau and Sikhulile Bonginkosi Msezane contributed the article "Greening the school for sustainable development: Tshwane North District case".

We present this issue to you with the contribution of our authors, referees, editors, and proofreaders. In the upcoming issues, we will also include instructional design examples, book reviews, and interview articles. We will continue to work to ensure that the concept of "Gifted Young Scientist Education", which has developed with JEGYS, continues to take place primarily in the academic world and then in the education community.

JEGYS is one of the 10 journals in the academic field of Gifted Education. Future education will be shaped on the axis of "talent". Another important concept that JEGYS offers to the academic community is the concept of the **Advanced Science Education.** Thus, JEGYS ended the discussion with the concept of "Advanced science education" at the discussion of "science education is for everyone" and "science education is for the gifted". The concept of Advanced Science Education deals with the part of science education for gifted children. Implementation of differentiated instruction is a necessity for Advanced Science Education. Conceptual understanding is not emphasized, product-oriented, student-centered, and in-depth studies are conducted. The concept of "Advanced Science Education" will now be used in the academic community. I am happy to present the concept of "Advanced Science Education" to educational sciences. I recommend the authors to develop this concept and use it frequently in academic research. Due to the intensity of my editorial duties, my article work has decreased a little. That's why I present my ideas to you, my esteemed colleagues, in the editorial. Our way is long, our goals are big. Stay healthy and happy.

Best regards
Dr. Hasan Said Tortop
Editor-in-Chief of the JEGYS

References

VanTassel-Baska, J., & Wood, S. (2010). The integrated curriculum model (ICM). Learning and Individual Differences, 20(4), 345–357. https://doi.org/10.1016/j.lindif.2009.12.006

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Research Article

Toys for children with the concept of STEM: study of the result from children's playing activities

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Abstract

This research aimed to examine the result from toy invention with the concept of STEM. The testers comprised 36 people who were the parents and children aged between five to seven years old that used the service of a child development center in Buriram Municipality in Thailand. Additionally, they were selected by purposive sampling that used multiple regression analysis to show the result from the testing of the newly designed toys as the concept of STEM. The results found that the toys had a satisfaction level of the Good (mean=4.333; S.D.=0.652) with the regression equation $\hat{Y}$ = 0.234 + [0.741 X1] + [0.106 X2] + [0.049 X3] + [0.071 X4] to explain the changing of the level of satisfaction to be 72.73% (r^2=0.7273). Research of the playing design as the concept of STEM at this time, Able to meet learning goals based on STEM concepts to an excellent level.

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Introduction

The 21st century is considered as the era of globalization (Hearn & Bridgstock, 2010). Moreover, it comprises a society with the movement of technologies and rapid news that has affected humans to experience severe accelerated changes. Similarly, it contributes to opportunities for the transfer of feelings from the application of human forces to global development (National Research Council, 2010). Thus, it is essential to use a high level of thought to potentially create an ideal world based on the concepts of integration, flexibility, applied thinking, etc. Additionally, this could be generated to become stimulation skills so to have creative thoughts, also called as the intellects of the world, in the 21st century. This would result from the creative thoughts being integrated with a creative economy (Tae, 2015), which would humans in the 21st century world (Flew, 2005). As a consequence, the preparation of children's thoughts should have learning support with increased knowledge with high effectiveness from the daily life of children, including the continuous development of knowledge for children through the integration of learning between their playing activities until gaining knowledge from the so-called activities. This development would be aimed at the integration of applying the concept of STEM, which would consist of the knowledge creation of four sciences; namely, science, engineering, technologies and mathematics resulting in toy invention (Rubin & Howe, 1985). Furthermore, for children aged five to seven years old, this would depend on the integration of learning during the playing activities to stimulate them by gaining multiple learning procedures as a real situation that would be tested and learned at the same time. Similarly, the knowledge from playing would aid the children to apply this learned knowledge for use in their daily life; such as, dressing, understanding technologies, bringing knowledge to apply in their daily life, etc.

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Hence, this could be designed as toys for children aged between five to seven years old by using the concept of STEM and providing the opportunity to promote intellectual knowledge in multiple ways, as well as offer the appropriate development for children in the future (Guba, 1990). Therefore, this could promote intellectual knowledge through the activities of playing with children's toys to stimulate knowledge through the various conditions without any stress. Moreover, this would provide benefits to the learning and understanding of the contents through suitable playing activities that would be accountable as an appropriate learning method procedure for future generations.

From the results of various research studies in many countries, it was found that nowadays the proactive learning pattern had a higher level of effectiveness than the defensive learning pattern, especially for children to have the high flexibility of their cognitive skills. Furthermore, this was relevant to the thinking frame, as there was a less level of original thought. Therefore, learning as a playing pattern has focused on the using of the senses with the building of children's knowledge to create opportunities of imaginary thoughts integrated with various other thought patterns. In this case, this could be considered as the stimulation for gaining the requirements of regular learning for children, (Liquin & Lombrozo, 2020) and creating an integrated learning pattern based on relational reasoning for children to gain knowledge and understanding with multiple views as the skills for human groups of children (Holyoak, 2016). Moreover, this could become the learning skills for children to have the readiness for the ever-changing global situation in the mid-21st century (Runco & Beghetto, 2019).

Provided that this could generate the designed playing attributions to encourage various kinds of knowledge while the children play, this might be able to build the skills that could conform to the future lifestyles (Guffey, 2014), as well as be vital knowledge for children to create thoughts as a relationship to link with knowledge (Penn, 2011). Significantly, this would not only represent the learning and development guidelines for children's playing during childhood, but also aim to memorize learning for building the integrated knowledge in several fields (Papandreou & Tsiouli, 2020). As a result, in supporting children to gain knowledge from activities and problem-solving skills, this could generate a new children's playing style in each pattern (Valkonen et al. 2020), as well as build up knowledge differently with playing goals for each pattern.

Aim of Study

- To study the guidelines and playing design for supporting the imagination with the concept of science, technology, engineering, and mathematics (STEM).
- To assess the activities from the new form of designed playing.

Method

Research Model

For the designing step to encourage the children's development, it would be relevant to design the toys based on the concept of STEM. In addition, this would consist of a summary of the results from the brainstorming to search for a suitable toy design for the children by selecting purposive sampling informants. Thus, this would depend on the specific knowledge quantification with the newly designed children's toys of the informants with the case study.

Participants and Data Collection Tools

For the designing step to encourage the children's development, it would be relevant to design the toys based on the concept of STEM. In addition, this would consist of a summary of the results from the brainstorming to search for a suitable toy design for the children by selecting purposive sampling informants. Thus, this would depend on the specific knowledge quantification with the newly designed children's toys of the informants with the case study. This was as follows:

➢ The population was composed of eight teachers and eight caretakers of the child development center located at Mueang Municipality of Buri Ram province, Thailand.

➢ The group sampling was selected by using purposive sampling that had a reliability level of 95% (Yamane, 1973).

➢ The data collection tool was a structured interview with determined questions by using Cronbach's alpha coefficient to assess 30 testers with the value of 0.91 that was more than 0.70, and it was applied and analyzed by using the mean and standard deviation (Streiner & Norman, 1995).

For the assessment of the activities, this involved playing with the newly designed toys as per the concept of STEM. In addition, the newly designed toys were tested before playing, and an imaginary role play was created for the children groups and the families who joined in this research.

From the real testing step with the group sampling, this presented that the researcher had applied the empirical experiment to check for the suitability of STEM and art. Then, children aged between five to seven years were tested with the new designed toys with the babysitters and parents joining in by giving an assessment by expressing their opinions together in this empirical experiment:

➢ The population was children aged between five to seven years and the parents who used the service of a child development center located in Mueang Municipality in Buri Ram province of Thailand. There was a total of 39 people who lived in the service area, where families have children aged between five to seven years according to a survey conducted in the year of 2020.

➢ Group sampling was the children aged between five to seven years and the parents who used the service of a child development center located in Mueang Municipality in Buri Ram province. There was a total of 36 people, who were selected by applying purposive sampling that had a confidence level of 95% (Yamane, 1973).

➢ The research tool was a structured questionnaire that had questions for determining the suitability assessment criteria of the knowledge, such as, in the fields of science, technology, engineering, mathematics, and arts. Additionally, from the questionnaire, it was found that there were the values of Cronbach's alpha coefficient with the questions to be assessed from the testing group of 39 people who were not in the group sampling, who had the values of 0.97, which was more than 0.70. Furthermore, it could be considered that the questionnaires could be applied in a real situation by applying multiple regression analysis (Streiner & Norman, 1995).

Framework

This research had various knowledge integration for the toy invention for children. Moreover, it was considered as an important subject that affected the effectiveness for stimulating their interest (Wolfberg & Schuler, 1993). This also contributed to the activities for stimulating the imagination development, which included mathematics, languages, technologies, engineering, and science. As a result, all fields were connected based on the design of the toy for children as per the concept of STEM that was applied with the research framework (Figure 1).

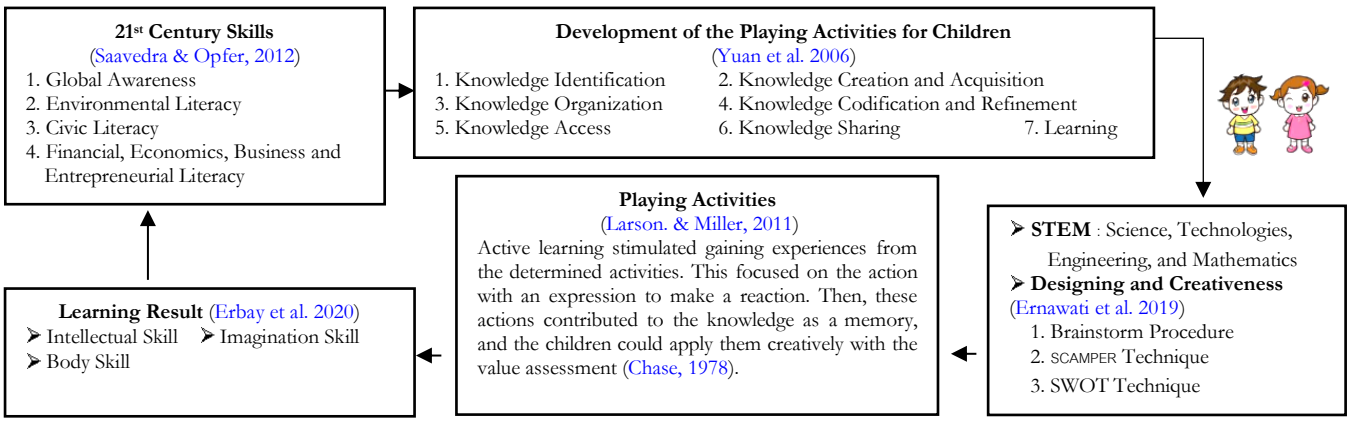

Figure 1.

Research Framework

From the former research, it was found that children's playing was considered as the basic behavior that every child could express (Kelsey et al. 2020). However, children's playing could relieve the mind, and during this relaxed condition, it would assist them to gain higher effectiveness on learning as being the environment to boost up their intelligence skills (Wu & Rao, 2011).

In this case, from the application of the playing characteristics between the children and the parents in their families, this was considered to be a relationship that was linked to be an important part of gaining a good thinking system and positive emotions for children (Amodia-Bidakowska et al. 2020). Furthermore, this research was relevant to applying the concept to be integrated with the toy design by building up multiple knowledge for the children. Thus, the researcher aimed at building the playing knowledge for the children by designing the toys to stimulate them to gain the feeling like "Wow, I did it!", and the successful feeling from the children's action would

congruently explore the playing characteristics to encourage the sustainable learning of the children (Doan et al. 2020).

From the playing characteristics and learning, these were considered as an inseparable characteristic with the intelligence building for children aged between five to seven years. Likewise, this learning pattern was integrated with playing to stimulate gaining creative ideas, analytical thinking, and synthesis thinking (Hassinger-Das et al. 2020; Pramling Samuelsson & Johansson, 2006). Additionally, this research used the learning theory of the Froebel Model for kindergarten children to be applied with the toy designing step as a new concept for STEM (Vogt et al. 2018). Thus, this was based on the building requirements of the toys to build up knowledge with the children's playing activities of the Froebel Model, so that it could create happiness during the learning while being noticed by the teachers and the parents to boost the children's knowledge (Colliver et al. 2021).

Brainstorming (Fig. 2) was conducted to determine the guidelines for the toy activities for children aged between five to seven years old based on the teacher groups and carers to present the ideas of the intellectual skill by supporting the imagination and body skills (Burns & Grove, 1993). This was concerned with the concept of STEM as a new pattern for toy invention that would develop the children's skills.

Figure 2.
Brainstorming between the Teachers and Carers

Results and Discussion

The brainstorming of the teacher groups and the experienced carers enabled stimulating the children aged between five to seven years old with the essential learning interests. The components were as follows:

- Integrated the mathematics skill, languages, and daily life skills with the toy invention to increase the learning interest through the playing activities with funniness and happiness.
- Played with amusement and happiness to effectively contribute to receiving a good memory.
- Blended the practicing skills to control the children's muscles and hands to be appropriately developed with the daily life skills.
- The playing of toys with the role-playing style stimulated the children's imagination during and after playing.
- The integration of playing with learning aided the children to feel relieved, including stimulated the children's brain cells for secreting the endorphin hormones during the play and created a good opportunity to develop the brain by continuously secreting the neurotransmitters, as well as gained thoughtful activities or brain exercises in the same way (Jirojanakul & Skevington, 2000).
- The playing generated an increased level of the children's happiness, especially when they undertook the playing activities with their parents or a family member for the high development of the emotional quotient (EQ).

The conclusions of the brainstorming about the concept by 16 child development experts were used to determine the children's playing activities and to design the intellectual development toys that would be appropriate with the goals of the concept of STEM and Art in terms of regulating the guidelines (Table 1) (Batlolona & Souisa, 2020).

Table 1.

The Results of the Brainstorming of the Playing Activities for the Concept of STEM

STEM	Playing Activity/Learning	Toy Playing Pattern
Science	➢ Wearing casual clothes. ➢ Calling the names of stars in the English and Chinese languages.	➢ Using the role as an astronaut by wearing a pilot's suit with learning involving equipment for daily life.
Technology	➢ Star system and world. ➢ Colors on the stars.	➢ Placing into order the stars in the solar system as a pair matching game. ➢ Placing into order the numbers to connect between the colors of the stars and colors of the numbers.
Engineering	➢ Space shuttle and space. ➢ Travelling into space by human beings.	➢ Placing into order the sizes of the rockets and space shuttles as jigsaws in pictures. ➢ Using the role as an astronaut to travel to the stars.
Mathematics	➢ Number counting and number grouping.	➢ Playing in groups and adding numbers with English and Chinese fonts.
Art	➢ Drawing to support imagination.	➢ Drawing with imagination as stories in various situations.

The playing patterns could be classified into seven subjects that could be used for promoting the well-being of the brain. These were as follows:

- Stimulated the children aged between five to seven years with a playing activity method to support them by using the bodily senses (multisensory method).
- Stimulated the bodily movement and thought movement inside the brain, including arousing the left and the right brain as the brain cell stimulation of the hippocampus and frontal lobe. This was a high and basic thinking procedure for growth with good potential that was used as a brain exercise.
- Stimulated non-movement playing with quickness by focusing on the slow movements with high accuracy as the stimulation of the neurotrophins to be a natural neural growth factor for developing the brain growth in children.
- Stimulated playing as integration of the brain working with the bodily movement as a whole system combined with thoughts, movements, emotions, and the environments to continuously secrete the neurotransmitters. Then, this would affect the practicing of the body for controlling the neurotransmitter to have effectiveness in the future when the children have grown.

Finally, the guidelines of the creative design were used for the inventive playing activities with the active learning pattern. Then, this could stimulate the children to do the activities with their parents and in the surrounding environments by applying the intellectual learning of long-term memory as creative guidelines by using the technique of SCAMPER (Table 2) (Eberle, 1996).

Table 2.

Creative design procedure for children's toys with the SCAMPER technique.

Creative Process	Designing Procedure for the New Toy Category
1) Data Processing 	Brought the concept and inspiration to be used for creating the design with four main words as the creative works: "*CCBS*" or Childlike (cute as a child), Cheerful (cheerfulness), Brain fitness (good brain) and Sustainable (sustainability). These key words of the designed concept were applied with the creative procedure as the concept of STEM (English & King, 2015).
2) Concept 	Created the stimulation to gain interest with the funniness of the children for promoting the brain and the body's development as the concept of STEM, including the intellectual development of Mathematics, Technology, Engineering, and Science with humanity and society in arts for using the children's imagination by brainstorming to search for the guidelines to solve the problems with data analysis (Ting-Ting & Yu-Tzu, 2021).
3) Idea Development 	Brought the SCAMPER technique as the toy designing step (Omorog, 2020) for classifying the ideas prior to considering the seven components; adapted the integration similar to the old styles by modifying some parts, including improving, extending, and cutting the opposite sides or altering the method with the working procedures and bringing the result to effectively make the toy product guidelines with the promotional development of the children.
4) Applying the Principle with the SCAMPER Technique 	Used the development of the draft idea by selecting three toy product patterns for children as the concept of STEM through brainstorming and considering the relationship of the design by taking the result of the assessment in the selection with the designed principle from bringing the two patterns for the model product development in the final level before testing with the children group and the parents who were interested in the promotional development of the children as the concept of STEM+A (Art) (Davidesco, 2020; Smith et al. 2013).

Playing Activities with the Concept of STEM + A(Art)	First Toy Pattern	Second Toy Pattern
		

Table 3.

Selection of the Procedure of the Toy Product Patterns Prior to Testing

Playing Activities with the Concept of STEM + A(Art)	First Toy Pattern		Second Toy Pattern		Comparison	
	Mean	S.D.	Mean	S.D.	t	Sig.
1. Science	3.75	0.58	3.81	0.66	-0.286	.388
2. Technology	4.31	0.60	4.75	0.45	-2.333*	.013
3. Engineering	4.44	0.51	4.38	0.50	0.349	.365
4. Mathematics	4.13	0.72	4.25	0.58	-0.542	.296
5. Art	3.88	0.81	4.06	0.85	-0.639	.264
6. Children's Body	4.00	0.63	4.50	0.52	-2.449*	.010
7. Holistic Thinking Skill	3.75	0.45	4.31	0.60	-3.000*	.003
8. Social Skill	3.50	0.82	4.13	0.62	-2.440*	.010
Total	**3.97**	**0.70**	**4.27**	**0.65**	**-3.618***	**.000**

The result of the assessment conformed to the concept of STEM + A (Art). Moreover, it was found that both the first and second toy product patterns had consistency at an excellent level ($\bar{X}$=3.97; S.D. =0.70) ($\bar{X}$=4.27; S.D. =0.65), respectively. However, the second toy pattern had consistency with the concept of STEM + A (Art) at a higher level than the first pattern that had a level of significance of .05 prior to producing the second toy pattern as the model for testing (Figures 3-4).

Figure 3.

Toy product model for children as the concept of STEM.

Figure 4.

Additional Skill Playing Activities for Children as the Concept of STEM

After applying the testing procedure for the children's toys with the concept of STEM +A (Art), this developed suitable environments for the learning and feeling stimulation to gain the funniness and happiness of the children (Table 6).

Table 6.

Coefficient of the Decision (R^2) for the Components as the Concept of STEM Affecting the Satisfaction of Newly Designed Toys by Using the Assessment from the Real Testing of the Group Sampling

	n=36			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
Testing	0.852	0.727	0.692	0.311

Table 6 represents the factor testing that found the coefficient of the decision or known as the factor testing (R^2), which had the value of 0.852 and affected the satisfaction of the group sampling. This testing could explain about the changing of the level of satisfaction of 72.73% or r^2=0.7273 by bringing the components as the concept of STEM that affected the satisfaction of the new toy patterns to be determined with the regression equation as $\hat{Y}$ = 0.234 + [0.741 $X1$] + [0.106 $X2$] + [0.049 $X3$] + [0.071 $X4$].

Table 7.

Relationship Analysis between the Newly Designed STEM Components with the Satisfaction

Testing	**SS**	**df**	**MS**	**F**	**Sig.**
Regression Equation	8.001	4	2.000	20.672	0.000
Deviation	2.999	31	0.097		
Total	11.000	35			

As shown in Table 7, the analysis depended on the predictors, which were 1.Science, 2.Technology, 3.Engineering, and 4.Mathematics.

This had the dependent variable; such as, the satisfaction of the toy's application for children as the newly designed concept of STEM. Thus, according to the analysis result, this represented the F-test = 20.672 > F-table = 2.690, and it was found that at least one independent variable or X had a relationship with the dependent variable or Y.

Table 8.

The Coefficient of the Multiple Linear Regression with the Prediction Variables for the New Pattern of Children's Playing Activities Satisfaction Affecting the Component of STEM

Prediction Variable	***b***	***S.E.b***	***B***	***T***	***P***
Constant	0.234	0.790		0.297	0.769
X1) Science	0.741	0.091	0.802	8.143	0.000
X2) Technology	0.106	0.120	0.091	0.886	0.382
X3) Engineering	0.049	0.111	0.044	0.438	0.664
X4) Mathematics	0.071	0.071	0.099	0.997	0.327

As seen in Table 8, the coefficient of the multiple linear regressions for the prediction variable with the satisfaction of the children and parents affected the newly designed toys developed from the concept of STEM. In addition, it was found that variable 1 or science had a relationship with the satisfaction of the toy as the concept of STEM as well as variable 2 or technology, variable 3 or engineering, and variable 4 or mathematics that had no relationship with the satisfaction of the toys as the newly designed concept of STEM.

Variable 1 represented science with multiple linear regression and was found to be equal to 0.741. Furthermore, if increased importance was given to the learning of science by one unit, this would represent the children's and parents' satisfaction and would affect the newly designed toys to gain an increased chance with 0.741 units.

Variable 2 represented technology with multiple linear regression and was found to be equal to 0.106. Additionally, if increased importance was given to the learning of technology by one unit, this would represent the children's and parents' satisfaction and would affect the newly designed toys to gain an increased opportunity with 0.106 units.

Variable 3 represented engineering with multiple linear regressions and was found to be equal to 0.049. Likewise, if increased importance was given to the learning of engineering by one unit, this would represent the children's and parents' satisfaction and would affect the newly designed toys to gain an increased opportunity with 0.049 units.

Variable 4 represented mathematics with multiple linear regression and was found to be equal to 0.071. Moreover, if increased importance was given to the learning of mathematics by one unit, this would represent the

children's and parents' satisfaction and would affect the newly designed toys to gain an increased opportunity with 0.071 units.

Thus, it could be concluded that the prediction equation of the toy product design had the concept of STEM as follows:

➢ According to the regression equation as a standard score pattern, this represented $Z = .802\ Z_1 + .091Z_1 + .044Z_3 + .099Z_4$.

➢ According to the regression equation as raw scores, this represented $\hat{Y} = .234 + .741X_1 + .106X_1 + .049X_3 + .090X_4$.

From the results of the satisfaction of the toys for the concept of STEM, the assessment was taken from the expression behavior of the children's playing activities and was based on the parents' satisfied behavior according to the newly designed playing activities (Table 9).

Table 9.

Satisfaction of the Children and Parents Affected by Playing Under the Newly Designed Concept of STEM.

Component of STEM to be Designed	Mean	S.D.	Satisfaction Level
Satisfaction of the Playing Activities	4.500	.561	Very Good
Satisfaction of the Science Knowledge	4.444	.607	Good
Satisfaction of the Technology Knowledge	4.667	.478	Very Good
Satisfaction of the Engineering Knowledge	4.167	.507	Good
Satisfaction of the Mathematics Knowledge	3.889	.785	Good
Total	4.333	.652	Good

According to the parents who noticed the children's playing activities as the newly designed concept of STEM, it was found that the overall satisfaction result was at the Good level ($\bar{X}$=4.333; S.D. =0.652). As such, this could represent the requirements of the parents and children groups for bringing the children into the knowledgeable world with the funniness of science, technology, engineering, and mathematics by integrating new playing patterns in a suitable way. This was also promoted with arts knowledge or appropriate playing activities without much quickness for stimulating the children's brain by secreting the neurotransmitters on the alpha brain waves. Furthermore, this stage was ready for the children to gain their knowledge as a super learning circle for stimulating relaxation plus funniness, happiness and eagerness to study and other related factors, which could fulfill the values for playing as newly developed toys that would be suitable for the requirements of the parents and the children.

The first rank showed the satisfaction of the technology knowledge of the parents and the children at the most level of satisfaction ($\bar{X}$=4.667; S.D. =0.478). This represented the aspects of most parents to give importance to additional skills as technology knowledge for children as the most important part, including the knowledge contribution that conformed with the trends of the current changing world and the future world where technology would give good advantages with human lifestyles at a high level.

The second rank demonstrated the satisfaction of the playing activities for the parents and the children at the most level of satisfaction ($\bar{X}$=4.500; S.D. =0.561). This represented the requirements of the parent groups for the children to play learning activities integrated with studying and playing.

The third rank displayed the satisfaction of the science knowledge of the parents and the children at an excellent level of satisfaction ($\bar{X}$=4.444; S.D. =0.607). This represented the importance that the parents needed to increase the satisfaction result of new developments by aiming at the importance of science in people's daily life as close stories for small children and future generations. Therefore, they should gain the science skill as basic knowledge to apply in their life in the future in a suitable way.

The fourth rank showed the satisfaction of engineering knowledge of the parents and children at an excellent level of satisfaction ($\bar{X}$=4.167; S.D. =0.507). This represented the result that the parents had gained more specific knowledge requirements in learning about engineering to stimulate the children to have more opportunities to create innovations for the future progress of human civilization.

The fifth rank displayed the satisfaction of mathematics knowledge of the parents and children at an excellent level of satisfaction ($\bar{X}$=3.889; S.D. =0.785). This represented the result for creating the basic calculation for the children to conduct activities with toys as the concept of STEM, but now, it still appeared as the result of the

increase in the mathematics skill without the connection of involving skills affecting the reduced satisfaction level as the newly designed concept of STEM.

From the results of the relationships between the satisfaction values of the new toys and the suitability values from science, technology, engineering and mathematics, it was found that there was harmony in a positive direction for children by finding suitable knowledge in the four fields through increasing ways. Thus, this resulted in the satisfaction of the children and the parents to the newly designed toys to be at an increased level with the $\bar{X}$=4.333; S.D. =0.652. In this case, this conformed with the research objective of the testing requirement of bringing the learning concept of STEM to be applied with the children's playing activities (Colliver & Veraksa, 2019). Moreover, this conformed with the concept of the Froebel Model that stated that the best form of learning for children was to play by expressing themselves with freedom until gaining positive experiences from the playing activity with their suitable development in each age level (Smedley & Hoskins, 2020). In the same way, it should have the integration from these two concepts for designing the toys to increase the playing requirements of the children and allowing them to express themselves with their bodies in various activities to learn new things: 1. Technology, 2. Playing activity styles, 3. Science, 4. Engineering, and 5. Mathematics.

Significantly, according to the testing to apply the newly designed toys, it was found that this could confirm the result of the concept of STEM with the learning theory of the kindergarten students from the Froebel Model. Therefore, provided that this could be integrated from these two concepts of the designing of the toys for children according to their ages, this would stimulate the children to participate in the learning activities regularly and in harmony with the development of the children's age (De Souza et al. 2020).

Conclusion and Recommendations

The research goals were relevant with the creative requirements of a new playing pattern to build up knowledge of science, technology, engineering, mathematics, and art. Therefore, this enabled building up the intelligence of children aged between five to seven years by gaining playing activities, and newly designed developed toys that always resulted from the stimulating requirements of children to feel "Wow, I did it!". Furthermore, this was considered as a form of integration of knowledge in the pattern of STEM that had a high level of effectiveness, (Keung & Fung, 2020) as well as made the new toys to ideally conform to be a concept that could focus on knowledge contribution with funniness and safety to be product designs for children (Nuri & Kursat, 2020).

In this case, when the children saw the new developed toys as the concept of STEM, they were often more interested in the playing pattern with the playing requirements in the activity areas. Furthermore, this was under the characteristic of modeling the situations with imagination building for children to play easily by conceiving the knowledge from the shape of the characteristics, and they could understand about the playing methods by using their own past experiences to be the expected thoughts for playing with new toy patterns (Richards et al. 2020). After that, when the children had tried to play with the toys, it was found that more than 90% of them could tell stories from their own imagination through the playing roles. This also included the satisfaction between the children and the parents to the designed toys as the concept of STEM that had an excellent level and was noticed from the playing behavior from the parents expressing knowledge to the children during the playing activities:

a) This presented that the children had bodily interaction at an increased level by using various parts of the body; such as, hands, arms, body, and legs while they were playing. Then, during this time, it enabled them to integrate between the learning and the playing based on the toys to stimulate the children to express themselves with positive behavior through the touching of their own bodies (Ledford et al. 2020).

b) This presented that the children had science knowledge from learning about the arrangement of the planets in the solar system, so they could tell about the shape attributions with colors, and the arrangement of each planet in the solar system, including memorizing about the planet's knowledge by using the knowledge modeling; they imagined they were astronauts flying in space and could see the stars in the universe that could increase their memorizing to be easier than the normal way (Zhang, et al. 2020).

c) The children had mathematics knowledge from the integrated learning of counting numbers by using the arrangement method of the stars in the universe; this used Arabic numbers to be integrated with the playing method in the characteristic of building the rocket base with the stimulation to increasingly interest the children, and this could be considered as a problem-solving method of basic calculation that could be applied suitably with the children's knowledge (Lin et al. 2020).

d) The children had engineering knowledge from learning about the components of the space shuttle and the solar system to use as stories and become the skills conforming with the world in the 21st century. The solar system and universe were much closer to them more than in the past, so they could memorize the information and answer questions about the universe or the world for conceiving the real knowledge in a concrete way (Moreno, 2016).

Therefore, from the invention of the newly designed toys as the concept of STEM at this time for children aged between five to seven years, it presented that they could join in the playing activities with funniness, and the parents could notice this from the children's playing in stimulated activities that allowed them to express ideas and interact using their body (Li & Schoenfeld, 2019). In this case, according to the result of the assessment from the children groups and the parents, it showed that the satisfaction was at an excellent level with the satisfaction from the most level to the least level being the technology knowledge, the funniness from the playing activity, the science knowledge, the engineering knowledge, and the mathematics knowledge, respectively. Thus, according to all five fields from the playing activity of children, it showed that the result of the playing as a concept of STEM from the new design could be the learning goals of STEM. In addition, this focused on the integration skills that could be applied in the daily life of children conforming with the current age and the future.

As a result, this should emphasize the development skills and thought creation from the real experiences of children by learning with their own senses until enabling them to stimulate this as memorizing knowledge at a sustainable level with high effectiveness; however, according to the research of the playing design as the concept of STEM at this time, it could be considered as a form of positive harmony with the learning goals as the concept of STEM at an excellent level (Takeuchi et al. 2020).

The world in the 21st century has changed to be the era of globalization (Postelnicu et al. 2015). However, now the situation has reversed to be one of severity because of the COVID-19 pandemic resulting in a downward trend of deglobalization. Therefore, this situation has affected the world's sustainability in the same way (Karunaratne, 2012). As such, humans in the new age must adapt themselves to give importance to the intellectual level by developing their potential to live in the future safely. This should also include not taking for granted the development of the thought system by applying the system of connected thinking, applied thinking and creative thinking (Khan & Riskin, 2001). Then, these thought systems would be based on flexible thinking skills to aid the new human age to live suitably in the future. Thus, the development of the intellectual level is called knowledge contribution in various ways (Li et al. 2020), and this involves technology, science, engineering, and mathematics as the concept of STEM to be the appropriate 21st century learning concept pattern that can be integrated with the learning guidelines for creating a sustainable intellectual level for children because they are considered as a significant human resource of the future (Bureekhampun & Mungmee, 2020).

Furthermore, the concept has been combined with the toys for gaining as knowledge from multiple sciences. Thus, this can contribute to the variety of knowledge by stimulating children to gain more flexible thinking skills, as well as developing them to gain knowledge that could be applied in their daily life in a suitable way. Therefore, playing by the new age children would stimulate gaining knowledgeable playing activities that would benefit people's future daily life.

Similarly, the designing of the toys would develop the imagination as per the concept of STEM by bringing the active learning pattern to be integrated with the toys' creation as part of the development of the children's stimulation. This could bring this subject to be utilized for creating toy product models by promoting the children's development as per the concept of STEM with two differentiating patterns for the children's playing activities. Therefore, this conformed with the conclusion that this must use active learning to be integrated with the successful result in a suitable way, and it would be essential to gain the learning attributes as a small group or lesser numbers of people to gain a better result (Freeman et al. 2014). From the result of the designing procedure as per the concept of STEM, this used pictures to develop the children's knowledge of mathematics, engineering, technology, and science that affected the second pattern of the toy products to have an excellent level of satisfaction for the teacher and carer groups. Hence, this conformed with the concept that these pictures could represent the language of communication to gain knowledge or the intellectual level with effectiveness (Rau, 2017).

Consequently, this would be capable of stimulating the children to gain creative ideas (Henriksen, 2014), and after bringing the model from the second concept to test for creating the children's playing activities, this represented that the children and parent groups had a level of satisfaction of the development of the stimulation and knowledge at an excellent level. Thus, this conformed with the concept of learning with the building of knowledge integrated with behavior stimulation while playing, as being the review and stimulation of an effective memory

(Chen et al. 2019; Vasquez & Comer, 2013). As a result, the result of the knowledge assessment occurred from the new design of the toys as per the concept of STEM and conformed with the satisfaction by ordering from the most to the least level as technology, playing activities, science, engineering, mathematics, and others, respectively (Özcan & Gülözer, 2020; Wullur & Werang, 2020).

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Research Article

Examining the stress, depressive thoughts, and working memory capacities of the university students

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Abstract

The objective of the study is to measure the capacity of the working memory, and also to investigate its relationship to life stress and depressive thoughts. The study sample consisted of 50 college students studied on Science and Art major. A cognitive task was designed to measure the working memory capacity based on the determinants found in previous research. The results indicated that there were statistically significant differences in the level of life stress events (high/low) on the task of measuring the working memory capacity. The results also showed that there were no statistically significant differences neither between genders nor between majors on the task of measuring the working memory capacity. Furthermore, the results reported that there was no statistically significant effect of the interaction of the level of life stress (high/low) and gender (male/female) on the task of measuring working memory capacity. Finally, the results reported that there were significant differences in the level of depressive thoughts (high/low) on the task of measuring working memory. The current research concludes that neither the interaction of stressful life events, gender, and academic major, nor the interaction of depressive thoughts, gender, and academic major have an effect on working memory capacity.

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Introduction

Working memory is one of those processes indicating how to preserve and process information that is essential for understanding different aspects of human cognitions. Miller (1956) claimed that working memory is targeted by an integer in a well-known paper humorously defining "the mysterious number seven plus or minus two." He showed that a sequence of no more than about seven arbitrarily arranged significant objects or bits (which could be letters, digits, or words) can be replicated again. However, other work has produced varying findings. Young adults can only recall three or four longer verbal chunks, such as idioms or short sentences (Martinez & O'Rourke, 2020; Vijay, Himanshu, 2017; Thalmann, Souza & Oberauer, 2019). Some have shrugged their shoulders, concluding that the "just depend" limit is based on the details of the memory task, but new work demonstrates where and how the cap can be expected.

Working memory is an essential element in understanding a task or cognitive activity; it is this virtual cognitive system that is responsible for entering the information required to continue in the activity, and is often what constitutes the limiting factor in the performance of this task. Despite its limited capacity, it is the system mainly responsible for attention distribution, planning, strategic choices, and thinking.

Theoretical Background

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On examining the literature, prior studies have tried to visualize this relationship by examining the effect of emotional substances on the working memory capacity. In the field of studying pressures or external stressful events, Goller, Banks and Meier (2020) described that working memory ability was found to be negatively associated with perceived negative life event stress and hypothesized that the relationship can be driven by ideas created from those experiences. Several studies such as Abo Hamza et al. (2020), Metz et al. (2018), and Goller et al. (2020) mentioned that the relationship between life difficulties/problems and working memory processes concluded that authoritarian ideas resulting from life problems are reflected in the efficiency of working memory processors ,whereas the results of a study by Legaa, Gidlowa, Jones, Ellisa, and Hurst, (2021) on stressors and the elements of working memory showed that an average level of stress is related to the improvement of processing elements on working memory tasks.

Gotlib, Jopling, Gotlib and LeMoult (2020) have discussed the association between psychological stress and working memory, and the results showed that stress affects the treatment of a task and the accuracy of the performance of its components. However, Lukasik, Waris, Soveri, Lehtonen, and Laine (2019) acknowledged that working memory is negatively associated with anxiety , but the same association does not exist with stress.

On the other hand, Violaa et al. (2019), and Xu, Guan, Li, Zhang & Xu (2020) realize that early life stress is linked with altered neuroimmune signaling trajectories that have cognitive development implications and negatively affect working memory. Results showed that the pressure caused a severe impact, through neurological mechanisms, on performance of the tasks of working memory. The results of the study by Banks (2011) and Abo Hamza, et al. (2020) indicated that mental questions (authoritarian ideas) constitute an intermediate variable in the relationship between stress and dysfunction on the tasks of working memory, and Metz, etal. (2018); Lukasik et al. (2019); and Legaa et al. (2021) supported the same conclusion regarding post-traumatic stressors on elements stored in working memory. Legaa et al. (2021) found that there is a weak ability to update the emotional information in working memory for a range of high pressures. Finally, Edwards et al. (2015), Petkus et al. (2017), Lukasik et al. (2019), Li et al. (2018), and Beloe & Derakshan (2019) relate that there was an effect of anxiety, depression and dysphoria on the efficiency of working memory processing and the absence of an effect of situation pressures on the processing capacity.

According to WHO (2017) , in 2015, over 300 million individuals worldwide(up to 4.4% of the world's population) suffered from major depressive disorder, a leading worldwide illness (Radell, Abo Hamza & Moustafa, 2020). Therefore, mechanisms that lead to the persistence of depressive disorders are crucially important to recognize. Jopling et al. (2020), and Gärtner et al. (2018) studied the effect of clinical depression on working memory and concluded that depression affects the distribution of sources of attention associated with the central outlet and patients with depression need to spend more efforts comparing with healthy groups.

Studies by Manelis et al. (2020), Gray et al. (2021) and Zhang et al. (2018), investigating the effect of emotional substance, such as depression, on updating the content of working memory found that there is an effect of depression on the content of working memory with the influence of authoritarian ideas. Moreover, in a study by Yoon, Le Moult and Joormann (2014) on the defective updating of the working memory content related to depression, the results concluded that depressed patients have difficulty in removing information that is not related to the task from the content of the memory. The studies by Hubbard et al. (2015) and Jopling et al. (2020) on depressive thinking and limited working memory capacity express an association between high depressive thinking and the speed of information processing in working memory. The same studies state that there is a strong influence of depressive thinking on working memory and that ruminants of depression constitute an intermediate variable in the relationship between depressive thinking and performance on the tasks of working memory.

Lukasik et al. (2019) indicated that working memory is a limited capacity system and is responsible for the active retention and processing of information necessary to carry out complex, cognitive tasks and functions such as thinking, learning, understanding, and problem solving. Li et al. (2018) and Legaa et al. (2021) indicated that working memory is a system of limited capacity reflecting the temporary activation of perceptions that constitute the content of consciousness. Furthermore, all of the definitions of working memory have agreed that it is a component of the utmost importance compared to the rest of the other elements of the cognitive system. Lukasik et al. (2019) emphasized that the dysfunction of working memory affects an individual's ability to understand, code, and retrieve information, perform complex cognitive tasks, and speak logically, and many studies have agreed that working memory is a central mechanism in conducting basic cognitive activities, including planning - life is difficult without all of these abilities.

van Abswoude, Buszard, van der Kamp & Steenbergen (2020), Thalmann et al. (2019), and Cansino et al. (2018) pointed to factors that can lead to an increase in the working memory capacity and the presence of differences in capacity between individuals, as some of these factors were classified into strategic factors, such as repeated training and the number of chunks, and non-strategic factors, such as the processing speed and perseverance in the face of the confusing elements.

The Current Study and Research Hypotheses

The current study is an attempt to examine the effect of some external stimuli (stressful life events) and internal stimuli (depressive thoughts) on the capacity of the working memory system. This study is focused on the capacity of working memory in storage and processing which should be studied in the clinical context. The cognitive tasks such as thinking, being attentive, and gaining academic achievement are only completed through the ability of the working memory. Therefore, working memory is deemed to be the main component of intelligent behavior. Consequently, understanding the way this system works is worth studying. The implications for understanding the process of human cognitions support positive changes for healthy psychological development. The scientific understanding of the interaction of clinical and cognitive variables can be used on the development of psychotherapy programs for clinical variables. Studying working memory is a necessary element for self-organization related to decision-making and behavior towards goals. There is an apparent scarcity of Arabic studies, dealing with the variables of the current study. The study pointed out that time is not a sufficient factor to influence the work of working memory. Based on the previous theoretical foundation, research suggests the following study hypotheses.

H1: There are significant differences supported by statistical evidence between the average scores of the high and low stressful life event groups on the process of measuring the working memory capacity.

H2: There are significant differences supported by statistical evidence between the average scores of males and females on the process of measuring the working memory capacity.

H3: There are significant differences supported by statistical evidence between the average scores of the arts major group and the science major group (in Egypt's high school system) on the process of measuring the working memory capacity.

H4: There is a statistically proven effect on the interaction between the level of pressure in life (high/low) and gender (male/female) on the process of measuring the working memory capacity.

H5: There is a statistically proven effect on the interaction between the level of stressful life events (high/low) and the study group major (science/arts) on the process of measuring the working memory capacity.

H6: There is a statistically proven effect on the interaction between gender (male/female) and the study group major (science/arts) on the process of measuring the working memory capacity.

H7: There is a statistically proven effect on the interaction between the level of stressful life events (high/low) and gender (male/female) and the study group major (science/arts) on the process of measuring the working memory capacity.

H8: There are significant differences between the average scores of participants having depression and negative thoughts (high/low) on the process of measuring the working memory capacity.

H9: There is a statistically proven effect on the interaction between the level of depressive thinking (high/low) and gender (male/female) on the process of measuring the working memory capacity.

H10: There is a statistically proven effect on the interaction between the level of depressive thinking (high/low) and the study group major (science/arts) on the process of measuring the working memory capacity.

H11: There is a statistically proven effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type (science/arts) on the process of measuring the working memory capacity.

Method

Participants

The study sample consisted of 50 participants from College of Education students – Tanta University in Egypt – from all four academic standings (freshmen, sophomores, juniors, and seniors) from the arts and sciences majors in the second semester of the year 2018/2019.

Table 1.

Descriptive Statistics of Sample

Major /Gender	Sciences	Arts	Total
Male	13	12	25
Female	13	12	25
Total	26	24	50

Data Collection Tools and Procedures

The study used the following assessments and procedures:

The Process of Measuring the Working Memory

A cognitive task was designed and prepared to measure the capacity of the working memory based on the variables found in previous studies, which stated that cognitive tasks are the best measures to determine the functions and capacity of the working memory. The purpose for measuring the capacity here was to determine the maximum number of elements that can be remembered and recalled in the working memory and that was done by measuring the main functions of the working memory, i.e. stopping, diversion, and updating, which are the functions of the central executive. Task description;

The task consisted of two experimental conditions, which were:

- Recalling of numbers
- Processing of letters

A facial emotional stimulus was introduced along with the two experimental conditions.

The First Experimental Condition

This condition was concerned with recalling numbers, and consisted of number chains varying from the simple to the more complicated, starting from two numbers all the way up to ten numbers. Every number chain was presented in a blank cell, as follows:

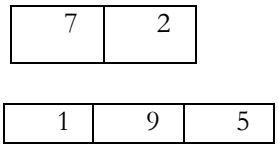

Figure 1.

Experiment Card

The card was presented to the person for a time interval that increased in line with the amount of numbers presented on the card, so the card that contained two numbers was displayed for two seconds with the time increasing by one second for each number added to the sequence, until the final card was reached, which was displayed for 10 seconds. After displaying each card, a facial emotional stimulus (sad face icon) representing depressed or stressed facial features was displayed for 3 seconds. This emotional stimulus acted as a provoking factor.

After displaying the card with the number sequence and then the photo, the person was asked to recall the number chain previously displayed, and they were allowed a number of seconds equal to the number of numbers displayed on the cards. For example, the card that contained five numbers was allocated a time interval of 5 seconds for recall.

Calculating the Results

The person was given one mark for every correct number they managed to recall.

The Second Experimental Condition

This condition was concerned with processing letters and it consisted of two cards. One card contained three letters, such as (O, G, T), for example, and the other card contained rows of letters, each of which may or may not have included the previously displayed letters. The three letters on the first card were displayed to the person for 3 seconds followed by a picture of a sad face for 3 seconds. The person was then asked to cross out on the second card the letters that were present on the first one, within a time interval of 10 seconds. This second condition aimed to determine the processing speed of the central executive, which consists of stopping, diversion, and updating as follows:

Stopping: one's ability to stop crossing out letters that did not appear on the first card.

Diverting: one's ability to divert attention from the stimulus that has no connection to the task (the letters that did not appear on the first card).

Updating: replacing the letters seen on the first card with the letters on the second card, which acts as a confusing factor. If the person did not complete the task within the 10 second time interval, the test was stopped.

Calculating the results

The examinee was given one mark for every letter that was crossed out. The total score was calculated by adding the result of the first and second test to make up the final result of measuring the working memory

Validity and Reliability of the Task

Validity; the task's validity was calculated by following the method proposed by Al-Zoghbi (2016), who used a calculated cognitive task with almost the same steps to measure functions of the working memory. The correlation among the validation sample (N=50) was r = 0.71, which indicates a high degree of validity.

Reliability; the reliability of the task was calculated in several ways: test-retest for a sample size of 50 with a time interval of two weeks, and by using Cronbach's alpha and Guttmann's assessment methods.

Table 2.

Reliability factors for the process of measuring the capacity of the working memory

Reapplying test	Cronbach's alpha	Guttmann's assessment
0.74	0.722	0.6911

Assessment of Stressful Life Events

The assessment used (Shokair, 2013) consisted of 70 statements that presented possible stressful life events. Participants indicate their level life events stress on a Likert scale of 4 points ranging from 1 ("often", "sometimes", "rarely", or "never", describing the person's feeling regarding that stressful life event. The scoring was carried out ("3", "2", "1", or "0" respectively) and the total possible score of the test was 210. The assessment dimensions, with the associated statements numbers, were as follows:

Family pressure (1, 8, 15, 22, 29, 36, 43, 50, 57, 64)
Economic pressure (2, 9, 16, 23, 30, 37, 44, 51, 58. 65)
Academic pressure (3, 10, 17, 24, 31, 38, 45, 52, 59, 66)
Social pressure (4, 11, 18, 25, 32, 39, 46, 53, 60. 67)
Emotional pressure (5, 12, 19, 26, 33, 40, 47, 54, 61, 68)
Health pressure (6, 13, 20, 27, 34, 41, 48, 55, 62, 69)
Personal pressure (7, 14, 21, 28, 35, 42, 49, 56, 63, 70)

The validity was confirmed through internal consistency by calculating the correlation coefficient between the total score and the score of the sub-dimensions, with the following results: Family pressure 0.63, Economic pressure 0.58, Academic pressure 0.93, Social pressure 0.84, Emotional pressure 0.84, Health pressure 0.71, and Personal pressure 0.66. These were all significant correlation coefficients at the 0.05 level. The reliability of the assessment was also calculated test-retest with a time interval of 21 days on two administrations (r = .72). Therefore, the assessment was reliable enough to be used in the current study.

Validity Assessment

The assessment validity was calculated by calculating the criterion validity of the test using the "Facing daily stressful life events" method (Abdul Salam, 2008), which is an assessment conducted to measure daily stressful life events through various dimensions. The correlation coefficient between individuals' scores was 0.68, indicating high validity.

The assessment validity was revalidated in several ways: including test-retest on the same validating sample (N=50) with a time interval of two weeks, as well as calculating reliability using Cronbach's alpha and Guttmann's assessment methods to each of the assessment's dimensions.

Table 3.

Stress coefficient for stressful life events (n=50)

Test-retest	Cronbach's alpha	Guttmann's assessment
0.76	0.7712	0.71

Depressive Thoughts Assessment

The assessment aimed to measure depressive thoughts or cognitive dimensions of major depressive disorder or what is also known as "rumination of depression." After reviewing the literature regarding depressive thoughts, 18 statements were rephrased and assembled to make up this assessment considering the local culture. Participants indicate their level of depression on Likert scale of 5 points ranging from 1 (never) to 5 (always) and 4 statements (1, 2, 3, 17, 18) have reversed scoring.

Validity

The validity of the assessment was conducted using vocabulary validity, by calculating the correlation coefficient between the score of every item and the total score of the assessment after deleting that item's score from the total mark; the correlation coefficient here indicates the validity of every single item, using the same validating sample (N=50). The results of this test are shown in table (4).

The researcher calculated the validity of the current assessment (face validity of the vocabulary) by finding out the correlated correlation coefficient between the degree of each individual and the total score of the scale after deleting the individual score from the total.

Table 4.

Correlation between Items

Depressive thoughts assessment			
Item number	**Correlation coefficient**	**Item number**	**Correlation coefficient**
1	0.6307	10	0.4511
2	0.4213	11	0.6125
3	0.3001	12	0.5112
4	0.2801	13	0.7242
5	0.3115	14	0.3180
6	0.4117	15	0.2917
7	0.718	16	0.6512
8	0.5316	17	0.7401
9	0.7531	18	0.6315

Reliability

Assessment reliability was calculated in the following ways: test-retest with time interval of two weeks, and also calculating the reliability coefficient using the Cronbach's alpha and Guttmann methods. After validating the psychometric properties of the study assessments, these assessments were applied on the main study sample. Then statistical analysis was carried out, based on the hypotheses of the current study.

Table 5.

Realibility Test Results of Depressive Toughts Test

Reapplying test	**Cronbach's alpha**	**Guttmann's assessment**
0.82	0.6819	0.7415

Results

To test the study hypotheses, a three-dimensional variance analysis was performed. Tables (6) and (7) show the results of the variance analysis of the stressful life events (high/low), gender (male/female), type of specialized study (science/arts), and level of depressive thoughts (high/low) on the individual's scores on the process of measuring the capacity of the working memory.

Table 6.

Descriptive Statistics of Students' Stress Level

Variable	**Sum of squares**	**Degrees of freedom**	**Average of squares**	**F-test**
Stressful life events (high/low)	931.548	1	931.548	21.602*
Gender (male/female)	34.806	1	34.806	0.807
Major category (science/arts)	6.197	1	6.197	0.144
Stressful life events × gender	18.171	1	18.171	0.421

Stressful life events × major category	0.727	1	0.727	0.017
Major category x gender	73.267	1	73.267	1.699
Stressful life events × gender × major category	103.968	1	103.968	2.411
Error	1811.208	42	43.124	-

*Function

There are no significant differences between the average scores of the science and arts groups on the process of measuring the capacity of the working memory. There is no significant difference of the interaction between stressful life events (high/low) and gender (male/female) on the process of measuring the capacity of the working memory. There is no significant difference on the interaction between stressful life events (high/low) and major category (science/arts) on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between gender (male/female) and major category (science/arts) on the process of measuring the capacity of the working memory. There is no significant difference on the interaction between the stressful life events (high/low), gender (male/female), and the major category (science/arts) on the process of measuring the capacity of the working memory.

Table 7.

Three-Way Variance Analysis of the Level of Depressive Thoughts, Gender, and Major Category on the Individual's Scores on the Process of Assessing the Capacity of the Working Memory

Variable	Sum of squares	Degrees of freedom	Average of squares	F-test
Depressive thoughts level (high/low)	103.345	1	103.345	25.548*
Gender (male/female)	43.168	1	43.168	0.841
Major category (science/arts)	5.088	1	5.088	0.125
Depressive thoughts × gender	12.072	1	12.072	0.297
Depressive thoughts × major category	2.554	1	2.554	0.063
Major category x gender	9.540	1	9.540	0.235
Depressive thoughts × gender × major category	78.258	1	78.258	1.927
Error	1705.342	42	40.603	-

*Function

There are no significant differences between the average scores of males and females on the process of measuring the capacity of the working memory.

There are no significant differences between the average scores of the science and arts groups on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between the level of depressive thoughts (high/low) and gender (male/female) on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between the level of depressive thoughts (high/low) and the major category (science/arts) on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between gender (male/female) and the major category (science/arts) on the process of measuring the capacity of the working memory. There is no significant difference on the interaction between the level of depressive thoughts (high/low), gender (male/female), and major category (science/arts).

H_1: There are significant differences between the average scores of the high and low stressful life event groups on the process of measuring the capacity of working memory.

Table 8.

Descriptive Statistics of the High and Low Stressful Life Event Groups on the Process of Measuring the Capacity of Working Memory

Group	n	Average	Standard deviation
High stressful life events	25	18.400	8.602
Low stressful life events	25	9.840	3.619

Table 8 illustrates the significant differences of the level of stressful life events (high/low) on the process of measuring the capacity of the working memory thereby making the hypothesis acceptable.

H_2: There are significant differences between the average scores of males and females on the process of measuring the capacity of the working memory.

Table 9.

Descriptive Analysis of the Scores of Males and Females on the Process of Measuring the Capacity of the Working Memory

Groups	n	Average	Standard deviation
Males	25	14.00	8.109
Females	25	14.24	7.463

Table 9 shows that there are no significant differences between the average scores of males and females on the process of measuring the capacity of the working memory. Thus, this hypothesis is rejected.

H_3: There are statistically significant differences between the average scores of the science major group and the arts major group on the task of measuring the capacity of the working memory.

Table 10

Descriptive analysis of the scores of the scientific and arts groups on the process of measuring the working memory

Groups	n	Average	Standard deviation
Science	26	12.808	7.93
Arts	24	15.542	7.38

It is clear from table (10) that there are no statistically significant differences between the scores of the science and arts group. Therefore, this hypothesis is rejected.

H_4: There is a statistically significant effect of the interaction between the level of pressure in life (high/low) and gender (male/female) on the task of measuring capacity of the working memory.

Table 11.

Descriptive statistics of the interaction between the level of stressful life events (high/low) and gender (male/female) on the task of measuring the working memory capacity

	High stressful life events		Low stressful life events	
Gender	**Males n=14**	**Females n=11**	**Males n=11**	**Females n=4**
Average	10.00	9.637	19.909	17.857
Standard deviation	3.496	2.582	9.670	7.999

Table 11 indicates that there is no statistically significant effect of the interaction of the level of stressful life events (high/low) and gender (male/female) on the task of measuring the working memory capacity. As a result, this hypothesis is rejected.

H_5: There is a statistically significant effect of the interaction between the level of stressful life events (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity.

Table 12.

Descriptive Statistics Of The Interaction Between The Level Of Stressful Life Events And Study Group Major On The Task Of Measuring The Working Memory Capacity

	High stressful life events		Low stressful life events	
Major	Science n=17	Arts n=8	Science n=9	Arts n=16
Average	10.000	9.500	18.111	18.562
Standard deviation	3.602	3.207	11.374	7.023

According to table (12) there is no statistically significant effect of the interaction of the level of stressful life events (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity. Accordingly, this hypothesis is rejected.

H_6: There is a statistically significant effect of the interaction between gender (male/female) and the study group major (science/arts) on the task of measuring the working memory capacity.

Table 13.

Descriptive Statistics for Male And Female Scores in Science and Arts on the Task of Assessing the Working Memory Capacity

		Males	Females
Science n=26	Mean	13.231 (n=13)	12.385 (n=13)
	Deviation	9.355	3.051
Arts n=26	Mean	14.833 (n=12)	16.250 (n=12)
	Deviation	6.820	8.125

As table (13) reported , there is no statistically significant effect of the interaction between gender (male/female) and the study group major (science/arts) on the task of measuring the working memory capacity. Therefore, this hypothesis is rejected.

H_7: There is a statistically significant effect of the interaction between the level of stressful life events (high/low), gender (male/female), and the study group major (science/arts) on the task of measuring working memory capacity.

Table 14.

Descriptive Statistics of Stressful Life Events for Males and Females from the Science and Arts Majors on the Task of Measuring the Working Memory Capacity

		High stressful life events		**Low stressful life events**	
		Males	Females	Males	Females
Science	Mean	10.00 (n=1)	10.00 (n=7)	24.00 (n=3)	15.167 (n=6)
	Deviation	3.496	2.582	15.621	8.841
Arts	Mean	10.00 (n=4)	9.00 (n=4)	17.250 (n=8)	19.863 (n=8)
	Deviation	2.8284	3.9158	7.046	7.220

According to Table 14 there is no statistically significant effect of the interaction between the level of stressful life events (high/low), gender (male/female), and the study group major on the task of measuring the working memory capacity. As a result, this hypothesis is rejected.

H_8: There are statistically significant differences between the average scores of people having depression and negative thoughts (high/low) on the task of measuring working memory capacity. According to Table 7 results, there are statistically significant differences between high and low depressive thoughts on the task of measuring the working memory capacity.

Table 15.

Descriptive statistics for high and low levels of depressive thoughts on the task of measuring the working memory capacity

Group	**N**	**Average**	**Standard deviation**
High depressive thoughts	25	9.440	2.551
Low depressive thoughts	25	18.800	8.327

It is clear from Table (15) that there are differences between the levels of high and low depressive thoughts. Accordingly, this hypothesis has been accepted.

H_9: There is a statistically significant effect of the interaction between the level of depressive thinking (high/low) and gender (male/female) on the task of measuring the working memory capacity. According to table (7) that there is no statistically significant effect of the interaction between the level of depressive thinking (high/low) and gender (male/female) on the task of measuring the working memory capacity.

Table 16.

Descriptive statistics of male and female high and low depressive thoughts on the task of measuring the working memory capacity

	Depressive thoughts level		**Gender**	
	High (n=25)	Low (n=25)	Males (n=25)	Females (n=25)
Average	9.440n	18.800	14.000	14.240
Standard deviation	2.551	8.327	8.109	7.463

Table 16 shows that there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low) and gender (male/female) on the task of measuring working memory capacity. As a consequence, this hypothesis is rejected.

H_{10}: There is a statistically significant effect on the interaction between the level of depressive thinking (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity. Table (7) indicates that there is no statistically significant effect on the interaction between the level of depressive thinking (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity.

Table 17.

Descriptive Statistics of High and Low Depressive Thoughts from the Science and Arts Majors on the Task of Measuring the Capacity of the Working Memory

	Depressive thoughts level		Gender	
	High (n=25)	Low (n=25)	Science (n=26)	Art (n=24)
Average	9.440	18.8000	12.808	15.542
Standard deviation	2.551	8.327	7.930	7.372

Table 17 reflects that there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity. Consequently, this hypothesis is rejected.

H_{11}: There is a statistically significant effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type (science/arts) on the task of measuring the working memory capacity**.**

Table 17 indicates that there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type (science/arts) on the task of measuring the working memory capacity.

Table 18

Descriptive statistics of males and females with high and low depressive thoughts from the scientific and arts specialties

		High depressive thoughts		Low depressive thoughts	
		Males	Females	Males	Females
Science	Mean	9.2222 (n=9)	10.2500 (n=8)	22.2500 (n=4)	15.8000 (n=5)
	Deviation	2.635	2.493	13.226	9.731
Arts	Mean	9.800 (n=5)	7.333 (n=3)	19.818 (n=7)	18.00 (n=9)
	Deviation	2.490	2.517	9.119	7.903

According to Table 18 there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type(science/arts) on the task of measuring the working memory capacity. Consequently, this hypothesis is rejected.

Discussion

It is proposed that the result regarding the first hypothesis is in line with definitions of the working memory in the literature, in that it is a system with limited capacity that presents a workspace for the other elements in the cognitive system to keep the information and process it. This system is made up of several elements, the most important of which is the central executive. It is the element responsible for the many important functions concerned with processing information, including stopping, diverting, and updating, and is responsible for dealing with the cognitive demands of a task. When an external burden is placed on the working memory, such as stressful life events, this burden leads to a dysfunction in the work of the central executive. These results also show that stressful life events require more space to be processed than the space available in the working memory, which has a limited capacity of 7±2 (approximately 5 to 9 chunks of code).

From a biological point of view, it is possible that the available elements fail because the task requires a high degree of extended activation, which places a burden on the working memory. Several studies such as Beloe & Derakshan (2019), Metz et al. (2018), Viola et al. (2019), Lukasik et al. (2019), and Manelis et al. (2020), and Gray et al. (2021) all stated that it would be biologically costly to have a working memory capacity larger than the one already available in which to process burdens, or excessive stimuli, that are not connected to the task. Fenn and Hambrick (2012), and Xie, Berry, Lustig, Deldin, & Zhang (2019) acknowledged that the capacity of the working memory is affected by fatigue or sleep deprivation, which can result from stressful life events; these events represent

a source of threat, which is the main element in anxiety disorders, thus leading to an increased burden on the working memory.

This result agrees with the model of Beloe & Derakshan (2019) where stressful life events lead to increased work of cognitive perceptions, which creates a burden on the limited capacity of the working memory. Also, stressful life events ease the access and entry to the working memory of controlling ideas associated with these events, thus using up the limited resources of the working memory and affecting the sources of attention as one of the cognitive inputs affecting information processing. This result is consistent with the studies of Goller et al. (2020), Xu et al. (2020) and Zhang et al. (2018), who explained that high levels of pressure are connected to a change in the capacity of the working memory, and also with the study of Blasiman and Was (2018) who stated that pressure level instructions are related to fluctuations in the level of capacity of the working memory.

Moreover, the study by Adams, Nguyen and Cowan (2018) showed that the difference in individuals' perception of stress and the difference in their knowledge assessment lead to differences in the level of working memory capacity. Pe et al. (2013) and Zhang et al. (2018) indicate that psychological stress affects performance on working memory tasks, explaining that pressure affects individuals' ability to update information in the working memory. However, this result disagreed with the result of the study by Edwards et al. (2015) who note no any effect of pressure on the capacity of processing information in the working memory.

Regarding the second hypothesis, as shown in these results, the working memory is one of the elements of the human cognitive system, and it is available to all of mankind (ie. males and females). It is the necessary component for performing cognitive processing of information, and the differences that occur in the working memory system may be due to reasons other than the difference in gender, such as the structural defect that occurs in the nervous system underlying the performance of the working memory system, or due to reasons specific to the context, such as cultural and social factors. Therefore, the assumption of differences in the performance of working memory due to gender might be related to the social and cultural context in which males and females are raised. A context having higher life stress events influences the performance of working memory by directly affecting the capacity available for retention and processing. This result is consistent with the results of studies by Adams et al. (2018), Lukasik et al. (2019), and Blasiman and Was (2018).

Results regarding the third hypothesis is attributed to the fact that the science and arts academic content does not affect the performance of the working memory. All academic curricula offered within universities are purely exam oriented, such as providing tools to assist memorization, and working towards the exam itself, which measures retrieval. They are only brief curricula that do not require the student to plan procedures, but rather are aimed at the student's automatically blind processing that retrieves specific information and then retains it as a result of its continuous repetition in the content of working memory (memorization and repetition). This result is also due to the cognitive style of students, who are accustomed from the beginning of the educational system to memorizing, and memorizing only, and the final mark is their ultimate goal. There are no differences in the type of procedure used. The important part is only to retrieve the information and write it in the examination paper. Therefore, the type of major is subject to society's philosophy of education, which is that the exam and the grade are the priority. This result contrasts with the result of a study by Wilding et al. (2007) who express that science students showed more difficulty in the tasks of retrieving words than arts students.

The result for fourth hypothesis can be attributed to the fact that gender (male/female) is an element that does not affect the performance on the tasks of measuring the working memory capacity because it is a basic function that exists in the human species, and that context factors are the biggest influence, but the effect of context factors here is subject to the principle of individual differences. The result is consistent with Unsworth and Robison (2020) regarding this hypothesis and is specific to the study sample in terms of characteristics, conditions of application, and the tools used. It is possible that this result differed in the different samples due to differences in age and characteristics, especially with the previously known impact of stressful events on the working memory capacity, as well as the absence of gender impact on the working memory capacity.

The results for fifth hypothesis can be attributed to the effect of stressful life events on the working memory capacity as a situational component that actually affects the working memory capacity, while at the same time being subject to the principle of individual differences (Unsworth & Robison, 2020) in the study samples, in terms of age and demographic characteristics, and the tools used to measure the variables. As for the effect of the academic major, it is an authentic cultural factor, especially as society has only one philosophy for all academic disciplines,

which is exam grades, and therefore only one side of the working memory is activated, which is memorization and retrieval.

Regarding the sixth hypothesis, this result can be attributed to specific factors related to individual differences. Gender was an ineffective variable because the working memory system is present in all humans with its limited capacity in both males and females. Regarding to the academic major, it is related to the curricula and education system activating just one of the elements of the knowledge system, as they focus on memorization. With regard to seventh hypothesis, this result is attributed to the influence of the level of stressful life events related to the individual differences of the study samples (Unsworth & Robison, 2020). The result of the current study might differ if it was conducted on another sample, with different age and demographic characteristics, but the gender result (male/female) is logical because the working memory system is present in the human species as a whole and the differences that occur between males and females might be due to attitude or context factors, rather than gender. This result is consistent with the results of Cansino et al. (2018), and Beloe & Derakshan (2019) as for the effect of the academic major, it is also a cultural influence in a society whose educational system is concerned with activating only one aspect of the working memory, i.e. related to memorization and retrieval, with the sole aim of exams and grades.

Additionally, the result for eighth hypothesis can be attributed to the depressive thoughts that constitute the cognitive component of depression, leading to a dysfunction in the three functions of the working memory (stopping/diversion/updating) and thus individuals' inability to stop information not related to the task from entering their working memory or individuals' inability to replace old information with new information related to the task, and individual's inability to convert negative variables to other positive or neutral ones. Depressive thoughts affect the vocal circle, which is one of the elements of the working memory, due to the state of fear associated with these ideas, and therefore affect internal verbal activity (self-talk). Lukasik et al. (2019) indicated that the effect of depression on one of the subsystems in the working memory, the "discoverer of happiness", which is a system that organizes the relationship among a complex set of stimuli found in the environment, and helps to evaluate options with positive and negative characteristics in our lives. Therefore, it helps us to accurately visualize the negative and positive stimuli, and reach quick and final conclusions regarding the stimuli in order to make a sound and correct decision. The presence of depressive thoughts leads to difficulty in weighing the conflicting characteristics among the stimuli, and a difficulty in the evaluation resulting from an individual's inability to cope with the semantic elements required for this evaluation. As a result of research of Baddeley (2013); Gärtner et al. (2018), Noreen, Cooke and Ridout (2020), an individual who suffers from depressive thoughts will be considered to suffer from:

- Difficulty in measuring equivalence between negative and positive stimuli.
- Weak ability to distinguish between options already stored.
- Lack of sensitivity in detecting any change in the previous equivalence levels.

Furthermore, hypotheses from nine to eleven have been rejected. The resulting symptoms of depressive thoughts, as discussed above, lead to the depletion of the knowledge sources of working memory and thus constitute a burden on the working memory because the difficulties facing the discoverer of happiness system in assessing environmental stimuli lead to more rumination of depressive ideas, which leads to further burden on the work of cognitive abilities. This result is consistent with the findings of Noreen et al. (2020), Adams et al. (2020), and Zhang et al. (2018) associating depression with defective elements of working memory and confirm that depressed patients have a problem in controlling the working memory content. This result also agrees with the results of Jopling et al. (2020) who show that depression affects the distribution of sources of attention associated with the central executive of working memory, and a study by Yoon et al. (2014) showing that patients with depression have problems removing information unrelated to the task from the content of working memory. Further, the result also agrees with the findings of Hubbard et al. (2015), Gärtner et al. (2018) who state that there is a correlation between a high degree of depression and limited working memory capacity, and with the findings of Hubbard et al. (2016) showing a relationship between ruminants of depression and performance on working memory tasks.

Conclusion

There is an agreement between the studies and models in the theoretical framework, which state the existence of an effect of external emotional stimuli (such as stressful life events) and internal stimuli (such as depressive thoughts)

on the amplitude of working memory, and the results of the current study, which determined the existence of this effect, especially in the first and eighth hypotheses. The maxim of the mutual influence between emotional elements and working memory capacity was not affected by gender. The mutual effect between emotional elements and the working memory capacity was not affected by the difference in the academic majors (science/arts), and the reason was considered to be a cultural factor related to the type of curricula, and the way students activate the working memory.

Finally, the general conclusion is that there is a mutual and strong relationship between our cognitive system, represented here in the working memory, and our emotional system, represented in the variables of stressful life events and depressive thoughts.

Clinical Implications

The current study recommends the following:

- Giving attention to the elements of activating the working memory in the context of the educational process in general, whether in the context of parenting or in the context of education within the school, and in the context of the interaction between teachers and students, as it is the most important component of the educational system in influencing intelligence, learning, and abilities.
- Paying attention to the presentation of the academic curricula, whether at school or university, taking into account the limited capacity of the working memory, by presenting the curricula in the form of chunks, packages, or groupings where the elements of a curriculum subject are organized in a coherent and logical way. This is especially the case in university curricula for a subject, where it was noticed that most are presented randomly, in unregulated and unorganized university notes, thus placing a cognitive burden on students' working memory.
- Activating the role of psychological counseling centers within universities to help deal with stressful life events and depressive thoughts among university students, which constitute a burden on the working memory capacity according to the results of the current study.
- Reflecting a major improvement in the perception of diminished forgetting in depression and also indicating that instruction in working memory could be a promising intervention to enhance stressed people's capacity to prevent unwelcomed memories from coming to mind as supported by Noreen et al. (2020).
- Reflecting a major improvement in the perception of diminished forgetting in depression and also indicate that instruction in working memory could be a promising intervention to enhance stressed people's capacity to prevent unwelcomed memories from coming to mind as supported by Li et al. (2019).

Limitations

The study has potential limitations, we used small random from university study which put limitations for the ability of generalizability of results. Additionally, the assessments that have been used in the two experiments should be computerized. Furthermore, we were supposed to start by examining the relationship between working memory capacity and depression and stress, not depressive thoughts and stressful life events.

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Research Article

The analysis of research about gifted and talented children at early childhood in Turkey: a study of meta – synthesis

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Abstract

The objective/aim of this study is to give an analysis of the researches conducted on gifted and talented in the early childhood period in Turkey through the methodology of meta-synthesis, and yet to reveal the tendencies of the scientific studies. This study provides the literature scanning/reviewing for the articles and graduate thesis written in Turkey between the years of 2002 and 2017. 37 scientific studies are included in this study. At choosing the studies, Google Scholars' search engine, databases of TUBITAK ULAKBIM DergiPark, YOK National Thesis Center, EBSCOhost-ERIC, and SPRINGER are recruited. All the studies which are approached for this study are analyzed through the content analysis for different themes such as years, subjects, working groups, objectives, methods, and outcomes. These categories of the themes present the data and these data are interpreted based on frequency and percentage values. All the theme categories and frequency values are visually shown in tables and graphs. As a result of this study, it is stated that studies on determining the gifted or talented kids in the early childhood period are quantitatively more. It is found interesting that most of the studies have recruited scales and survey methods. Some of the studies on this subject are the articles from the thesis studies. It is revealed that studies focusing on differentiated education programs for the gifted and talented kids in early childhood are minute amount. In accordance with these results, several facts and suggestions related to these facts are discovered such as multi-dimensional measurement methods are needed to be related to identification in Turkey's early childhood period, identification for the gifted and talented kids in their early childhood period is crucial as well as the education for their parents and teachers due to their health education is needed, it is also needed to develop relevant differentiated education programs related to kids' talent fields and finally, it is important to create a national education program to be applied to all the departments who are concerned.

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Introduction

Studying gifted and talented is being one of the most popular study fields in our country for the last decade. The early childhood period for gifted and talented studies is very rare in the literature. Especially in the last decades, studies in this field got increased by number. Generally, these studies are on evaluation the gifted and talented kids and their education as well as their families and teachers.

It is difficult to make a study on the concepts of intelligence or talent, whose definitions are difficult for years. Although there are no common definitions of giftedness, there are some common points for researchers. These common points are considered to be logically evident by Stenberg (1999), who examines them as complex relationships, generalization, abstraction, imagination, sensitivity, reasoning, adaptation, speed, perception and, memory. Criteria considered in defining giftedness and abilities are also taken into account.

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Taking into account the components involved in the definition of intelligence, Maker (2003) describes components of gifted and talent; it states that there is complicated problem solving and desires. Gifted and talented children are effective in complex problems and they produce solutions in a short time and love challenging things. In another definition; Field experts treat individuals as intelligent, creative, leadership, arts, or academically highly successful individuals from their peers (MEB, 2009). Considering similar criteria, Koshy (2001) gifted and talented; High intelligence, creativity, artistic ability, physical and mechanical ability. In another definition, gifted and talented; General competence, special ability, motivation, and self-concept (Feldhusen & Kollof, 1986). This definition is similar to Renzulli's general and special ability, the definition of creativity and motivation (Renzulli, 1977, 1978, 1986, 1998, 1999). Winner (1996), which also combines different features, distinguishes gifted individuals with early development, speed, deepening interest contents

Gifted and talented individuals are rare in society. It is assumed to be around 2% in every society (Marland Raport, 1972; Webb, Meckstroth and Tolan, 2003). Because there are few gifted and talented individuals, society should be best served by them. The early identification of these individuals, the recognition of educational opportunities, and the provision of pieces of training for their families and teachers have great precaution. Gifted and talented individuals can be detected at an early age and their education can be initiated by providing suitable environmental conditions. As known, intelligence and talent are influenced by two factors. These are heredity and environment (Davaslıgil, 2004a). By providing appropriate environmental factors, superior intelligence and talent are expected to emerge in a more positive manner. Environmental factors have been particularly taken into account in the second half of the 20th century and are considered as an effective factor in the emergence of superior ability (Stenberg, 2003).

The provision of favorable environmental conditions will lead to more specific features of general gifted and talented individuals. The most important features of gifted and talented individuals are their cognitive characteristics (Ataman, 2003; Çetinkaya, 2013; Delisle, 2003). Gifted and talented people need special and individual training due to their mentioned this characteristic. The early recognition and education of gifted and talented individuals have made the early childhood of gifted and talented people the subject of research (Baska, 2005; Maker ve Nielson, 1996).

Gifted and Talented in Early Childhood

The fastest period of child development is in the first six years of birth (Karadağ, 2015). Children whose skills are recognized early will develop better than cognitive, academic, social, and emotional aspects (Dağlıoğlu and Suveren, 2013; Schofield and Hotulainen, 2004; Stapf, 2003). According to Baykoç (2011), early talents and skills lead to the education of children. Early identification of children's abilities, organization of school and home environments, informing the family and the teacher, preparation of appropriate programs. At the same time, the correct planning of your future is of social and social significance.

Gifted and talented individuals need to be trained in early detection areas (Hökelekli and Gündüz, 2004; Gür, 2006). If gifted and talented children cannot get recognition early on, they may have negative attitudes towards life and the future in further years of their lives. The inability to use the mental power of gifted and talented children in the right direction can have a reverse effect. This can reveal unwanted educational processes and behaviors (Hodge & Kemp, 2002).

Early identification of gifted and talented children, the first way to prepare future-oriented programs is to recognize them correctly. This process takes place in Turkey as nomination, pre-evaluation, group screening, individual review, registration, and placement (MEB, 2009). For children to be properly identified, the family and teachers have as much responsibility as the experts (Karadağ, 2015). Especially in earlier periods, questions about how to predict and measure intelligence bring more tasks and responsibility for the family and the teacher. From the instruments used in identification, to the diagnosis criterion there are many areas that we should be careful of.

WISC-R, Stanford Binet, Leiter are some of the instruments used in Turkey. These have been used in the first year of the adaptation. It is a deficiency that has not been updated in years (Arı, 1999). The use of these tests within the same norms and criteria for many years has risen to questions about reliability. In this sense, the MEB has standardized the Wechsler Non-Verbal Test / Wechsler Nonverbal Talent Test (WNV) and the Kaufman Brief Intelligence Test / Kaufman Short Intelligence Test (K-BIT). These tests have been used in the selection of students for BILSEM in recent years (Alma, 2015).

Early education of gifted and talented individuals also benefits their families and teachers. The energy of gifted and talented children, the willingness to ask questions and learn leaves their teachers and families in a difficult

situation. Early identification of superiority can help parents and teachers to map the pathways on how to live with these children (Cutts & Moseley, 2004; Dağlıoğlu, 2010; Heller & Schofield, 2008).

Most of the studies on gifted and talented education focus on primary education and older ages (Alma, 2015). Most of the studies on gifted and talented education focus on primary education and older ages. There are no researches that analyze these researches in a multi-factorial way in the article and thesis dimension and synthesize them qualitatively. This study will ensure that the researches working on this topic will be aware of the work they will undertake in the field and have knowledge of the content and methodology of their work.

The Importance of the Research

As a result of this research, we explain in detail what type of studies conducted for gifted and talented children in Turkey, what years those studies are conducted, what kind of objectives these studies have, what methods to be used in the studies, and what outcomes are obtained, therefore, it will be a sort of guideline for the experts who work on this topic.

The Objective of the Research

The main objective of this study to synthesize regarding with early childhood area gifted and talented children masters and doctoral theses made in turkey and published scientific articles in various journals. For this purpose, answers to the following questions were sought:

- What are the types of the studies conducted on gifted and talented children in early childhood period?
- What are the years of the studies conducted on gifted and talented children in early childhood period?
- What are the most common issues of the studies conducted on gifted and talented children in early childhood period?
- What are the participants / research groups of the studies conducted on gifted and talented children in early childhood period?
- What are the objectives of the studies conducted on gifted and talented children in early childhood period?
- What are the methods of the studies conducted on gifted and talented children in early childhood period?
- What are the outcomes of the studies conducted on gifted and talented children in early childhood period?

Method

The Design of the Research

In this study, a meta-synthesis study was used from the content analysis types as it was aimed to analyze the studies about giftedness and talent in early childhood in Turkey by qualitative methods and to determine general tendencies. The aim is to conceptualize the data obtained from the scientific studies in the content analysis. Coding of concepts under certain headings, determination of themes, the arrangement of categories, identification and interpretation of findings from the obtained categories (Yıldırım & Şimşek 2011). Meta-synthesis is a study that is included in the content analysis studies and it is the interpretation and synthesis of the works done on the same topic with a critical point of view by creating themes or main templates (Çalık & Sözbilir, 2014). Meta-synthesis studies are studies in which qualitative aspects of only qualitative studies or mixed method studies in which a small number of studies are addressed and an in-depth study is made (Polat & Ay, 2016).

The Scope of the Research, Collecting Data and the Criteria for Including the Data in the Study

The scope of the research consists of 37 scientific studies in Turkey, including 20 articles, 12 master thesis, and 5 doctorate thesis carried out by Turkish researchers in the years between 2002-2017. Keywords "early childhood" and "gifted and talent" were used during the literature review. Despite the absence of early childhood concepts in the titles of the studies, studies in which gifted and talented individuals were formed and/or family and teachers were included in the early childhood period of the sample group were also evaluated and included in the study. Thus, all the studies related to early childhood gifted and talent in terms of keywords and sample/study group and data sources were tried to be investigated. The National Thesis Center, TUBITAK ULAKBİM Dergipark, Google Scholars, EBSCOhost-ERIC, and SPRINGER databases were used in determining the studies to be included in the research. While the studies were determined within the scope of the research, the sample was determined according to the purposeful sampling method. Criteria for determining the studies; a- the studies are made by the Turkish researchers in Turkey, b- whether the research is for the children aged 0-6 /8 and their families and teachers, c- the studies are either thesis studies or published in journals with the editorial board.

The Analysis of the Data and Coding Process

In the study, the steps of the meta-synthesis work were applied sequentially and systematically. These steps are listed below:

- Determination of the subject and writing of research questions
- Selection of the articles to be included in the study.
- Reading the chosen articles.
- Creating common themes
- Synthesis of the common themes
- Writing reports about the process and the findings (Polat & Ay, 2016).

It is thought that the visualization of the data in the form of graphics and tables will facilitate the reader's sense of meaning. In content analysis, the main objective is to collect the themes and the data that are similar to each other in the studies and, to organize these operations in the most comprehensive way that readers can understand. It is necessary to achieve a healthy synthesis by editing and interpreting this data appropriately. In the study, firstly the themes were formed from all qualitative and quantitative studies that were examined after determining the research questions. The themes obtained are presented in the graphics and tables with their categories, frequencies and, percentage values.

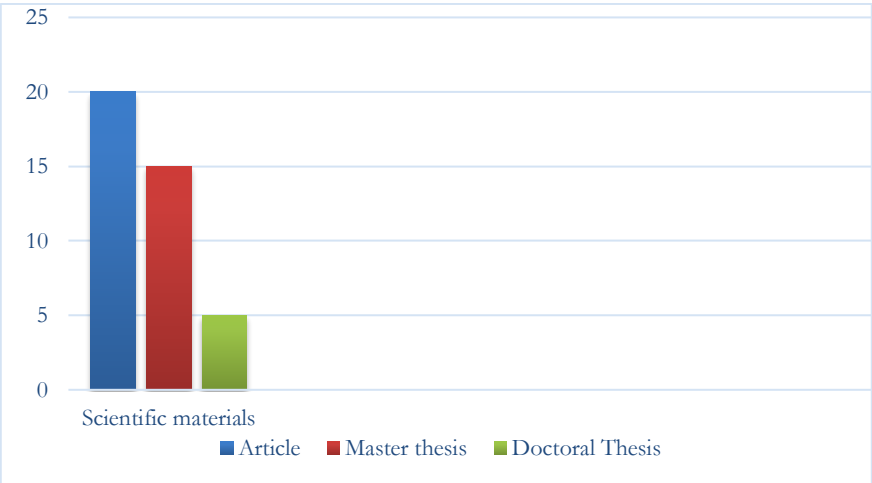
In the coding process, each study included in the research was first read in detail and examined according to the research problems and coded according to each theme and recorded in the computer platform. Each study examined is coded as A1, A2, A3 ... A37. The data were read over and over again and unnecessary parts were removed.

The Validity and Reliability of the Research

The objectives and research questions of the study have been expressed clearly in order to ensure validity and reliability. The method of data collection and the criteria have been included in the collection of data to ensure the validity of the findings. It has been presented in tables and graphics to ensure the reader understands easily. The analysis of the data and the creation of common themes are explained in detail. Subcategories related to the subject, purpose, study group, and results of the studies have been created and an internal reliability study was conducted by evaluating consistency between evaluators. During the evaluator disputes, the agreement has been achieved by reviewing the subcategories together with the evaluator. All studies were checked by comparison by two investigators. The studies that have been determined by an unbiased assignment are independently re-evaluated by the expert to evaluate the inter-study reliability.

Results

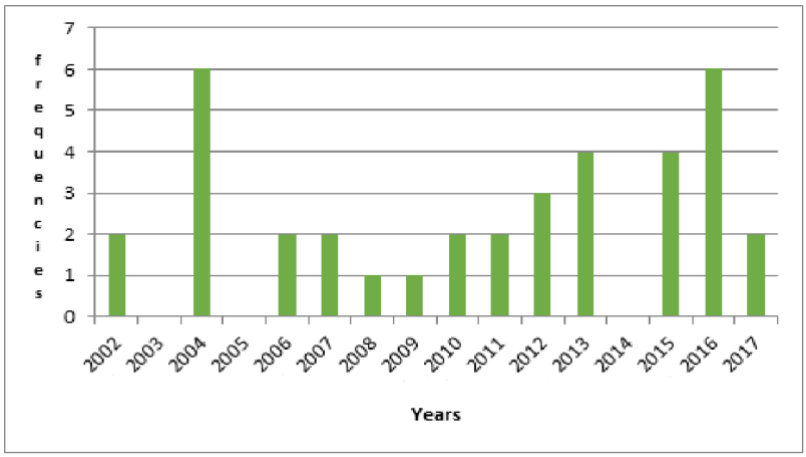
In this section, findings obtained from the analysis of the data are presented.



Graphics 1.

Distributions of the Study by Types

The distribution of scientific studies conducted with gifted and talented children in early childhood period in Turkey is shown in Table 1. According to Table 1, 20 of 37 studies analyzed were scientific articles (54,05%), 12 of them were master thesis (32,43%), and 5 of them were doctoral theses (13,51%).



Graphics 2.

Distribution of the Study by Years

Graphics 2 shows the distribution of scientific studies conducted in Turkey with respect to gifted and talented children in early childhood according by the publication year. Among the 37 studies examined according to Graph 2, the most studied studies were conducted between 6 and 24 years between 2004 and 2016, while the least studied years were 1 year and the 2008-2009 years were the opposite. Again, according to Graphics 2, it is seen that in 2003, 2005 and 20014 there was no study of gifted and talented children in early childhood.

Table 1.

Distribution of the Studies in Turkey by Subjects

Subjects	Studies	f	%
Effects of Parent and/or Teachers	A23	1	2,70
Detecting perception, attitude and ideas of the parent or/and teachers.	A17, A18, A20, A22, A26, A28, A32, A33, A36	9	24,32
Education Applications towards Over Talented Children and The Effects	A9, A15, A33	3	8,10
Determining and Diagnosis of gifted and talent in Early Childhood	A1, A2, A4, A5,A6, A10, A11, A14, A16, A19, A21, A24, A25, A29, A34, A37	16	43,24
Intelligence Test/ Scale Adjustment	A8, A12, A13, A27, A31	5	13,51
Case Determination	A3, A7,A30	3	8,10

The distribution of gifted children in early childhood by subjects is shown in Table 1. In Table 1, the study of the talents of early childhood has been divided into 6 different themes in terms of the total of 37 study subjects. It is seen that the most studied subject is "Identifying and diagnosing gifted and talent characteristics in early childhood" (n=16, 43,24%). Considering all the studies in our country regarding gifted and talented in early childhood, it is noticed that this topic of the studies is almost half of the topic of all the studies. This is followed by studies on "Determination of parent and / or teacher perception, attitudes and opinions" (n=9, 24,32%). Apart from these subjects, aspects such as "Intelligence test / Scale adaptation" (n=5, 13.52%), "Educational practices and effects for gifted children" (n =3, 8,10%), "Case detection" are observed. Other than these, the least observed / studied subjects were "Parent and / or teacher education / effects" (n=1, %2,70).

Table 2.

Distribution of the Studies by Working Groups

Working Groups	Studies	f	%
Normal, Gifted and Talented Children in early childhood	A6, A8, A10, A12, A13, A14, A15, A16, A27, A29, A31, A34	12	32,43
Gifted and talented Children in early childhood	A1, A2, A4, A5, A9, A11, A19, A25,A37	9	24,32
Preschool Teacher	A17, A20, A23, A26,A28, A32, A33, A36	8	21,62
Parent of gifted or talented Children in the early childhood	A21, A22.	2	5,40
Preschool Teacher and Parent of gifted or talented Children	A18, A24	2	5,40
Gifted or talented Children in the early childhood ad his/her family	A35	1	2,70

The classification of the 37 studies by participants is shown in Table 2. It was determined that 32.43% of the studies (n=12) were "normal, gifted and talented children in early childhood period" and 24.32% (n=9) were in "gifted and talented children in early childhood period". However, the study groups of the other researches are respectively: "Preschool teacher" (n=8, %21,62), "Parent with gifted and talented child in early childhood" (n=2, %5,40), "Parent with gifted and talented child who has a preschool teacher" (n=2, %5,40) and finally only one study "Gifted and talented child and family in early childhood" (n=1, %5,40).

Table 3.

Distribution of the Studies by Objectives

Objectives	Studies	f	%
Determining the gifted and talented children in early childhood	A1, A2, A5, A6, A13	5	13,51
Adaptation the scale in determining the gifted and talented children in early childhood	A8, A12, A13, A27, A31	5	13,51
Determining the gifted and talented children in early childhood	A10, A14, A18, A35.	4	10,81
Analysis of the perceptions, attitudes and opinions of preschool teachers and/or parents towards gifted and talented children in early childhood	A17, A20, A28, A32	4	10,81
Information about differentiated curriculum for gifted and talented children in early childhood	A3, A30	2	5,40
Determining the developmental characteristics of superiors during early childhood / babyhood	A4, A11	2	5,40
Examination of gifted and talented children according to different demographic characteristics in early childhood	A4, A19	2	5,40
Analysis of the effect of art education program on drawing skills of gifted children in early childhood	A9, A19	2	5,40
Comparison of some features from children with normal development and gifted and talented children	A16, A34	2	5,40
Giving information to parents and teachers about gifted and talent in early childhood	A7	1	2,70
Analysis of the correlation between intelligence level and motivation	A12	1	2,70
Researching on the contributions of an enriched English learning program	A15	1	2,70
Analysis of the correlation between parent's attitudes and intelligence	A22	1	2,70
Analysis of the efficiency in the education given to preschool teachers	A23	1	2,70
Analyzing the opinions of gifted children's teachers on the preschool education given to the gifted and talented children	A26	1	2,70
Analyzing the effects of intelligence on receptive and expressive language skills in early childhood	A29	1	2,70

The relationship between self-efficacy levels of pre-school teachers and attitudes towards education of gifted children	A33	1	2,70
Examining the effect of social skills training program on social skills development	A35	1	2,70
Determining the opinions of pre-school teachers about using the enrichment method as an intervention method	A36	1	2,70
Examination of non-simultaneous development, identification of possible problems and solutions	A37	1	2,70

Table 3 shows the distribution of gifted children in early childhood by the objectives of the study. When the studies were examined, the objectives were collected under a total of 20 category headings. In the studies examined, it is seen that studies are mostly aimed at the categories "to determine the gifted ones in mathematics in early childhood" (n=5, %13,51) and "to adapt the scale to determine giftedness and talent in early childhood" (n=5, %13,51). Beginning new concepts of giftedness and talent in early childhood in our country can be seen as one of the reasons for the excessive aim of talent and intelligence determination studies. Indeed, the first step in the process of studying and examining the outputs is identification. The following objectives have been identified as categories of "identifying gifted and talented children in early childhood" (n=4, %10,81) and "examining the opinions, perceptions and attitudes of pre-school teachers and / or parents about gifted and talented children in early childhood" (n=4, %10,81).

The objectives as two at a time are the following (n=2, %5,40): "To give information about differentiated curriculum related to early childhood", "To determine developmental characteristics of early childhood period", "To examine gifted and talented children in early childhood according to different demographic characteristics", "Studying the effect of the art education program on the skill of drawing gifted children in early childhood", "Comparison of some characteristics between normal developing children and gifted and talented children".

The categories of the objectives are arrayed as one at a time as following (n=1, %2,70): "Giving information to parents and teachers about gifted and talented children in early childhood", "The relationship between intelligence level and motivation styles", "Researching the contributions of an enriched English teaching program", "Analysis of the correlation between parent's attitudes and intelligence", "Analysis of the effectiveness of education given to preschool teacher", "Analyzing the views of gifted children's teachers about gifted students in pre-school education", "Analyzing the effects of intellect on receptive and expressive language skills in early childhood", "The relationship between self-efficacy levels of pre-school teachers and attitudes towards education of gifted children", "Examining the effect of social skills training program on social skills development", "Determine the opinions of pre-school teachers about using the enrichment method as an intervention method" and "Examination of non-simultaneous development, identification of possible problems and solutions".

Table 4.

Distribution of the Studies by Outcomes

Outcomes	Author	f	%
Parent / teacher opinions are influential in determining giftedness.	A18, A21, A10, A17, A28	5	13,51
Preschool teachers need to be informed, trained and supported about giftedness and talent.	A17, A20, A26, A32, A37	5	13,51
Some demographic differences are influential in determining gifted and talented children in early childhood.	A5, A6, A16, A19, A34	5	13,51
Scales adapted to determine gifted and talented children in early childhood are valid and reliable.	A8, A12, A13, A27, A31	5	13,51
Scale / questionnaires used are effective in determining relevant skills in early childhood.	A1, A2, A6, A10	4	10,81
Candidate children in early childhood match general characteristics of giftedness and talent.	A4, A8, A24	3	8,10
Parents are more successful than teachers in determining intelligence and creativity characteristics.	A1, A11, A14	3	8,10
There are significant differences occurred after the training sessions.	A23, A35	2	5,40
There were no significant differences after the training.	A9, A10	2	5,40
Preschool teacher / teacher candidates have positive perceptions	A32,A33	2	5,40

and attitudes towards gifted students.			
Intelligence is effective on receptive and expressive language skills.	A26, A36	2	5,40
Pre-school gifted and talented students have unusual interests and ideas.	A25	1	2,70
Parent / teacher attitudes are predictors of giftedness in early childhood.	A22	1	2,70
There is a significant relation between intelligence and motivation styles.	A12	1	2,70

Table 4 shows the distribution of gifted children in early childhood period by outcomes. When all of the study results were examined, it could be collected under 14 categories. The outcomes of the categories suggest the following findings are the most popular ones: "Parent / teacher opinions are influential in determining gifted and talented.", "Preschool teachers need to be informed, trained and supported about giftedness and talent.", "Some demographic differences are influential in determining giftedness and talent in early childhood.", "Scales adapted to determine superior intelligence and ability in early childhood are valid and reliable." (n=5, %13,51).

Following this, some other outcomes from the categories are listed as: Scale / questionnaires used are effective in determining relevant skills in early childhood" (n=4, %10,81), "Candidate children in early childhood match general characteristics of giftedness and talent" (n=3, %8,10) and, "Parents are more successful than teachers in determining intelligence and creativity characteristics." (n=3, %8,10), "There are significant differences occurred after the training sessions." (n=2, %5,40), "There were no significant differences after the training." (n=2, %5,40), "Preschool teacher / teacher candidates have positive perceptions and attitudes towards gifted students." (n=2, %5,40), "Intelligence is effective on receptive and expressive language skills." (n=2, %5,40) and as one outcome a time: "Pre-school gifted and talented students have unusual interests and ideas." (n=1, %2,70), "Parent / teacher attitudes are predictors of giftedness in early childhood.", "There is a meaningful relationship between intelligence and motivation styles.".

Table 5.

Distribution of the Studies by Methods

Methods	**Design**	**Studies**	**f**	**%**
Quantitative	Survey	A1, A2, A4, A5, A11, A16, A19, A22, A32	9	24,32
	Experimental	A9, A15, A23, A29, A35	5	13,51
	Scale Adaptation	A12, A13, A27, A31	4	10,81
	Correlational Research	A6, A10, A12, A13, A14, A18, A28, A33, A34	9	24,32
Qualitative	Case Study	A24, A26, A37	3	8,10
	Phenomenology	A17, A20, A21, A25, A36	5	13,51
Mix Method		A8	1	2,70
Literature Review		A3, A7, A30	3	8,10

The classification of the 37 articles analyzed is presented in Table 5. More than half of the work on in the general framework seems to be applied to quantitative methods. As for the majority of the quantitative studies (%n=924,32), it is seen that the survey and correlational research design are preferred among the quantitative methods. The least used quantitative research method is the experimental model (n=5, %13,51). When we look at the qualitative studies, it is seen that the case study (n=3, %8,10) and the phenomenology (n=5, %13,51) design are preferred. Apart from this, it is seen that in the three studies, the field literature review and the mix method are used. It is seen that almost all of the studies using the survey method have collected data with a few measuring instruments and tried to determine the current situation with short-term studies and trying to determine normal and gifted and talented children.

All of the 3 compilation studies (A3, A7, A30) consisting of articles are presented in Table 5. Qualitative method was applied in 10 of the articles examined while 7 of them were applied to quantitative method. The experimental design (A23) in one of them, the scale development (A31) in one of them, the survey model (A2, A4, A5, A16) in five of them and the correlational survey models (A6, A18, A22) in three of them were used in only one of the quantitative methods used in the models. Qualitative methods used in 7 articles are four examples (A17, A21, A25, A36) and three case studies (A24, 126, A37). Experimental design (A2, A15, A35) were preferred in three out of five

doctoral theses made on the field, one mix method (A8) and one survey method (A1) were used. Four of his doctoral theses were based on quantitative (A1, A2, A15, A35) and only one composite (A8) method. While quantitative methods were used in eleven of the 12 graduate thesis, in only one of them, qualitative method was preferred. Five of these are the ones where the correlational research method is used (A10, A14, A28, A33, A34), three of them recruit scale development studies (A12, A13, A27), two of them recruits survey method (A11, A32) and finally only one of them recruits experimental method (A29).

Discussion and Conclusion

In this section, the results obtained in the research are discussed in the context of research problems. A total of 37 studies were analyzed in this study covering the teaching and services offered by gifted and talented children, families, and teachers in early childhood (0-6/8 years) in Turkey from the years 2002 to 2017. It is seen that the first study was done in 2002 when giftedness or talent was obtained in the early childhood period in our country. Given the scientific work on gifted and talented children in early childhood in general, only 37 studies have been conducted for a total of 16 years since 2002 reveal that in our country, studies are quantitatively insufficient. Although there has been a general increase in awareness and the number of studies conducted with gifted and talented children in recent years in our country, studies on giftedness and talent in early childhood are not sufficient and qualitative. However, the identification of early childhood giftedness and talent is important in early education in these fields, yet this is stated both in foreign and domestic studies (Dağlıoğlu, 2002; Gür, 2006; Çetinkaya 2012, Saranlı 2017; Schofield & Hotulainen, 2004; Stapf, 2003).

When the distribution of scientific studies by types is examined, it is seen that 20 of them are articles, 12 of them are master thesis and 5 of them are doctoral theses. When the distribution of all the studies done by years is examined, it is noteworthy that the years of 2004 and 2016 are determined as the most concentrated years with 6 studies each, on the other hand, no studies have been reached between the years 2003, 2005 and 2014. However, when we look at the work done in these years, in 2016, there are three graduate theses and one doctorate thesis. The concentration of the work done at the graduate level is considered promising in this sense. In addition, the increase in work after 2005 is a sign that researchers are increasingly interested in this issue. It is important that field researchers are directed to work at the doctoral level in order to reach more qualified and effective studies. Studies conducted in the field and in our country suggest that the studies on gifted and talented children should be continued in early childhood.

When the distribution of researches by study groups is examined, it is seen that most studies were made with children. These studies are usually studies aimed at determining children's gifted and talent areas by applying certain scales. Studies conducted with families of children gifted and talented in early childhood are limited. Studies conducted with preschool teachers are few, and studies conducted with this group have generally received opinions for children who have gained gifted and talent in early childhood. As in every child in early childhood, gifted and talented children cannot be denied the importance of the environment. In this age range, the environment covers the family and teacher relationship intensively for one individual (Damasio, 1999; Miklewska, Kaczmarek & Straleu, 2006; Weiten, 1995). It is estimated that in new studies to be done parents, children, and teachers/specialists will considerably increase the quality of studying to be involved in the same work.

When we look at the distribution by methods, it is seen that a significant part of the studies is handled with quantitative methods. Researchers emphasize that quantitative methods are preferred over qualitative methods in studies (Selçuk, Palancı, Kandemir & Dündar, 2014). However, when the quantitative studies in the research are examined in detail, it is seen that the studies focused on the survey studies using data collection tools such as scale, questionnaire are emphasized. It is seen that in some studies the methodological tendencies of the articles and theses are less favorable than the survey method in the quantitative researches (Varışoğlu, Şahin & Göktaş, 2013; Karadağ, 2010). This can be attributed to the fact that the cost of survey work is low in terms of time and effort. Very few of the studies on gifted and talented children in early childhood have used experimental pattern which aims to reveal the change in the process. Especially when the articles are examined, it is seen that the studies carried out with the experimental designs are so small that there is no work to be done. The difficulty of reaching children with gifted and talent recognition in early childhood as a result of the small number of experimental designs in quantitative studies and therefore the group can be expressed as the strength of the design of experimental studies. Qualitative studies have been reached even though they are not sufficient in numbers. Büyüköztürk et al. (2013) emphasize that qualitative research types will provide more in-depth information in comparison with quantitative research and that

questions in response to quantitative methods will lead to a better expression of problem questions. It is thought that qualitative researches take a considerable amount of time and cannot be preferred due to the difficulty of data analysis. However, studies on gifted children in early childhood are thought to be able to reveal problems, thoughts, and perceptions on this subject in a healthier way and to include qualitative research to describe the situation more in detail.

Given the distribution of the studies examined, it was generally seen that early gifted and talented children were selected from a group of children and their characteristics were taken into consideration. Another issue that has been intensively preferred is to determine parents' and teacher's attitudes and opinions to the child who is gifted and talented in early childhood. Scale adaptations are also a preferred research topic by researchers in order to identify early intelligence and talent areas. There seems to be little to be said about the issues that aim to develop a teacher and family education program for these children. It is being trained as an instructor who will plan and implement early post-childhood education determined to be gifted and talented in our country. However, the number of experts who plan and implement the training of gifted and talented children in the early period is almost none. Due to this reason, it is necessary for academicians and experts working in the field to prepare a teacher training program in this regard. Also, the development of differentiated educational programs for gifted and talented children in this period and studies that test effectiveness will help policy practitioners to draw attention to this topic.

When we focus on the results obtained from the studies, there is a quantitative surplus in the category numbers generated under the resulting base. The reason for this is that the goals and problems of a small number of studies can be carrying different qualities. The scales adapted to determine giftedness and talent in early childhood are valid and reliable in terms of use, according to the results of the reviewed studies. In a large majority of studies examined, it is seen that different demographic characteristics affect determining giftedness and talent. It is observed that the scales applied to the children who were nominated by their teachers or their families give the same results, and it was observed that the parents give effective results in the nomination process compared to the teacher. About this, in the studies related to preschool teachers, teachers also state that they need some information and support certain on this subject. According to another research result, there was a correlation between preschool teachers' self-sufficiency levels and their attitudes towards the education of these children. Between intelligence and motivation styles, according to the results of some studies: significantly significant differences between intelligence and early mathematics education were found.

Recommendations

This study on gifted and talented children in the early childhood period aims to reveal the general situation in our country, as well as to reveal the educational and social needs to show the path to the ones who work in this field. In our country, it is possible to see and detect the deficiencies in the field of education regarding gifted and talented children in the early childhood period, and to establish new commissions and solutions for this. A researcher who wants to work in the early childhood period may be able to recognize the deficiencies and increase their focus and tendency on this field. The research also reveals that the studies on giftedness and talents in early periods in our country are limited. Yet, the awareness level of early childhood diagnoses is very significant. It will be beneficial to organize projects and volunteer base activities through internet websites and social media to create and raise awareness.

When studies on gifted and talented children in early childhood are examined, it is observed that such studies are usually tried to be determined by using a measuring tool in our country. It may be suggested that the studies carried out in this respect be improved by using differentiated training programs. However, in early childhood, healthy diagnosis instruments are needed. Beyond using a single scale, new work on early detection should cover different measurement instruments that have validity and reliability and that can be measured with different parameters. In studies, it is seen that in order to identify giftedness and talent in early childhood, these intelligence scales and some scales recruited from abroad are used. The healthier outcome may be achieved by a domestic identification instrument.

The place of the family in early childhood period is undeniable. Families with gifted children in early childhood period need to be informed about the characteristics and educational needs of such children. Researchers should work on educational programs to inform families on these issues. It is thought that parents having sufficient knowledge about this issue and identify the children on time will increase the probability of studies to prevent and interventions.

In order to ensure the early childhood identification and children's nomination by teachers correctly, teachers should be informed about giftedness skills. In this respect, the focus should be the teachers' awareness and training on giftedness and talent in early childhood. Therefore, it will be beneficial if the ministry organizes such training programs. Gifted and talented children may have kindergartens offering full or part-time differentiated education. Also, in our country, it is the primary school period when the children are admitted to the science and art centers where the gifted and talented students are in. In the early period, however, education is vital to all gifted and talented children in special education services as much as for all children. Due to these reasons, the training process for gifted and talented children should be started from an early age.

Gifted and talented children identified at an early age should be educated with an enriched curriculum accordingly and, it is important to test the educational programs developed in this subject with experimental design. If researchers create educational programs for children identified as such in their early childhood period and if those children can get education according to their situation, this will be beneficial both as materially and morally for our country. Therefore, it is suggested that the differentiated curriculum should be increased in order to focus on pre-school education apart from the primary and high school.

The Limitations of the Research

The research covers theses written in Turkey or the articles addressed in Turkey in the field of gifted and talented children early childhood period in 2002-2017. This research is limited to a total of 37 studies including 20 articles, 12 master thesis and, 5 doctorate thesis. In terms of research and research groups, the amount of data covered in the field of gifted education in early childhood was used. The generalizability of the findings is limited to the review articles and postgraduate theses.

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Appendices

Appendix 1.

Selected Sources Listed Below are Used for Analysis

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Research Article

The parenting attitudes and effects on their gifted children: a literature review

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Abstract

Family is essential for physical, emotional, social developments of the gifted children. The parenting attitudes could affects the child's emotional and social development. This literature review was conducted to examine parenting attitudes and effects on their gifted children. According to inclusion criteria, 11 studies were included in study. Gifted children perceived parental attitudes as tolerant and democratic, while peer groups perceived them as authoritarian and permissive. It was also found that the authoritarian attitudes of the parents of the gifted children have negative impacts on children mental developments, anxiety level, sense of self, inter-family relations and on level of well-being. The having democratic, tolerant attitudes of parents of gifted children will increase the academic performance, self-esteem, well-being, and relations among the family members. It has been determined that the partnership of the parenting attitudes of the mother and the father should be and the mother-child interaction is important.

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Introduction

The concept of intelligence can be defined as a common component of the score acquired from a test, adaptation to surrounding stimuli, problem-solving skills, and innate and acquired skills of the individual (Akkan,2012; Ozbay, 2013). Whereas children who score high on intelligence tests are referred to as gifted children, since the concept of talent covers the concept of intelligence and the intelligence scores determine the academic success of individual in recent years, usage of the expression of gifted child is now preferred, rather than the expression of genius child (Ataman,2012; Ozbay,2013; Levent,2013). As the matter of giftedness is a complex and multifaceted subject, there is no universally accepted single definition for "gifted child". The generally accepted definition for "gifted child" is children with an IQ score of 130 and above, who are successful in multiple fields and who have special superior skills in specific areas. The gifted children representing 4-5% of societies make different developments in comparison with their peers. Active throughout a baby, early language development, having an early and advanced vocabulary, abstract thinking, ability to generate original ideas, extraordinary problem-solving skills, perfectionism, creativity, vast imagination, being open to new ideas and high academic success are among the traits of gifted children (Rosenberg, Robokos, & Kennedy, 2010; Levent, 2013; Davis, 2014).

Gifted children are defined as extraordinary children due to their special skills. These children may also face with numerous positive situations, as well as negative ones, in their family, school and social environments due to their unique understanding, thinking and perception capacities. As gifted children mostly do not have any problems related to academic and language development, they can experience emotional and social problems. Gifted children

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may also have problems with their parents and family members, in addition to their peers and teachers. Gifted children need special support from their teachers and parents because of their emotional and social problems (Morawska & Sanders, 2009).

Giftedness is a dynamic concept that emerges as a result of interaction between the child and family characteristics. Parents' awareness of the developmental characteristics of children and approaching them accordingly is a significant factor for their social and emotional development. A positive parental attitude makes a substantial contribution to the child's development and the child is satisfied with his/her life, is brought up as a healthy and happy individual. As in the case of all children, family is a highly important factor for the gifted children, in terms of their physical, emotional and social development (Rudasill, Adelson, Callahan, Houlihan, & Keizer, 2013). According to Sowa and May (1997), family is the place where a gifted child finds a meaning for himself/herself. Children's having special skills as different from their peers may negatively impact the children, family members and domestic relationships (Clark, 2015).

The children's being perceived as a different person by the environment they live in, not being raised in accordance with certain rules, desire to occupy themselves with something continuously, getting bored when they are free, frequently changing areas of interest, distraction, vulnerability and oversensitivity, non-parallelism of their mental development with their social and emotional development, having an idea on every subject and speaking out (Karakus, 2010; Ogurlu & Yaman, 2013).

The underlying reasons for the problems encountered by parents include not having a thorough command of the concept of gifted children, not accurately understanding the children's developments, failing to be aware of the children's needs and inability to meet them, supporting their developments insufficiently, planning the children's needs incompletely and failing to exhibit a proper parental attitude (Levent, 2013). Besides, parents have difficulty in the following: neglecting their children's requests to spend time with their peers, failing to ensure their participation in social events, the parent's insufficient educational and socioeconomic levels for the child, spending time with the child is tiring, exhausting, and taking up so much time of the family members and guiding the child in planning the events and activities for the gifted children (Karakus, 2010).

The conducted studies determined that differences between the parental attitudes of gifted children and their peers (Morawska & Sanders, 2008; Rudasill et al. 2013; Yazdani & Daryei, 2016). The differences in the parental attitudes may affect academic successes, motivations and social environments of children (Dwairy, 2004; Morawska & Sanders, 2009). A democratic parental attitude is associated to high academic success and grade point average. An authoritarian parental attitude can adversely affect the academic successes and grade point averages of children. Positive attitudes towards children may positively impact the social development of children (Huey, Sayler, & Rinn, 2013; Olszewski-Kubilius, Lee, & Thomson, 2014). The attitudes exhibited by parents towards their gifted children also have various effects on the mental health of children (Dwairy, 2004; Morawska & Sanders, 2009).

Parents play a critical role in the organization and provision of enriched early interventions, child-appropriate education, and long and sustainable development practices (Kiewra and Rom, 2019; Witte et al. 2015). They play an important role in preventing and finding solutions for the problems related to children's education and they may face with difficulties in fulfilling their roles during the process of raising children (Morawska & Sanders, 2009; Jolly & Matthews, 2012). It is very important for parents to support and create a supportive environment in order for children to cope with the problems they experience and to form a self-concept (Luo and Kiewra, 2020; Mammadov et al. 2013). Although studies focusing on the educational requirements of gifted children and their parents' perceptions of education have been carried out, there is a limited number of studies about the difficulties encountered by the families of gifted children and their parental attitudes (Morawska & Sanders, 2008, 2009; Pilarinos & Solomon, 2017). The aim of this literature review is to examine parenting attitudes and effects on their gifted children.

Method

This literature review was conducted on the following databases: Pubmed, Medline, SAGE Journals Online and Science Direct. The key words were "Gifted/talented Children", "Parents Attitues", "Parents Effects" and "Family Style". Inclusion criteria were as follows: Studies, 1) conducted between 2008-2020, 2) published as full text in English, 3) accessed on the databases of Pubmed, Medline, SAGE Journals Online and Science Direct, 4) investigating the parenting attitudes and effects on their gifted children. After searching, it was reached 30 articles

but found after searching, total of 11 met inclusion criteria and thus, 11 studies were included in study. The studies were evaluated in terms of year, country, sample size and characteristics, and significant results.

Results

All gifted children representing the sample of studies analyzed as part of the research are children who receive a special education for gifted children at relevant educational institutions. Considering the number of samples in the conducted studies, the study carried out by Olszewski-Kubilius et al. (2014) has the highest number of samples (n=1526). The study carried out by Wu (2008) has the lowest number of samples (n=5). The study samples were gifted children and his/her parents in four studies; only the gifted children in three studies; and only the families in two studies. The sample group consists of parents and caregivers in one of the other two studies; and the gifted children and his/her peer group in the other study.

The studies included in the research were conducted in the USA (4), Italy (1), England (1), North Korea and the USA (1), Australia (1), China (1), Iran (1), Australia and New Zealand (1). The age range of children involved in the studies is between 4 and 17. There are studies revealing that there are differences in the perceived parental attitudes of gifted children and their peers. It has been determined that gifted children perceive the attitudes of their parents as tolerant and democratic, while the peer group perceive them as authoritarian and permissive. It has also been found out that the attitudes of gifted children's parents are less authoritarian than their peers' parents and the IQ level of children are inversely proportional to the authoritarian parental attitude. The studies determined that authoritarian parental attitude negatively affect the mental developments, anxiety level, sense of self, domestic relationships and well-being levels of the gifted children. Along with the authoritarian attitude, a permissive family structure also negatively affects domestic relationships and the academic successes of children. It has been found that a democratic parental attitude have a positive effect on the academic success of children. It has been determined that a democratic attitude and a high interaction between the mother and the child play a significant role in the cognitive development of children. It detected that supportive and respectful family environment towards the gifted child has positive impacts on the development of interpersonal skills of children and contribute to their relationships with their peers. The studies stated that parents' high level of confidence in their children is an important factor for observing less emotional problems, stress, depression and parent-child conflicts. In addition, it has been observed that the parents of gifted children have been advised to their children and parents who listen and share their children's problems.

It has been found out that a positive parental attitude along with the gift factor, the parents' supporting their children and establishing a warm relationship increase the academic success of children and enhance the motivation of children and their parents. There are studies expressing that, in order to increase the motivation of children, teachers need to perceive children sufficiently and parents need to give autonomy to their children and support them. As the ages of children decrease, they perceive their parents' attitudes as permissive. It was determined that girl children perceive their parents as more authoritarian than boy children. Moreover, it has been further found that being a boy child, educational level of the mother and low confidence of the parents in their children are an important factors in observing behavioral problems.

The studies have detected that parental attitudes vary depending on the values, beliefs and culture of the family, as well as its ethnical structure, and that culture prevails in parental attitudes. While black children evaluate their mothers as more authoritarian, Chinese families regard themselves as primarily responsible for the academic successes of their children and encourage them. Even if the gender status does not affect academic success, it has been indicated that being a male child and parents' supporting the child in his/her educational process raise the expectations of the family. The studies state that an extended family structure is important for the development, education and support systems of gifted children. On the contrary this situation, an extended family structure is considered to cause communication problems for children with their peers, as a source of stress for both the child and the family. Another source of stress for the child and the family, ıt has stated that is the lack of consistence between the parents and disruption of family routines. Summary of 11 articles researched as a result of the literature review is given in Table 1.

Discussion

As a result of the literature review, 11 research articles have been accessed in order to determine the health, caring and family problems observed in gifted children, published between 2008 and 2018. It has established that there are

differences in perceived parental attitudes between gifted children and peers. The study performed by Rudasill et al. (2013) sets forth how gifted children identify their parents' attitudes as tolerant and democratic, whereas the peer group identifies the same as permissive and authoritarian. The study carried out by Yazdani & Daryei (2016) has ascertained that gifted children perceive their parents' attitudes as less authoritarian than their peers.

Parental attitudes are an important factor for the development of children. It has been seen that the most appropriate parental attitude for gifted children is the democratic attitude. It has been determined that a democratic and tolerant parental attitude has a positive impact on the academic successes and cognitive development of children. The study conducted by Huey et al. (2013) has designated that the democratic parental attitude has a substantial effect in increasing academic success. The authoritarian and permissive attitude, on the other hand, negatively affects the mental development, sense of self and well-being levels of children. The study performed by Yazdani & Daryei (2016) found out that an authoritarian parental attitude negatively affects the mental health, sense of self and well-beings of adolescents and leads to a high level of depression and anxiety.

Perfectionism in gifted children is affected by various factors. Margot & Rinn (2016) determined that the relationship between perfectionism and gender, birth order, and age/grade level. The examined studies wasn't found that relationship between perfectionism and parental attitude. However, researchers have demonstrated that correlation between positive and negative perfectionism and authoritative parenting style (Besharat et al. 2011; Biran & Reese, 2007). Basirion, Abd Majid & Jelas (2014) indicated that positive perfectionism is influenced by the authoritarian attitude of the father and the authoritarian attitude of the mother. the authoritarian attitude of the mother is more effective in the development of negative perfectionism than the authoritarian attitude of the father. Also, permissive parenting style positively and negatively do not affect perfectionism (Basirion et al. 2014).

It was stated that supportive and respectful family environment towards the gifted child and a high confidence in the child by his/her parents, as well as parents' supporting and encouraging their children, have positive impacts on the development of interpersonal skills of children contribute to their relationships with their peers, reduce emotional problems and increases motivation (Olszewski-Kubilius et al. 2014; Huey et al. 2013). The study conducted by Olszewski-Kubilius et al. (2014) has determined that supportive and respectful family environment towards the gifted child has positive impacts on the development of interpersonal skills of children and contribute to their relationships with their peers. A study by Morawska & Sanders (2008) indicates that parents' high level of confidence in their children is an important factor for observing less emotional and sensual problems, stress, depression and parent-child conflicts. A study by Koshy, Smith & Brown (2017) found out that parents' supporting their children and establishing a warm communication with them are important in terms of increasing the motivation of the child and the parent. Garn, Matthews, & Jolly (2010) suggest in their study that children need to be sufficiently understood by their teachers, supported at home and given autonomy, in order to increase their motivation. Eren, Cete, Avcil & Baykara (2018) indicated that parents of gifted children are more supportive of their children and show sufficiently love, respect and attention to their children.

Along with a democratic attitude, it has been determined that parental attitudes which are observed condemnations in families of gifted children. A study by Morawska & Sanders (2009) was determined that the gifted children gave advice to their parents, the children expressed themselves to their parents comfortably, and the problems they experienced were shared with their parents.

It has been also established that ages and genders of children are influential in the perceived parental attitudes. A study by Rudasill et al. (2013) states that as the ages of children decrease, they consider their parents' attitudes as permissive and that girls find their parents more authoritarian than boys. Being boys, an only child or a first-born have been observed to be effective factors in parental attitudes. The study performed by Margot & Rinn (2016) indicated that being a first-born or only child increases the concerns for making mistakes and raises parents' expectations and personal standards. The study carried out by Morawska & Sanders (2008) revealed that being a male child, a first-born or an only child, mother's level of education and parents' low confidence in their children are important factors in observing behavioral problems.

Ethnical structure of families, their racial, and cultural values have been identified as factors affecting parental attitudes. A study conducted by Wu (2008) suggested that Chinese families regard themselves as primarily responsible for the academic successes of their children and encourage them to receive education. In addition to that, the study made by Rudasill et al. (2013) established that black children consider as more authoritarian their mothers.

It has been observed that an extended family structure has both positive and negative impacts on children. The study performed by Koshy, Smith & Brown (2017) stated that a majority of families believe that an extended family structure will not help gifted children's educations, only one mother says that having an extended family structure will help children's educations and it is an indirect support system. The study made by Renati & Bonfiglio (2017) established that having an extended family structure and relatives' failure to use an appropriate means of communication causes stress in the child and the family. It has been stated that the main source of stress in the family results from a lack of alliance between parents and irregular family routines.

Table 1. Summary of the Studies Related to The Parenting Attitudes and Effects on Their Gifted Children

Author/Year/Country	N	Sample Characteristics	Method	Results and Conclusion
1. Rudasill, Adelson, Callahan, Houlihan, & Keizer (2013) The USA	332	-Girls: About 60% -Boys: About 40% - About 67% whites - About 23% black	-Title "Gifted Students' Perceptions of Parenting Styles: Associations With Cognitive Ability, Sex, Race, and Age" -Students attending Virginya University Summer Camp -A descriptive study	-It has been determined that gifted children perceive the attitudes of their parents as tolerant and democratic, while the peer group perceive them as authoritarian and permissive. -It found that the attitudes of gifted children's parents are less authoritarian than their peers' parents and the IQ level of children are inversely proportional to the authoritarian parental attitude. -Democratic parental attitudes and child-parent interaction play an important role in the cognitive development of children. -As the age level decreases, children's attitude of their parents is considered as permissive. -Girls found their parents to be more authoritarian than boys. -Black children were found to be more authoritarian in their mothers.
2. Yazdani & Daryei (2016) Iranian	233	-Gifted children:118 (36 boys, 82 girls) -Their Peers:115 (38 boys, 117 girls) - Grade 6-9	-Title "Parenting styles and psychosocial adjustment of gifted and normal Adolescents" -Conducted in a school for gifted children and in a primary school -A descriptive study	-It has been found out that the attitudes of gifted children's parents are less authoritarian than their peers' parent -Authoritarian parental attitude negatively affect the mental developments, anxiety level, sense of self, domestic relationships and well-being levels of the gifted children. -Permissive and authoritarian parental attitudes have been found to be not suitable structures for family relations and well-being of gifted children.
3. Huey, Sayler, & Rinn (2013) The USA	88	-Girls: 34 (38,64%) -Boys: 54 (62,36%) -Age range: 14-17	-Title "Effects of Family Functioning and Parenting Style on Early Entrants' Academic Performance and Program Completion" -Conducted at Texas Academy of Mathematics and Science -Working time 2 years -A descriptive study	-It determined that gender has no effect on academic achievement. -Democratic parental attitudes were found to be associated with an increase in children's grade point averages. -Authoritarian and permissive parental attitudes have been found to have a negative effect on children's grade point averages. -Family and parent attitudes along with the skill factor have been found to have a significant effect on the success of children.

4. Olszewski-Kubilius Lee, & Thomson (2014) The USA and South Korea	1526	-1526 (52.5% Boy, 47.5% Girl) -Grade 5 and 12 -Students, mothers or fathers	-Title"Family Environment and Social Development in Gifted Student" -Conducted in a university and a center for talent development summer, weekend, and distance learning programs. -A cross-sectional study	-An affectionate, supportive and respectful family environment influenced positively the development of interpersonal ability and peer relationships for the gifted children. -Parent's positive attitudes had positive effects on behavioral development of the gifted children.
5. Morawska & Sanders (2008) Australia & New Zealand	278	-Gifted children: 278 -Age range: 2-6 years -Children with IQ>130: 214 -409 Parents	- Title"Parenting Gifted and Talented Children: What are the Key Child Behaviour and Parenting Issues?" -Conducted in a school for gifted children and in a primary school -A descriptive study	-Being a boy, having a mother with a low education level and having lower level of parental confidence were important factors related to behavioral problems. -Higher levels of parental confidence were important in less emotional problems, less stress and depression and less conflicts over parenting.
6. Koshy, Smith & Brown (2017) England	21	-Mother: 19 -Father: 1 -Caregiver: 1 -Age range: 12-16 years	-Title "Parenting 'gifted and talented'children in urban areas: Parents' voices." -Conducted in a university. University Based Intervention Program -A qualitative study. - They started the program at the age of 12. Lasted 4 years	-It has been found that some families have a large family structure of gifted children and that they do not help children's education. -In addition, some families have stated that having a large family structure will help children's education and increase their support systems. -Parents' support for their children and a warm communication have been found to be important in increasing the motivation of the child and parent.
7. Garn, Matthews, & Jolly (2010) The USA	59	-Parents: 59 -30 parents completed the interviews -Gifted Children: 39 -Girls: 20 -Boys: 19 -Age range:4-17	-Title "Parental Influences on the Academic Motivation of Gifted Students: A Self-Determination Theory Perspective" - Thirty-one of these 59 parents (53%) agreed to interview requests sent to the e-mail address or telephone number. -A qualitative study.	-It was determined that negative attitudes of parents of gifted children towards academic motivation teachers were not sufficiently understood by the children. -It was found that parents applied autonomy and control strategies to create academic motivation environment at home.
8. Morawska & Sanders (2009) Australia	6	- The average age of mothers: - The average age of fathers: - Eight mothers started the program but six people finished. - Gender of children are boys and their average age: 6	-Title "Parenting Gifted and Talented Children: Conceptual and Empirical Foundations" -South Tasmanian schools and families from the Tasmanian Union for gifted children attended. - A qualitative study.	- The parents of the gifted children advise their children to their children, children express themselves to their parents comfortably, share the problems they have with their parents; It was found that there were appropriate parental attitudes and that children improved their problem-solving skills, self-esteem and improved peer relationships.

9. Margot & Rinn (2016) The USA	96	-96 (47 Girls, 49 Boys) -Grade 7 and 12 -70% Caucasian	- Title"Perfectionism in Gifted Adolescents: A Replication and Extension" -Conducted in a rural middle and high school -A descriptive study	-The gifted who were only or first born children had increased levels of anxiety about making a mistake, higher parental expectations and personal standards. -The parents of the gifted boys had higher expectations.
10. Wu (2008) China	5	- Five parents living in America for over five years. -Three families live in a university town	-Title "Parental Influence on Children's Talent Development: A Case Study With Three Chinese American Families" - The interviews were made via telephone. - All interviews were made in Chinese as the mother tongue of the families. -A semi-structured study	-It determined that parental attitudes change according to family values and beliefs and cultures and their culture is dominant. -It found that Chinese families regard themselves as primarily responsible for the academic successes of their children and encourage them and children are to be more successful in the academic field. -It was found that parents supported children's education and parents increased their academic success expectations from children.
11. Renati & Bonfiglio (2017) Italia	49	-Mother: 26 -Father: 23 -Age average: 44 - 62% of parents are university graduates	-Title "Challenges raising a gifted child: Stress and resilience factors within the family" - Conducted in Fronez Center for Potential Development and Endurance in Milan, founded by the Italian National Association for Gifted and Talented Children. -A semi-structured study - Talk time: 20min	- One of the main sources of stress in the family is the lack of consistency between parents and the lack of regular family routines. - It is determined that families have a large family structure and that relatives do not use appropriate communication methods cause stress in children and families.

Conclusion

In order to reduce the negative effects of parental attitudes on gifted children, parents need to be evaluated from the perspective of appropriate parental attitudes. Creating positive parental attitudes will result in a higher motivation for both the child and the family, reduction in stress factors and consistence between parents. Consultation should be made reducing the effects of the extended family structure on the child and increasing the interaction between the mother and the child. In addition, support programs for the challenges of gifted children and families should be developed and efforts to be carried out in this area should be increased.

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Review Article

The schoolwide enrichment model for reading (SEM-R) framework

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Abstract

Educators and researchers have suggested that the Schoolwide Enrichment Model for Reading (SEM-R) is an appropriate approach that helps in meeting their needs. SEM-R was developed from the general SEM model. It was designed to emphasize reading enjoyment and reading skill development (Reis et al., 2008). The SEM-R consists of three phases: (a) Phase I: Exposure, (b) Phase II: Supported Independent Reading, and (c) Phase III: Choice Components. Separate studies have demonstrated the effectiveness of the SEM-R on increasing gifted students' reading fluency, achievement, and attitude toward reading. Therefore, the purpose of this paper is to provide a brief literature review exploring the researched effects of the SEM-R on gifted students' reading fluency, achievement, and attitude toward reading.

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Introduction

Around 5 million students are identified as gifted in the United States; however, many of them are disadvantaged in the sense that they frequently are not given the chance to reach their full achievement (Dweck, 2008). Although they possess higher levels of intelligence, many of them are disadvantaged in the sense that they frequently are not given the opportunity to reach their full potential (Farmer, 1993). The research has demonstrated that gifted students spend most of their day in regular classroom settings (Cox et al. 1985). Unfortunately, traditional classroom instruction does not meet their needs appropriately (Archambault et al. 1993; Cox et al. 1985; Westberg et al. 1993). This situation may result in disappointment, a loss of self-esteem, weariness, languor, and underachievement (Knight & Becker, 2000).

Gifted readers, who are characterized as individuals having an extraordinary reading ability and are able to understand the complexities of language above their age (Mason & Au, 1990), face the same issue. These individuals read differently for different reading purposes. Levande (1993) described gifted readers as children with extensive vocabularies who read two or more years above their grade level. In addition, gifted readers utilize higher-order thinking skills, such as analysis, synthesis, and evaluation (Catron & Wingenbach, 1986). Unfortunately, traditional reading curricula do not help these readers to develop their reading abilities. Usually, gifted readers have little to gain from the reading materials and reading activities in a regular classroom (Witty, 1985). Further, many gifted readers develop their reading skills outside the school (Jackson, 1993). Therefore, to obtain real growth in reading skills and secure school success, educators must provide gifted readers with appropriately challenging instruction, instructional tools, and learning experiences (Anderson et al. 1985).

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Fortunately, researchers have demonstrated that there are strategies and programs to meet the needs of gifted students. Programs based on enrichment models and projects are the most ordinarily used method in gifted education (Reis & Renzulli, 2003). Enrichment programs are "richer and more varied educational experiences" that modify a curriculum "to provide greater depth and breadth than is generally provided" (Davis & Rimm, 2004, p.120). Enrichment programs can provide gifted students with appropriate education in different methods (Olszewski-Kubilius & Lee, 2004; Schenkel, 2002). Reis and Renzulli (2003) stated that enrichment programs could have a positive effect on students in general education since these programs address 21st-century skills such as complex thinking strategies and problem-solving. Furthermore, enrichment approaches are the key component of reading instruction for gifted students (Mangieri & Madigan, 1984).

Over the last 20 years, researchers and educators have tested different enrichment approaches. Both educators and researchers have suggested that the Schoolwide Enrichment Model (SEM) is capable at serving gifted learners in a variety of educational environments (Karafelis, 1986; Reis et al. 1995). The SEM was developed to support and incres creative outpot in gifted students. This model was developed using Renzulli's Enrichment Triad (Renzulli, 1977; Renzulli & Reis, 1985, 1997). The SEM consists of three types of enrichment: (a) Type I: general exploratory activities, (b) Type II: group training activities, and (c) Type III: individual and small group investigation of real-world problems.

For gifted readers, educators and researchers have suggested that the Schoolwide Enrichment Model for Reading (SEM-R) is an appropriate method that helps in meeting their needs (Reis et al. 2008; Reis et al. 2007; Reis et al. 2011). SEM-R was developed from the general SEM model. It was created to confirm reading enjoyment and reading skill development (Reis et al. 2008). The SEM-R consists of three phases: (a) Phase I: Exposure, (b) Phase II: Supported Independent Reading, and (c) Phase III: Choice Components. The Exposure phase typically involves book talks and other methods of exposing students to different books, genres, and authors in ways that spark their interest (e.g., stopping at a cliffhanger). During Phase two, students read independently from their selected books while each student or a small group of students take turns participating in individual conferences with the teacher to be sure that their choice was appropriately challenging. It is during Phase II that the teacher provides differentiated instruction and has students practice their fluency. Lastly, in Phase three, students participate in extension or enrichment activities related to their reading. These activities directly correlate to the third enrichment type of Renzulli's Enrichment Triad Model. Some examples include creating a boem related to the lesson, creating a book, and developing a project.

Additionally, separate studies have demonstrated the effectiveness of the SEM-R on increasing gifted students' reading fluency, achievement, and attitude toward reading. Reading fluency is defined as the ability to read text fast and minutely (NRP, 2000). Nathan and Stanovich (1991) pointed out, reading fluency enables speed that frees memory and helps to increase comprehension and analysis of the written word. Reading researchers emphasize the existence of strategies that contribute to the development of reading fluency. The SEM-R has been found to be effective at rising reading fluency, and in some schools, understanding (Reis & Boeve, 2009; Reis et al. 2008; Reis & Housand, 2009; Reis et al. 2007).

In addition, reading achievement is a widely used term in education. It refers to being able to use the skills that are needed to read grade-level material fluently and with understanding. Gifted learners' achievement development results from complex, advanced, and significant content provided (Little, 2012; Tomlinson, 2001, 2003, 2012; VanTassel-Baska, 2012). Reis et al. (2010) stated that SEM-R increases reading achievement.

Finally, the SEM-R is effective in increasing academic attitude toward reading, which is defined as "reading for the acquisition of knowledge about content areas, correct language usage, and understanding grammar" (Moore & Lemons, 1982, p. 48). Attitudes toward reading affect the growth of reading skills and result in academic achievement. Reis et al. (2008) found that SEM-R develops reading enjoyment, which helps to increase reading skill development and supplement.

The purpose of this paper is to provide a brief literature review exploring the researched effects of the SEM-R on gifted students' reading fluency, achievement and attitude toward reading. An additional purpose of this paper is to provide implications for practice and give suggestions for future research.

Literature Review

Understanding the complex needs of gifted readers and what programs work (or something like that?) is critical to the provision of support in educational contexts. The following section provides a brief review of the literature related to the impact of SEM-R on gifted students' reading fluency, achievement, and attitude toward reading.

Fluency

Reis and Boeve (2009) conducted a mixed-method study to investigate an afterschool enriched reading program among five gifted readers in grades 3–5. Researchers implemented the Schoolwide Enrichment Model–Reading (SEM-R) to present challenging reading activities for two days each week in a 6-week afterschool program. In addition, researchers administered observations, parent and teachers' interviews, school records, the Elementary Reading Attitude Survey (ERAS; McKenna & Kear, 1990), and curriculum-based measures of oral reading fluency. Findings indicated that students' reading fluency scores improved after implementing the SEM-R. The findings confirmed the effectiveness of the SEM-R on increasing elementary students' reading fluency.

Moreover, Reis et al. (2008) conducted an experimental design to evaluate the effect of the Schoolwide Enrichment Reading Model (SEM-R) on oral reading fluency (ORF), reading comprehension, and attitudes toward reading for students in two elementary schools. A total of 31 teachers and 475 students from Grades 3-5 were randomly assigned to either the SEM-R treatment with one hour of SEM-R and one hour of basal instruction or to the control group with two hours of basal instruction. The researchers utilized the Iowa Tests of Basic Skills (ITBS), the Elementary Reading Attitudes Survey, and the oral reading fluency assessments. Results showed that the treatment group scored significantly higher than the control group in reading fluency. In addition, there were no significant differences in reading comprehension or attitudes toward reading between the two groups. The results suggest that SEM-R produces higher oral reading fluency than a standard program and does no harm in terms of reading comprehension and attitudes.

Finally, Little et al. (2014) evaluated the effectiveness of the Schoolwide Enrichment Model–Reading (SEM-R) approach on students' reading fluency and comprehension. The researchers conducted a multi-site cluster-randomized design among 2,150 students and 47 teachers in four middle schools. Participants were randomly assigned to treatment or control conditions. Researchers implemented pretest and posttest. Additionally, they administered the oral reading fluency (ORF) and the Gates–MacGinitie Reading Tests (GMRT). Results indicated that the SEM-R resulted in similar or higher scores for fluency and similar scores for comprehension between the groups. The results indicated the effectiveness of the SEM-R in increasing middle school students' reading fluency.

Achievement

Little and Hines (2006) sought to determine the effect of the Project Expanding Horizons, which is based on the Schoolwide Enrichment Model-Reading (SEM-R) on reading achievement. The researchers conducted an experimental design among 155 students in grades 3–6. Further, the researchers administered standardized fluency passages obtained from the AIMSweb program through EdFormation Results showed statistically significantly higher scores for third and fifth graders. No differences were founded in fourth and sixth graders' scores. These results suggested that participating in this project may have result in further support to students' developmen in reading achievement.

Further, Reis and Housand (2009) examined the effect of the Schoolwide Enrichment Reading Framework (SEM-R) on students' reading achievement and fluency by using a quantitative, randomized design. A total of nine teachers and 260 third and fourth-grade students participated in this study, and they were randomly assigned to treatment and control conditions. The researchers utilized observations, the Measures of oral reading fluency (ORF), and the Iowa Tests of Basic Skills (ITBS). Results indicated that statistically significantly higher scores in oral reading fluency and reading comprehension for the treatment group in all grades. Results emphasize that the SEM-R produces higher oral reading fluency and reading achievement than the traditional programs.

More recently, Shaunessy-Dedrick et al. (2015) conducted an experimental design to explore the effects of the Schoolwide Enrichment Reading (SEM-R) on fourth-grade students' (n = 786) reading comprehension and attitudes toward reading. Eight schools were randomly assigned to treatment or control conditions. Treatment schools utilized SEM-R for eight months, whereas control schools utilized the district curriculum. Researchers administered the Iowa Tests of Basic Skills (ITBS), the Reading Skills Survey and the Elementary Reading Attitude Survey (ERAS). Two results were found. First, there were no statistically significant differences in students' attitudes toward reading. Second, treatment groups had significantly higher scores on the comprehension test than control groups. Based on the results, the SEM-R may increase students' reading achievement.

Attitude Toward Reading

Reis et al. (2007) conducted a randomized design to examine the effect of the Schoolwide Enrichment Model–Reading (SEM-R) on 226 urban elementary students' (third through sixth grade) reading comprehension, oral reading fluency, and attitude toward reading in two elementary schools. Fourteen teachers were randomly assigned to teach either the

treatment or control group. The researchers administered the Iowa Tests of Basic Skills (ITBS), the Elementary Reading Attitudes Survey, and the oral reading fluency assessments. The results demonstrated that after implementing the SEM-R, the treatment group reseved higher score than the control group in reading fluency and attitude toward reading. The results support the use of the SEM-R to increase students' fluency and reading enjoyment.

Additionally, Reis et al. (2011) investigated the effect of SEM-R on students' oral reading fluency, comprehension, and attitudes toward reading. A total of 63 teachers and 1,192 seconds through fifth-grade students across five elementary schools participated in this investigation, and they were randomly assigned to treatment or control conditions. The researchers administered the Measures of oral reading fluency (ORF), the Iowa Tests of Basic Skills (ITBS), the Reading Comprehension subtest (Form A), and the Attitudes and Practices Survey (TRAPS). Results indicated that the SEM-R increased students' attitudes toward reading. Further, results showed that both the enrichment reading approach and differentiated instruction were effective. Based on these results, the most significant benefit of the SEM-R was increasing students' enjoyment of reading.

Last, Reis et al. (2010) conducted a qualitative study to examine the SEM-R in 11 elementary and middle schools. Researchers administered qualitative comparative analysis with multiple data sources, including observations and interviews. Findings indicated that SEM-R was beneficial for both teachers and students. The finding showed that teachers had positive attitudes about the implementation of SEM-R. Further, over 95% of the teachers reported positive changes in students' attitudes toward reading. This study supported the implementation of the SEM-R to increase students' reading enjoyment.

Summary of Brief Literature Review

As seen through this brief review of selected literature, the SEM-R impacts students' reading fluency, attitude toward reading, and in some cases, reading achievement. The SEM-R has received a wealth of attention from researchers using a diverse range of methods (e.g., Reis et al. (2010) conducted a qualitative study; Reis & Boeve (2009) conducted a mixed-methods study; Rise and Housand (2009) used a quantitative, randomized design). Further, each one of these studies focused on different group ages. Little et al.'s (2014) study included middle school students, and Shaunessy-Dedrick et al.'s (2015) research was on elementary school students.

Regardless of whether the study was quantitative, qualitative, or mixed-method, all of the studies described above present data that indicated the relation between the SEM-R and students' reading fluency,achievement, and attitude toward reading.

Implications for Practice and Suggestions for Future Research

In this section, I will discuss the implications for practice and discuss suggestions for future research to enhance practitioners' and other researchers' understanding of the impact of SEM-R on gifted reading fluency, achievement, and attitude toward reading.

Implications for Practice

Many of the studies highlighted in this paper provided implications for practice that were important for gifted reading fluency, achievement, and attitude toward reading. Reis and Boeve's (2009) results indicated that gifted students need time to learn self-regulation strategies that encourage them to read challenging texts independently. In practice, this implies earlier intervention might help these students to react more positively to challenge and to acquire self-regulation strategies at a younger age. In addition, Rise et al.'s (2004) finding emphasizes that the success of the SEM-R is significantly dependent on teachers' skills. Therefore, teacher training and professional development are important since they contribute to the success of the SEM-R.

Suggestions for Future Research

The studies included in this brief literature review incorporated many suggestions for future research related to the SEM-R. First, most of the studies investigate the use of the SEM-R for couple weeks; therefore, Rise et al. (2011) suggest that future research investigates the use of this tool for a full academic year. Second, Rise et al.'s (2011) study was done on elementary school students; therefore, researchers suggested future research on the impact of the SEM-R on high school students. Finally, since there is a wide range of fidelity of implementation across classrooms, Little et al. (2014) recommended additional research on the SEM-R to study aspects of implementation more closely to determine critical levels of fidelity of each aspect of the intervention.

Conclusion

In conclusion, the highlighted studies indicate several factors related to the impact of the SEM-R on gifted reading fluency, attitude toward reading, and in the same cases achievement. The implementation of the SEM-R increases

students' reading fluency (Reis & Boeve, 2009; Rise et al. 2008; Little et al. 2014). In addition, there is a correlation between the SEM-R and reading enjoyment. The application of the SEM-R increases students' reading enjoyment. (Reis et al. 2010; Reis et al. 2007; Reis et al. 2011). Unfortunately, the effects of SEM-R on student reading achievement is inconclusive as some studies showed improvement while others showed it caused no harm (Little & Hines, 2006; Rise & Housand, 2009; Shaunessy-Dedrick et al. 2015). Therefore, in future SEM-R research, we hope to investigate the effect of this approach on students' reading achievement.

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Research Article

The mediating role of emotion regulation in the relationship between executive functions and self-regulations of gifted and nongifted students

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Self-regulation

Abstract

The main purpose of this study is to examine the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation of students with and without in the Science and Art Center (SaC) (called BILSEM in Turkish) which trained gifted students at Turkey. The study is a descriptive study in which predictive correlational research, one of the types of correlational research model, is used. The study group of the research consisted of the students studying in the province of Istanbul in the 2020-2021 academic year. In the sample, 6,7 and 8th grade students who are gifted in SaC (59 females, 64 males in total 123) and those who are not in SaCs (89 males 95 females, 184) 6, 7th and 8th grade students are included. Appropriate sampling method was used for participation in the study. In the study, Behavioral Rating Inventory of Executive Function (BRIEF) Parent Form, Difficulties in Emotion Regulation Scale (DERS) and The Adolescent Self-Regulatory Inventory (ASRI) were used. In the research, the data were analyzed using the PROCESS macro plug-in of Hayes with the SPSS 20 package program.For the mediation model created in line with the results, Bootstrap method was used to see the indirect effects. In the study, also the moderated mediation effect model analysis was used to. İn result, the direct, indirect and total effects of emotion regulation difficulties were found to be statistically significant in the relationship between executive functions and self-regulation skills of secondary school students with and without in SaC. It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect.

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Introduction

In recent years, it has been observed that there has been an increase in studies on executive functions, self-regulation and emotion regulation in the field of social sciences, educational sciences and psychology (Sinatra, Broughton & Lombardi, 2014). In the studies, each of these concepts are used with many different names and this situation makes it difficult to understand the concepts. It can also be said that these concepts are used interchangeably and that meaning shifts are experienced (Jones, Bailey, Barnes & Partee, 2016; Jones, Bailey, Meland & Brion-Meisels, 2019). In addition, while indicating the diverging aspects of these concepts, the relationships between them should also be looked at through direct and indirect effects (Hofmann, Schmeichel & Baddeley, 2012; Eisenberg, Hernández & Spinrad, 2017).

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These concepts have been included in studies that address diverse groups such as autism, learning difficulties, special abilities, and poor children (Ekşi-Sınır, 2020; Jones et al. 2016,2019; Leana-Taşcılar & Cinan, 2012; Nathalia, 2011; Rocha, Almeida & Perales, 2020; Tercanlı-Metin, Harma, Gökçay & Bahçivan-Saydam, 2017). In the literature respectively executive functions, self-regulation and emotion regulation have been associated with concepts such as intelligence and success (Best, Miller & Naglieri 2011; Finders et al. 2021). It is also said that executive functions are associated with fluent intelligence especially rather than crystallized intelligence, which expresses more learned knowledge (Diamond, 2013; Diamond, 2013; Zelazo, Blair & Willoughby, 2016). In order to observe these relationships, it is stated that studies comparing executive functions between gifted and normal individuals should be increased (Leana-Taşcılar & Cinan, 2012).

If we give information about the variables of the study, executive functions are seen as skills that enable people to control their thoughts and actions and to direct their behaviors to long-term goals. It is also argued that the executive function is a collect of neurocognitive skills within high cognitive processes (Carlson, Zelazo & Faja, 2013; Hendry, Jones & Charman, 2016). Cognitive neuroscientists often define executive functions as a set of mental processes located in the frontal cortex region of the brain used for targeted behavior (Fuster, 2008; Miyake et al. 2000). According to this definition, it is seen that there are many components in executive functions. In the literature these components are: shifting/flexibility, response inhibition, working memory (Bayliss & Roodenrys, 2010; Hughes, 2002), speed / arousal, sustainable attention, planning, serial ordering and sequencing, initiation and self-generation, set-shifting and cognitive flexibility (Brocki & Bohlin, 2004; Hanna-Pladdy, 2007).

Emotion regulation explains what emotions we have, when and how. It also deals with the process of how we experience and express emotions. It is also said that emotion regulation may involve maintaining, increasing or decreasing negative or positive emotions. It is explained that emotions are not good or bad by nature (Gross, 2002). In emotion regulation, people try to reroute the spontaneous flow of their emotions. Emotions are understood here as valuable (positive or negative) responses to events that people perceive about their ongoing anxiety. Emotions in this understanding include multiple components, including behavioral and physiological responses, as well as specific thoughts and feelings (Cacioppo et al. 1992; Frijda, 2006; Mauss et al. 2005). It is stated that emotion regulation is also based on cognitive resources that constitute executive functions as a process. It is said that the emotion regulation process will be disrupted in problems experienced in areas related to executive functions (Şahin, 2020).

Self-regulation is defined as the process of deliberately directing one's actions, thoughts and feelings towards a goal (Carver & Scheier, 2011). It requires a range of skills, including self-regulation, planning, and other executive functions. However, these skills are not limited to. Successful self-regulation also includes the capacity for motivation, such as wanting and enjoying behaviors that match the goal (Berkman, 2016). When people self-regulate, they often face potentially emotional situations. Self-regulation processes are therefore closely related to emotion regulation processes (Koole & Aldao, 2016). When the place of emotions in learning is investigated, it is suggested that regulating one's emotions is as important as regulating cognition, metacognition and motivation. In fact, given that focusing on emotions is new in the educational psychology literature, current definitions of self-regulation now include emotion regulation as one of the key components of self-regulated learning (Usher & Schunk, 2018)

Learning how self-regulation interacts with emotion regulation will likely generate important new insights for both processes. This will lead to a deeper understanding of how people can successfully express themselves in their environment. It is also stated that the relationship between emotions and self-regulation is by no means one-sided. It is said that too much self-regulation over a period of time can increase emotional responsiveness and this may impair the individual's ability to regulate their emotions (Wagner & Heatherton, 2014). For this reason, self-regulation research can shed light on how people are actively involved in managing their emotional lives. Conversely, emotion regulation research can shed light on how people navigate their actions in emotional contexts (Koole & Aldao, 2016). At this point, it is thought that paying more attention to moderation and mediation processes will clarify the relationship between self-regulation, executive functions and internalization problems (Eisenberg et al. 2017). Jones et al. (2016) They developed a model called "An Integrated Model of Regulation" in their work on executive functions, effortful control and self-regulation skills. According to this model, executive functions are in the cognitive domain, including simple and complex cognitive skills. Effortful Control refers to the ability to deliberately manage thoughts, attention, emotions and behaviour (Lengua, 2008). And these skills are stated to be in the area of emotion, which is the more complex skills (Jones et al. 2016). Self-regulation is defined as an umbrella term that reflects other regulatory structures such as impulsivity, conscientiousness, self-control, delayed pleasure, carelessness-hyperactivity, executive function, and willpower (Moffitt et al. 2011). Jones et al. (2016) states that new models are needed especially to

understand executive functions, self-regulation and other concepts and to better explain the relationships between them.

Here, it is thought that working models can be created in order to see the effects of these variables on SaC students. SaC's are private education institutions that serve specially talented students, affiliated to the Ministry of National Education, General Directorate of Special Education and Guidance Services. Students are recruited to SaCs in the fields of general mental ability and special ability (Visual Arts and Music) through diagnosis. In the study, students studying in the field of general mental ability were included in order to see the interactions of the related concepts with the concept of giftedness. Students in the field of general mental ability are determined at the Guidance and Research Centers by expert staff with intelligence test practitioner certificate. Students who score 130 and above in the intelligence test register to SaC in the field of general mental ability (MEB, 2016). Studies indicate that these variables have different effects according to developmental stages. For example, it is said that more complex skills such as organization, self-regulation and emotion regulation skills are acquired more quickly in late childhood (11-13) and adolescence than in early and middle childhood (Bailey & Jones, 2019). Considering late childhood and adolescence, models that address executive functions, self-regulation and emotion regulation skills are needed on different groups. In this way, children will be helped to fulfill the tasks that they need to realise due to their developmental periods (Jones et al. 2016, 2019).

Importance of Research

In the study, in line with both the information in the literature and the "An Integrated Model of Regulation", a new model was created in which executive functions are the independent variable, emotion regulation difficulties are the mediator variable and dependent variable's self-regulation. It has been considered to examine the model created according to both SaC students and 6,7 and 8th grade students who are not in SaC. When the literature is reviewed, it is seen that there are studies on executive functions, self-regulation and emotion regulation variables. However, there isn't found study examining all of these variables in the direction of a model. Here, it will be checked whether the model has a significant effect for both groups. The direct, indirect and total effects of the model will be examined for both groups. It will has been also look at the moderated mediation model. With these aspects of the study, it is thought that it can be an example in terms of method. The purpose and sub-problems of the research are given below.

The Study Problem

The main purpose of this study is to examine the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation of students with and without in the SaC. Also, the moderated mediation effect of with and without in SaC will be looked at.In line with the stated purpose, answers were sought for the following problems:

- Are the direct, indirect and total effects of emotion regulation difficulties in the relationship between executive functions and self-regulation of secondary school students with SaC statistically significant?
- Are the direct, indirect and total effects of emotion regulation difficulties statistically significant in the relationship between executive functions and self-regulation of secondary school students without in SaC?
- In the relationship between executive functions and self-regulation, is there a regulatory effect of being in the science and art center in the indirect effect of emotion regulation difficulties?

Method

In this section, the titles of research model, study group, data collection tools, data collection and analysis are included.

Research Model

The study is a descriptive study in which predictive correlational research, one of the types of correlational research model, is used. Predictive correlational studies are approaches that focus on indirect-mediating effects besides direct effects (Büyüköztürk et al. 2020). In the study, the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation skills of SaC and non-SaC students was examined through the Process Macro Model-4 diagram of Hayes (2018). In addition, Model-14 was used to test the regulatory effect of with and without in SaC or not on the indirect effect. Model diagrams are given below.

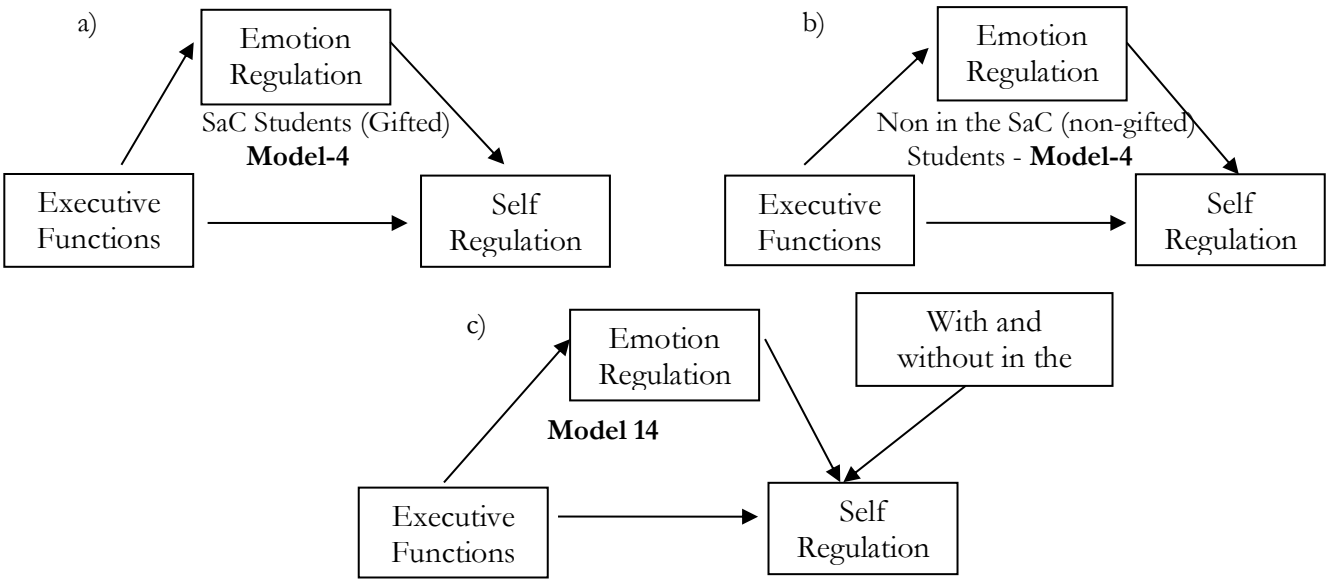

Figure 1.
Model-4 Diagrams Created for Secondary School Students with and without SaC and Model-14 Diagram Created for the Regulatory Mediator Effect of with and without In SaC

With and without in SaC (moderator), executive functions (independent variable), difficulty in emotion regulation (mediator) and self-regulation (dependent variable) in Figure-1 are.

Participitans

The study group of the research consisted of the students studying in the province of Istanbul in the 2020-2021 academic year. In the sample, 6,7 and 8th grade students who are gifted in SaC (59 females, 64 males in total 123) and those who are not in SaC (89 males 95 females, 184) 6, 7th and 8th grade students are included. Appropriate sampling method was used for participation in the study. Information about the working group is shared in Table 1 below.

Table 1.
Socio-demographic Characteristics of the Study Group

Variable	SaC		Normal		Total	
	n	%	n	%	n	%
Gender						
Male	59	48	89	48.4	148	48.2
Female	64	52	95	51.6	159	51.8
Class						
6th	80	65	83	45.1	163	53.1
7th	29	23.6	61	33.2	90	29.3
8th	14	11.4	40	21.7	54	17.6
Mother Education						
Primary School	20	16.3	58	31.5	78	25.4
Secondary School	9	7.3	32	17.4	41	13.4
High School	31	25.2	60	32.6	91	29.6
Undergraduate	51	41.5	34	18.5	85	27.7
Graduate	12	9.8	0	0.0	12	3.9
Father Education						
Primary School	11	8.9	50	27.2	61	19.9
Secondary School	18	14.6	24	13.0	42	13.7
High School	32	26.0	77	41.8	109	35.5
Undergraduate	42	34.1	30	16.3	72	23.5
Graduate	20	16.3	3	1.6	23	7.5
Total	123	40.1	184	59.9	307	100

Data Collection Tools

Behavioral Rating Inventory Of Executive Function (BRIEF) Parent Form

BRIEF Parent Form, It is a 3-point Likert-type inventory consisting of 86 items in total in which parents with children aged 5-18 evaluate the behaviors of their children regarding their executive functions. The inventory has 2 comprehensive indexes and 8 subscales. In addition, there is a total index score in which 72 items are included in the assessment. Developed by Gioia, Isquith, Guy & Kenworthy (2000) the internal consistency of the parent form of the scale was found between .80 and .97 in a healthy sample. The adaptation of the scale to Turkish and its validity and reliability studies were carried out by Nazlı-Köylü (2010). The internal consistency of the parent form of the scale was between .60 and .94 in the healthy sample. Within the scope of this research, the internal consistency coefficient for the total score was found to be .96.1. High scores on the scale indicate a high level of dysfunction.

Difficulties in Emotion Regulation Scale (DERS)

It is a 5-point Likert-type scale developed by Gratz & Roemer (2004) consisting of 36 items and 6 factors. The internal consistency coefficient of the original form varies between .93, and the values of the sub-dimensions vary between .88 - .89. Test-retest reliability was found to be .88. Adaptation study to Turkish was done by Rugancı & Gençöz (2010). In this study, it was found that the 6-factor structure of the scale explained 62.4% of the total variance. Also, the Cronbach Alpha was found to be .94. It was observed that the internal consistency coefficients of the subscales varied between .90 and .75. Test-retest reliability was found to be .83. The study for adolescents was conducted by Sarıtaş & Gençöz (2011). The overall internal consistency coefficient of the scale was found to be .93, similar to the original scale, and the test-retest reliability was found to be .83. Within the scope of this study, the internal consistency coefficient for the total score of the Difficulty in Emotion Regulation was found to be .92.5.

The Adolescent Self-Regulatory Inventory (ASRI)

Moilanen (2005) developed the scale to evaluate self-regulation skills in adolescents. The scale is a 4-point Likert type instrument consisting of 32 items. There are 2 factors, "Self-Regulation Success" and "Self-Regulation Failure". The internal consistency coefficient of the scale was found to be .89. The scale was adapted to Turkish by Harma (2008). The internal consistency of the self-control success subscale was .85, and the self-control failure sub-dimension was .80. Within the scope of this research, the internal consistency coefficient for the total score of the scale was found as .88.8. When both dimensions of the scale are found to be related, the items of failure in self-regulation can be reversed and an evaluation can be made in one dimension under the title of successful self-regulation. In this case, high scores from the scale indicate successful self-regulation skills (Tercanlı-Metin et al. 2017).

Data Collection and Analysis

The data were collected online through measurement tools created on Google form. Informed consent forms were prepared for parents and young people to participate in the study. After the necessary consents were obtained, the stage of collecting data was initiated. In the research, the data were analyzed using the PROCESS macro plug-in of Hayes with the SPSS 20 package program (Hayes, 2018). In analyzing the data, descriptive statistics were calculated and Pearson Product Moment Correlation Coefficient was examined to calculate the correlation between continuous variables. Before the mediation analysis, the relationships between variables were examined using stepwise linear regression and multivariate regression analysis methods. For the mediation model created in line with the results, Bootstrap method was used to see the indirect effects. In contemporary statistical approaches, much more attention is paid to whether the indirect effect (a.b) is significant or not. Contemporary approachs; In the Baron and Kenny method, they do not look for conditions related to the steps required to be carried out and they criticize these conditions. Contemporary approaches argue that even if these conditions are not fulfilled, the mediating effect (indirect effect = a.b) may occur. In the contemporary approach, it is recommended to test the indirect effect with the Bootstrap technique, which produces stronger and valid results than the Sobel test. (Hayes, 2018). In order to have meaningful results in this method, the lower and upper limits of the confidence interval should not include the "0" value. If the result does not contain a value of zero, it is concluded that mediations, direct and indirect effects are significant (Gürbüz, 2019). In the study, the moderated mediation effect model analysis was used to examine whether the moderated variable has an effect on the indirect effect. The effect model that shows in which situations the indirect effect of the independent variable "X" on the dependent variable "Y" through the (mediation variable) "M" is called "moderated mediation effect model" (Gürbüz, 2019).

Results

In this section, firstly, descriptive statistics, assumptions and relationships regarding research variables are presented. According to the research diagram, direct, indirect and total impact results are shared. Finally, in order to show the effect of the moderated effect on the indirect effect, the moderated mediator effect model was tested and the findings were presented.

Table 2.

Descriptive Statistics, Correlations and Assumptions Regarding Variables

Variable	Descriptive Statistics				Correlations(r)			
	Mean	Ss	Skewness	Kurtosis	1.	2.	3.	Cronbach's α
SaC								
1. EF	124,86	27,189	,561	-,254	1	,408**	-,535**	,96.6
2. ER	78,59	22,690	,436	-,474	,408	1	-,610**	,92.6
3. SR	86,71	14,205	,207	-,271	-,535**	-,610**	1	,88.5
Normal								
1. EF	123,49	24,192	,082	-,452	1	,492**	-,639**	,95.7
2. ER	81,79	23,016	,379	-,373	,492**	1	-,723**	,92.4
3. SR	84,88	15,215	,250	-,472	-,639**	-,723**	1	,89.0

** p<0.001; Note: **EF**: Execautive Functions, **ER**: Emotion Regulation, **SR:** Self Regulation, S**aC**: Gifted Students' School, Normal: Nongifted students or not enrolled SaC

In this study, secondary school students' who are in the SaC and secondary school students' who are not in the SaC were examined the scores of in terms of executive functions, emotion regulation difficulties and self-regulation skills. According to Table 2, The average scores of secondary school students educated in the field of general ability in SaC are as seen in executive functions ($\bar{X}$ = 123.49), self-regulation ($\bar{X}$ = 84.88) and emotion regulation difficulties ($\bar{X}$= 81.79). The average scores of secondary school students not in BİLSEM are as seen in executive functions ($\bar{X}$= 123.49), self-regulation ($\bar{X}$= 84.88) and emotion regulation difficulties ($\bar{X}$= 81.79). It was observed that the skewness and kurtosis values of the variables for both groups were between the -1 and +1 points accepted for normality. In addition, the linearities between variables are examined through scatter diagrams. It has been observed that the variables show an elliptical linear distribution. In this case, it is seen that normality and linearity are met (Büyüköztürk, Şekercioğlu & Çokluk, 2018; Karagöz, 2019). The extreme values were examined taking into account the z values and mahalanobis values and no extreme values that could be deduced from the study were found. The VIF values are 1,320 and the tolerance values are 758 for the group whose multiple connectivity and singularity between variables are not in SaC. For the group with in SaC, VIF values were found to be 1.199 and tolerance values were found to be 834. It is desirable that the tolerance values should not be smaller than 0.333 and VIF values should not be greater than 3. (Tabachnick & Fidell, 2013). Autocorrelation was checked with Durbin Watson value and for the group not in SaC (dw: 1931); The value (dw: 2.123) was found for the group with SaC. These values are stated to be within normal ranges (Küçüksille, 2014). According to Tabachnick and Fidell (2013), the number of participants in the regression analysis was given as N≥104 + m. "m" is used for the number of variables. Since there are 3 variables in the study, there should be at least N ≥ 107 people in two groups. 123 in SaC in the research; Since there are 184 secondary school students who are not in SaC, it is seen that this condition is met. In this case, it can be said that the assumptions required for multivariate statistics are met. Correlation values were also examined in the study. In Table 2, for the group in SaC, it was found that there was a moderately positive significant relationship between the scores of executive functions and emotion regulation difficulties (r = .408, p <.01). It was found that executive functions scores had a moderately negative significant relationship with self-regulation(r = -.535, p <.01). It was found that emotion regulation difficulties scores had a moderately negative significant relationship with self-regulation scores (r = -.610, p <.01). For the group not in SaC, the scores of executive functions scores were found to be positively moderate with emotion regulation difficulties scores (r = .492, p <.01) and moderately negative with self-regulation (r = -.639, p <.01) It was found to have a significant relationship. It was found that emotion regulation difficulties scores had a highly level negative significant relationship with self-regulation scores (r = -.723, p <.01).

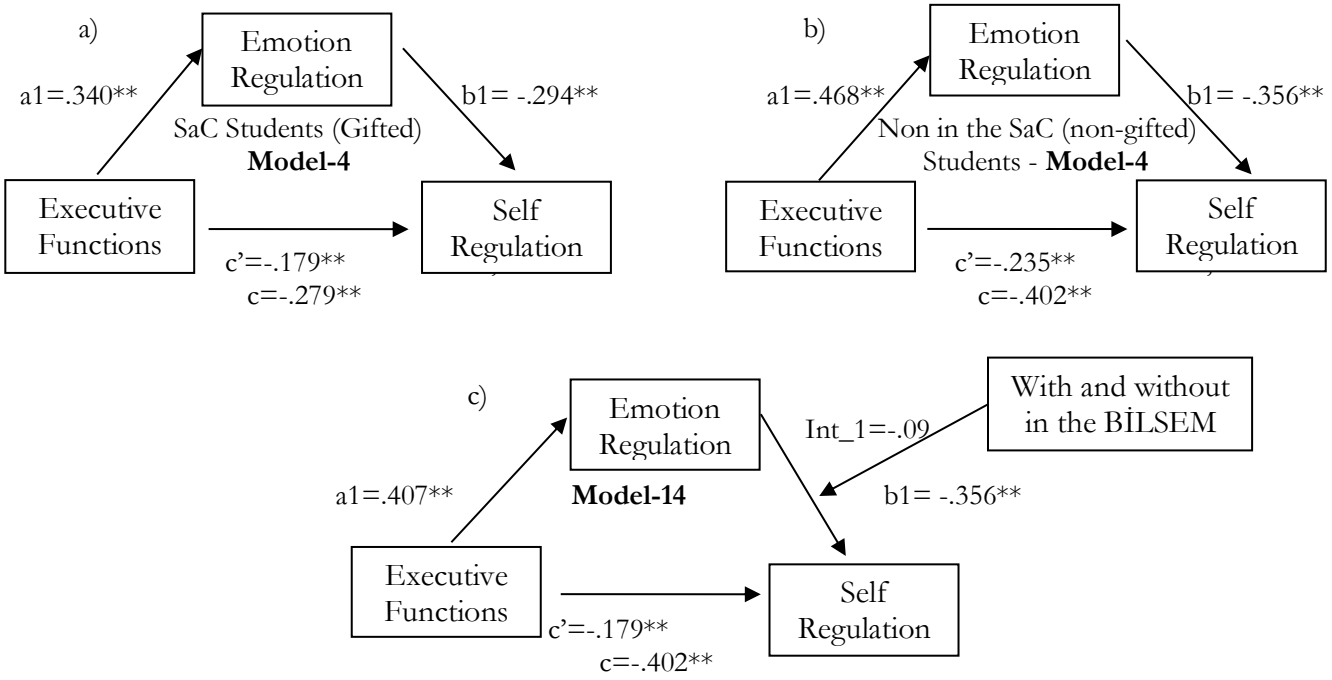

Figure 2.
Model-4 and Model-14 Mediation Analysis Results for Gifted and Nongifted Students Enroled Secondary School Level

In Figure-2a and 2b, the a, b, c and c 'ways of emotion regulation difficulties in the relationship between executive functions and self-regulation skills and regression coefficients related to these paths are given. Considering the findings of middle school students both in with and without SaC in Figure-2a and 2b, it is seen that the executive functions, which are the predictor variables, significantly affect the emotion regulation difficulties, which are the mediator variable (SaC, b=.340, %95 CI [.2032,.4775], p<0.001; Not in SaC, b=.468, %95 CI [.3472,.5894], p<0.001). In the next section, the combined effects of emotion regulation difficulties (b-path) and preditors executive functions (c 'path), which are the mediator variables for both groups, on self-regulation skills, which are the dependent variable have been examined. According to this; Emotion regulation difficulties were observed to significantly and negatively level affect self-regulation skills for both groups. (SaC, b=-.294, %95 CI [-.3846, -.2042], p<0.001 ; Not in SaC, b=-356., %95 CI [-.4244,-.2888], p<0.001). In addition, it is seen that executive functions significantly and negatively affect self-regulation skills for both groups (SaC, b=-.179, %95 CI [-.2545, -.1040] p<0.001; Not in SaC b=-235., %95 CI [-.2996,-.1706], p<0.001). In Figure-2c, PROCESS macro Model-14 is used to see whether the indirect effect depends on the moderated variable. Here, the analyzes were carried out over data set of 307 people. Moderated was examined through the variable of with and without at SaC. According to the results, the significance level of the "b" value of the Int_1 variable, which consists of the interaction of emotion regulation difficulties and the moderator variable, was examined. Accordingly, it was seen that the moderated effect of the variable was not significant (b=-.090, %95 CI [-.1888, .0083], p>.05).

Table 3.
Mediation Analysis Results: Direct, Indirect, Total And Moderated Mediation Effects

Effect	B Coefficient	Lower bound[a]	Upper bound[a]
SaC			
Total Effect	-.279**	-.358	-.200
Direct Effect	-.179**	-.254	-.104
Indirect Effect	-.100**	-.153	-.054
Non in the SaC	B Coefficient	Lower bound[a]	Upper bound[a]
Total Effect	-.402**	-.472	-.331
Direct Effect	-.235**	-.299	-.170
Indirect Effect	-.167**	-.227	-.113
SaC- Moderated Mediation Effects	B Coefficient	Lower bound[a]	Upper Bound[a]
Index of Moderated Mediation	-.037**	-.085	.008

**p<0.001; Note= B. Coefficient: bootstraping regression coefficient=5000 bootstrap based on sample., CI, [a] %95 bootstrap confidence interval.

According to Figure-2a, 2b, 2c and Table 3, direct, indirect and total effects were found to be significant for both groups with and without in SaC [(SaC= total effect (b=-.279, %95 CI [-.358, -.200], p<0.001); direct effect (b=-.179, %95 CI [-.254,-.104], p<0.001); indirect effect (b=-.100, %95 CI [-.153, -.054], p<0.001), (Not in SaC= total effect (b=-.402, %95 CI [-.472, -.331], p<0.001); direct effect (b=-.235, %95 CI [-.299,-.170], p<0.001); indirect effect (b=-.167, %95 CI [-.227, -.113], p<0.001)]. That is, it is seen that the mediating effect of emotion regulation difficulties is statistically significant for both groups.

In order to test whether the indirect effect is due to the moderated effect or not, the moderated mediation indexes were examined in the moderated mediator effect model analysis. It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect (b=-.037, %95 CI [-.085, .008]).

Discussion and Conclusion

This section is with and without in SaCs in Turkey and executive functions of middle school students and the results of the mediating role of emotion regulation in the relationship between self-regulation skills were discussed.

The direct, indirect and total effects of emotion regulation difficulties were found to be statistically significant in the relationship between executive functions and self-regulation skills of secondary school students with and without in SaC. In addition, it was found that there was a positive and significant relationship between executive functions and emotion regulation difficulties for both groups. We can say that decrease in executive functions will decrease emotion regulation or increase in executive functions will increase emotion regulation. When the literature is reviewed, it is seen that similar results were found in studies on executive functions and emotion regulation (Thompson & Calkins, 1996; Barish, 2012; Öztemür, 2018). In the study, a negative correlation was found between emotion regulation difficulty scores and self-regulation scores in two groups. According to this result, we can say that as the emotion regulation difficulty scores increase, self-regulation scores will decrease, and as the emotion regulation difficulty scores decrease, self-regulation scores will increase. Koole & Aldao (2016) and Wagner & Heatherton (2014) made statements supporting the results in their studies. In the study, a negative relationship was found between executive functions and self-regulation for both groups. We can say that the decrease in executive functions scores will increase the self-regulation scores, while the increase in the scores of executive functions will decrease the self-regulation scores. Hofmann et al. (2012) mentions the existence of a relationship between executive functions and self-regulation.

If we evaluate the model in general, we can say that executive functions predict both emotion regulation and self-regulation. In this case, it is seen that emotion regulation is a mediating variable in the relationship between executive functions and self-regulation skills of secondary school students with and without SaC. That is, part of the effect of executive functions on self-regulation skills is through emotion regulation control. According to the result, it can be said that the studies to be done to develop executive functions may have a positive effect on self-regulation skills, but developing them together with emotion regulation skills can increase this effect. Jones et al. (2016) focused on the relationships between executive functions and inhibitory control in their research, and stated that these two skills were effective on self-regulation skills, similar to the results of the research. There is no study in the literature that examines executive functions, emotion regulation and self-regulation variables together and looks at the relationships between them through a mediation model. It was observed that especially one of the variables in question was considered and there were studies to compare different groups. In studies comparing gifted students and normal groups, executive functions (Leana-Taşcılar & Cinan, 2012), self-regulation skills for scientific learning, self-regulated learning strategies (Kanık, 2017), executive functions (Al-Hmouz & Abu-Hamour, 2017; Rocha et al. 2020) like variables has been found to be used. With the increase in neurocognitive studies, the contents of concepts such as, executive functions, self-regulation and emotion regulation are expanding. However, interest in these concepts has started to increase gradually in different disciplines. However, there may also be confusion about the concepts arising from different uses. Establishing a language unity on the subject can increase the number of studies to be done. In addition, the use of contemporary statistical approaches such as situational mediation analysis, structural equation models, and indirect impact analysis with bootstrap method is newer. This situation may explain the limitations of the studies.

It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect. In this case, we can say that emotion regulation difficulty plays a mediating role in the relationship between executive functions and self-regulation. However, in this relationship, it can not be said that with and without in SaC makes a significant difference in terms of the effect of the model. In summary, it can be concluded that the model created creates statistically similar effects in both groups. There is no found similar study about SaCs in the literature. The research will be an example for the studies to be done in this aspect. In addition, there are different institutions abroad that support gifted students. İt can use working in these institutions as an example. The fact that the model

created for both the gifted group and the group not identified as gifted yielded significant results for both groups is also important for the generalizability of the study.

Recommendations

It may be more effective in terms of student development if teachers, families and experts examine executive functions, emotion regulation and self-regulation studies together. In future studies, researchers can develop new models in which they consider executive functions, emotion regulation and self-regulation variables and components together. The effect of the model can also be examined in different groups (special learning disability, autism, mental disability, etc.).

Limitations of Study

Due to Covid-19 process, parental inventory was used instead of performance tests to determine executive functions. The teacher inventory was not preferred because it consists of 86 items and will be filled in for each student. These situations can be evaluated in future studies.

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Research Article

The effects of using games on teaching vocabulary in reading comprehension: a case of gifted students

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Abstract

Using educational games for the improvement of the students' vocabulary retention has been widely used in the educational setting for many decades. The acquisition of vocabulary as part of the subskills of the English language is considered a vital part of learning any target language. Hence, this research study aimed at exploring the effects of using games to teach vocabulary in reading comprehension among freshmen students at Takhar University. This study has employed mixed-method research involving pre-test, post-test, and a semi-structured interview. The researcher employed descriptive statistical analysis to analyze the frequency and percentage of the respondents and inferential statistical analysis to mainly T-test to figure out whether there is any significant difference in the mean score of the pre and post-test across gender. In addition, the inference method of the content analysis is also used for the semi-structured interview to identify whether games are motivating the students to enhance their vocabulary knowledge of the student. The targeted group was 20 freshmen students from the English department. The findings of the present study revealed that employing games are effective and beneficial for teaching vocabulary in reading comprehension. Moreover, the findings showed no significant difference in the mean score of the pre and post-test across gender. The study also indicated that games improved students' motivation in acquiring new vocabulary. Besides, it is hoped that educational games are more attractive, fun, and helpful in teaching and as well as building the vocabulary knowledge of the students. It is proposed that teachers should look for educational games and techniques to involve their students in the use of the creative expression in the enhancement of vocabulary knowledge.

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Introduction

Reading comprehension is one of the key strategies of reading skills that allow students to make written texts meaningful (Hashemi and Kew, 2020). It is proposed that understanding through participation in written language is the process of creating and making sense. It is a system that allows students to make sense by communicating with the text. Reading comprehension is an essential component that involves students reading and understand a given text. It highly assesses the reading ability of learners and their aptitude to understand a text. Research has shown that students who lack vocabulary, will impede their comprehension of reading (Semtin and Maniam, 2015). This is because vocabulary teaching has always been a daunting activity for teachers and students, as vocabulary in the ESL classroom is given limited emphasis. Educational games are, therefore, one of the strategies in ESL classrooms to teach vocabulary. Educational games have been used in educational contexts for many decades (Pekalongan, et al. 2019). Therefore, employing educational games is hoped to be beneficial for students of the English department at Takhar University, Afghanistan.

In addition, Vocabulary Acquisition is regarded by students as one of the hardest components of learning the language. However, vocabulary is considered one of the sub-skills of the language (Orfan, 2020). Although, there is

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not much attention paid to making it simpler and easier for enhancing the vocabulary knowledge of the students. Moreover, vocabulary knowledge helps improve the social potential of the student and also in improving the communicative skills of the student. For students to develop their vocabulary skills, different ways and techniques can be helpful. But there are no clear rules that allow vocabulary to be learned by students. Every student has their way of building vocabulary knowledge. Various studies have shown that learning new vocabulary by using games has helped to increase vocabulary retaining and make language learning fun and inspiring (Hoa and Trang, 2020; Ma and Yodkamlue, 2019; Selvi and Çoşan, 2018).

However, using educational games for the enhancement of the vocabulary skills in the upper classes of the Afghan classroom is not given much consideration and attention. Furthermore, the acquisition of vocabulary in the Afghan context is more based on the traditional way. According to Orfan, et al. (2021), grammar translation method is considered as the dominant approach among Afghan university lecturers. The teachers are used to teach vocabulary by repeating its pronunciation and meaning several times and as well as requesting the students to follow the same rule to memorize the vocabularies. Following in the footsteps of prior studies on the use of educational games to teach vocabulary, the study was carried out to teach vocabulary in reading comprehension using educational games. This paper, therefore, targeted three topics to be explored in the Afghan context, which are educational games, reading comprehension, and motivation to figure out the effects of using games in teaching vocabulary and as well as to identify how educational games motivated the students to build their vocabulary knowledge. In this regard, the focus of our attention in the current study is to teach vocabulary through games, the encouragement of the student, and the impact of vocabulary on reading comprehension. Therefore, the current mixed-method research helps to find out the results of employing games in teaching vocabulary and motivation among Takhar University freshmen students to learn vocabulary.

Literature Review

The emphasis of every student and instructor has recently been on improving vocabulary awareness through games. Donmus (2010) suggested that games have significant value in enhancing the vocabulary skills of students in educational toys. Similarly, the results of a study by Barabadi and Khajavi, (2017) suggest that the combination of education and games can be both educational and entertaining. The world of the class can be made more communicative when learning vocabulary through games. Besides, Murray and Ian, (2018) accepted that engaging students in activities such as using games allows learners to more quickly recall new vocabulary. Game-based education helps the learning process to be fearless and meaningful. The acquisition of vocabulary by using games has encouraged students to contribute with each other and enhance the knowledge of their vocabulary (Ebrahimzadeh and Alavi, 2016). They are also supportive in keeping teachers to be boring and also helping them feel free to instruct students in an expressive way of learning.

In learning new vocabularies, games have plenty of advantages and effectiveness. For all students in the class, games will create a friendly atmosphere where every student is interested in a fun and competitive way of the supportive learning environment. In this way, in a group, the students will have the ability to assist each other to solve the issues posed when working together. They will also stimulate the imagination of students and develop their capability to practice the language entertainingly (Rasti-Behbahani and Shahbazi, 2020; Akramy, 2020). As can be seen, it can bring pleasure and motivate both teachers and learners to make the learning process significant and comprehensible by teaching vocabulary through games. In a language teaching classroom, it is not possible to disregard the essential role of games in educating and learning new vocabulary.

Learning vocabulary plays a vital role in reading comprehension. To understand the text as easily as possible, reading comprehension needs enough vocabulary awareness. The researchers claimed that reading skill as the main skill of the language and vocabulary skill as the sub-skill are interrelated with each other. Lack of vocabulary will affect learners' understanding of reading, and reading comprehension is considered a major necessity and vital factor (Hashemi and Kew, 2020). Ibrahim et al. (2016) recognized that there is a relation between vocabulary and reading comprehension as student concurrently develop their vocabulary knowledge. Thus, reading comprehension and vocabulary are the dependable elements that can make the learning process simple and understandable.

Rolletschek (2020) claimed that it was easier for those with a strong background in vocabulary knowledge to understand the text comparing to those who lack vocabulary knowledge. Moghadam et al. (2012) studied the vital role of vocabulary in reading comprehension in the Malaysian context, it was found that learning vocabulary is the primary goal of language learning, whether it is a second or a foreign language. Researchers accepted that vocabulary competence is the fundamental factor for skilled learners and suggested that those with excellent vocabulary

knowledge would be effective in comprehending the reading text (Camacho &Vásquez 2019; Ovalle et al. 2020; Kamnardsiri et al. 2017; Li & Cummins, 2019; Miyazaki, 2019). Likewise, a study by Kameli & Baki (2013) investigated the effect of the level of vocabulary awareness on EFL reading among Iranian students. They claimed that vocabulary awareness has an influence on reading comprehension at different levels of learners.

Several methods and techniques help students to enhance their vocabulary skills. Motivation, whether intrinsic or extrinsic motivation, is one of the main factors in enhancing the vocabulary knowledge of the students in reading comprehension (Franciosi et al. 2016). There are also several ways, however, to inspire learners to actively engage in learning and developing their knowledge of vocabulary. This objective can be accomplished by using games for the enhancement of the vocabulary knowledge of the students in the classroom. It is also distinguished that educational games can be inherently and extrinsically driven to provide an enjoyable atmosphere. This learning process can be over-learning and can inspire learners to learn and to promote the learning process for the teachers. (Bakhsh, 2016) thought that it offers a social function and social meaning to inspire students by using games in learning vocabulary. Student interpersonal skills and even verbal engagement in a cooperative manner with group learning.

Definition of Reading Comprehension

Reading uses receptive abilities and defines the language potential of a learner. Chung and Bidelman, (2021) described reading as the text implementing values from written documents. This desires the unity of the multifarious initiation of knowledge connected with it. Sowell (2018) strongly supports this view, explaining reading as a mechanism of conceiving meaning that includes the existing awareness of the reader, text content, and text reading. Meanwhile, Shimono (2018) claimed that reading is a mutual `progression between readers and reading texts that result in a fluent reading of the text. In this regard, while reading readers can often communicate with the texts as they can derive the meaning by using different kinds of information, such as bottom-up processing and top-down processing. Dindar et al. (2021) also indicated that reading aims to obtain correct information from a reading background that the writer intended to attain from the reader. Li and Cummins (2019) argued that reading creativity can be described as an intellectual skill a person can use when engaging with the circumstance they are reading. Most importantly, reading is a cognitive and productive activity as the students need to connect written symbols and use his/her prior experience to understand and extract meaning from the sense of reading and the author's purpose. Reading, as a result, helps learners understand a text.

Comprehension refers to the process of acquiring and making meaning through communication and written language participation (Miyazaki, 2019). He described comprehension as the growth in the mind of the reader to design meaning by engaging with the context. Readers do this through the combination of their previous knowledge and experience, text details, and their views on the text. In the meantime, Chung and Bidelman (2021) claimed that understanding of reading refers to a growth in a text's context. The reader's primary objective is to obtain an interpretation of the text as opposed to knowing the meaning of sentences. Reading comprehension is thus a process of formulating language, recognizing, and responding to what is written in a particular text.

Strategies of Reading Comprehension

Besides, three styles help to explain reading: interactive, bottom-up, and top-down. The cognitive mechanism that occurs when readers interrelate with the text is clarified by these models. A decoding method and a set of written symbols into aural sounds is the principle of the bottom-up reading model (Barabadi and Khajavi, 2017). In other words, the emphasis of this method is first on letters, then on sentences followed by phrases in the text. According to this approach, the comprehension of the text is accomplished based on the number of details in each paragraph. The top-down model, however, is the opposite of the bottom-up one, since readers use their previous experience to refer to a new text in this top-down model. This method, therefore, starts by concentrating on larger aspects of the document, such as the title, basic points, and then focuses on reduced features of linguistics in the text. An interactive strategy of the reading model is the third model. This reading model refers to an example of reading that requires the concurrent involvement of both top-down and bottom-up procedures. As Pourhosein and Gilakjani (2016) claimed that sufficient reading entails processing both top-down and bottom-up. Teachers can look for guidance in reading based on this model to boost the abilities of L2 students.

In reading comprehension there are limited methods that play an important role: applying and stimulating context information, aggravating and asking questions, creating an inference, anticipating, epitomizing, visualizing, and tracking comprehension. One of the methods that help the reader's previous knowledge to better interpret a reading text is to stimulate and apply context knowledge. This understanding consists of the interactions of individuals with their principles of understanding how the written text works, including word recognition, print concepts, word sense,

and how the text is created (Gilakjani, 2016). Another technique for reading comprehension is creating and answering questions. Readers would like to ask themselves some important questions to get a clearer understanding of the text they are reading. This approach allows readers to recognize the main concept and essential details in a text (Davenport et al. 2017). Making inferences is another approach to reading comprehension (Tarchi, 2015). In this method, readers need to infer from data in a text. The data from the text and their previous information will be combined.

Predicting is another skill of the reading techniques that help readers to guess by getting information about a text. To learn new information from the text, the readers use their prior knowledge. The content may be expected by readers based on the author and the title of the text. Davenport et al. (2017) once mentioned that for readers to remember the text they read quickly, encapsulating is a critical technique. By doing this, readers can incorporate all the data into a reading text and describe it using their own words. As readers use this approach, they can understand the text's structure, the text's emphasis, and the way opinions are connected. Effective narrative text summarization involves topics such as connecting events in a plot or recognizing basics that stimulate the activities and behavior of a character. As one of the techniques, visualizing helps readers to imagine to grasp a text. Readers who imagine when they read without any assistance, recall the content of the text and as well as help them remember some non-concrete points and significant names (Rasti-Behbahani and Shahbazi, 2020). Finally, monitoring is one of the successful techniques that enable readers to use acceptable and different strategies in various categories of manuscripts. Besides, it allows learners to make the best decision-maker, as they can select and use a suitable strategy when appropriate.

Educational Games

Vocabulary in the English language is considered to be one of the sub-skills of the four integrated skills (writing, reading, speaking, and listening). It is also recognized among learners as a hard part of language learning. There is also no clear and effective rule and method for helping students to learn the vocabularies and terminologies. More precisely, this study aims to figure out how to teach vocabulary using games, how to inspire students to learn vocabulary to enhance their ability to communicate, and how successful vocabulary in their academic contexts is to understand any reading text.

It is very fun to learn vocabulary through games and has garnered a lot of popularity among teachers and students. Sowell (2018) believed that because they support making language education enjoyable, the importance of educational games has increased in language education. He noted that it can be entertaining and educational when a game is selected as a medium for teaching and educating students to improve the classroom atmosphere. As Riahipour and Saba (2012) accepted that typical practices such as memorizing long lists of words, derivations, translation, word repetition, fill-in-the-blank exercises are all hard and repetitive to recall for students.

Similarly, the impact of games on the level of development of Iranian EFL vocabulary awareness among kindergarten students was investigated by (Aslanabadi and Rasouli 2013). Their aim of the research was to find out about every realistic and enjoyable way to learn vocabulary. To perform their study, the researchers covered two kindergartens. The researchers then split the students into two experimental and control groups. An online language teaching game is given to the experimental group and periodic class lectures are given to the second group, which is the control group. Their study results showed that game teaching not only retains the class alive and enjoyable but also helps learners to enhance their skills and trust in vocabulary. Besides, Hoa and Trang (2020) reported that those who use games in the classroom to teach new words to their students have fun and a pleasant environment rather than those who teach their students the traditional language.

Techniques are not commonly used to teach and practice vocabulary, such as using games. They are only used by both teachers and students for a time or occasion that can be powerless and useless. Learning vocabulary through games is helpful and has many advantages. Prabha and Abdul Aziz (2020) stressed that games should provide learners with a learning experience that is fun-filled and calming. Students can use language in a non-stressful way after studying and using new vocabulary. Although students learn vocabulary and their emphasis is on the message rather than the language. Therefore, the linguistic forms don't matter to them and they just feel free to preserve the theme. This would remove the fear of publicly assessing or evaluating students negatively and this may be the primary reason for students to reduce their anxiety and learn more in a friendly environment (Miyazaki, 2019).

Research Questions

- Is there any effect of using games on teaching vocabulary in reading comprehension?
- Is there any significant difference in the scores of pre and post-test across gender?
- How is the motivation of games in enhancing the vocabulary knowledge of the students in reading comprehension?

Method

The Design of the Research

The study employed a mixed-method design, qualitative and quantitative (experimental research) to achieve a comprehensive understanding of the research topic. The qualitative data is obtained through the use of interviews and whereas the quantitative data comes from the pre and post-test. Descriptive and inferential statistical analysis is employed to analyze the data in the study. For the qualitative analysis, the researcher employed a semi-structured interview analysis through the content analysis method where certain themes have been inferences to be categorized. The qualitative approach is used to delve further into the minds of respondents and ask more open questions, and as well as it allows the researcher for more intense and accurate data to be collected (Daqiq and Hashemi, 2021).

Participants

The researcher employed convenience sampling and purposeful sampling techniques to choose the participants. Convenience sampling is a time constraint and easy to meet the students (Semry and Mahendran 2015). The present research also used purposeful sampling, which is also known as judgment sampling. Based on their results in the previous exam, the samples are selected (Ilker et al. 2015). From the same 20 participants selected earlier, 16 participants participating in the pre-and post-test, and 4 participants are chosen for the interview session.

Data Collection Procedure

The pre and post-test and as well as interview sessions are used as the methods for collecting the data in this study. Kelly (2019) indicates that the pre-test shows the degree of comprehension of a student before teaching, while a post-test assess the learning process of the students. Before and after the implementation of the action, the pre-test was conducted by using games as the experimental group where the students were expected to match the vocabulary with their meanings. While the control group was given the treatment as the traditional way of teaching. To show the progress and development in the performance of the students, the number of correct answers and percentages were used. In addition to the pre-and post-test methods, a semi-structured interview was used to assess how successful are games in motivating the students for the enhancement of their level of vocabulary knowledge in reading comprehension. Kallio et al. (2016) clarified that a semi-structured interview allows participants the ability to articulate their point of view. It boosts two-way contact in which the interviewer may ask questions about those being questioned.

Materials and Instruments

Before and after the implementation of the action, the pre and post-tests were carried out using five distinct games such as memory game, ladder, snake and bingo, Pictionary, and wheel of fortune where the students were expected to align the vocabulary with their meanings in the pre-test and the traditional method of teaching vocabulary was followed in the control group. None of the students managed to pick or fit all 10 terms to the correct meaning from the pre-test result. The lowermost percentage recorded by the students in the pre-test is 20 percent, where that individual student will correctly select or match 2 out of 10 words to their context.

Data Analysis

The analysis of the data was carried out through the Statistical Package of Social Science (SPSS) software, version 26. The descriptive statistical analysis was used to compute the frequency, percentage, and mean. Besides, the inferential statistics were employed to examine the differences of pre and post-test scores across gender and as well as for comparing the pre-test and post-test scores. Moreover, semi-structured interview sessions were conducted with four students, especially about how it helped them to develop their vocabulary knowledge by reading comprehension. The researcher analyzed the outcomes of the data obtained from the semi-structured interview through the content analysis method.

Results

Table 1.
Descriptive Statistics for Respondents' Age

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	10	50.0	50.0	50.0
	Female	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

The participants of the present study were 20 Afghan university EFL students including male and female from freshmen class at Takhar University. There were equally 10 male participants and 10 female who participated in the study.

Table 2.
Descriptive Statistics for Respondents' Gender

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-20	9	45.0	45.0	45.0
	20-23	7	35.0	35.0	80.0
	23-25	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

According to Table 2, the age of the respondents ranged from 18 to 25 where all the students at the undergraduate level fit between these ages. There were 9 respondents who had 18-20 years old and 7 respondents whose ages ranged between 20-23 years old. While 4 respondents had 23-25 years old.

Pre-Post Test

According to Table 3, students, S7, S9, and S13 recorded the same percentage in the pre-test, which is 20 percent. The lowest percentage scored by the students in the post-test is 70 percent, where that certain student will correctly choose or match 7 out of 10 words to their context. Only one student, S13, had a post-test score of 70%. For post-test, the lowest percentage of the pre-test is 20 percent, while 70 percent indicates that the action works and is successful for students to develop reading comprehension vocabulary. As can be seen from the results, all the students in the post-test managed to select or fit more than 6 terms correctly to their meanings.

Table 3.
Descriptive Statistics of the Students Before and After the Implementation of Games

Respondents	Number of Correct Answers	Pre-Test Scores (100%)	Number of Correct Answers	Post-Test Scores (100%)
S1	4	40	9	90
S2	5	50	8	80
S3	5	50	10	100
S4	4	40	8	80
S5	3	30	9	90
S6	4	40	10	100
S7	2	20	8	80
S8	3	30	8	80
S9	2	20	8	80
S10	4	40	8	80
S11	3	30	8	80
S12	6	60	9	90
S13	2	20	7	70
S14	3	30	9	90
S15	3	30	8	80
S16	5	50	10	100
S17	3	30	8	80
S18	6	60	10	100
S19	3	30	8	80
S20	6	60	10	100

This indicates that in reading comprehension, there was a great increase in the vocabulary skills of the students. In the pre-test, the highest percentage scored by the students is 60% where that specific student can correctly select or match 6 out of 10 terms to their meanings. In the pre-test, three students, S12, S18, and S20, scored 60%. On the other side, where 5 students scored maximum marks, the highest percentage scored by the students in the post-test is 100 percent. These 5 students can correctly pick or fit 10 words to their meanings.

Table 4.
The Descriptive Statistics of Respondents

		N	Mean	Std.Deviation	Std.Error	Lower	Upper	Minimum	Maximum
Pretest	Male	10	2.4000	1.34990	.42687	1.4343	3.3657	1.00	5.00
	Female	10	3.7000	1.05935	.33500	2.9422	4.4578	2.00	5.00
	Total	20	3.0500	1.35627	.30327	2.4152	3.6848	1.00	5.00
Posttest	Male	10	8.2500	.95015	.30046	7.5703	8.9297	7.00	9.50
	Female	10	7.8000	.91894	.29059	7.1426	8.4574	7.00	10.00
	Total	20	8.0250	.93857	.20987	7.5857	8.4643	7.00	10.00

Table 4, illustrates the mean differences between male and female respondents. As can be seen, the mean score of the male respondents was 2.4 in the pretest while the same respondents' mean scores have been dramatically changed to 8.25 in the post-test. Similarly, the mean score of the female respondents was 3.7 in the pretest while the mean score of the female respondents in the post-test was considered 7.8.

Table 5.
The Significant Difference Between the Pre and Post-test

	F	Sig.	t	df	p	Mean	Std. Error	Lower	Upper
Pretest	.750	.398	-2.396	18	.028	-1.30000	.54263	-2.44002	-.15998
Posttest	.355	.559	1.077	18	.296	.45000	.41800	-.42818	1.32818

As can be seen in Table 5, the result of the T-test shows that the P-value for the pre-test was greater than the alpha level p=0.39>0.05. Therefore, it can be concluded that there is no statistically significant difference in the pre-test scores between males and females. Similarly, concerning the post-test, the P-value based on Levene's Test for equality of variance is greater than the alpha level p=0.55>0.05. Therefore, it can be also concluded that there is no statistically significant difference in the post-test scores across gender.

Semi-Structured Interview

The researcher decoded three themes that were motivation, the interest of students, and the features of games. These three themes allowed us to understand how games in reading comprehension helped students to develop their vocabulary. The emerging theme, first and foremost, was motivation. The students were motivated and get inspired through the use of games, and as well as able to understand the meaning of the words. The evidence from the interview showed that games increased the incentive of learners to develop vocabulary in reading comprehension. For example, when the answer was happy, happier, S15 felt proud. Similarly, S1 thought the same as well. The reaction was "happy." Next, it is indicated that games prompted the interest of learners to learn or understand the sense of vocabulary by playing games for the second subject. The proof can be seen in the reply from S11, who said, "Yes, it's easy." Finally, the theme extracted from the interview sessions was the games' characteristics.

Table 6.
Content Analysis of Student's Interview Sessions

Themes	Keywords/Categories	Participants	Transcription
Motivation	happy	S1	Happy
		S15	happier
	proud	S11	I am proud
	excited	S16	I am excited
Students' Interest	Easy	S11	Yes, it is easy
	Helpful	S11	Yes, helpful
		S16	Yes, helpful
	interesting	S15	Yes, interesting
	understandable	S1	Yes, I understand the words
	Like	S1	Yes, I like it because can understand the words
		S15	Yes, I like the games
Features of The Games	Visual	S11	Yes, I like it because it has pictures

It was clear that pictures served as guides to grasp the significance of words for students. Maryam (2012) supported this by stating that positive images helped to explain the textual content and encouraged learners to create bridges between verbal (text) and non-verbal (illustration).

Discussion and Conclusion

Concerning the first research question on whether there are any effects of using games on teaching vocabulary in reading comprehension or not. The findings of the study indicated that educational games have improved the vocabulary knowledge of the students. Their comprehension and understanding of the vocabulary have also been enhanced. The findings of the study are similar to the studies conducted by (Alhajaji et al. 2020; Camacho Vásquez and Ovalle, 2019; Karaaslan et al. 2018; Miyazaki, 2019) who indicated that educational games are the key factors to improve vocabulary knowledge. Before this, they felt it was hard to learn English, but when the use of educational games was introduced in the classroom, students felt more energetic and excited to join in in the lesson given to them. The findings of the study also show that a variety of educational games benefited students in learning and building

new vocabularies and as well as help them to comprehend the reading text efficiently. This finding is in line with the findings of a study carried out by Allen et al. (2015) who believed that using proper games while teaching students can enhance their comprehension and as well as their ability to build their vocabulary knowledge. Students are always stressed that they and other students who don't focus in class should improve a little bit of their vocabulary knowledge. To ensure that all students engage in the lesson and learn new vocabulary through playing games, it would be better to strengthen their memory to be able to memorize it by just reading it the normal way.

Besides, the findings of the current study show that students are more likely to play educational games or a kind of language game that makes them feel interested in learning vocabulary knowledge. For children and adults, educational games have always been common and fun activities, it will be more interesting because students will focus on various activities to ensure the learning process is going well. Thus, this study indicated that educational games have motivated students to take part in each session of vocabulary learning. Hence, the findings of this study are consistent with these studies conducted by (Derakhshan and Davoodi Khatir, 2015; Ebrahimzadeh and Alavi, 2016) where they indicated that educational games motivated students and increased their participation in learning vocabulary. In this regard, it is for teachers to use language games to enhance the vocabulary knowledge of the students in reading comprehension, as the vocabulary provides a lot of value. In this respect, educational games are not going to delay the lesson but rather help the students to comprehend the reading text easily and effectively. Most importantly, the findings of the study show that educational games that were employed once should not be used again within a week, because they will feel bored and will not participate every day. This finding is confirmed by (Dindar et al. 2021) who focused on using games only once to teach the students. By using educational games, the students can improve their engagement, memorize new words, and as well as explain the new words.

Moreover, educational games have positive implications for learning and enhancing the vocabulary knowledge of the students. This is because students do not feel bored when learning these new words through educational games. The findings of this study are in line with the study conducted by Chen and Hsu (2020) where they have agreed on the effects of games in teaching vocabulary. Students can also be more excited when educational games are being used in the classroom and need to memorize the words they are learning immediately. In the sense of encouragement, educational games have a great influence on learners' vocabulary enhancement and memorization as well as on their psychological side in reading comprehension. This proved to be a successful way for both teachers and students to consolidate and use new lexical objects. As for the second research question on whether there is any significant difference in the mean scores of pre and post-test across gender. The findings of the study showed that there is no statistically significant difference in the pre and post-test scores of the respondents across gender.

Considering the third research question on how is the motivation of games in enhancing the vocabulary knowledge of the students in reading comprehension. The findings of the study in this respect indicate that motivation is a key factor for the enhancement of the vocabulary knowledge of the students in reading comprehension. This finding has been supported by (Elaish et al. 2019; Khalidiyah, 2017; Shahriarpour and Kafi, 2014) who believed that using games can motivate the students to improve their vocabulary knowledge. Vocabulary terms are not for a day's study, but the students need to practice them every day so that they can use the words and know how to use them. In other words, for a specific student, vocabulary is very important because it takes some time to acquire the skills to learn something new. In the classroom, we just need to concentrate and the students can apply the urge to learn something new. There will be a time when students will not take part in the lesson as they tend to be in their way, we as a teacher should know how to draw the attention of the students so that they can come and take part in the learning process. Since the students will be left out if the students do not participate, students will not be able to offer an example or clarify in their own words when it comes to explaining the meaning of the new words.

Considering that, vocabulary is a sub-skill of English language skill, especially for beginners who try their best to learn new words as much as possible, the instructor should use all his background to teach this skill in various ways. He or she needs to select a method that correctly collects all the factors that make it easier for them to understand. Several studies have agreed that language games, as a teaching tool, have a significant influence on improving the vocabulary of learners (knowledge, memorization, and use) as well as on their psychological side (motivation, relaxation, and self-confidence). The current research is carried out to illustrate the effects of using vocabulary through games in reading comprehension. In conclusion, learning vocabulary through games has been considered more effective in reading comprehension and will be more energetic for students who are willing to enhance their vocabulary knowledge in a strategic and fun way. On the other hand, employing games for teaching and learning vocabulary allow the students to participate more frequently.

The goal of the current study was to examine the impact of using games on students' vocabulary knowledge in reading comprehension and to find out the efficacy of games in encouraging students to develop their vocabulary knowledge in reading comprehension. Therefore, the results of this study showed that the use of five different games in reading comprehension steadily increased the vocabulary skills of the students. In addition to that, without the help of facilitators, the students were able to understand and recall the words. This helped to inspire the students to learn the vocabulary when playing the games introduced during the class. Therefore, on the other hand, teachers have to take responsibility for attending to the needs of all students to maximize their vocabulary learning. It has also been shown that in reading comprehension, educational games have a significant influence on the vocabulary skills of students. In conclusion, the results of the current study have indicated that teaching vocabulary through educational games can increase the motivation of students as it provides them with enjoyable activities.

Recommendations

This paper has some recommendations for the use of educational games by students and teachers to enhance the vocabulary knowledge of the students. It is proposed that teachers should look for techniques to involve their students in the use of creative expression. Students may use the language more communicatively by using vocabulary games. Due to their benefits, educational games are widely recommended for both teachers and students to use in enhancing the vocabulary knowledge of the students. Because, they offer students accountability and the chance to be physically and mentally involved, and are student-centered rather than teacher-centered, easily attract the interest of children, promote their engagement, and are fun to play in the structured academic phase, and socialize students. Students often learn or grow several skills, such as taking turns, working independently, and working as a team with others for a common goal.

The Limitations of the Research

The present study is limited to several limitations number such as the number of participants was one constraint and less N= 20. Another limitation was, the researcher selected all the students from the same class (freshmen). Hence, the power of the study was lower than desired with the small number of participants (N=20). Moreover, this analysis was limited to one university whereas the large population from many universities could be more effective and generalizable. This university may not be representative of other universities, therefore, it restricts the generalizability of the results to other universities. Finally, it should be remembered that introducing more games into language classes to promote learning is a new strand of study. It is possible to consider the impact of learning concrete and abstract words through various games as another line of study. Mobile-assisted language learning apps can help learners develop their vocabulary domain, so the influence of various mobile applications on vocabulary learning is a good area of research to find out.

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Research Article

Greening the school for sustainable development: Tshwane North District case

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Abstract

The aim of the study was to answer the question that arises about what knowledge do role players have about sustainable development through greening schools. The research employed qualitative multiple case study design in three purposefully sampled schools at Tshwane North District, Gauteng Province of South Africa. Besides literature review and theoretical framework of sources, the data was collected through focus group interviews, direct observation and document analysis. Data collected was analysed with thematic content analysis. The results revealed that school role players have little knowledge on greening schools to ensure sustainable development; and opportunities and threats need to be addressed by role players. These were attributed by lack of policy framework and capacity building on how greening schools should be implemented. The study recommended creation of an integrative assessment of green schools that embraces practical activity plan on curriculum and infrastructure. Further research studies in the area of greening schools are recommended for effective sustainable development on school resources.

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Introduction

The original work of the field of Environmental Education (EE) embracing sustainable development (SD) was pioneered in the twentieth century by the Stockholm conference (1972). The United Nations Development Programme (UNDP) emphasises SD to be achieved by all member states by 2030. The 17-point sustainable development goals (SDGs) were adopted by United Nations (UN) member states in 2015 (Kariaga et al. 2013, p. 246), due to the failure of most countries to achieve their set of targeted millennium development goals by 2015 (Ogenokokwo, 2017). We are currently in the era of UNDP (2015-2030) and SDGs create a positive image of the future by targeting good living conditions for all by 2030 (Luetkemeier et al. 2021, p. 1). The challenges humanity faces today, especially in the countries of the South Sahara, are unprecedented (Luetkemeier et al. 2021, p. 1). From the South African context, the Constitution of South Africa (SA) emphasised SD and enshrined the right of a healthy environment for all citizens (Act 108, 1996). The Academy of Science of South Africa (ASSAf) report shows that there is no shortage of the South African policy documents that supports the notion of green for SD, namely, the New Growth Path, the National Development Plan (NDP), and the Green Economy Accord, to name but a few (Diab, 2015, p. 1).

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The current Curriculum Assessment Policy Statement (CAPS) has EE topics in all learning areas of the curriculum which supports SD (Department of Basic Education, 2014). Basic needs like air, water, sanitation, energy and food, if they are not met, then the school generation suffers (Le Grange, in Stevenson, et al. 2013, p. 128). The World Decade on Education for Sustainable Development (WSSD, 2005, 2014) proposed a way of signaling that education and learning lie at the heart of approaches to SD (Kariaga, et al. 2013). Based on these global declarations, SA released the NDP: vision 2030, identifying nine challenges the country faces (National Planning Committee, NPC, 2013). Among them is the slow progress on sustainable resources and intensive economy (NPC, 2013, p. 15). This study reminds all leaders and role players of their responsibilities to protect the vulnerable environment we all share through sustainability of resource consumption through SD and greening. Since the fruits of education ripen slowly, the leaders of tomorrow must be educated today by tirelessly reminding all people that they share the same destiny and must unite to protect the planet Earth, whose resources have sometimes been overestimated, and that is the task of education (UNESCO/UNEP, 1978, p. 77).

In SA, the Department of Environmental Affairs (DEA, 2010, p. 4) was given mandatory to ensure that SA effectively manages the environment and natural resources in a manner that ensures economic and social sustainability for current and future generations. Irwin and Lotz-Sisitka (in Loubser, 2014, p. 59) state that the Department of Basic Education (DBE) ensured that every learning area in the school curriculum has an environmental focus embedded in it. Environmental concerns are considered to be one of the main vehicles for teaching EE and education for sustainable development (ESD). Education is at the heart of SD (Loubser, 2014, p. 133). Therefore, ESD is a subset of EE and green school is another way of promoting SD.

Empirical Studies

Over the past decades there has been an increased demand of green schools both is SA and internationally (Wildlife Environment Society of South Africa, WESSA News, 2018). The study by Kerlin et al. (2015) state that a 'green school' is a label given to a school building whose occupants focus on sustainable development with regard to energy consumption. Additionally, they contemplate that it is a building that is wireless, fuel-less, which utilise solar energy power, rainwater catchment, vegetative roofing, geothermal heating and cooling systems primarily for sustaining resources (Kerlin et al. 2015). Similarly, the study of Earthman (2009) and United States Health Report (2015) refer to green schools as high performance and sustainable schools that reduce incidents of illness and absenteeism. A similar study by Hens et al. (2010) was conducted in SA and developed Environmental Management Systems for rating a green school in 39 primary schools in the northern Gauteng and southern Limpopo provinces. In this regard, the conceptual understanding of green schools became the point of focus of this study. Therefore, there is indeed a need for green schools in order to ensure sustainable development that will result in protecting future generations from resource depletion.

Theoretical Framework

Although theories are generally used to explain phenomena or conceptual perspectives (Trafford & Leshem, 2011), this study explored issues experienced by role players at the school in the implementation of SD plans. Aligned to the emphasis on greening school and sustainable development, this study adopted the ecological democracy theory by Kensler (2012), which integrates ecology, democracy and greening school phenomena. Secondly, the sustainability theory (Jenkins, 2009; Department of Environmental Affairs, 2012) to understand how green schools sought to find sustainable consumption patterns in the school ever-growing demand on learner teaching support materials, energy, water and others, since greening schools and sustainable development. Thirdly, the leadership complexity theory (Lichtenstein, et al. 2006; Morrison, 2002) was also adopted since the complexities that arise in the educational endeavour concern not only the physical but also the normative questions of how leaders' responsibility is taken and assigned at school. These theories underpinned the study and enabled to develop an argument that was conceptual.

Research Problem Statement

This study is rooted in and academic interest of the researchers regarding green schools and ESD interests. We experienced depletion of school resources due to the school's lack of knowledge about greening schools. The current study came about when the school experienced periodic and recurring resource depletion especially during the last quarter of the year when learners were about to write their final year examinations. Combining experiences on resource depletion, EE and knowledge, the researchers pursuit this topic to project what might have been accomplished if the school was a green school. Future generations are at risk if the present generation does not take action and efforts to ensure that better environmental learning and actions are sustained and become part of how schools are managed (Ringdahl, 2008, p. 36). Green development is not about the way the environment is managed, but about who has the

power to decide how it is managed (Adams, 2009, p. 379). The school role players have the authority to initiate greening the school (South African Schools Act, 1996). Kensler (citing Ferreira, Ryan & Tilbury, 2006, p. 8) argues that

> *"in their initial training, teachers may learn about sustainability in science, geography, or studies of society and environmental curricula. However, sustainability does not feature in educational leadership, management, psychology or sociology classes, thereby limiting the potential for whole school approaches"* (DE, 2012, p. 794).

Research Questions, Aims and Objectives

The main research question of the study is:

What are the strengths, weaknesses, opportunities and threats in greening the school for sustainable development?

The following sub-question unpacked the main research question:

- What is the nature of the knowledge of the role players in the school about greening the school?

The main aim was to: Explore the strengths, weaknesses, opportunities and threats in greening the school for sustainable development. The objective of this study is to:

- Examine the nature of knowledge of the role players in the school about greening the school.

Method

Research Design

Informed by the literature review, the research process provided details about two phenomena, namely, greening schools and SD situations which were explored through qualitative multiple case study design to understand the contextual factors that hindered schools to effectively achieve SD. The qualitative and exploratory methods were used since these methods provide significant contributions to both theory and practice (McMillan & Schumacher, 2014, p. 344). To understand how schools implement their respective sustainability practices, we focused on school role players' knowledge of SD and greening schools to identify the strengths, weaknesses, opportunities and threats for greening schools to promote SD. According to Zikmund and Babin (2010, p. 82-84) exploratory research produces qualitative data or is used when new insight is needed to reach an appropriate decision statement and research objectives. We chose the case study design due to its ability to involve issues explored through one or more cases within a bounded system, meaning, setting or same context (Creswell, 2007, p. 73).

Research Location

This research was conducted at three primary schools each from city, township and rural schools of the Department of Basic Education in Tshwane North District. Tshwane North district is located at the Northern direction of the city of Pretoria, the capital city of SA in Gauteng Province. It is bordered by Anlin in the north and Wonderboom town in the south. The research location can be seen on the following map.

Figure 1.

Case study context: Tshwane North District

Retrieved from: https://www.google.com/maps/place/Department+of+Education+-+Tshwane+North+District+D3/@-25.716748,28.1898713,15z

Participants

Four to six participants from each school were sought from both the school management team (SMT) and school governing body (SGB) members of each participating school. Furthermore, we used purposeful sampling which selected people who are holders of data needed for the study (Maree, 2012, p. 79; Creswell, 2013, p. 156) according to table 1 below:

Table 1.

Components of SMT and SGB Members

SMT	SGB
1.Principal	1.Parents or guardians
2. Deputy principal	2. Teachers
3. Heads of Departments	3. Learners
4. Senior teachers	4. Non-teaching staff
	5. Co-opted members

Source: Education Employment Act, 2007; South African Schools ACT, 2007

Both the SMT and SGB were selected because they are the holders of data needed for the study (Maree, 2012, p. 79; Creswell, 2013, p. 156). The SGB is allocated financial powers, staffing including educators' promotions (South African Schools Act, 1996) and the SMT manage professional matters of the school and resources needed to provide quality teaching and learning (Educators Employment Act, 2007).

Data Collection Tools

The study employed a series of semi-structured focus group interviews in phase one. The structured observation in conjunction with an environmental audit tool and document analysis was phase two of this study, in order to achieve triangulation and increase trustworthiness (Brundrett & Rhodes, 2014, p. 30). Triangulation implies comparing many sources of evidence in order to determine the accuracy of information, a means of cross-checking data to establish its credibility (Briggs et al. 2012, p. 84).

Focus Group Interviews

This study employed web-based focus group interviews using e-mails or internet. Four to six participants per school were interviewed as a group, rather than each person individually (McMillan & Schumacher, 2014, p. 389). The participants debated and argued about the topic to provide interaction on realities as defined in group context; and on interpretations of events that reflect the group input (Frey & Fontana, 1991, p. 175).

Observation

The semi-structured observations were employed in conjunction with an environmental audit tool with questions drawn from green features in the study of Kerlin et al. (2015). The study used items which met the Leadership in Energy and Environmental Design certification standards (Kerlin, et al. 2015).

Document Analysis

The documents analysed were CAPS and the school environmental management policy aimed at providing a larger data base and methodological rigor (Frey & Fotana, 1991, p. 178).

Trustworthiness

Even though the aspects of trustworthiness are separated, they should be viewed as intertwined and interrelated (Graneheim & Lundman, 2004, p. 109). The credibility of the study increased by the researcher's prolonged stay in the field until data saturation. Transferability was enhanced by providing detailed information on the research procedures; and sampling those participants who have the best knowledge regarding the research topic. Dependability was achieved by outlining and discussing in detail the processes of data collection; asking the same questions for all participants in interviews. Confirmability was enhanced by transcribing the interviews verbatim with latent content; allowing field notes on observational data to offer a reliable record that corroborate text interviews and transcripts.

Coding

The coding framework has been decided deductively emanating from the theoretical frameworks from the three theories mentioned above underpinning the study. Data was analysed through thematic content analysis since this analysis is suitable for relatively low level of interpretation, in contrast to grounded theory, in which a higher level of interpretive complexity is required (Vaismoradi, Turunen & Bondas, 2013, p. 399). Five predetermined thematic areas developed by the researcher were used as the unit of analysis in the focus group interview guide to ensure that conclusive results could be made. The researcher transcribed all online and text-based interviews of each participating

school verbatim according to the predetermined themes in the interview guide. Setting code was used to code participating schools as *SC* (city school), *ST* (township school), and *SV* (village school). Participant perspective code was given to every participant in each focus group and coded as *P1, P2, P3*, and so on according to the Table 2 below. Categories coded C1 and C2 emanated from Kensler's theory for describing, explaining and predicting a continuum of development from more traditional schools to green schools (DE, 2012, p. 790). C3 – C6 emanated from the sustainability theory; C7 from the complexity theory and C8 emerged inductively.

Table 2.

Coding of Participants and Cases

Cases and Participants	Codes
City school	SC
Township school	ST
Village school	SV
Participant 1	P1
Participant 2	P2
Participant 3	P3
Participant 4	P4
Participant 5	P5
Participant 6	P6
Category 1 (Ecological principles)	C1
Category 2 (Democratic principles)	C2
Category 3 (Economic)	C3
Category 4 (Social)	C4
Category 5 (Political)	C5
Category 6 (Spiritual)	C6
Category 7 (Complex environmental problems	C7
Category 8 (Biography)	C8

Own source coding analysis, 2020

The transcripts were written in question-by-question format to enable the researcher to capture what each participant in each group had to say regarding each question (Maree, 2012, p. 92) where possible. The group, not the individual was the fundamental unit of analysis (Morgan, 2013, p. 60). Focus groups are not isolated individuals but are engaged in a conversation (Silverman, 2016, p. 176). Therefore, neither the individual nor the group constitutes a separable unit of analysis.

Results and Discussion

The results are presented in threefold, namely: focus group interviews, observations and document analysis of each participating school. Each case is presented as *P1- SC* to *P4 - SC*; *P1 - ST* to *P6 - ST;* and *P1 - SV* to *P5 - SV*.

Focus Group Interview

Theme 1. Sources of School Funding

The results indicated clearly that the role players are knowledgeable about the sources of funding in their schools. This is evident in the statement of all schools who reported government funding (*P4 – SC; P2 – ST*) whereby *SV* reported 100% government funding and non-governmental organisations (*P2 – SV*). *SC* further reported payment of school fund (*P4 – SC*). Another source of funding emanated from fundraising (*P4 – SC; P1- ST*; P2 – SV). These methods of fundraising did not promote green and SD, since learners wore casual clothes on Fridays and donated R2. 00 to the school coffers (*P2- ST*). The fact that all schools needed extra funding, indicated that the schools' basic source of funding was not sufficient to operate efficiently as it was reported that

> "*the school ended-up topping government funding by recruiting different businesses to support the school*" (*P5 – SV*).

Theme 2. Experience on Resource Depletion

A variety of participants' statements revealed that schools were not self-reliant with resources and there were inconsistencies from government and non-governmental organisations funding which were not reliable. *P1 - SC* stated that:

> "*Parents are persuaded to pay school fees through constant letter reminders and during the Annual General Meetings. However, many of them still struggle to pay or no payment at all is made.*"

P3 – ST stated that they even borrowed resources from neighbouring schools. From all participants, *P5 – SV* singlehandedly disagreed and stated that

> *"schools need proper planning, sharing of ideas, teamwork, time management and making estimates when running fundraising projects."*

Theme 3. Experience of Using School Resources

P1 - SC calls it *"a nightmare",* stating that these resources run out before the expected time. Contrary to that, *P2 - SC* stated:

> "*Sometimes we have to out-source from other schools or request from the SGB for new ones."*

P3 - ST reported that burglary and theft were causing constraints to school resources. In addition, *P2 - SV* stated that they experienced learners who damage or loose books.

Theme 4. Educational Experience on Resource Use

Three participants out of four in *SC* stated that they learnt a lesson about the areas where school expenses were channeled such as furniture, textbooks, photocopiers, infrastructural maintenance etc. (*P1; P2; P4*), whereas *P3* complained that

> "*most teachers did not study Accounting at school*."

Only four participants from all cases reported that they learnt how to use resources sparingly (*P1 - SC;* P4 - *SV*; *P2 - SV* and *P3 - SV*), and only one of the participants highlighted that they improvised where there is shortage of resources (*P2 - SC*). On the other hand, one participant reported that he realised the importance of fundraising and donations because they boost the school income for effective running of the school (*P4 - SC*). However, the results revealed that the lessons learnt by these groups are not green and poses a threat to sustainable resources.

Theme 5. Sustainable Development or Sustainability

Concerning which resources must be sustained, the groups listed a number of resources, namely, infrastructure, natural resources, learner teacher support materials and electricity. The rationale was based on the fact that

> "*they are expensive to replace or service; are the basic needs of the school; they are scarce and valuable*" (*P5 - SV*)

and that resources should be able to cater for future generations (*P4 - SV*).

The Environmental Audit

The results of the environmental audit clearly indicated that all groups were knowledgeable that electricity could be saved on lights and computers. All participants in all groups agreed that water could be saved by harvesting rain water. Only two participants in *ST* are knowledgeable about recycling taking place at school as recyclers came to collect bottles (*P2* and *P4*); whereas *P1* and *P3* indicated that they do not know about recycling; and *P5* and *P6* did not comment about recycling. *SC* and *SV* did not report recycling. Electricity green saving mechanisms were not applied in all cases. This is evident whereby all cases reported that their schools did not use energy saving lights.

Observation Results

The observation schedule revealed the following results per school in Table 3 below:

Table 3.

Observation of School Sites

Criteria	Comments
Were water tanks installed?	Water tanks installed for storing borehole water (*SC*) and harvesting rainwater (*ST*; *SV*).
Were there planting plants programmes?	Trees, lawn and flowers were planted around the building and sports grounds (*SC*); few indigenous plants and flowers (*ST*); there was visibility of more trees, green grass, flower plants, citrus fruits and vegetables (*SV*).
Were there appropriate waste reduction methods?	*SC* used municipality bins for waste removal and office waste paper was shredded and recycled; *ST* sorted waste for recycling; and *SV* composted waste to fertilise the gardens.
Was the school located far from public transport?	In *SC* and *SV* public transportation was far from the school and *ST* was closer to it. There was no land degradation in all cases.

Based on the observations, only SV had efficient managed fruits and vegetable gardens and none at *SC* and *ST*. Irrigation took place in all cases and leaking taps were addressed. All schools were not registered as eco-schools, did not partake in auditing waste or use solar energy. When renovating or building, *ST* and *SV* used local people and *SC* sometimes out-sourced. The air quality was compromised in all cases whereby *SC* and *ST* only used air conditioners in the administration offices but none in the classrooms and no indoors plants in all cases. It was revealed that energy conservation strategies used by the schools were not sufficiently environmentally friendly.

Document Analysis

According to Merriam (1998) the researcher has the authority to judge whether the document is appropriate as a data source by finding out whether the information in the document has information pertinent to the research question and whether it can easily be acquired. CAPS curriculum is the current South African curriculum document which determines which content must be taught and assessed in all school subjects since its implementation in 2012 (DBE, 2014). Table 4 below shed light on the subjects' themes in the curriculum with EE topics which supports SD.

Table 4.

Grade 4, 5, 6 and 7 ESD Content in the Curriculum

Subject	Theme
Natural Science Social Sciences Life Skills Life Orientation Economic and Management Sciences Technology	Water, Energy, Food and Security, Biodiversity, Ecology, Natural Resources, Waste and Pollution, Health, Values, Ethics, Action Competence and Careers

Adapted from Department of Environmental Affairs (DEA, nd)

It is clear from the table above that ESD was integrated in the curriculum (DEA, nd). One of the general aims of the curriculum which embraced SD is "Human rights, environmental and social justice" (National Curriculum Statement, 2012). It is evident that the DBE made a decision to include ESD in the curriculum. Mathematics and Languages themes were not included since Mathematics is a language that makes symbols and notations to describe numerical, geometrical and graphical relations (CAPS, Mathematics, 2011, p. 8). The results revealed that the concepts "EE, ESD or green" are not mentioned in the curriculum content topics, however, their content is variably integrated in all curricular subjects across the grades. The results revealed that the operational methods on waste management of the schools do not show a positive relationship between curricular content and practice or behavior (DBE, 2014). For example, the curriculum has included water cycles and roles of water in ecosystems and wetlands, but all schools observed do not have any evidence of using harvested water for wetlands where frogs and other species can co-exist. There is no action plan made for direct implementation of environmental topics in the curriculum. The curriculum emphasised content and assessment with no planning of environmental activities evidence. This study further revealed that non-renewable and renewable energy sources and impact topics are in the curriculum, however all schools observed are operating with non-renewable energy sources. Additionally, strategies of implementing green features and SD skills are not suggested in the curriculum.

The curriculum is aimed at promoting cognitive skills for promotional purposes. The focus is on knowledge assessment, since it does not suggest sustainable strategies and implementation is not action-centred. Although knowledge is fundamental in promoting positive sustainable behaviour, CAPS did not provide guidelines for achieving the ability to solve environmental problems. There are no mechanisms established in the curriculum to assess the effectiveness of environmental programmes in the curriculum. In contrast, not all role players are teachers, and not all teachers in the SMT are ESD specialists experienced in the interpretation of ESD content in the learning areas they are teaching and thus they are unable to come up with creative and innovative approaches to develop green and sustainable sites at schools.

Strategies such as fieldwork are hindered by contextual factors such as resources, CAPS policy contradictions and teaching time as stipulated by the curriculum. It appears that there is a gap between the curriculum and role players' job descriptions if they might make efforts to implement SD through the curriculum content. As a result, it would be difficult for role players to identify SD themes in the curriculum and put them into practice.

It is apparent that ESD is not practical, but used as a tool for teaching and learning topics. This could be a reason for poor visibility regarding a variety of environmental and sustainable practices. Furthermore, it is evident that EE or ESD topics were taught only for skills (writing, reading etc.), assessment and promotion purposes.

Although CAPS suggest inquiry-based learning opportunities and suggest that learners do practical tasks regularly, its major assessment objective is knowledge based and continuous assessment (DBE, 2012, p. 62). Although knowledge is fundamental in developing sustainability literacy, CAPS did not inform guidelines for assessment of skill competencies in taking actions towards solving unsustainable environmental problems.

Environmental Policy

Only SV Environmental policy was submitted and provided the following inputs:

The policy was given an effective date of January 2019 and was supposed to be reviewed in September 2020. The preamble was aligned to the Constitution of SA within its Bill of Rights that it provides all citizens with the right "to a healthy environment that is not harmful, protected for the benefit of the present and future generations." The preamble was also aligned to the White Paper on Education and Training (1995) which highlighted EE, involving interdisciplinary approach to learning.

The policy's purpose emphasized:

- *To improve and include environmental components in the curriculum*
- *To provide opportunities for learners to study local environmental issues*
- *To implement an environmentally responsible purchasing policy*
- *To reduce waste*
- *To maximise the school's energy efficiency*
- *To encourage the planting of vegetables at the school*
- *To optimise and control the use of water at the school."*

The results on the environmental policy revealed that this policy was formulated and signed by SMT and SGB chairpersons. From the researchers' point of view, it is uncertain to verify that all members of the SGB and SMT participated in the formulation of this policy.

The Nature of the Knowledge of the Role Players in the School about Greening the School

From the literature study of greening schools, most studies acknowledge the definition of sustainable development as defined by the Brundtlant report, that it is "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (Kensler, 2012, p. 792; Ogenokokwo, 2017; Foo, 2013; Loubser, 2014, p. 124). This relates to *P4 - SV*, who asserted that

> *"school resources like buildings and fencing need to be protected because many generations can still make use of them."*

All participants are knowledgeable that the state is the main source of funding according to the national norms and standards for school funding (2018). However, according to the participants in all cases, they acknowledge that these funds are not sufficient to run day-to-day operations of the school. *ST* and *SV* are no-fee paying schools in quintile two and one respectively in accordance with the NDP (NCP, 2013, p. 51) and the official guide to SA in Education (Government Communication and Information System, 2018/19, p. 94). *SC* is in quintile 4 and charges school fees as determined by the SGB according to the South African Schools Act (1996).

The majority of the participants acknowledged that they lack knowledge and experience on challenges to achieve efficient fundraising methods for sustainability of school resources. It is revealed that participants have no knowledge that there are local companies in Tshwane local municipality that provided recycling bins for bottles, paper, plastic and tins. The waste is separated, weighted and schools are reimbursed for waste recycled as observed in *ST*.

SV used green sustainable practices with the food garden. The role players generate sufficient funds by selling organic vegetables to communities. These practices are healthy and reduce incidents of illness and absenteeism (Earthman, 2009, p. 264; US Health Report, 2015). Unfortunately, *ST* would not be able to erect a food garden because of the limited space. It can be easily assumed that *SC* with a large school yard did not understand that vegetables and fruits could be planted, produced and sold locally.

All schools further revealed that they lack knowledge of using a renewable energy source, lights are switched on at night in *ST* and in *SV* and they did not use energy efficient lights. This is aligned to the participants' report that:

> *"Money is depleted by services such as water bills, electricity bills, photocopying machines, paper, stationary, transport for teacher workshops, fuel for the generator" (P3 - SC).*

Furthermore, *SC* revealed that their computers are left in standby mode when not in use. Literature revealed that machines left in standby mode still draw 20% of the power they do when fully operational (Gear, 2009). In addition, *SC* needs to install roof gutters to channel rainwater into water tanks which may be used for irrigation and filling the

swimming pool. The swimming pool needs to be covered with a pool cover to also reduce water evaporation, pollution and wastage. However, installation of boreholes in *SC* and *SV* are environmentally and eco-friendly, green, sustainable and reduce unnecessary water bills in to a certain extent.

Strengths, Weaknesses, Opportunities and Threats Analysis on Greening the School Field Notes Results

Exploring greening schools in three schools provided a valuable insight into what the overall strengths, weaknesses, opportunities and threats (SWOT) are regarding sustainable development. The researcher examined areas that shows evidence of positive or best practices and interpreted them as strengths for greening the school. The negative or worst environmental practices are interpreted as weaknesses. Those practices that could guide or provide local planning approaches to achieve sustainable development were interpreted as opportunities. Finally, those practices that were dangerous practices and showed health and safety risks were interpreted as threats. Holistic coding as an exploratory method was used based on what the researcher deductively assumes may be present in the data (Miles et al. 2014). The researcher used deductive thematic content analysis with five pre-determined themes drawn from the South African Green Schools Programme (Bizcommunity, 2017). The start list of themes (in bolded caps font) and then categories numbered *C1 - C10* (in small caps) were provided according to display figure 2 below:

Table 5.

List of Themes and Categories for SWOT Analysis

Theme 1. Waste Management
C1: reduce
C2: reuse
C3: recycle
Theme 2. Energy Efficiency
C4: audits
C5: saving criteria
Theme 3. Water Conservation
C6: rain water harvesting
C7: Irrigation methods
Theme 4. Landscaping Tree Planting & Beautification
C8: carbon offsetting
Theme 5. Institutional Management
C9: instil knowledge and skills
C10: instil awareness

Source: South African Green Schools Programme (Bizcommunity, 2017).

The SWOT results across all cases are summarised according to thematic discussion in Table 6 below:

Table 6.
SWOT Thematic Analysis

Themes	SWOT analysis
Waste management	The results revealed that *SC* did not practice the best waste management methods of reducing, reusing and recycling waste. The question that could be raised as a concern to *SC* is why they have to bury resources in landfill sites that can be used for socio-economic upliftment of the school. *SC* and *SV* did not use efficient sorting of waste materials for recycling. However, *SV* used waste material for organic gardening which was efficiently managed. *ST* implemented effective waste management method whereby recycling bins were sorted at source. Therefore, disposal in landfill site was the least, since waste was used for economic and social upliftment of the school and did not risk the integrity of the environment.
Energy efficiency	The results revealed that all cases used non-renewable energy source which was costly. There was no evidence of site wind power plants or solar panels in all cases which implies high taxation on electricity bills. This induces threats of depleting electrical power and denying future generations to benefit. However, *SV* implemented fossil energy in a form of gas for reducing costs on the school nutrition kitchen stoves and *SC* had a giant generator installed on site to alleviate costs and for backup purposes.
Water conservation	The results indicated that water was conserved in an effective way in all cases, since all water leaks were addressed. *ST* and *SV* installed water tanks to harvested rain water and used this water in different positive ways. *SV* put rain water runoff to good use in irrigation and having fruits and vegetable garden. The negative approach revealed in all cases was that the schools did not create wetland plants from rain water runoffs where learners can identify different species like frogs, birds and insects which can help to improve environmental learning and action through the curriculum. There were also no water reduction methods in all cases through water surveys or audits.
Landscaping, tree planting and beautification	The school' surroundings were used as learning tools and for beautification as more trees including indigenous trees were planted in *ST* and *SV*. This revealed that the outdoor air quality was environmentally healthy and supported the whole local ecosystems and biodiversity conservation within the school. The results also revealed that there were no indigenous medicinal plants in all cases and these deprived learners to learn about the uses of different medicinal plants around their area.
Institutional management	Only *SV* had an environmental management policy which provided the basis on how environmental matters are managed at school. It was very unfortunate that *SC* and *ST* did not have such a policy to be analysed.

Source: South African Green Schools Programme (Bizcommunity, 2017)

Discussion of the SWOT Analysis

Theoretically, this study is environmental in nature, integrating ecological democracy (Kensler, 2012), sustainability (Jenkins, 2009; Department of Environmental Affairs, 2012) and complexity leadership theories in education (Lichtenstein et al. 2006; Morison, 2007). Coded categories were deductively derived directly from these theories underpinning the study, guided by research questions through discovering manifesting patterns of particular expressions of meaning and ideas in the data which allowed for exploration of narratives in the data (Ngulube, 2015, p. 18). Deductive approaches in this study involved using predetermined frameworks to analyse data (Burnard et al. 2008, p. 429).

The strengths on waste management practices were evident in *ST* who cut down on waste by recycling bottles, paper and plastics to reduce waste. The participants in *SC* lacked knowledge that there are local recycling companies in Tshwane local municipality, like Nampak (Ringdahl, 2008, p. 36) and Collect-a-Can that has obtained local and international acclaim for its contribution towards protecting the environment, as well as its significant contribution to job creation and poverty alleviation (official guide to SA in Education, 2018/19, p. 114). Food and garden waste was composted in *SV* and reused for the school garden which sold vegetables to the local community. The role players in *SV* generated extra funds by selling organic vegetables to Tshwane North communities. The findings by Hens et al. revealed that vegetable gardens were used by the schools studied to support their feeding schemes (2010, p. 666). This

resonates with Earthman (2009, p. 264) and the findings by the US Health Report (2015) who state that these practices reduce incidents of illness and absenteeism. *ST* school gate showed "Recycle Here" indicating that the school practices recycling of waste.

There were serious weaknesses and threats whereby all cases used non-renewable energy source. A study by Le Roux (2014, p. 111) reported that an increase in energy demand in SA led to the increase in electricity prices seen yearly. This is aligned to the participants' report during focus groups interviews stating that electricity and electrical appliances extort school finances (*P3 - SC* and *P5 - SV*). This is similar to the study by Tsikra and Andreou (2017, p. 207) stating that using artificial lighting significantly increases the operating costs.

Water conservation strategies were quite remarkable in all cases with few threats. There were water decanters in each class at *ST* and jelly water cans in each class at *SV*. Water tanks were visible in all cases with no visibility of dripping taps. Landscaping by trees, flowers, grass, fruits and vegetables in *SC* and *SV* was physically greening the school and also promoted positive sustainability behaviour. Indigenous trees visible in both cases are cost effective because most of them are drought resistant. This resonates with the findings of Carvello (2009), who established that vegetation supports the ecosystem within a school with curricular benefits on biodiversity study and is also aligned with global SDGs; and Eco-school themes of nature; biodiversity; and healthy living. In addition, plants provide shelter to people and habitats to biodiversity; are home to 80% of terrestrial biodiversity; provide building materials to 300 million people; maintain global climate; are sources of medicines and clean water; and are the lungs of the Earth, which add to the oxygen content of the atmosphere (South African National Biodiversity Institute (SANBI), 2018). Tree planting is supported by the study of Le Roux (2014), who stated that plants should not be overused or exploited, but protected for atmospheric stability. This process improves air quality, provides shade to the school play grounds, reduces water runoff, storm water pollution and improves the appearance of the school. The results in *ST* with limited tree planting pose a health threat which does not align to the Constitution (1996) that gives South Africans the right to a healthy environment that is not harmful to their health or well-being. A study by Kensler (2012, p. 797) revealed that when the environment is not protected, the results are horrifying whirlwinds, record-breaking tornados, coastal flooding, drought and wildfires.

It should be noted that resource management is regulated by legislation at a national level, however implementation does not take place at a national level (Makokotlela, 2016, p. 55) but rather at a grass root level by school policies. Schools need to register as eco-schools with WESSA (2018) and celebrate environmental commemoration days to promote and encourage activism in schools and communities.

Conclusion

In conclusion, education is the best vessel or vehicle to bring about the paradigm shift from unsustainable behaviour to green efficient sustainable schools. Education needs to be at the forefront to lead and fulfill the responsibility of protecting the environment as endorsed by the Constitution. However, the education system cannot achieve positive results if its implementation is done in isolation. All citizens need to be taken on board irrespective of their age, educational and economic backgrounds. Sustainable development and greening need to become a way of life of all South Africans. The current schooling system in South Africa is not yet paperless. There is a trail of e-waste generated from old technology that still needs to be addressed, whereby less than 20% of e-waste is recycled, resulting in global health, environmental risks and loss of scarce and valuable natural material (World Economic Forum Annual Meeting, 2020).

Finally, collective responsibility is an important part of our heritage to survive in the planet Earth. Change to sustainable development and green lifestyles are a global need, it must happen; we cannot ignore or neglect it. Greening and sustainable development in our schools and communities is the only hope to reverse the damage already done to planet Earth.

Recommendations

The following recommendations are suggested:

- An introduction of school awareness campaigns on greening schools programmes.
- Participation and community empowerment for all role players.
- The creation of an integrative assessment of green schools in South Africa that embraces practical activity plan on curriculum and infrastructure.
- Research in the area of greening schools in accordance with global sustainable development goals need to increase.

Limitations of the Study

The limiting factors are listed below:

- The difficulty in finding adequate 8 participants in the focus group interviews.
- The collection of data through face-to-face focus group interviews was interrupted by the unprecedented COVID19 pandemic that forced the researchers to use online text-based interviews.
- South Africa is a vast country with nine provinces, many races, diverse cultures and religions of valuable research direction that would have been included.

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Appendices

Appendix 1.

The Focus Group Interview Guide

The Focus Group Question Guide

Theme 1. Sources of Funding (Economic)

- What processes do you follow in generating money in the school's coffers?

Probing if necessary: school fund, state funds or NGOs.
Is it difficult to generate funds?
Probing: If so, in what ways? How do you deal about it?

Theme 2. Experience When Resources Are Depleted

- Tell me about causes of depletion.
- During depletion, how do you overcome these constraints/challenges?
- How did the DBE and NGOs assist in these matters?

Theme 3. Experience of Using School Resources (How Do You Extort/Deplete Resources On)

- LTSM and Equipment;
- Infrastructure, behaviour, awareness and attitudes.

Theme 4. Educational Experience on Resource Use

- How do you rate your capabilities with regard to sustainability of school resources in the scale of 1-10?

Probe: since most of you are not from entrepreneurship profession.

- Ever since you suffered resource depletion/constraints, has your attitudes towards being in the school leadership changed?

Probe: how? In what way?

Theme 5. Sustainable Development/Sustainability

- What must be sustained? Why so? How?

Probing: Which goods must be protected? Why so? How?
What is the rationale of doing so?

Appendix 2.
Environmental Audit Tool

Score	Yes	Sometimes	No	Comments
Are you aware that switching off lights during school hours saves electricity?				
Are you aware that switching computers off after school saves energy?				
Are you aware that rain water harvesting saves water and electricity?				
Do you implement strategies to save water and electricity?				
Do you practice recycling of paper, water, electricity, machines, e-wastes, plastics, bottles, uniform etc?				
Do you make your own food garden, for NSNP or for fundraising?				
Do you use HVL globes at school or CFLs?				
Do you know which materials are recyclable or places where to recycle?				
Do you have a school environmental or green policy?				
Are you registered as a green school or Eco-school?				
Do you audit waste relating to water, paper, energy, travel?				
Do you use renewable energy like solar energy?				
When building or renovating, do you use local people and products?				
Researcher's reflections:				

Appendix 3.

Observation of School Sites

Criteria	Yes	No	Comments
Were water tanks installed to collect rainwater/for water harvesting/use rainwater runoff to good use like creating a wetland in their garden? *SC*		√	Water tanks were installed for storing ground water from the borehole. Rainwater was not harvested and no rainwater runoff were used for good use. No visibility of fountain, garden or wetland
ST	√		Only two tanks available for harvesting rainwater which was used only during municipality water stoppages
SV	√		Rainwater harvested was used to water the gardens and cleaning of classrooms and toilets. There were no wetlands in their gardens
Were there planting plants programme or indigenous fynbos /indigenous medicinal plants at site? *SC*	√		Trees, lawn and flowers were planted around the building and sports grounds. There was visibility of indigenous acacia trees plants and no medicinal plants
ST	√		Some plants are visible with visibility of some indigenous plants and few flower plants. No medicinal plants
SV	√		Trees, green grass and flower plants are planted for shade, beautification, soil erosion prevention and for fundraising especially citrus fruits and vegetables. The latter were also used to support the school nutrition programme. No evidence of medicinal plants
Were there irrigation systems that conserved water and leaking taps addressed? *SC*	√		Leaking taps were not visible and irrigation took place in the mornings to conserve water
ST	√		Irrigation was done in the morning and leaking taps were addressed because learners used water containers available in their respective classes
SV	√		Irrigation was done in the morning and leaking taps were addressed. Water was stored in water containers for all classes for learners
Were there lighting systems that conserve fossil fuels and maximise the use of renewable energy like solar panels or LED lights? *SC*		√	Solar panels were not installed and the lighting systems used were not energy saving lights
ST		√	There was no visibility of energy saving lights and solar panels
SV		√	No evidence of renewable energy system and energy saving lights
Were there appropriate waste reduction methods to minimise landfills and reduce resource depletion? *SC*	√		The school used municipality bins for waste removal. Office waste paper was shredded and recycled

ST	√		Waste was sorted in four waste bins for recycling of bottles, paper, plastic and solid waste
SV	√		Waste bins were used for collection of solid waste to a landfill inside the school yard which was converted to compost to fertilise the gardens. Paper and steal waste from desks were recycled for fundraising purposes. Damaged desks are repaired.
Was the school located far from public transportations to reduce pollution and land degradation? *SC*	√		Public transportation was far from the school, so there was no air, noise, pollution and land degradation
ST		√	Taxis and buses pass in front of the school gate causing noise pollution. There was no land degradation because the roads were tarred
SV	√		The school was not next to public transport and most learners walk to school because they resided in the neighbourhood. Those who were residing far from school, used local transport and lift clubs
Was there an indoor environmental quality that provides occupants with thermal comfort and acoustic, visual and air quality? *SC*		√	They used air conditioners in the administration offices but none in the classrooms or any plants planted indoors
ST		√	Air conditioners were installed only in the administration offices. There were no indoor plants in classes and offices
SV		√	They relied on natural air plants by opening windows to support indoor air for occupants. One class was using an electrical fan and the offices used ceiling mounted fans; no air conditioners installed and no plants planted indoors.

Appendix 4.
Grade 4, 5, 6 and 7 ESD Content in the Curriculum

Subject	Theme	Grade	Content
Natural Science	Water	5 6	Water cycle Water, role of water in ecosystems, wetlands
	Energy	5 6 7	Renewable and non-renewable sources Energy, renewable and non-renewable energy Energy, renewable and non-renewable energy impact
	Biodiversity/ecology	4 5 7	Plant and animal rights, IK in relation to biodiversity Food chains, lifestyles Extinct spaces in SA; biosphere
	Natural resources	4 5	Earthworms, animals and soil Soil erosion
	Waste and pollution	7	Extraction and use of materials, including pollution; sorting and recycling materials; Impact on the environment.
	Values, ethics and action competence	4 6	Caring for plants and animals, animals used by man-value and responsibility to care for them Healthy environment important for the healthy planet
Social Sciences	Water	4 5 7	Water in SA: sources, access, storage, pollution, quality Rivers, activities, dams, rainfall in SA. Water: need, supply and catchments
	Food and security	4	Food and farming in SA
	Biodiversity/ecology	7	Marine reserves
	Natural resources	4 5 7	People and resources Mining and minerals, deforestation Natural resources and conservation in SA
	Waste and pollution	5	Waste disposal
Life Skills	Health	4 6	Personal health and hygiene caring for the environment, caring for animals Beliefs about purpose of life, people, and animals, role of religion: opportunities for volunteering, moral obligations
Life Orientation	Health	7	health and safety
	Values, ethics and action competence		
	Careers		Careers
Economic and Management Sciences	Natural resources	7	Sustainable use of resources
Technology	Waste and pollution	7	How to recycle and use goods to satisfy needs and wants, use of recycled material
	Natural resources	7	Use of natural resources for shelter, food, etc.
	Waste and pollution	7	Recycling scrap metals and design recycling scheme

Adapted from Department of Environmental Affairs (n.d)

Appendix 5.
Document Analysis Tool

Name of Document:
Document Creator:
Date of Analysis:
Data to be analysed:

Development, implementation and monitoring of the policy

- Who is involved in the development, implementation and review of the policy?
- What actions are taken to meet the aims and objective of the policy?

Curriculum

- How is environmental education teaching and learning guided in greening the school in the policy?
- What environmental education teaching and learning opportunities are available for learners to promote greening of the school?
- What teaching and learning activities around learner projects, fieldworks and curriculum excursions are undertaken by the school to promote greening the school?
- What curricula content directly **refer to resource use such as water?**

Sustainable Waste Management Systems

- How is the school's waste managed and monitored?

Water Sources

- What are school's water sources and how are they managed and monitored to promote sustainability?

Energy Sources and Usage

What are the sources of energy and how are they managed and monitored to promote sustainability?

Transport

Are they promoting sustainable development?

Purchasing PolicyAre they buying from local and green companies?

The outdoor activities

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Research Article

Factors bolstering the implementation of environment and sustainability education: A South African case study

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Abstract

Scholars, globally, acknowledge environment and sustainability education (ESE) as a key vehicle towards addressing the myriad of environmental challenges. This paper is premised on empirical evidence which succinctly points to the dearth of literature that focuses on the implementation of ESE in the realm of early childhood education (ECE). The approach adopted for this inquiry is a multiple-embedded case study, underpinned by an interpretivist qualitative research paradigm which focussed on four institutions enlisted for investigation. One-on-one interviews, participant observations and document analysis were used for data generation while thematic and domain analyses were used for data interpretation. The findings of this inquiry suggest that there are numerous factors that support the teaching of ESE. The researcher asserts that the findings highlighted in this paper corroborate those of numerous studies conducted elsewhere in the world. However, based on the findings, the researcher also notes and can thus conclusively aver that there is a dearth of research that focuses on enablers of ESE. Furthermore, the researcher recommends that more research be conduct which focuses on the investigation of the factors that support the environment-inclined pedagogy.

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Introduction

The first Intergovernmental Conference on Environmental Education held in Tbilisi (Georgia, USSR) in 1977 adopted a declaration which included, inter alia, the guiding principles of Environmental Education (UNESCO 1978). One of the key propositions advanced by these principles is the notion that Environmental Education (EE) should be a lifelong process that cuts across all stages of human development and education levels. Indeed, this call for sustained and impactful environment-inclined education, which was made for the first time by the UN Conference on the Environment of 1972 held in Stockholm, has been heeded by various counties across the globe. Nevertheless, the state of the environment has continued to decline. Globally, there is a myriad of environmental challenges, these include climate change, pollution, excess waste production, population explosion, a decline in biodiversity, water shortage and etcetera (Casinader 2021; Sagala, Nuangchalerm, Saregar & El Islami, 2019). For this reason, various environment–inclined efforts have been undertaken in many countries and various environment–inclined conferences and meetings also called for impactful action towards addressing environmental challenges (Sikhosana, Mudau and Msezane 2020; Mandikonza and Lotz-Sisitka, 2016).

Over the past few years, studies have been conducted which demonstrate that, to some degree, EE is being implemented at certain primary and secondary schools in various countries around the globe (Green and Somerville, 2015). For example, in Southern Africa, just like in other parts of the world, studies have been conducted which

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focused on the implementation of EE (Mathenjwa 2014; Mokhele 2011; Motshegoa 2006). Also, in the same region, numerous empirical investigations have highlighted barriers that impede the teaching of EE (Mwendwa 2017; Velempini 2016; Joseph 2014; Kanyimba, Hamunyela & Kasanda 2014; Agnes & Nor 2011). These studies have focused on older children and adults such as teachers.

Contrariwise, literature also indicates that the realm of early childhood education (ECE) has experienced a very slow and intangible uptake of EE (Sawitri 2017). The snail pace in the uptake of EE in ECE can be attributed, at least in part, to the virtual absence of research that focuses on EE in this vital field of education. Accordingly, to underscore the lamentable dearth of research of EE in ECE, Davis (2009) uses the phrase '*gaping research hole'* as a metonym for this shortcoming. Recent research supports Davis's (2009) findings that EE in ECE is neglected and, that more research is needed in this area (Sawitri 2017). This is essential because researchers have little idea concerning what works or does not work in enabling the advancement of EE in ECE. The selective implementation and non-implementation of EE is, without doubt, not helpful as the conditions of the environment continues to deteriorate.

The on-going decline of the environment could be attributed to the fact that for many years, worldwide, there has been sustained focus on and the application of education *about* and education *in* the environment (Agnes & Nor 2011) rather than on education *for* the environment. Various studies distinguish between the 'triumvirate approach' to environmental education, namely education *about* the environment, education *in* the environment and education *for* the environment (Kopelke, 2012; Palmer 1998; Lucas, 1972). Education *about* the environment focuses on equipping learners with knowledge and facts about, *inter alia*, what the environment entails, how it works and the challenges of the environment while education *in* the environment provides learners with opportunities to interact with the environment, for example, by interacting with various fauna and flora in the outdoors. Arguably, both education *about* and *in* the environment are less advanced forms of environmental education. Thus, the continued decline in the state of the environment accounts for the greater focus on these two forms of environmental education with minimal attention given to 'advanced' environmental education.

In its 'advanced' form, environmental education manifests as education *for* the environment (Kopelke 2012; Le Grange, 2002). Education *for* the environment has been 'rebadged' by some scholars as education for sustainable development (Robottom, 2007) or environment and sustainability education (ESE). This form of environmental education empowers the learner to actively participate in bringing about social change *for* the betterment of the environment. Education for sustainable environment is characterised by, among other characteristics, pro–environment activism emanating from advanced awareness of the challenges affecting the environment, positive attitudes towards the environment and application of skills acquired, over time, to advocate for the well-being of the environment. Therefore, in its advanced form, environmental education enables individuals and groups to work towards ameliorating the negative impact that human beings have on the environment by fostering and promoting environmental sustainability for future generations and the well–being of all components of the environment. Furthermore, ESE is transformative, dynamic, all–inclusive, accommodates diversity of opinion and knowledge and, it advocates for justice and social change (Tilbury, 2004). In its content and form, the agenda advanced through Sustainable Development Goals (SDGs) is in line with education *for* the environment (Ferguson, 2020; Sikhosana, Mudau and Msezane 2020). Accordingly, in this article the concept ESE is preferred as it acknowledges 'real' environmental education in the form of education *for* the environment.

Previous work

The literature reviewed in preparation of this paper suggests that there are numerous factors that could be considered as enablers of EE. These factors could be classified into the following main categories, namely, an enabling curriculum framework, teachers' training background and teaching experience, leadership and support, cooperation, and collegiality, and learning and teaching support materials (LTSM).

Even though it is the view of this researcher that each of the enablers discussed in this paper is as important as any other, an enabling curriculum framework seems to be more important. By its nature, the curriculum framework is cardinal in providing guidance to the teacher within the realm of pedagogy. It is the blueprint that carries the mandate and guidelines on what the teacher is expected to do in the classroom situation (Kuzich et al. 2015). Research suggests that, in the main, the schools that incorporate EE in pedagogy, across the world, do so based on tangible investments made by governments in shaping curricula in the way that directs the schools, implicitly and/or explicitly, on the importance of EE in pedagogy (Kuzich et al. 2015; Evans et al. 2012). Likewise, school subject policies that are, ordinarily, crafted in line with the school curriculum also serve to enable EE in pedagogy (Joseph 2014; Gajus-

Lankamer, 2004). Therefore, the nexus between the school curriculum and the various school subjects offered in a school enhances the possibility of EE implementation.

In addition to an enabling curriculum, literature also points to the importance of teacher training background and teaching experience in enhancing the possibility of EE implementation. Gajus-Lankamer (2004) argues that for teachers to be able to implement EE, they need to be trained and prepared for this role. The extent of teacher education and preparedness should be discernible from, inter alia, expertise in sustainability issues, pedagogical competencies and innovative strategies employed in the practical integration of EE in pedagogy (Kuzich et al. 2015; Joseph 2014; Evans et al. 2012; Walshaw 2012). Incontrovertibly, the realisation of preceding ideals hinges on, inter alia, '*appropriate*' teacher training and teaching experience accumulated by the teacher, over time, in the field of teaching.

An on-going in-service professional leadership and support provided, both from within and beyond the school setting, is considered one among various elements that serve to complement the pre-service training and teaching experience of individual teachers in enabling EE implementation. Literature suggests that within the school setting, the leadership and support provided by the principal and co-managers plays a vital role in enabling EE. Likewise, from 'outside' the school, government authorities, particularly, education departments also play an important role in providing leadership and support to assist teachers in the implementation of EE. Evans et al. (2012) point out that school principals and government authorities play various cardinal roles in empowering and supporting teachers in their quest to advance effective implementation of EE in Australia. For example, in Australia, both the federal and state governments are credited for offering, inter alia, grant schemes while school managers see to the provision of expert needs of teachers regarding sustainability education (Evans et al. 2012). Joseph (2014) also noted that in Namibia, government authorities play a critical role in facilitating the implementation of EE by, for example, presenting in-service workshops to empower teachers.

The importance of cooperation and formation of partnerships among teachers as well as between teachers and community organisations is another important enabler of EE (Hart, 2006). For example, in their research with a focus on the inclusion of education for sustainability in selected schools in Australia, Green and Somerville (2015) observed that to expand their knowledge of sustainability, teachers often reach out to the broader neighbourhood by collaborating with various stakeholders such as parents, civic organisations, businesspeople, local government and environment preservation groups. Likewise, Kuzich et al. (2015) also noted, in their research conducted in Australia, that EE-inclined programmes were initiated and structured in a way that enables collaboration between schools and communities in areas such the supply of teaching resources, staff training and reporting on the results of sustainable education programmes. Equally, Joseph (2014) points to the importance of collegiality and support among teachers in enabling EE in the classroom. Accordingly, Joseph (2014) asserts that her study participants indicated that teachers supported one another in a quest to integrate environment-based pedagogy in their schools.

The selection and/or designing of 'appropriate' learning and teaching support materials (LTSM) are other elements that are considered key enablers in the implementation of EE (Kassabolat et al. 2020). There are various forms of LTSM that can be used to support EE in pedagogy. These include, inter alia, textbooks and workbooks that are designed with environmental issues in mind (Joseph 2014) and, an enabling infrastructure (Kuzich et al. 2015). Kuzich et al. (2015: 187) assert that the schools that implement EE effectively have physical infrastructure that is "purposely created to support EfS". Typically, to enable action-based environmental learning (Fisher-Maltese, 2016), these schools would have features such as vegetable grounds, water recycling systems and used water stratagems in place (Kuzich et al. 2015).

Problem of the Study

As indicated in the preceding paragraphs, empirical evidence suggests that there is exiguous and narrow implementation of ESE in primary and secondary schools and the scarcity of ESE research in ECE is acknowledged. Apart from the dearth of ESE research in ECE, literature also suggests that there are several barriers that impede the implementation of ESE (Anderson and Jacobson 2018; Lasen et al. 2017), not only in ECE but, across various levels of education universally. However, on the opposite side of the scale, based on the literature reviewed for this paper, there seems to be a paucity of research that focuses on the factors that facilitate the implementation of ESE across various levels of education, particularly in ECE. Accordingly, this paper seeks to answer the question: What are the factors that enable teachers to implement ESE in the realm of ECE?

In an attempt to answer the preceding question, a research project was conducted to investigate the teaching of ESE in ECE. This paper therefore seeks to address the following objectives, namely, to provide an outline of factors, based on empirical research conducted, that can be considered as drivers of ESE and to draw a link, if any exists,

between these factors that enable ESE and literature. Arguably, an attempt to answer the above question should help to uncover the enablers of, obstacles to and prospects of education for sustainable environment in the realm of early childhood education (Davis, 2009). This process is essential as it serves to enhance the prospects of ESE pedagogy.

Method

Research Model

This research is located within a broader context of a doctoral project conducted by the researcher to investigate the implementation of EE in selected Grade R (known elsewhere as kindergarten or the preschool class) centres in one geographical region of the North West Province of South Africa. The interpretive qualitative paradigm, which aids a researcher to obtain a deeper understanding and varied perspectives on phenomena under investigation (Dean, 2018), was used in this research. To facilitate the generation of rich context-based information that is reflective of the 'real' life world of respondents (Thanh and Thanh 2015), the multi-embedded case study design (Yin, 2006) was identified as an appropriate vehicle for this inquiry.

Participants

Maximum variation, an element of purposive sampling strategy (McMillan and Schumacher, 1997), was used in the selection of cases for this inquiry. This approach helps the researcher to access an extensive variety of deviations, forms, and views on the subject under inquiry. The researcher used a set of predetermined criteria (Patton, 1990), as informed by the demographics of the geographical location of this investigation, to identify the four grade R centres, which took part in this inquiry. From each institution, one grade R teacher was chosen to voluntarily partake in the investigation.

The four research sites were selected from the grade R centres that fell under the jurisdiction of the Maquassi Hills Education Area Office, a component of the Dr. Kenneth Kaunda education district. This is one of the four education districts of the Northwest Province of South Africa. For ethical reasons, and in line with the wishes of participants, pseudonyms are used to refer to each of the cases in this research. Site A was a grade R centre attached to a rural primary school while Site C was attached to a township (a settlement designated for African people under the erstwhile laws of segregation) primary school. Both centres used Setswana, one of the eleven official languages of South Africa, for pedagogy. Furthermore, these institutions obtained funding from the provincial government. On the other hand, both Sites B and D, respectively, were based in urban areas. Site B was attached to a comprehensive school, which catered to classes ranging from grade R to grade 12 and used English as the language of pedagogy. Site D was attached to a primary school and used Afrikaans (another official language of South Africa) for instruction. Concerning funding, Site B received no government funding while Site D was partly funded by the government.

In respect of participants, some connections and disparities were also noted. Two of the four respondents (Respondents W and X) did not possess the minimum qualification recognised by the South African National Department of Higher Education (DHET) for teaching purposes. According to the norms and standards that regulate teaching, the diploma in grade R teaching or an equivalent qualification, usually a three-year teaching qualification obtained after the completion of grade 12, is recognised for teaching purposes in South Africa (DHET, 2015). Respondents Y and M, attached to Sites C and D respectively, possessed teaching qualifications recognised by the DHET for teaching purposes. Likewise, these respondents had accumulated more teaching experience compared to both Respondents W and X. As illustrated in the findings of this inquiry, some of these demographic details have a bearing on the implementation of EE. The preceding demographics are summarised in Table 1.

Table 1.

Respondents' Profiles

Participant	Grade R Centre	Teaching Qualifications	Age	Grade R and/or other teaching experience
Respondent W	Site A	Grade 12	< 30yrs	4 years
Respondent X	Site B	ECD[1] Level 4	41 – 50yrs	2 years
Respondent Y	Site C	PTC; SED; HED	51 – 60yrs	36 years
Respondent M	Site D	PTD and HED	51 – 60yrs	36 years

*The following is a brief explanation of the acronyms referring to various teaching qualifications as used in table 1, above: ECD Level 4 is a one-year post-Grade 12 Early Childhood Development certificate; PTC = a two-year post-Grade 12 Primary Teachers' Certificate; PTD = is a three-year post-Grade 12 Primary Teachers' Diploma; SED = a three-year post-Grade 12 Secondary Education Diploma; HED = is a one-year Higher Education Diploma awarded to someone who would have obtained a three-year post-Grade 12 qualification before enrolling for such a teaching qualification.

It needs to be noted that to enhance the findings the principals of the four institutions selected for this research were also interviewed. However, since they were not central to the inquiry, their profiles were not requested. The following pseudonyms are used to refer to the principals, namely, Respondent J (Site A), Respondent K (Site B), Respondent L (Site C) while Respondent M doubled as a grade R teacher and principal of Site D.

Data Collection

In this inquiry, participant observations, semi-structured one-on-one interviews, and document analysis were used for data collection. Guided by an observation protocol, the researcher recorded the pedagogical processes that took place in respective classroom contexts. Due to field dynamics, the observation period varied from centre to centre, and it ranged from three to five full days per institution.

After the completion of observations, one-on-one interviews were conducted with each of the grade R teachers and school principals. With permission from each respondent, the interviews were audio-recorded. These interviews were conducted at the convenience of participants, and each respondent had the latitude to be interviewed in their preferred languages. Additionally, to enhance the richness of data, numerous documents (lesson plans, LTSM, learner-activity books) were requested from each of the four grade R teachers and analysed.

Data Analysis

Data analysis was done thematically through text reduction (Attride–Stirling, 2001), coding, categorisation and noting of various themes or patterns (Alhojailan, 2012). The nexus between the themes was determined through constant comparison (Leech and Onwuegbuzie, 2007) as the analysis unfolded. However, some of the data collected during observations and analysis of documents could not be analysed in the manner already mentioned, and domain analysis (Neuman, 2011) was thus employed to facilitate the 'extraction' of some examples of environmental issues from the pedagogical activities observed and the documents provided by participants.

It is worth noting that the processes mentioned above commenced in the field. Accordingly, the field notes were examined meticulously and organised into meaningful words, phrases, and sentences to ease data analysis. Likewise, there was a process of transcription of all audio-recorded interviews, and the translation of those interviews that were recorded in languages other than English.

Trustworthiness

Data and methodological triangulation alongside an audit trail of raw data, field notes and data analysis procedures were used to ensure three elements of trustworthiness, namely, credibility, dependability, and confirmability of the findings (Creswell, 2012; Daymon and Holloway 2011). To enable the transferability of findings to other settings, the researcher provided a comprehensive and substantive account of research setting and events.

Ethical considerations

Prior to data collection the researcher met and interacted with each respondent to provide them with detailed information on the purpose of this study and to obtain their consent to participate in the study. The participants were assured anonymity and confidentiality and, their identities were concealed, instead; alphabets were used to identify each participant. Furthermore, the participants were assured that they were free to recuse themselves from participation in the study at any stage if they so desired.

Findings

The analysis of data generated through all three strategies used in this inquiry produced the findings that could be summed up into the following main headings, namely, enabling curriculum framework, teachers' training and teaching experience, leadership, support, and collegiality, and learning and teaching support materials (LTSM). It is important to point out that since it is not the intention of this paper to reflect on the evidence that demonstrates the implementation of EE but to highlight the factors that enable EE implementation, the researcher will only take a cursory reflection on such evidence only when he deems it essential to do so. This is done since the evidence drawn from this inquiry, which suggests that participant-teachers did accommodate EE in their respective classes, is extensive and would thus require a 'special' paper dedicated only to it.

An Empowering Curriculum Framework

Evidence generated from this inquiry indicates that the curriculum pursued in all four learning sites enabled the integration of EE in grade R. Among the four sites, three sites (A, C and D) followed the curriculum assessment policy statement (CAPS) of the South African national Department of Basic Education (DBE) while Site B pursued the Accelerated Christian Education (ACE) curriculum designed by ACE ministries (www.aceministries.co.za). It is also important to note that the DBE curriculum has an expressed commitment toward EE. Among its principles,

which are found in all its CAPS documents, it has one that stands out expressing the intent "to produce learners that are able to use science and technology effectively and critically showing responsibility towards the environment and the health of others" (DBE, 2011b: 5).

Based on data produced from this research, both curricula are designed in a way that enables the integration of EE in grade R classrooms. The topics that are accommodated and can be used to facilitate the teaching of EE in grade R include *weather*, *stories,* and *songs* (DBE, 2011a), *water*, *seasons*, *healthy environment*, *animals*, *birds*, *reptiles,* and *other wild animals* (DBE, 2011b). The findings of this investigation indicate that some of these topics were treated either in the presence of the researcher or prior to his visit to the respective schools. Additionally, it is also essential to note that at least two of the school principals who participated in this inquiry, noted that the already-mentioned curricula allow for the integration of EE in grade R. For example, Respondent J of Site A pointed out that EE "*is being integrated in CAPS*". Likewise, Respondent K of Site B suggested that the ACE curriculum does enable the teaching of EE by asserting, "*I think a lot of that is worked in, into our program, through the stories and through the activities…there is some emphasis on Environmental Education.*"

Professional Teacher Training and Teaching Experience

The ability of a teacher to effectively integrate issues of environmental concern in a specific subject depends on the knowledge content of the teacher in that specific subject and on numerous other proficiencies. Competent teachers have deep subject content knowledge, are skilled in the teaching profession, know how various learners learn different subjects, can apply an array of pedagogical strategies (Lupascu et al. 2014; Yilmaz, 2011), and are also able to help learners draw a link between the subject content and lived experiences (Edwards et al. 2016). Some studies also suggest that to a certain degree, there is a positive correlation between effective teaching and teaching experience (Kini and Podolsky, 2016; Rice, 2010). The teaching competencies mentioned above are very important in the learning of EE because environmental learning is best learned experientially. However, this does not suggest that only experienced teachers are effective or that experienced teachers are necessarily effective teachers.

In this inquiry, three Respondents (M, X and Y) demonstrated some level of effectiveness in their teaching by undertaking an in-depth covering of certain topics. For example, each of the three respondents would begin their daily lessons by vigorously and meticulously engaging learners in some reflection on various elements of the day's weather and their effects on humans and surroundings. These engagements, which could be conceived as learning *about* the environment, demonstrated, inter alia, that the learners had developed some level of awareness that, for example, the choices of clothes worn on a specific day depend on weather conditions, strong winds can shake tree branches and etcetera. The contributions made by the learners in these and numerous other lessons in the classrooms of the three Respondents (M, X and Y) seemed to give credence to a point made by McBer (2000: 11) who argues that "in classes run by effective teachers, pupils are clear about what they are doing and why they are doing it". Furthermore, some authors aver that the effectiveness of a teacher in the classroom is predicated on their level and quality of both pre-service and in-service education and training (Metzler and Woessmann 2010; Rowe, 2006) and teaching experience. Accordingly, it can be argued that the apparent effectiveness of the three respondents (M, X and Y) could be credited to their training and teaching experience. Respondents M and Y respectively, had undergone professional teacher training that exceeded the minimum training required for a person to teach kindergarteners, and had more than 36 years of teaching experience at ECE level. By her own admission, which was corroborated by her manager, Respondent X had no training in the teaching of grade R. To mitigate this shortcoming, she attended "*annual conventions with workshops*" (Respondent K) aimed at enhancing pedagogical effectiveness. Also, she relied on on-going support from the principal and senior colleagues within the school.

Leadership, Support and Collegiality

The findings of this inquiry also suggest that collaboration between teachers and the support given to teachers by various stakeholders also contribute towards enabling teacher effectiveness, and by extension, the accommodation of EE in pedagogy. Literature intimates that teachers who collaborate and interact by, inter alia, sharing knowledge, ideas, and experiences on lesson planning, problem-solving, selection and use of LTSM, and observation of colleagues at work tend to be effective in their teaching (Kini and Podolsky, 2016; The New Teacher Project, 2013). Additionally, factors such as support from school-based leaders and office-based (that is, outside the school) education authorities are also considered important in facilitating teacher effectiveness (TNTP 2013; Pretorius, 2010).

In this inquiry, inter-teacher collaboration interspersed with support from other stakeholders seemed to have contributed to classroom effectiveness. This effectiveness observed in pedagogical activities of three respondents (Respondents M, X and Y) includes the integration of environmental issues. With respect to Respondents M and Y, collaboration with colleagues within their respective school settings seems to be one of the reasons for their classroom

effectiveness. The following assertions by the two respondents highlight the collegiality between them and their respective colleagues. During the interview, Respondent M underlined the collegiality between her and her grade R colleague at Site D by stating, *"We do our planning together. It helps a lot because our work is the same. When there are problems in terms of specific children or groups, we discuss them and find solutions together*". Respondent Y amplified this interdependence by stating that as colleagues in Site C "*we do sit and discuss whatever*" needs to be discussed and share ideas, and "*if we don't get any solution we go to the Head of Department*".

As it was the case with Respondent M and her colleague, there was also an indication that Respondent Y does her lesson planning with her three colleagues. Regarding Respondent X, although she had no grade R colleague with whom she could collaborate to enable her to become effective in her teaching, she had support from her seniors. It is also worth noting that on more than one occasion during the visits to the two centres (Sites C and D), the two respondents (Y and M respectively) would be seen sitting down doing their planning with their grade R colleagues just at the end of their class lessons.

Learning and Teaching Support Materials

Kassabolat et al. (2020) highlight the importance of LTSM in promoting and enabling pedagogical competence by asserting that schools must provide teachers with adequate and pliant teaching resources to enhance teaching effectiveness and attainment of lesson objectives. Likewise, Akiri and Ugborugbo (2009) contend that effective teaching depends on copious dynamics, and these include the availability of pedagogy-enabling setup and teaching resources at the disposal of the teacher. Hence, Jones (1998) concurs that to fortify a lesson framework, and thereby, promote effective pedagogy, teachers need pertinent learning and teaching resources. Additionally, an absence of resources that 'fit in' with the lesson plan objectives and activities, should nudge an effective teacher to resort to innovation by augmenting the pedagogical program by either, innovatively, developing new resources or adapting existing ones (Green, 2017; Edwards et al. 2016; Jones, 1998).

Evidence from this investigation suggests that although Respondent X did receive some LTSM designed 'to fit into' her daily lesson plans from curriculum developers (ACE), she also developed some resources such as weather charts to supplement these resources. These resources aided learning *about* the environment. Likewise, to complement the limited pedagogical resources such as learner workbooks and wall charts supplied by the DBE, Respondents M and Y developed most of their teaching resources. These resources included, inter alia, flash cards, wall charts, cartoons, material photocopied from personal or library texts, and etcetera. These resources also contributed towards enabling learning *about* the environment. For example, as part of her LTSM, Respondent Y had some A4-size cards that depicted changes in a tree over the four seasons of the year, which she effectively used in her lessons. She also had a wall chart with the title "*where do I live?*" This chart portrayed the "homes" of various animals, for example, a river for the crocodile, a kennel for a dog, and so on. Likewise, Respondent M also had numerous wall charts, which she used effectively in the classroom. For example, among the resources she developed there was a wall chart, entitled *Night Animals*. This wall chart depicted some night-time creatures that could be found in the immediate environment of the learners. These included, inter alia, an owl, a cat, a bat, a lion and a jackal.

Discussion and Conclusion

This paper was an attempt to contribute towards ameliorating the dearth of literature tilted towards identifying facilitators of EE in pedagogy. The findings of this inquiry corroborate several views ventilated by literature concerning the factors that serve as vehicles of EE. Accordingly, in this inquiry, the following factors were identified as supportive of the implementation of EE within the context of ECE settings that formed part of this inquiry, enabling curricula, professional teachers' training and teaching experience, leadership, support, and collegiality and, the appropriate selection of teaching resources. Furthermore, it could be argued that even though there are numerous barriers to EE, which this paper deliberately overlooks as their exploration was not within the scope of this paper; there are evidently numerous factors, as already indicated, which could be taken advantage of, and strengthened, as they serve to expedite EE pedagogy. Significantly, as highlighted in this study, there is a shortage of literature which focuses on identifying factors that enable EE pedagogy. For this reason, more research is essential in this area.

The literature reviewed for this paper also identified the preceding factors as enablers of EE. For example, literature suggests that those in authority are the ones who shape the curriculum to facilitate (or inhibit) the implementation of EE in pedagogy. In essence, one of the key points raised in literature is that if EE is to be implemented then the curriculum should highlight, explicitly or implicitly, the importance and need to teach EE (Kuzich et al. 2015; Joseph 2014; Evans et al. 2012). Additionally, a well-designed curriculum provides opportunities for teachers to, innovatively,

incorporate science and environmental learning (Masters and Park Rogers, 2018). As presented in the results above, the curricular followed in all the sites referred to in this paper were designed to enable EE-inclined pedagogy.

However, for teachers to be able to integrate EE, they need to be well-trained, competent and experienced. Also, the teachers' subject content knowledge and competence, which hinge mainly on professional training and teaching experience, largely, determine classroom pedagogical effectiveness (Hill and Chin, 2018). Therefore, for teachers to effectively implement EE, they need to be professionally competent, have knowledge of sustainability issues and teaching experience. Evidence from this study suggests that three teachers (Respondents M, X and Y) were able to integrate EE in their classrooms while one teacher (Respondent W) could not do so. This could be attributed to the fact that the three teachers had an edge over Respondent W due to their level of training, work experience and the subject content knowledge, which the latter teacher did not possess. These findings corroborate previous and current research (Maidou et al. 2019; Hill and Chin, 2018), which amplifies the value of professional teachers' training, teaching experience and content knowledge in the integration of EE in pedagogy.

Likewise, the three teachers (Respondents M, X and Y) had support from their colleagues and leaders while Respondent W did not have such support. This could be another reason why, as discerned from classroom observations, the three teachers were more effective and were able to infuse environmental learning in pedagogy while Respondent W had shortcomings in this area. The findings corroborate previous and more recent research. Various studies underscore the importance of providing meaningful institutional leadership and support to teachers and the impetus of collegiality in fostering teacher pedagogical effectiveness, including factoring EE in the classroom (Kassabolat et al. 2020; Kuzich et al. 2015; Joseph, 2014). Likewise, recent studies underscore the significant role played by institutional leadership in supporting efforts aimed at ameliorating environmental challenges (Woo and Kang, 2020).

The findings presented in this paper also suggest that Respondents M, X and Y used a variety of learning and teaching resources to cultivate meaningful and effective learning and teaching, including the incorporation of EE, in their classrooms whereas Respondent W relied only on the meagre resources provided by the department of education. In their quest to incorporate real-life experiences to pedagogy, the three respondents selected and designed 'appropriate' teaching and learning resources. As outlined in the presentation of results from this research above, these resources included an array of media that were used to incorporate environmental learning. Accordingly, these findings just like various literature reports amplify the central role played by the selection and designing of appropriate and relevant learning and teaching resources in enabling EE (Heliawati et al. 2020; Kassabolat et al. 2020; Kuzich et al. 2015).

Limitations of the Study

This research, like numerous other inquiries, had its own limitations. Accordingly, two main limitations can be noted, namely, the limited amount of time spent in the field and the non-participation of education officials from the North West Department of Education (NWDE) in the study. As pointed out earlier in this paper, due to field dynamics, the time spent by the researcher in the field varied from one site to the other and the researcher is of the view that the time spent on the field was inadequate. Hence, the researcher is of the view that it is probable that had he spent more time at each site, a deeper understanding of the factors that could be considered enablers of EE would have been obtained.

The other point worth mentioning is that the researcher had intended to enlist the participation of office-based (that is, education department offices outside of the school terrain) officials of the NWDE in this inquiry, particularly those responsible for providing curriculum support to teachers. However, due to undisclosed reasons, they were unwilling to participate in the inquiry. It was the wish of this researcher to find out from them how the department of education ensures the realisation of the ideals and aims enshrined in curriculum policy documents that point to the commitment of the South African National Department of Education to EE.

Despite the above-mentioned limitations, it is the view of this researcher that the purpose of this investigation was fulfilled. The findings highlighted in this paper affirm this assertion.

Recommendations

Based on the findings mentioned in preceding paragraphs, this researcher would like to underscore the need for more research that focuses on factors that contribute to the implementation of EE, not only within the realm of ECE but across the spectrum of education levels. This need derives from the fact that, as stated earlier in this paper, there is a dearth of literature that seeks to identify the factors that facilitate the implementation of EE. Accordingly, it is the

view of this researcher that to broaden the knowledge of teachers, and all the stakeholders who are interested in the advancement of EE, it is necessary to conduct more research that focuses on enablers of EE. This should be done to help all stakeholders with an interest in education obtain a broader perspective regarding the factors and approaches that work to facilitate the implementation of EE, particularly in ECE and, generally, in other levels of education. Arguably, knowing what works and what does not work would best serve the purpose of strengthening the effectiveness of existing practices that advance EE and circumvent those that derail EE. Thus, it is the view of this researcher that to make inroads towards advancing the implementation of EE, especially in early childhood education, the existing enablers of EE should be put to good use, but more importantly, more enablers of EE need to be 'uncovered'.

Furthermore, since the South African public school curriculum policy framework does not provide explicit guidelines on how EE should be integrated in teaching, policy developers need to enhance the curriculum by incorporating tangible guidelines on how environmental learning should be accommodated and advanced in pedagogy. Accordingly, it is the considered view of this researcher that some of the enabling factors underscored in this paper could be tailored to help in the crafting of environment-oriented curriculum directives. Arguably, this approach could be adopted by countries globally where environment and sustainability inclined pedagogy is disenfranchised.

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From the Editor: Novelties to academia from JEGYS

Abstract
Scientific journals should contribute to the creation of new academic fields as well as publishing original articles. JEGYS continues to be the platform that enables the development of the new academic field it has created with particular issues and congresses. Original articles from six different countries were published in this issue. Gifted young scientist education invites authors to develop their academic field.
Keywords: Gifted young scientist education, new academic field, JEGYS, ICGYSE congress, Special Issue: STEM for Gifted

Dear Authors, Readers, Reviewers, Editors

One of the most important issues in academic publishing is to create a new academic field. Because all disciplines are now changing and evolving. We recognize that even the old journals have changed their titles. It is no surprise to see subtitles become a new journal-title.

We always emphasize that JEGYS is an academic journal that creates a new academic field by combining the fields of science education and gifted education. Our authors, referees, and editors are aware of this difference. For that, I am grateful to them.

The fact that science is the product of scientists with Kuhn's explanations, that it is affected by his feelings, thoughts, ideas, and beliefs, has made it accepted that it is subjective. Academic journals should contribute to the development of this aspect of science. JEGYS supports authors in these matters. We indicate that we do not want to publish articles in which known models or theories are tested. We invite research that contributes to the creation of new fields.

STEM research is the study that took place in gifted education 10-15 years ago (Van-Tasselbaska & Wood, 2010). Any attempt to apply STEM practices to all students (nongifted) will fail because not every student can be successful in engineering and science fields. This is obvious that interdisciplinary teaching is not a new instructional approach. Therefore, it is seen that the STEM approach is very suitable for gifted education. As JEGYS editorial board, we decided to publish a Special Issue to support this academic field. We invite all authors studied in this field to this special issue.

Our congress, which will be held for the second time this year, will continue to be the meeting point of researchers in the fields of gifted education, science education, and sustainability of education, as well as all educational sciences. The congress will also contribute to the development of this new academic field, which is an important aspect of JEGYS being a widely read and cited academic journal. We invite all our authors to the 2nd International Congress on Gifted Youth and Sustainability of the Education (ICGYSE).

Table 1.
June 2021 Issue Article Review Process Data

Articles ID	Reviewers number	Review Time (Average)	Contributions to Field	Countries
849063	3	85 days	STEM	Thailand
862904	2	90 days	Cognitive science	Bahrain
696491	2	360 days	Early Childhood	Turkey
864037	2	60 days	Parenting	Turkey
857911	2	130 days	Program Model	US
908540	2	70 days	Self-regulation	Turkey
846480	4	70 days	Differentiation	Afghanistan
901622	2	80 days	Sustainibility	South Africa
874050	2	115 days	Sustainibility	South Africa
Total	At least 2 reviewers	118 days	Gifted education	6 different contries

As seen in Table 1, articles from 6 different countries were published in the June 2021 issue, with at least 2 referee evaluations and review processes that lasted an average of 118 days, all of which would contribute to the

topics in gifted education. Thanks to our referees in this review process. Academicians who want to work as referees can send an e-mail to editorjegys@gmail.com or click the reviewer request button on web site. The late referee turnaround times are 25 days and the response rate of the appointed referees is 70%.

In this issue, Songwut Egwutvongsa from Thailand contributed his article "Toys for children with the concept of STEM: the study of the result from children's playing activities". Eid Abo Hamza and Ahmed Helal from Bahrain contributed their article "Examining the stress, depressive thoughts, and working memory capacities of the university students". Gamze Inci contributed from Turkey with her article "The analysis of research about gifted and talented children at early childhood in Turkey: a study of meta–synthesis". Sumeyye Yıldız and Naime Altay contributed from Turkey with their article "The parenting attitudes and effects on their gifted children: a literature review". Contribution from Mashael Alhibs, US, with the article "The schoolwide enrichment model for reading (SEM-R) framework". Oğuzhan Yavuz and Müge Yukay Yüksel contributed from Turkey with the article "The mediating role of emotion regulation in the relationship between executive functions and self-regulation of gifted and nongifted students". Aminuddin Hashemi contributed from Afghanistan with the article "The effects of using games on teaching vocabulary in reading comprehension: a case of gifted students". Johannah Bopape, Awelani V Mudau and Sikhulile Bonginkosi Msezane contributed the article "Greening the school for sustainable development: Tshwane North District case". Headman Hebe contributed the article “Factors bolstering the implementation of environment and sustainability education: A South African case study”.

We present this issue to you with the contribution of our authors, referees, editors, and proofreaders. In the upcoming issues, we will also include instructional design examples, book reviews, and interview articles. We will continue to work to ensure that the concept of "Gifted Young Scientist Education", which has developed with JEGYS, continues to take place primarily in the academic world and then in the education community.

JEGYS is one of the 10 journals in the academic field of Gifted Education. Future education will be shaped on the axis of "talent". Another important concept that JEGYS offers to the academic community is the concept of the **Advanced Science Education.** Thus, JEGYS ended the discussion with the concept of "Advanced science education" at the discussion of "science education is for everyone" and "science education is for the gifted". The concept of Advanced Science Education deals with the part of science education for gifted children. Implementation of differentiated instruction is a necessity for Advanced Science Education. Conceptual understanding is not emphasized, product-oriented, student-centered, and in-depth studies are conducted. The concept of "Advanced Science Education" will now be used in the academic community. I am happy to present the concept of "Advanced Science Education" to educational sciences. I recommend the authors to develop this concept and use it frequently in academic research. Due to the intensity of my editorial duties, my article work has decreased a little. That's why I present my ideas to you, my esteemed colleagues, in the editorial. Our way is long, our goals are big. Stay healthy and happy.

Best regards
Dr. Hasan Said Tortop
Editor-in-Chief of the JEGYS

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Research Article

Toys for children with the concept of STEM: study of the result from children's playing activities

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Abstract

This research aimed to examine the result from toy invention with the concept of STEM. The testers comprised 36 people who were the parents and children aged between five to seven years old that used the service of a child development center in Buriram Municipality in Thailand. Additionally, they were selected by purposive sampling that used multiple regression analysis to show the result from the testing of the newly designed toys as the concept of STEM. The results found that the toys had a satisfaction level of the Good (mean=4.333; S.D.=0.652) with the regression equation $\hat{Y}$ = 0.234 + [0.741 X1] + [0.106 X2] + [0.049 X3] + [0.071 X4] to explain the changing of the level of satisfaction to be 72.73% (r^2=0.7273). Research of the playing design as the concept of STEM at this time, Able to meet learning goals based on STEM concepts to an excellent level.

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Introduction

The 21st century is considered as the era of globalization (Hearn & Bridgstock, 2010). Moreover, it comprises a society with the movement of technologies and rapid news that has affected humans to experience severe accelerated changes. Similarly, it contributes to opportunities for the transfer of feelings from the application of human forces to global development (National Research Council, 2010). Thus, it is essential to use a high level of thought to potentially create an ideal world based on the concepts of integration, flexibility, applied thinking, etc. Additionally, this could be generated to become stimulation skills so to have creative thoughts, also called as the intellects of the world, in the 21st century. This would result from the creative thoughts being integrated with a creative economy (Tae, 2015), which would humans in the 21st century world (Flew, 2005). As a consequence, the preparation of children's thoughts should have learning support with increased knowledge with high effectiveness from the daily life of children, including the continuous development of knowledge for children through the integration of learning between their playing activities until gaining knowledge from the so-called activities. This development would be aimed at the integration of applying the concept of STEM, which would consist of the knowledge creation of four sciences; namely, science, engineering, technologies and mathematics resulting in toy invention (Rubin & Howe, 1985). Furthermore, for children aged five to seven years old, this would depend on the integration of learning during the playing activities to stimulate them by gaining multiple learning procedures as a real situation that would be tested and learned at the same time. Similarly, the knowledge from playing would aid the children to apply this learned knowledge for use in their daily life; such as, dressing, understanding technologies, bringing knowledge to apply in their daily life, etc.

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Hence, this could be designed as toys for children aged between five to seven years old by using the concept of STEM and providing the opportunity to promote intellectual knowledge in multiple ways, as well as offer the appropriate development for children in the future (Guba, 1990). Therefore, this could promote intellectual knowledge through the activities of playing with children's toys to stimulate knowledge through the various conditions without any stress. Moreover, this would provide benefits to the learning and understanding of the contents through suitable playing activities that would be accountable as an appropriate learning method procedure for future generations.

From the results of various research studies in many countries, it was found that nowadays the proactive learning pattern had a higher level of effectiveness than the defensive learning pattern, especially for children to have the high flexibility of their cognitive skills. Furthermore, this was relevant to the thinking frame, as there was a less level of original thought. Therefore, learning as a playing pattern has focused on the using of the senses with the building of children's knowledge to create opportunities of imaginary thoughts integrated with various other thought patterns. In this case, this could be considered as the stimulation for gaining the requirements of regular learning for children, (Liquin & Lombrozo, 2020) and creating an integrated learning pattern based on relational reasoning for children to gain knowledge and understanding with multiple views as the skills for human groups of children (Holyoak, 2016). Moreover, this could become the learning skills for children to have the readiness for the ever-changing global situation in the mid-21st century (Runco & Beghetto, 2019).

Provided that this could generate the designed playing attributions to encourage various kinds of knowledge while the children play, this might be able to build the skills that could conform to the future lifestyles (Guffey, 2014), as well as be vital knowledge for children to create thoughts as a relationship to link with knowledge (Penn, 2011). Significantly, this would not only represent the learning and development guidelines for children's playing during childhood, but also aim to memorize learning for building the integrated knowledge in several fields (Papandreou & Tsiouli, 2020). As a result, in supporting children to gain knowledge from activities and problem-solving skills, this could generate a new children's playing style in each pattern (Valkonen et al. 2020), as well as build up knowledge differently with playing goals for each pattern.

Aim of Study

- To study the guidelines and playing design for supporting the imagination with the concept of science, technology, engineering, and mathematics (STEM).
- To assess the activities from the new form of designed playing.

Method

Research Model

For the designing step to encourage the children's development, it would be relevant to design the toys based on the concept of STEM. In addition, this would consist of a summary of the results from the brainstorming to search for a suitable toy design for the children by selecting purposive sampling informants. Thus, this would depend on the specific knowledge quantification with the newly designed children's toys of the informants with the case study.

Participants and Data Collection Tools

For the designing step to encourage the children's development, it would be relevant to design the toys based on the concept of STEM. In addition, this would consist of a summary of the results from the brainstorming to search for a suitable toy design for the children by selecting purposive sampling informants. Thus, this would depend on the specific knowledge quantification with the newly designed children's toys of the informants with the case study. This was as follows:

➢ The population was composed of eight teachers and eight caretakers of the child development center located at Mueang Municipality of Buri Ram province, Thailand.

➢ The group sampling was selected by using purposive sampling that had a reliability level of 95% (Yamane, 1973).

➢ The data collection tool was a structured interview with determined questions by using Cronbach's alpha coefficient to assess 30 testers with the value of 0.91 that was more than 0.70, and it was applied and analyzed by using the mean and standard deviation (Streiner & Norman, 1995).

For the assessment of the activities, this involved playing with the newly designed toys as per the concept of STEM. In addition, the newly designed toys were tested before playing, and an imaginary role play was created for the children groups and the families who joined in this research.

From the real testing step with the group sampling, this presented that the researcher had applied the empirical experiment to check for the suitability of STEM and art. Then, children aged between five to seven years were tested with the new designed toys with the babysitters and parents joining in by giving an assessment by expressing their opinions together in this empirical experiment:

➢ The population was children aged between five to seven years and the parents who used the service of a child development center located in Mueang Municipality in Buri Ram province of Thailand. There was a total of 39 people who lived in the service area, where families have children aged between five to seven years according to a survey conducted in the year of 2020.

➢ Group sampling was the children aged between five to seven years and the parents who used the service of a child development center located in Mueang Municipality in Buri Ram province. There was a total of 36 people, who were selected by applying purposive sampling that had a confidence level of 95% (Yamane, 1973).

➢ The research tool was a structured questionnaire that had questions for determining the suitability assessment criteria of the knowledge, such as, in the fields of science, technology, engineering, mathematics, and arts. Additionally, from the questionnaire, it was found that there were the values of Cronbach's alpha coefficient with the questions to be assessed from the testing group of 39 people who were not in the group sampling, who had the values of 0.97, which was more than 0.70. Furthermore, it could be considered that the questionnaires could be applied in a real situation by applying multiple regression analysis (Streiner & Norman, 1995).

Framework

This research had various knowledge integration for the toy invention for children. Moreover, it was considered as an important subject that affected the effectiveness for stimulating their interest (Wolfberg & Schuler, 1993). This also contributed to the activities for stimulating the imagination development, which included mathematics, languages, technologies, engineering, and science. As a result, all fields were connected based on the design of the toy for children as per the concept of STEM that was applied with the research framework (Figure 1).

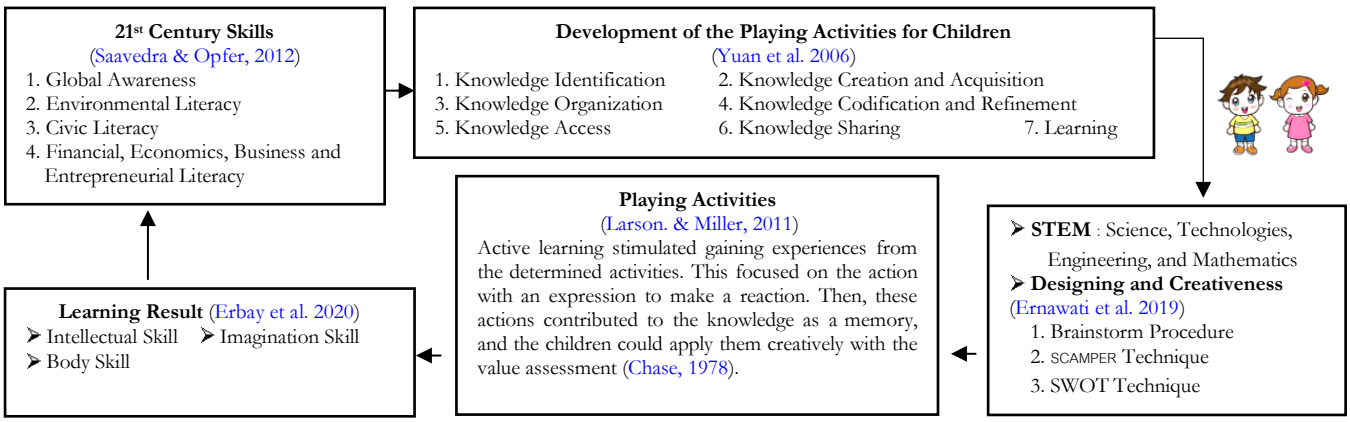

Figure 1.

Research Framework

From the former research, it was found that children's playing was considered as the basic behavior that every child could express (Kelsey et al. 2020). However, children's playing could relieve the mind, and during this relaxed condition, it would assist them to gain higher effectiveness on learning as being the environment to boost up their intelligence skills (Wu & Rao, 2011).

In this case, from the application of the playing characteristics between the children and the parents in their families, this was considered to be a relationship that was linked to be an important part of gaining a good thinking system and positive emotions for children (Amodia-Bidakowska et al. 2020). Furthermore, this research was relevant to applying the concept to be integrated with the toy design by building up multiple knowledge for the children. Thus, the researcher aimed at building the playing knowledge for the children by designing the toys to stimulate them to gain the feeling like "Wow, I did it!", and the successful feeling from the children's action would

congruently explore the playing characteristics to encourage the sustainable learning of the children (Doan et al. 2020).

From the playing characteristics and learning, these were considered as an inseparable characteristic with the intelligence building for children aged between five to seven years. Likewise, this learning pattern was integrated with playing to stimulate gaining creative ideas, analytical thinking, and synthesis thinking (Hassinger-Das et al. 2020; Pramling Samuelsson & Johansson, 2006). Additionally, this research used the learning theory of the Froebel Model for kindergarten children to be applied with the toy designing step as a new concept for STEM (Vogt et al. 2018). Thus, this was based on the building requirements of the toys to build up knowledge with the children's playing activities of the Froebel Model, so that it could create happiness during the learning while being noticed by the teachers and the parents to boost the children's knowledge (Colliver et al. 2021).

Brainstorming (Fig. 2) was conducted to determine the guidelines for the toy activities for children aged between five to seven years old based on the teacher groups and carers to present the ideas of the intellectual skill by supporting the imagination and body skills (Burns & Grove, 1993). This was concerned with the concept of STEM as a new pattern for toy invention that would develop the children's skills.

Figure 2.
Brainstorming between the Teachers and Carers

Results and Discussion

The brainstorming of the teacher groups and the experienced carers enabled stimulating the children aged between five to seven years old with the essential learning interests. The components were as follows:

- Integrated the mathematics skill, languages, and daily life skills with the toy invention to increase the learning interest through the playing activities with funniness and happiness.
- Played with amusement and happiness to effectively contribute to receiving a good memory.
- Blended the practicing skills to control the children's muscles and hands to be appropriately developed with the daily life skills.
- The playing of toys with the role-playing style stimulated the children's imagination during and after playing.
- The integration of playing with learning aided the children to feel relieved, including stimulated the children's brain cells for secreting the endorphin hormones during the play and created a good opportunity to develop the brain by continuously secreting the neurotransmitters, as well as gained thoughtful activities or brain exercises in the same way (Jirojanakul & Skevington, 2000).
- The playing generated an increased level of the children's happiness, especially when they undertook the playing activities with their parents or a family member for the high development of the emotional quotient (EQ).

The conclusions of the brainstorming about the concept by 16 child development experts were used to determine the children's playing activities and to design the intellectual development toys that would be appropriate with the goals of the concept of STEM and Art in terms of regulating the guidelines (Table 1) (Batlolona & Souisa, 2020).

Table 1.

The Results of the Brainstorming of the Playing Activities for the Concept of STEM

STEM	Playing Activity/Learning	Toy Playing Pattern
Science	➢ Wearing casual clothes. ➢ Calling the names of stars in the English and Chinese languages.	➢ Using the role as an astronaut by wearing a pilot's suit with learning involving equipment for daily life.
Technology	➢ Star system and world. ➢ Colors on the stars.	➢ Placing into order the stars in the solar system as a pair matching game. ➢ Placing into order the numbers to connect between the colors of the stars and colors of the numbers.
Engineering	➢ Space shuttle and space. ➢ Travelling into space by human beings.	➢ Placing into order the sizes of the rockets and space shuttles as jigsaws in pictures. ➢ Using the role as an astronaut to travel to the stars.
Mathematics	➢ Number counting and number grouping.	➢ Playing in groups and adding numbers with English and Chinese fonts.
Art	➢ Drawing to support imagination.	➢ Drawing with imagination as stories in various situations.

The playing patterns could be classified into seven subjects that could be used for promoting the well-being of the brain. These were as follows:

- Stimulated the children aged between five to seven years with a playing activity method to support them by using the bodily senses (multisensory method).
- Stimulated the bodily movement and thought movement inside the brain, including arousing the left and the right brain as the brain cell stimulation of the hippocampus and frontal lobe. This was a high and basic thinking procedure for growth with good potential that was used as a brain exercise.
- Stimulated non-movement playing with quickness by focusing on the slow movements with high accuracy as the stimulation of the neurotrophins to be a natural neural growth factor for developing the brain growth in children.
- Stimulated playing as integration of the brain working with the bodily movement as a whole system combined with thoughts, movements, emotions, and the environments to continuously secrete the neurotransmitters. Then, this would affect the practicing of the body for controlling the neurotransmitter to have effectiveness in the future when the children have grown.

Finally, the guidelines of the creative design were used for the inventive playing activities with the active learning pattern. Then, this could stimulate the children to do the activities with their parents and in the surrounding environments by applying the intellectual learning of long-term memory as creative guidelines by using the technique of SCAMPER (Table 2) (Eberle, 1996).

Table 2.

Creative design procedure for children's toys with the SCAMPER technique.

Creative Process	Designing Procedure for the New Toy Category
1) Data Processing 	Brought the concept and inspiration to be used for creating the design with four main words as the creative works: "*CCBS*" or Childlike (cute as a child), Cheerful (cheerfulness), Brain fitness (good brain) and Sustainable (sustainability). These key words of the designed concept were applied with the creative procedure as the concept of STEM (English & King, 2015).
2) Concept 	Created the stimulation to gain interest with the funniness of the children for promoting the brain and the body's development as the concept of STEM, including the intellectual development of Mathematics, Technology, Engineering, and Science with humanity and society in arts for using the children's imagination by brainstorming to search for the guidelines to solve the problems with data analysis (Ting-Ting & Yu-Tzu, 2021).
3) Idea Development 	Brought the SCAMPER technique as the toy designing step (Omorog, 2020) for classifying the ideas prior to considering the seven components; adapted the integration similar to the old styles by modifying some parts, including improving, extending, and cutting the opposite sides or altering the method with the working procedures and bringing the result to effectively make the toy product guidelines with the promotional development of the children.
4) Applying the Principle with the SCAMPER Technique 	Used the development of the draft idea by selecting three toy product patterns for children as the concept of STEM through brainstorming and considering the relationship of the design by taking the result of the assessment in the selection with the designed principle from bringing the two patterns for the model product development in the final level before testing with the children group and the parents who were interested in the promotional development of the children as the concept of STEM+A (Art) (Davidesco, 2020; Smith et al. 2013).

Playing Activities with the Concept of STEM + A(Art)	First Toy Pattern	Second Toy Pattern
		

Table 3.

Selection of the Procedure of the Toy Product Patterns Prior to Testing

Playing Activities with the Concept of STEM + A(Art)	First Toy Pattern		Second Toy Pattern		Comparison	
	Mean	S.D.	Mean	S.D.	t	Sig.
1. Science	3.75	0.58	3.81	0.66	-0.286	.388
2. Technology	4.31	0.60	4.75	0.45	-2.333*	.013
3. Engineering	4.44	0.51	4.38	0.50	0.349	.365
4. Mathematics	4.13	0.72	4.25	0.58	-0.542	.296
5. Art	3.88	0.81	4.06	0.85	-0.639	.264
6. Children's Body	4.00	0.63	4.50	0.52	-2.449*	.010
7. Holistic Thinking Skill	3.75	0.45	4.31	0.60	-3.000*	.003
8. Social Skill	3.50	0.82	4.13	0.62	-2.440*	.010
Total	**3.97**	**0.70**	**4.27**	**0.65**	**-3.618***	**.000**

The result of the assessment conformed to the concept of STEM + A (Art). Moreover, it was found that both the first and second toy product patterns had consistency at an excellent level ($\bar{X}$=3.97; S.D. =0.70) ($\bar{X}$=4.27; S.D. =0.65), respectively. However, the second toy pattern had consistency with the concept of STEM + A (Art) at a higher level than the first pattern that had a level of significance of .05 prior to producing the second toy pattern as the model for testing (Figures 3-4).

Figure 3.

Toy product model for children as the concept of STEM.

Figure 4.

Additional Skill Playing Activities for Children as the Concept of STEM

After applying the testing procedure for the children's toys with the concept of STEM +A (Art), this developed suitable environments for the learning and feeling stimulation to gain the funniness and happiness of the children (Table 6).

Table 6.

Coefficient of the Decision (R^2) for the Components as the Concept of STEM Affecting the Satisfaction of Newly Designed Toys by Using the Assessment from the Real Testing of the Group Sampling

	n=36			
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
Testing	0.852	0.727	0.692	0.311

Table 6 represents the factor testing that found the coefficient of the decision or known as the factor testing (R^2), which had the value of 0.852 and affected the satisfaction of the group sampling. This testing could explain about the changing of the level of satisfaction of 72.73% or r^2=0.7273 by bringing the components as the concept of STEM that affected the satisfaction of the new toy patterns to be determined with the regression equation as $\hat{Y}$ = 0.234 + [0.741 $X1$] + [0.106 $X2$] + [0.049 $X3$] + [0.071 $X4$].

Table 7.

Relationship Analysis between the Newly Designed STEM Components with the Satisfaction

Testing	**SS**	**df**	**MS**	**F**	**Sig.**
Regression Equation	8.001	4	2.000	20.672	0.000
Deviation	2.999	31	0.097		
Total	11.000	35			

As shown in Table 7, the analysis depended on the predictors, which were 1.Science, 2.Technology, 3.Engineering, and 4.Mathematics.

This had the dependent variable; such as, the satisfaction of the toy's application for children as the newly designed concept of STEM. Thus, according to the analysis result, this represented the F-test = 20.672 > F-table = 2.690, and it was found that at least one independent variable or X had a relationship with the dependent variable or Y.

Table 8.

The Coefficient of the Multiple Linear Regression with the Prediction Variables for the New Pattern of Children's Playing Activities Satisfaction Affecting the Component of STEM

Prediction Variable	***b***	***S.E.b***	***B***	***T***	***P***
Constant	0.234	0.790		0.297	0.769
X1) Science	0.741	0.091	0.802	8.143	0.000
X2) Technology	0.106	0.120	0.091	0.886	0.382
X3) Engineering	0.049	0.111	0.044	0.438	0.664
X4) Mathematics	0.071	0.071	0.099	0.997	0.327

As seen in Table 8, the coefficient of the multiple linear regressions for the prediction variable with the satisfaction of the children and parents affected the newly designed toys developed from the concept of STEM. In addition, it was found that variable 1 or science had a relationship with the satisfaction of the toy as the concept of STEM as well as variable 2 or technology, variable 3 or engineering, and variable 4 or mathematics that had no relationship with the satisfaction of the toys as the newly designed concept of STEM.

Variable 1 represented science with multiple linear regression and was found to be equal to 0.741. Furthermore, if increased importance was given to the learning of science by one unit, this would represent the children's and parents' satisfaction and would affect the newly designed toys to gain an increased chance with 0.741 units.

Variable 2 represented technology with multiple linear regression and was found to be equal to 0.106. Additionally, if increased importance was given to the learning of technology by one unit, this would represent the children's and parents' satisfaction and would affect the newly designed toys to gain an increased opportunity with 0.106 units.

Variable 3 represented engineering with multiple linear regressions and was found to be equal to 0.049. Likewise, if increased importance was given to the learning of engineering by one unit, this would represent the children's and parents' satisfaction and would affect the newly designed toys to gain an increased opportunity with 0.049 units.

Variable 4 represented mathematics with multiple linear regression and was found to be equal to 0.071. Moreover, if increased importance was given to the learning of mathematics by one unit, this would represent the

children's and parents' satisfaction and would affect the newly designed toys to gain an increased opportunity with 0.071 units.

Thus, it could be concluded that the prediction equation of the toy product design had the concept of STEM as follows:

➢ According to the regression equation as a standard score pattern, this represented $Z = .802\ Z_1 + .091Z_1 + .044Z_3 + .099Z_4$.

➢ According to the regression equation as raw scores, this represented $\hat{Y} = .234 + .741X_1 + .106X_1 + .049X_3 + .090X_4$.

From the results of the satisfaction of the toys for the concept of STEM, the assessment was taken from the expression behavior of the children's playing activities and was based on the parents' satisfied behavior according to the newly designed playing activities (Table 9).

Table 9.

Satisfaction of the Children and Parents Affected by Playing Under the Newly Designed Concept of STEM.

Component of STEM to be Designed	Mean	S.D.	Satisfaction Level
Satisfaction of the Playing Activities	4.500	.561	Very Good
Satisfaction of the Science Knowledge	4.444	.607	Good
Satisfaction of the Technology Knowledge	4.667	.478	Very Good
Satisfaction of the Engineering Knowledge	4.167	.507	Good
Satisfaction of the Mathematics Knowledge	3.889	.785	Good
Total	4.333	.652	Good

According to the parents who noticed the children's playing activities as the newly designed concept of STEM, it was found that the overall satisfaction result was at the Good level ($\bar{X}$=4.333; S.D. =0.652). As such, this could represent the requirements of the parents and children groups for bringing the children into the knowledgeable world with the funniness of science, technology, engineering, and mathematics by integrating new playing patterns in a suitable way. This was also promoted with arts knowledge or appropriate playing activities without much quickness for stimulating the children's brain by secreting the neurotransmitters on the alpha brain waves. Furthermore, this stage was ready for the children to gain their knowledge as a super learning circle for stimulating relaxation plus funniness, happiness and eagerness to study and other related factors, which could fulfill the values for playing as newly developed toys that would be suitable for the requirements of the parents and the children.

The first rank showed the satisfaction of the technology knowledge of the parents and the children at the most level of satisfaction ($\bar{X}$=4.667; S.D. =0.478). This represented the aspects of most parents to give importance to additional skills as technology knowledge for children as the most important part, including the knowledge contribution that conformed with the trends of the current changing world and the future world where technology would give good advantages with human lifestyles at a high level.

The second rank demonstrated the satisfaction of the playing activities for the parents and the children at the most level of satisfaction ($\bar{X}$=4.500; S.D. =0.561). This represented the requirements of the parent groups for the children to play learning activities integrated with studying and playing.

The third rank displayed the satisfaction of the science knowledge of the parents and the children at an excellent level of satisfaction ($\bar{X}$=4.444; S.D. =0.607). This represented the importance that the parents needed to increase the satisfaction result of new developments by aiming at the importance of science in people's daily life as close stories for small children and future generations. Therefore, they should gain the science skill as basic knowledge to apply in their life in the future in a suitable way.

The fourth rank showed the satisfaction of engineering knowledge of the parents and children at an excellent level of satisfaction ($\bar{X}$=4.167; S.D. =0.507). This represented the result that the parents had gained more specific knowledge requirements in learning about engineering to stimulate the children to have more opportunities to create innovations for the future progress of human civilization.

The fifth rank displayed the satisfaction of mathematics knowledge of the parents and children at an excellent level of satisfaction ($\bar{X}$=3.889; S.D. =0.785). This represented the result for creating the basic calculation for the children to conduct activities with toys as the concept of STEM, but now, it still appeared as the result of the

increase in the mathematics skill without the connection of involving skills affecting the reduced satisfaction level as the newly designed concept of STEM.

From the results of the relationships between the satisfaction values of the new toys and the suitability values from science, technology, engineering and mathematics, it was found that there was harmony in a positive direction for children by finding suitable knowledge in the four fields through increasing ways. Thus, this resulted in the satisfaction of the children and the parents to the newly designed toys to be at an increased level with the $\bar{X}$=4.333; S.D. =0.652. In this case, this conformed with the research objective of the testing requirement of bringing the learning concept of STEM to be applied with the children's playing activities (Colliver & Veraksa, 2019). Moreover, this conformed with the concept of the Froebel Model that stated that the best form of learning for children was to play by expressing themselves with freedom until gaining positive experiences from the playing activity with their suitable development in each age level (Smedley & Hoskins, 2020). In the same way, it should have the integration from these two concepts for designing the toys to increase the playing requirements of the children and allowing them to express themselves with their bodies in various activities to learn new things: 1. Technology, 2. Playing activity styles, 3. Science, 4. Engineering, and 5. Mathematics.

Significantly, according to the testing to apply the newly designed toys, it was found that this could confirm the result of the concept of STEM with the learning theory of the kindergarten students from the Froebel Model. Therefore, provided that this could be integrated from these two concepts of the designing of the toys for children according to their ages, this would stimulate the children to participate in the learning activities regularly and in harmony with the development of the children's age (De Souza et al. 2020).

Conclusion and Recommendations

The research goals were relevant with the creative requirements of a new playing pattern to build up knowledge of science, technology, engineering, mathematics, and art. Therefore, this enabled building up the intelligence of children aged between five to seven years by gaining playing activities, and newly designed developed toys that always resulted from the stimulating requirements of children to feel "Wow, I did it!". Furthermore, this was considered as a form of integration of knowledge in the pattern of STEM that had a high level of effectiveness, (Keung & Fung, 2020) as well as made the new toys to ideally conform to be a concept that could focus on knowledge contribution with funniness and safety to be product designs for children (Nuri & Kursat, 2020).

In this case, when the children saw the new developed toys as the concept of STEM, they were often more interested in the playing pattern with the playing requirements in the activity areas. Furthermore, this was under the characteristic of modeling the situations with imagination building for children to play easily by conceiving the knowledge from the shape of the characteristics, and they could understand about the playing methods by using their own past experiences to be the expected thoughts for playing with new toy patterns (Richards et al. 2020). After that, when the children had tried to play with the toys, it was found that more than 90% of them could tell stories from their own imagination through the playing roles. This also included the satisfaction between the children and the parents to the designed toys as the concept of STEM that had an excellent level and was noticed from the playing behavior from the parents expressing knowledge to the children during the playing activities:

a) This presented that the children had bodily interaction at an increased level by using various parts of the body; such as, hands, arms, body, and legs while they were playing. Then, during this time, it enabled them to integrate between the learning and the playing based on the toys to stimulate the children to express themselves with positive behavior through the touching of their own bodies (Ledford et al. 2020).

b) This presented that the children had science knowledge from learning about the arrangement of the planets in the solar system, so they could tell about the shape attributions with colors, and the arrangement of each planet in the solar system, including memorizing about the planet's knowledge by using the knowledge modeling; they imagined they were astronauts flying in space and could see the stars in the universe that could increase their memorizing to be easier than the normal way (Zhang, et al. 2020).

c) The children had mathematics knowledge from the integrated learning of counting numbers by using the arrangement method of the stars in the universe; this used Arabic numbers to be integrated with the playing method in the characteristic of building the rocket base with the stimulation to increasingly interest the children, and this could be considered as a problem-solving method of basic calculation that could be applied suitably with the children's knowledge (Lin et al. 2020).

d) The children had engineering knowledge from learning about the components of the space shuttle and the solar system to use as stories and become the skills conforming with the world in the 21st century. The solar system and universe were much closer to them more than in the past, so they could memorize the information and answer questions about the universe or the world for conceiving the real knowledge in a concrete way (Moreno, 2016).

Therefore, from the invention of the newly designed toys as the concept of STEM at this time for children aged between five to seven years, it presented that they could join in the playing activities with funniness, and the parents could notice this from the children's playing in stimulated activities that allowed them to express ideas and interact using their body (Li & Schoenfeld, 2019). In this case, according to the result of the assessment from the children groups and the parents, it showed that the satisfaction was at an excellent level with the satisfaction from the most level to the least level being the technology knowledge, the funniness from the playing activity, the science knowledge, the engineering knowledge, and the mathematics knowledge, respectively. Thus, according to all five fields from the playing activity of children, it showed that the result of the playing as a concept of STEM from the new design could be the learning goals of STEM. In addition, this focused on the integration skills that could be applied in the daily life of children conforming with the current age and the future.

As a result, this should emphasize the development skills and thought creation from the real experiences of children by learning with their own senses until enabling them to stimulate this as memorizing knowledge at a sustainable level with high effectiveness; however, according to the research of the playing design as the concept of STEM at this time, it could be considered as a form of positive harmony with the learning goals as the concept of STEM at an excellent level (Takeuchi et al. 2020).

The world in the 21st century has changed to be the era of globalization (Postelnicu et al. 2015). However, now the situation has reversed to be one of severity because of the COVID-19 pandemic resulting in a downward trend of deglobalization. Therefore, this situation has affected the world's sustainability in the same way (Karunaratne, 2012). As such, humans in the new age must adapt themselves to give importance to the intellectual level by developing their potential to live in the future safely. This should also include not taking for granted the development of the thought system by applying the system of connected thinking, applied thinking and creative thinking (Khan & Riskin, 2001). Then, these thought systems would be based on flexible thinking skills to aid the new human age to live suitably in the future. Thus, the development of the intellectual level is called knowledge contribution in various ways (Li et al. 2020), and this involves technology, science, engineering, and mathematics as the concept of STEM to be the appropriate 21st century learning concept pattern that can be integrated with the learning guidelines for creating a sustainable intellectual level for children because they are considered as a significant human resource of the future (Bureekhampun & Mungmee, 2020).

Furthermore, the concept has been combined with the toys for gaining as knowledge from multiple sciences. Thus, this can contribute to the variety of knowledge by stimulating children to gain more flexible thinking skills, as well as developing them to gain knowledge that could be applied in their daily life in a suitable way. Therefore, playing by the new age children would stimulate gaining knowledgeable playing activities that would benefit people's future daily life.

Similarly, the designing of the toys would develop the imagination as per the concept of STEM by bringing the active learning pattern to be integrated with the toys' creation as part of the development of the children's stimulation. This could bring this subject to be utilized for creating toy product models by promoting the children's development as per the concept of STEM with two differentiating patterns for the children's playing activities. Therefore, this conformed with the conclusion that this must use active learning to be integrated with the successful result in a suitable way, and it would be essential to gain the learning attributes as a small group or lesser numbers of people to gain a better result (Freeman et al. 2014). From the result of the designing procedure as per the concept of STEM, this used pictures to develop the children's knowledge of mathematics, engineering, technology, and science that affected the second pattern of the toy products to have an excellent level of satisfaction for the teacher and carer groups. Hence, this conformed with the concept that these pictures could represent the language of communication to gain knowledge or the intellectual level with effectiveness (Rau, 2017).

Consequently, this would be capable of stimulating the children to gain creative ideas (Henriksen, 2014), and after bringing the model from the second concept to test for creating the children's playing activities, this represented that the children and parent groups had a level of satisfaction of the development of the stimulation and knowledge at an excellent level. Thus, this conformed with the concept of learning with the building of knowledge integrated with behavior stimulation while playing, as being the review and stimulation of an effective memory

(Chen et al. 2019; Vasquez & Comer, 2013). As a result, the result of the knowledge assessment occurred from the new design of the toys as per the concept of STEM and conformed with the satisfaction by ordering from the most to the least level as technology, playing activities, science, engineering, mathematics, and others, respectively (Özcan & Gülözer, 2020; Wullur & Werang, 2020).

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Research Article

Examining the stress, depressive thoughts, and working memory capacities of the university students

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Abstract

The objective of the study is to measure the capacity of the working memory, and also to investigate its relationship to life stress and depressive thoughts. The study sample consisted of 50 college students studied on Science and Art major. A cognitive task was designed to measure the working memory capacity based on the determinants found in previous research. The results indicated that there were statistically significant differences in the level of life stress events (high/low) on the task of measuring the working memory capacity. The results also showed that there were no statistically significant differences neither between genders nor between majors on the task of measuring the working memory capacity. Furthermore, the results reported that there was no statistically significant effect of the interaction of the level of life stress (high/low) and gender (male/female) on the task of measuring working memory capacity. Finally, the results reported that there were significant differences in the level of depressive thoughts (high/low) on the task of measuring working memory. The current research concludes that neither the interaction of stressful life events, gender, and academic major, nor the interaction of depressive thoughts, gender, and academic major have an effect on working memory capacity.

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Introduction

Working memory is one of those processes indicating how to preserve and process information that is essential for understanding different aspects of human cognitions. Miller (1956) claimed that working memory is targeted by an integer in a well-known paper humorously defining "the mysterious number seven plus or minus two." He showed that a sequence of no more than about seven arbitrarily arranged significant objects or bits (which could be letters, digits, or words) can be replicated again. However, other work has produced varying findings. Young adults can only recall three or four longer verbal chunks, such as idioms or short sentences (Martinez & O'Rourke, 2020; Vijay, Himanshu, 2017; Thalmann, Souza & Oberauer, 2019). Some have shrugged their shoulders, concluding that the "just depend" limit is based on the details of the memory task, but new work demonstrates where and how the cap can be expected.

Working memory is an essential element in understanding a task or cognitive activity; it is this virtual cognitive system that is responsible for entering the information required to continue in the activity, and is often what constitutes the limiting factor in the performance of this task. Despite its limited capacity, it is the system mainly responsible for attention distribution, planning, strategic choices, and thinking.

Theoretical Background

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On examining the literature, prior studies have tried to visualize this relationship by examining the effect of emotional substances on the working memory capacity. In the field of studying pressures or external stressful events, Goller, Banks and Meier (2020) described that working memory ability was found to be negatively associated with perceived negative life event stress and hypothesized that the relationship can be driven by ideas created from those experiences. Several studies such as Abo Hamza et al. (2020), Metz et al. (2018), and Goller et al. (2020) mentioned that the relationship between life difficulties/problems and working memory processes concluded that authoritarian ideas resulting from life problems are reflected in the efficiency of working memory processors ,whereas the results of a study by Legaa, Gidlowa, Jones, Ellisa, and Hurst, (2021) on stressors and the elements of working memory showed that an average level of stress is related to the improvement of processing elements on working memory tasks.

Gotlib, Jopling, Gotlib and LeMoult (2020) have discussed the association between psychological stress and working memory, and the results showed that stress affects the treatment of a task and the accuracy of the performance of its components. However, Lukasik, Waris, Soveri, Lehtonen, and Laine (2019) acknowledged that working memory is negatively associated with anxiety , but the same association does not exist with stress.

On the other hand, Violaa et al. (2019), and Xu, Guan, Li, Zhang & Xu (2020) realize that early life stress is linked with altered neuroimmune signaling trajectories that have cognitive development implications and negatively affect working memory. Results showed that the pressure caused a severe impact, through neurological mechanisms, on performance of the tasks of working memory. The results of the study by Banks (2011) and Abo Hamza, et al. (2020) indicated that mental questions (authoritarian ideas) constitute an intermediate variable in the relationship between stress and dysfunction on the tasks of working memory, and Metz, etal. (2018); Lukasik et al. (2019); and Legaa et al. (2021) supported the same conclusion regarding post-traumatic stressors on elements stored in working memory. Legaa et al. (2021) found that there is a weak ability to update the emotional information in working memory for a range of high pressures. Finally, Edwards et al. (2015), Petkus et al. (2017), Lukasik et al. (2019), Li et al. (2018), and Beloe & Derakshan (2019) relate that there was an effect of anxiety, depression and dysphoria on the efficiency of working memory processing and the absence of an effect of situation pressures on the processing capacity.

According to WHO (2017) , in 2015, over 300 million individuals worldwide(up to 4.4% of the world's population) suffered from major depressive disorder, a leading worldwide illness (Radell, Abo Hamza & Moustafa, 2020). Therefore, mechanisms that lead to the persistence of depressive disorders are crucially important to recognize. Jopling et al. (2020), and Gärtner et al. (2018) studied the effect of clinical depression on working memory and concluded that depression affects the distribution of sources of attention associated with the central outlet and patients with depression need to spend more efforts comparing with healthy groups.

Studies by Manelis et al. (2020), Gray et al. (2021) and Zhang et al. (2018), investigating the effect of emotional substance, such as depression, on updating the content of working memory found that there is an effect of depression on the content of working memory with the influence of authoritarian ideas. Moreover, in a study by Yoon, Le Moult and Joormann (2014) on the defective updating of the working memory content related to depression, the results concluded that depressed patients have difficulty in removing information that is not related to the task from the content of the memory. The studies by Hubbard et al. (2015) and Jopling et al. (2020) on depressive thinking and limited working memory capacity express an association between high depressive thinking and the speed of information processing in working memory. The same studies state that there is a strong influence of depressive thinking on working memory and that ruminants of depression constitute an intermediate variable in the relationship between depressive thinking and performance on the tasks of working memory.

Lukasik et al. (2019) indicated that working memory is a limited capacity system and is responsible for the active retention and processing of information necessary to carry out complex, cognitive tasks and functions such as thinking, learning, understanding, and problem solving. Li et al. (2018) and Legaa et al. (2021) indicated that working memory is a system of limited capacity reflecting the temporary activation of perceptions that constitute the content of consciousness. Furthermore, all of the definitions of working memory have agreed that it is a component of the utmost importance compared to the rest of the other elements of the cognitive system. Lukasik et al. (2019) emphasized that the dysfunction of working memory affects an individual's ability to understand, code, and retrieve information, perform complex cognitive tasks, and speak logically, and many studies have agreed that working memory is a central mechanism in conducting basic cognitive activities, including planning - life is difficult without all of these abilities.

van Abswoude, Buszard, van der Kamp & Steenbergen (2020), Thalmann et al. (2019), and Cansino et al. (2018) pointed to factors that can lead to an increase in the working memory capacity and the presence of differences in capacity between individuals, as some of these factors were classified into strategic factors, such as repeated training and the number of chunks, and non-strategic factors, such as the processing speed and perseverance in the face of the confusing elements.

The Current Study and Research Hypotheses

The current study is an attempt to examine the effect of some external stimuli (stressful life events) and internal stimuli (depressive thoughts) on the capacity of the working memory system. This study is focused on the capacity of working memory in storage and processing which should be studied in the clinical context. The cognitive tasks such as thinking, being attentive, and gaining academic achievement are only completed through the ability of the working memory. Therefore, working memory is deemed to be the main component of intelligent behavior. Consequently, understanding the way this system works is worth studying. The implications for understanding the process of human cognitions support positive changes for healthy psychological development. The scientific understanding of the interaction of clinical and cognitive variables can be used on the development of psychotherapy programs for clinical variables. Studying working memory is a necessary element for self-organization related to decision-making and behavior towards goals. There is an apparent scarcity of Arabic studies, dealing with the variables of the current study. The study pointed out that time is not a sufficient factor to influence the work of working memory. Based on the previous theoretical foundation, research suggests the following study hypotheses.

H1: There are significant differences supported by statistical evidence between the average scores of the high and low stressful life event groups on the process of measuring the working memory capacity.

H2: There are significant differences supported by statistical evidence between the average scores of males and females on the process of measuring the working memory capacity.

H3: There are significant differences supported by statistical evidence between the average scores of the arts major group and the science major group (in Egypt's high school system) on the process of measuring the working memory capacity.

H4: There is a statistically proven effect on the interaction between the level of pressure in life (high/low) and gender (male/female) on the process of measuring the working memory capacity.

H5: There is a statistically proven effect on the interaction between the level of stressful life events (high/low) and the study group major (science/arts) on the process of measuring the working memory capacity.

H6: There is a statistically proven effect on the interaction between gender (male/female) and the study group major (science/arts) on the process of measuring the working memory capacity.

H7: There is a statistically proven effect on the interaction between the level of stressful life events (high/low) and gender (male/female) and the study group major (science/arts) on the process of measuring the working memory capacity.

H8: There are significant differences between the average scores of participants having depression and negative thoughts (high/low) on the process of measuring the working memory capacity.

H9: There is a statistically proven effect on the interaction between the level of depressive thinking (high/low) and gender (male/female) on the process of measuring the working memory capacity.

H10: There is a statistically proven effect on the interaction between the level of depressive thinking (high/low) and the study group major (science/arts) on the process of measuring the working memory capacity.

H11: There is a statistically proven effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type (science/arts) on the process of measuring the working memory capacity.

Method

Participants

The study sample consisted of 50 participants from College of Education students – Tanta University in Egypt – from all four academic standings (freshmen, sophomores, juniors, and seniors) from the arts and sciences majors in the second semester of the year 2018/2019.

Table 1.

Descriptive Statistics of Sample

Major /Gender	Sciences	Arts	Total
Male	13	12	25
Female	13	12	25
Total	26	24	50

Data Collection Tools and Procedures

The study used the following assessments and procedures:

The Process of Measuring the Working Memory

A cognitive task was designed and prepared to measure the capacity of the working memory based on the variables found in previous studies, which stated that cognitive tasks are the best measures to determine the functions and capacity of the working memory. The purpose for measuring the capacity here was to determine the maximum number of elements that can be remembered and recalled in the working memory and that was done by measuring the main functions of the working memory, i.e. stopping, diversion, and updating, which are the functions of the central executive. Task description;

The task consisted of two experimental conditions, which were:

- Recalling of numbers
- Processing of letters

A facial emotional stimulus was introduced along with the two experimental conditions.

The First Experimental Condition

This condition was concerned with recalling numbers, and consisted of number chains varying from the simple to the more complicated, starting from two numbers all the way up to ten numbers. Every number chain was presented in a blank cell, as follows:

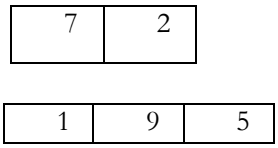

Figure 1.

Experiment Card

The card was presented to the person for a time interval that increased in line with the amount of numbers presented on the card, so the card that contained two numbers was displayed for two seconds with the time increasing by one second for each number added to the sequence, until the final card was reached, which was displayed for 10 seconds. After displaying each card, a facial emotional stimulus (sad face icon) representing depressed or stressed facial features was displayed for 3 seconds. This emotional stimulus acted as a provoking factor.

After displaying the card with the number sequence and then the photo, the person was asked to recall the number chain previously displayed, and they were allowed a number of seconds equal to the number of numbers displayed on the cards. For example, the card that contained five numbers was allocated a time interval of 5 seconds for recall.

Calculating the Results

The person was given one mark for every correct number they managed to recall.

The Second Experimental Condition

This condition was concerned with processing letters and it consisted of two cards. One card contained three letters, such as (O, G, T), for example, and the other card contained rows of letters, each of which may or may not have included the previously displayed letters. The three letters on the first card were displayed to the person for 3 seconds followed by a picture of a sad face for 3 seconds. The person was then asked to cross out on the second card the letters that were present on the first one, within a time interval of 10 seconds. This second condition aimed to determine the processing speed of the central executive, which consists of stopping, diversion, and updating as follows:

Stopping: one's ability to stop crossing out letters that did not appear on the first card.

Diverting: one's ability to divert attention from the stimulus that has no connection to the task (the letters that did not appear on the first card).

Updating: replacing the letters seen on the first card with the letters on the second card, which acts as a confusing factor. If the person did not complete the task within the 10 second time interval, the test was stopped.

Calculating the results

The examinee was given one mark for every letter that was crossed out. The total score was calculated by adding the result of the first and second test to make up the final result of measuring the working memory

Validity and Reliability of the Task

Validity; the task's validity was calculated by following the method proposed by Al-Zoghbi (2016), who used a calculated cognitive task with almost the same steps to measure functions of the working memory. The correlation among the validation sample (N=50) was r = 0.71, which indicates a high degree of validity.

Reliability; the reliability of the task was calculated in several ways: test-retest for a sample size of 50 with a time interval of two weeks, and by using Cronbach's alpha and Guttmann's assessment methods.

Table 2.

Reliability factors for the process of measuring the capacity of the working memory

Reapplying test	Cronbach's alpha	Guttmann's assessment
0.74	0.722	0.6911

Assessment of Stressful Life Events

The assessment used (Shokair, 2013) consisted of 70 statements that presented possible stressful life events. Participants indicate their level life events stress on a Likert scale of 4 points ranging from 1 ("often", "sometimes", "rarely", or "never", describing the person's feeling regarding that stressful life event. The scoring was carried out ("3", "2", "1", or "0" respectively) and the total possible score of the test was 210. The assessment dimensions, with the associated statements numbers, were as follows:

Family pressure (1, 8, 15, 22, 29, 36, 43, 50, 57, 64)
Economic pressure (2, 9, 16, 23, 30, 37, 44, 51, 58. 65)
Academic pressure (3, 10, 17, 24, 31, 38, 45, 52, 59, 66)
Social pressure (4, 11, 18, 25, 32, 39, 46, 53, 60. 67)
Emotional pressure (5, 12, 19, 26, 33, 40, 47, 54, 61, 68)
Health pressure (6, 13, 20, 27, 34, 41, 48, 55, 62, 69)
Personal pressure (7, 14, 21, 28, 35, 42, 49, 56, 63, 70)

The validity was confirmed through internal consistency by calculating the correlation coefficient between the total score and the score of the sub-dimensions, with the following results: Family pressure 0.63, Economic pressure 0.58, Academic pressure 0.93, Social pressure 0.84, Emotional pressure 0.84, Health pressure 0.71, and Personal pressure 0.66. These were all significant correlation coefficients at the 0.05 level. The reliability of the assessment was also calculated test-retest with a time interval of 21 days on two administrations (r = .72). Therefore, the assessment was reliable enough to be used in the current study.

Validity Assessment

The assessment validity was calculated by calculating the criterion validity of the test using the "Facing daily stressful life events" method (Abdul Salam, 2008), which is an assessment conducted to measure daily stressful life events through various dimensions. The correlation coefficient between individuals' scores was 0.68, indicating high validity.

The assessment validity was revalidated in several ways: including test-retest on the same validating sample (N=50) with a time interval of two weeks, as well as calculating reliability using Cronbach's alpha and Guttmann's assessment methods to each of the assessment's dimensions.

Table 3.

Stress coefficient for stressful life events (n=50)

Test-retest	Cronbach's alpha	Guttmann's assessment
0.76	0.7712	0.71

Depressive Thoughts Assessment

The assessment aimed to measure depressive thoughts or cognitive dimensions of major depressive disorder or what is also known as "rumination of depression." After reviewing the literature regarding depressive thoughts, 18 statements were rephrased and assembled to make up this assessment considering the local culture. Participants indicate their level of depression on Likert scale of 5 points ranging from 1 (never) to 5 (always) and 4 statements (1, 2, 3, 17, 18) have reversed scoring.

Validity

The validity of the assessment was conducted using vocabulary validity, by calculating the correlation coefficient between the score of every item and the total score of the assessment after deleting that item's score from the total mark; the correlation coefficient here indicates the validity of every single item, using the same validating sample (N=50). The results of this test are shown in table (4).

The researcher calculated the validity of the current assessment (face validity of the vocabulary) by finding out the correlated correlation coefficient between the degree of each individual and the total score of the scale after deleting the individual score from the total.

Table 4.

Correlation between Items

Depressive thoughts assessment			
Item number	**Correlation coefficient**	**Item number**	**Correlation coefficient**
1	0.6307	10	0.4511
2	0.4213	11	0.6125
3	0.3001	12	0.5112
4	0.2801	13	0.7242
5	0.3115	14	0.3180
6	0.4117	15	0.2917
7	0.718	16	0.6512
8	0.5316	17	0.7401
9	0.7531	18	0.6315

Reliability

Assessment reliability was calculated in the following ways: test-retest with time interval of two weeks, and also calculating the reliability coefficient using the Cronbach's alpha and Guttmann methods. After validating the psychometric properties of the study assessments, these assessments were applied on the main study sample. Then statistical analysis was carried out, based on the hypotheses of the current study.

Table 5.

Realibility Test Results of Depressive Toughts Test

Reapplying test	**Cronbach's alpha**	**Guttmann's assessment**
0.82	0.6819	0.7415

Results

To test the study hypotheses, a three-dimensional variance analysis was performed. Tables (6) and (7) show the results of the variance analysis of the stressful life events (high/low), gender (male/female), type of specialized study (science/arts), and level of depressive thoughts (high/low) on the individual's scores on the process of measuring the capacity of the working memory.

Table 6.

Descriptive Statistics of Students' Stress Level

Variable	**Sum of squares**	**Degrees of freedom**	**Average of squares**	**F-test**
Stressful life events (high/low)	931.548	1	931.548	21.602*
Gender (male/female)	34.806	1	34.806	0.807
Major category (science/arts)	6.197	1	6.197	0.144
Stressful life events × gender	18.171	1	18.171	0.421

Stressful life events × major category	0.727	1	0.727	0.017
Major category x gender	73.267	1	73.267	1.699
Stressful life events × gender × major category	103.968	1	103.968	2.411
Error	1811.208	42	43.124	-

*Function

There are no significant differences between the average scores of the science and arts groups on the process of measuring the capacity of the working memory. There is no significant difference of the interaction between stressful life events (high/low) and gender (male/female) on the process of measuring the capacity of the working memory. There is no significant difference on the interaction between stressful life events (high/low) and major category (science/arts) on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between gender (male/female) and major category (science/arts) on the process of measuring the capacity of the working memory. There is no significant difference on the interaction between the stressful life events (high/low), gender (male/female), and the major category (science/arts) on the process of measuring the capacity of the working memory.

Table 7.

Three-Way Variance Analysis of the Level of Depressive Thoughts, Gender, and Major Category on the Individual's Scores on the Process of Assessing the Capacity of the Working Memory

Variable	Sum of squares	Degrees of freedom	Average of squares	F-test
Depressive thoughts level (high/low)	103.345	1	103.345	25.548*
Gender (male/female)	43.168	1	43.168	0.841
Major category (science/arts)	5.088	1	5.088	0.125
Depressive thoughts × gender	12.072	1	12.072	0.297
Depressive thoughts × major category	2.554	1	2.554	0.063
Major category x gender	9.540	1	9.540	0.235
Depressive thoughts × gender × major category	78.258	1	78.258	1.927
Error	1705.342	42	40.603	-

*Function

There are no significant differences between the average scores of males and females on the process of measuring the capacity of the working memory.

There are no significant differences between the average scores of the science and arts groups on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between the level of depressive thoughts (high/low) and gender (male/female) on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between the level of depressive thoughts (high/low) and the major category (science/arts) on the process of measuring the capacity of the working memory.

There is no significant difference on the interaction between gender (male/female) and the major category (science/arts) on the process of measuring the capacity of the working memory. There is no significant difference on the interaction between the level of depressive thoughts (high/low), gender (male/female), and major category (science/arts).

H_1: There are significant differences between the average scores of the high and low stressful life event groups on the process of measuring the capacity of working memory.

Table 8.

Descriptive Statistics of the High and Low Stressful Life Event Groups on the Process of Measuring the Capacity of Working Memory

Group	n	Average	Standard deviation
High stressful life events	25	18.400	8.602
Low stressful life events	25	9.840	3.619

Table 8 illustrates the significant differences of the level of stressful life events (high/low) on the process of measuring the capacity of the working memory thereby making the hypothesis acceptable.

H_2: There are significant differences between the average scores of males and females on the process of measuring the capacity of the working memory.

Table 9.

Descriptive Analysis of the Scores of Males and Females on the Process of Measuring the Capacity of the Working Memory

Groups	n	Average	Standard deviation
Males	25	14.00	8.109
Females	25	14.24	7.463

Table 9 shows that there are no significant differences between the average scores of males and females on the process of measuring the capacity of the working memory. Thus, this hypothesis is rejected.

H_3: There are statistically significant differences between the average scores of the science major group and the arts major group on the task of measuring the capacity of the working memory.

Table 10

Descriptive analysis of the scores of the scientific and arts groups on the process of measuring the working memory

Groups	n	Average	Standard deviation
Science	26	12.808	7.93
Arts	24	15.542	7.38

It is clear from table (10) that there are no statistically significant differences between the scores of the science and arts group. Therefore, this hypothesis is rejected.

H_4: There is a statistically significant effect of the interaction between the level of pressure in life (high/low) and gender (male/female) on the task of measuring capacity of the working memory.

Table 11.

Descriptive statistics of the interaction between the level of stressful life events (high/low) and gender (male/female) on the task of measuring the working memory capacity

	High stressful life events		Low stressful life events	
Gender	**Males n=14**	**Females n=11**	**Males n=11**	**Females n=4**
Average	10.00	9.637	19.909	17.857
Standard deviation	3.496	2.582	9.670	7.999

Table 11 indicates that there is no statistically significant effect of the interaction of the level of stressful life events (high/low) and gender (male/female) on the task of measuring the working memory capacity. As a result, this hypothesis is rejected.

H_5: There is a statistically significant effect of the interaction between the level of stressful life events (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity.

Table 12.

Descriptive Statistics Of The Interaction Between The Level Of Stressful Life Events And Study Group Major On The Task Of Measuring The Working Memory Capacity

	High stressful life events		Low stressful life events	
Major	Science n=17	Arts n=8	Science n=9	Arts n=16
Average	10.000	9.500	18.111	18.562
Standard deviation	3.602	3.207	11.374	7.023

According to table (12) there is no statistically significant effect of the interaction of the level of stressful life events (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity. Accordingly, this hypothesis is rejected.

H_6: There is a statistically significant effect of the interaction between gender (male/female) and the study group major (science/arts) on the task of measuring the working memory capacity.

Table 13.

Descriptive Statistics for Male And Female Scores in Science and Arts on the Task of Assessing the Working Memory Capacity

		Males	Females
Science n=26	Mean	13.231 (n=13)	12.385 (n=13)
	Deviation	9.355	3.051
Arts n=26	Mean	14.833 (n=12)	16.250 (n=12)
	Deviation	6.820	8.125

As table (13) reported , there is no statistically significant effect of the interaction between gender (male/female) and the study group major (science/arts) on the task of measuring the working memory capacity. Therefore, this hypothesis is rejected.

H_7: There is a statistically significant effect of the interaction between the level of stressful life events (high/low), gender (male/female), and the study group major (science/arts) on the task of measuring working memory capacity.

Table 14.

Descriptive Statistics of Stressful Life Events for Males and Females from the Science and Arts Majors on the Task of Measuring the Working Memory Capacity

		High stressful life events		**Low stressful life events**	
		Males	Females	Males	Females
Science	Mean	10.00 (n=1)	10.00 (n=7)	24.00 (n=3)	15.167 (n=6)
	Deviation	3.496	2.582	15.621	8.841
Arts	Mean	10.00 (n=4)	9.00 (n=4)	17.250 (n=8)	19.863 (n=8)
	Deviation	2.8284	3.9158	7.046	7.220

According to Table 14 there is no statistically significant effect of the interaction between the level of stressful life events (high/low), gender (male/female), and the study group major on the task of measuring the working memory capacity. As a result, this hypothesis is rejected.

H_8: There are statistically significant differences between the average scores of people having depression and negative thoughts (high/low) on the task of measuring working memory capacity. According to Table 7 results, there are statistically significant differences between high and low depressive thoughts on the task of measuring the working memory capacity.

Table 15.

Descriptive statistics for high and low levels of depressive thoughts on the task of measuring the working memory capacity

Group	**N**	**Average**	**Standard deviation**
High depressive thoughts	25	9.440	2.551
Low depressive thoughts	25	18.800	8.327

It is clear from Table (15) that there are differences between the levels of high and low depressive thoughts. Accordingly, this hypothesis has been accepted.

H_9: There is a statistically significant effect of the interaction between the level of depressive thinking (high/low) and gender (male/female) on the task of measuring the working memory capacity. According to table (7) that there is no statistically significant effect of the interaction between the level of depressive thinking (high/low) and gender (male/female) on the task of measuring the working memory capacity.

Table 16.

Descriptive statistics of male and female high and low depressive thoughts on the task of measuring the working memory capacity

	Depressive thoughts level		**Gender**	
	High (n=25)	Low (n=25)	Males (n=25)	Females (n=25)
Average	9.440n	18.800	14.000	14.240
Standard deviation	2.551	8.327	8.109	7.463

Table 16 shows that there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low) and gender (male/female) on the task of measuring working memory capacity. As a consequence, this hypothesis is rejected.

H_{10}: There is a statistically significant effect on the interaction between the level of depressive thinking (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity. Table (7) indicates that there is no statistically significant effect on the interaction between the level of depressive thinking (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity.

Table 17.

Descriptive Statistics of High and Low Depressive Thoughts from the Science and Arts Majors on the Task of Measuring the Capacity of the Working Memory

	Depressive thoughts level		Gender	
	High (n=25)	Low (n=25)	Science (n=26)	Art (n=24)
Average	9.440	18.8000	12.808	15.542
Standard deviation	2.551	8.327	7.930	7.372

Table 17 reflects that there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low) and the study group major (science/arts) on the task of measuring the working memory capacity. Consequently, this hypothesis is rejected.

H_{11}: There is a statistically significant effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type (science/arts) on the task of measuring the working memory capacity**.**

Table 17 indicates that there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type (science/arts) on the task of measuring the working memory capacity.

Table 18

Descriptive statistics of males and females with high and low depressive thoughts from the scientific and arts specialties

		High depressive thoughts		Low depressive thoughts	
		Males	Females	Males	Females
Science	Mean	9.2222 (n=9)	10.2500 (n=8)	22.2500 (n=4)	15.8000 (n=5)
	Deviation	2.635	2.493	13.226	9.731
Arts	Mean	9.800 (n=5)	7.333 (n=3)	19.818 (n=7)	18.00 (n=9)
	Deviation	2.490	2.517	9.119	7.903

According to Table 18 there is no statistically significant effect on the interaction between the level of depressive thoughts (high/low), gender (male/female), and the study group type(science/arts) on the task of measuring the working memory capacity. Consequently, this hypothesis is rejected.

Discussion

It is proposed that the result regarding the first hypothesis is in line with definitions of the working memory in the literature, in that it is a system with limited capacity that presents a workspace for the other elements in the cognitive system to keep the information and process it. This system is made up of several elements, the most important of which is the central executive. It is the element responsible for the many important functions concerned with processing information, including stopping, diverting, and updating, and is responsible for dealing with the cognitive demands of a task. When an external burden is placed on the working memory, such as stressful life events, this burden leads to a dysfunction in the work of the central executive. These results also show that stressful life events require more space to be processed than the space available in the working memory, which has a limited capacity of 7±2 (approximately 5 to 9 chunks of code).

From a biological point of view, it is possible that the available elements fail because the task requires a high degree of extended activation, which places a burden on the working memory. Several studies such as Beloe & Derakshan (2019), Metz et al. (2018), Viola et al. (2019), Lukasik et al. (2019), and Manelis et al. (2020), and Gray et al. (2021) all stated that it would be biologically costly to have a working memory capacity larger than the one already available in which to process burdens, or excessive stimuli, that are not connected to the task. Fenn and Hambrick (2012), and Xie, Berry, Lustig, Deldin, & Zhang (2019) acknowledged that the capacity of the working memory is affected by fatigue or sleep deprivation, which can result from stressful life events; these events represent

a source of threat, which is the main element in anxiety disorders, thus leading to an increased burden on the working memory.

This result agrees with the model of Beloe & Derakshan (2019) where stressful life events lead to increased work of cognitive perceptions, which creates a burden on the limited capacity of the working memory. Also, stressful life events ease the access and entry to the working memory of controlling ideas associated with these events, thus using up the limited resources of the working memory and affecting the sources of attention as one of the cognitive inputs affecting information processing. This result is consistent with the studies of Goller et al. (2020), Xu et al. (2020) and Zhang et al. (2018), who explained that high levels of pressure are connected to a change in the capacity of the working memory, and also with the study of Blasiman and Was (2018) who stated that pressure level instructions are related to fluctuations in the level of capacity of the working memory.

Moreover, the study by Adams, Nguyen and Cowan (2018) showed that the difference in individuals' perception of stress and the difference in their knowledge assessment lead to differences in the level of working memory capacity. Pe et al. (2013) and Zhang et al. (2018) indicate that psychological stress affects performance on working memory tasks, explaining that pressure affects individuals' ability to update information in the working memory. However, this result disagreed with the result of the study by Edwards et al. (2015) who note no any effect of pressure on the capacity of processing information in the working memory.

Regarding the second hypothesis, as shown in these results, the working memory is one of the elements of the human cognitive system, and it is available to all of mankind (ie. males and females). It is the necessary component for performing cognitive processing of information, and the differences that occur in the working memory system may be due to reasons other than the difference in gender, such as the structural defect that occurs in the nervous system underlying the performance of the working memory system, or due to reasons specific to the context, such as cultural and social factors. Therefore, the assumption of differences in the performance of working memory due to gender might be related to the social and cultural context in which males and females are raised. A context having higher life stress events influences the performance of working memory by directly affecting the capacity available for retention and processing. This result is consistent with the results of studies by Adams et al. (2018), Lukasik et al. (2019), and Blasiman and Was (2018).

Results regarding the third hypothesis is attributed to the fact that the science and arts academic content does not affect the performance of the working memory. All academic curricula offered within universities are purely exam oriented, such as providing tools to assist memorization, and working towards the exam itself, which measures retrieval. They are only brief curricula that do not require the student to plan procedures, but rather are aimed at the student's automatically blind processing that retrieves specific information and then retains it as a result of its continuous repetition in the content of working memory (memorization and repetition). This result is also due to the cognitive style of students, who are accustomed from the beginning of the educational system to memorizing, and memorizing only, and the final mark is their ultimate goal. There are no differences in the type of procedure used. The important part is only to retrieve the information and write it in the examination paper. Therefore, the type of major is subject to society's philosophy of education, which is that the exam and the grade are the priority. This result contrasts with the result of a study by Wilding et al. (2007) who express that science students showed more difficulty in the tasks of retrieving words than arts students.

The result for fourth hypothesis can be attributed to the fact that gender (male/female) is an element that does not affect the performance on the tasks of measuring the working memory capacity because it is a basic function that exists in the human species, and that context factors are the biggest influence, but the effect of context factors here is subject to the principle of individual differences. The result is consistent with Unsworth and Robison (2020) regarding this hypothesis and is specific to the study sample in terms of characteristics, conditions of application, and the tools used. It is possible that this result differed in the different samples due to differences in age and characteristics, especially with the previously known impact of stressful events on the working memory capacity, as well as the absence of gender impact on the working memory capacity.

The results for fifth hypothesis can be attributed to the effect of stressful life events on the working memory capacity as a situational component that actually affects the working memory capacity, while at the same time being subject to the principle of individual differences (Unsworth & Robison, 2020) in the study samples, in terms of age and demographic characteristics, and the tools used to measure the variables. As for the effect of the academic major, it is an authentic cultural factor, especially as society has only one philosophy for all academic disciplines,

which is exam grades, and therefore only one side of the working memory is activated, which is memorization and retrieval.

Regarding the sixth hypothesis, this result can be attributed to specific factors related to individual differences. Gender was an ineffective variable because the working memory system is present in all humans with its limited capacity in both males and females. Regarding to the academic major, it is related to the curricula and education system activating just one of the elements of the knowledge system, as they focus on memorization. With regard to seventh hypothesis, this result is attributed to the influence of the level of stressful life events related to the individual differences of the study samples (Unsworth & Robison, 2020). The result of the current study might differ if it was conducted on another sample, with different age and demographic characteristics, but the gender result (male/female) is logical because the working memory system is present in the human species as a whole and the differences that occur between males and females might be due to attitude or context factors, rather than gender. This result is consistent with the results of Cansino et al. (2018), and Beloe & Derakshan (2019) as for the effect of the academic major, it is also a cultural influence in a society whose educational system is concerned with activating only one aspect of the working memory, i.e. related to memorization and retrieval, with the sole aim of exams and grades.

Additionally, the result for eighth hypothesis can be attributed to the depressive thoughts that constitute the cognitive component of depression, leading to a dysfunction in the three functions of the working memory (stopping/diversion/updating) and thus individuals' inability to stop information not related to the task from entering their working memory or individuals' inability to replace old information with new information related to the task, and individual's inability to convert negative variables to other positive or neutral ones. Depressive thoughts affect the vocal circle, which is one of the elements of the working memory, due to the state of fear associated with these ideas, and therefore affect internal verbal activity (self-talk). Lukasik et al. (2019) indicated that the effect of depression on one of the subsystems in the working memory, the "discoverer of happiness", which is a system that organizes the relationship among a complex set of stimuli found in the environment, and helps to evaluate options with positive and negative characteristics in our lives. Therefore, it helps us to accurately visualize the negative and positive stimuli, and reach quick and final conclusions regarding the stimuli in order to make a sound and correct decision. The presence of depressive thoughts leads to difficulty in weighing the conflicting characteristics among the stimuli, and a difficulty in the evaluation resulting from an individual's inability to cope with the semantic elements required for this evaluation. As a result of research of Baddeley (2013); Gärtner et al. (2018), Noreen, Cooke and Ridout (2020), an individual who suffers from depressive thoughts will be considered to suffer from:

- Difficulty in measuring equivalence between negative and positive stimuli.
- Weak ability to distinguish between options already stored.
- Lack of sensitivity in detecting any change in the previous equivalence levels.

Furthermore, hypotheses from nine to eleven have been rejected. The resulting symptoms of depressive thoughts, as discussed above, lead to the depletion of the knowledge sources of working memory and thus constitute a burden on the working memory because the difficulties facing the discoverer of happiness system in assessing environmental stimuli lead to more rumination of depressive ideas, which leads to further burden on the work of cognitive abilities. This result is consistent with the findings of Noreen et al. (2020), Adams et al. (2020), and Zhang et al. (2018) associating depression with defective elements of working memory and confirm that depressed patients have a problem in controlling the working memory content. This result also agrees with the results of Jopling et al. (2020) who show that depression affects the distribution of sources of attention associated with the central executive of working memory, and a study by Yoon et al. (2014) showing that patients with depression have problems removing information unrelated to the task from the content of working memory. Further, the result also agrees with the findings of Hubbard et al. (2015), Gärtner et al. (2018) who state that there is a correlation between a high degree of depression and limited working memory capacity, and with the findings of Hubbard et al. (2016) showing a relationship between ruminants of depression and performance on working memory tasks.

Conclusion

There is an agreement between the studies and models in the theoretical framework, which state the existence of an effect of external emotional stimuli (such as stressful life events) and internal stimuli (such as depressive thoughts)

on the amplitude of working memory, and the results of the current study, which determined the existence of this effect, especially in the first and eighth hypotheses. The maxim of the mutual influence between emotional elements and working memory capacity was not affected by gender. The mutual effect between emotional elements and the working memory capacity was not affected by the difference in the academic majors (science/arts), and the reason was considered to be a cultural factor related to the type of curricula, and the way students activate the working memory.

Finally, the general conclusion is that there is a mutual and strong relationship between our cognitive system, represented here in the working memory, and our emotional system, represented in the variables of stressful life events and depressive thoughts.

Clinical Implications

The current study recommends the following:

- Giving attention to the elements of activating the working memory in the context of the educational process in general, whether in the context of parenting or in the context of education within the school, and in the context of the interaction between teachers and students, as it is the most important component of the educational system in influencing intelligence, learning, and abilities.
- Paying attention to the presentation of the academic curricula, whether at school or university, taking into account the limited capacity of the working memory, by presenting the curricula in the form of chunks, packages, or groupings where the elements of a curriculum subject are organized in a coherent and logical way. This is especially the case in university curricula for a subject, where it was noticed that most are presented randomly, in unregulated and unorganized university notes, thus placing a cognitive burden on students' working memory.
- Activating the role of psychological counseling centers within universities to help deal with stressful life events and depressive thoughts among university students, which constitute a burden on the working memory capacity according to the results of the current study.
- Reflecting a major improvement in the perception of diminished forgetting in depression and also indicating that instruction in working memory could be a promising intervention to enhance stressed people's capacity to prevent unwelcomed memories from coming to mind as supported by Noreen et al. (2020).
- Reflecting a major improvement in the perception of diminished forgetting in depression and also indicate that instruction in working memory could be a promising intervention to enhance stressed people's capacity to prevent unwelcomed memories from coming to mind as supported by Li et al. (2019).

Limitations

The study has potential limitations, we used small random from university study which put limitations for the ability of generalizability of results. Additionally, the assessments that have been used in the two experiments should be computerized. Furthermore, we were supposed to start by examining the relationship between working memory capacity and depression and stress, not depressive thoughts and stressful life events.

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Research Article

The analysis of research about gifted and talented children at early childhood in Turkey: a study of meta – synthesis

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Abstract

The objective/aim of this study is to give an analysis of the researches conducted on gifted and talented in the early childhood period in Turkey through the methodology of meta-synthesis, and yet to reveal the tendencies of the scientific studies. This study provides the literature scanning/reviewing for the articles and graduate thesis written in Turkey between the years of 2002 and 2017. 37 scientific studies are included in this study. At choosing the studies, Google Scholars' search engine, databases of TUBITAK ULAKBIM DergiPark, YOK National Thesis Center, EBSCOhost-ERIC, and SPRINGER are recruited. All the studies which are approached for this study are analyzed through the content analysis for different themes such as years, subjects, working groups, objectives, methods, and outcomes. These categories of the themes present the data and these data are interpreted based on frequency and percentage values. All the theme categories and frequency values are visually shown in tables and graphs. As a result of this study, it is stated that studies on determining the gifted or talented kids in the early childhood period are quantitatively more. It is found interesting that most of the studies have recruited scales and survey methods. Some of the studies on this subject are the articles from the thesis studies. It is revealed that studies focusing on differentiated education programs for the gifted and talented kids in early childhood are minute amount. In accordance with these results, several facts and suggestions related to these facts are discovered such as multi-dimensional measurement methods are needed to be related to identification in Turkey's early childhood period, identification for the gifted and talented kids in their early childhood period is crucial as well as the education for their parents and teachers due to their health education is needed, it is also needed to develop relevant differentiated education programs related to kids' talent fields and finally, it is important to create a national education program to be applied to all the departments who are concerned.

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Introduction

Studying gifted and talented is being one of the most popular study fields in our country for the last decade. The early childhood period for gifted and talented studies is very rare in the literature. Especially in the last decades, studies in this field got increased by number. Generally, these studies are on evaluation the gifted and talented kids and their education as well as their families and teachers.

It is difficult to make a study on the concepts of intelligence or talent, whose definitions are difficult for years. Although there are no common definitions of giftedness, there are some common points for researchers. These common points are considered to be logically evident by Stenberg (1999), who examines them as complex relationships, generalization, abstraction, imagination, sensitivity, reasoning, adaptation, speed, perception and, memory. Criteria considered in defining giftedness and abilities are also taken into account.

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Taking into account the components involved in the definition of intelligence, Maker (2003) describes components of gifted and talent; it states that there is complicated problem solving and desires. Gifted and talented children are effective in complex problems and they produce solutions in a short time and love challenging things. In another definition; Field experts treat individuals as intelligent, creative, leadership, arts, or academically highly successful individuals from their peers (MEB, 2009). Considering similar criteria, Koshy (2001) gifted and talented; High intelligence, creativity, artistic ability, physical and mechanical ability. In another definition, gifted and talented; General competence, special ability, motivation, and self-concept (Feldhusen & Kollof, 1986). This definition is similar to Renzulli's general and special ability, the definition of creativity and motivation (Renzulli, 1977, 1978, 1986, 1998, 1999). Winner (1996), which also combines different features, distinguishes gifted individuals with early development, speed, deepening interest contents

Gifted and talented individuals are rare in society. It is assumed to be around 2% in every society (Marland Raport, 1972; Webb, Meckstroth and Tolan, 2003). Because there are few gifted and talented individuals, society should be best served by them. The early identification of these individuals, the recognition of educational opportunities, and the provision of pieces of training for their families and teachers have great precaution. Gifted and talented individuals can be detected at an early age and their education can be initiated by providing suitable environmental conditions. As known, intelligence and talent are influenced by two factors. These are heredity and environment (Davaslıgil, 2004a). By providing appropriate environmental factors, superior intelligence and talent are expected to emerge in a more positive manner. Environmental factors have been particularly taken into account in the second half of the 20th century and are considered as an effective factor in the emergence of superior ability (Stenberg, 2003).

The provision of favorable environmental conditions will lead to more specific features of general gifted and talented individuals. The most important features of gifted and talented individuals are their cognitive characteristics (Ataman, 2003; Çetinkaya, 2013; Delisle, 2003). Gifted and talented people need special and individual training due to their mentioned this characteristic. The early recognition and education of gifted and talented individuals have made the early childhood of gifted and talented people the subject of research (Baska, 2005; Maker ve Nielson, 1996).

Gifted and Talented in Early Childhood

The fastest period of child development is in the first six years of birth (Karadağ, 2015). Children whose skills are recognized early will develop better than cognitive, academic, social, and emotional aspects (Dağlıoğlu and Suveren, 2013; Schofield and Hotulainen, 2004; Stapf, 2003). According to Baykoç (2011), early talents and skills lead to the education of children. Early identification of children's abilities, organization of school and home environments, informing the family and the teacher, preparation of appropriate programs. At the same time, the correct planning of your future is of social and social significance.

Gifted and talented individuals need to be trained in early detection areas (Hökelekli and Gündüz, 2004; Gür, 2006). If gifted and talented children cannot get recognition early on, they may have negative attitudes towards life and the future in further years of their lives. The inability to use the mental power of gifted and talented children in the right direction can have a reverse effect. This can reveal unwanted educational processes and behaviors (Hodge & Kemp, 2002).

Early identification of gifted and talented children, the first way to prepare future-oriented programs is to recognize them correctly. This process takes place in Turkey as nomination, pre-evaluation, group screening, individual review, registration, and placement (MEB, 2009). For children to be properly identified, the family and teachers have as much responsibility as the experts (Karadağ, 2015). Especially in earlier periods, questions about how to predict and measure intelligence bring more tasks and responsibility for the family and the teacher. From the instruments used in identification, to the diagnosis criterion there are many areas that we should be careful of.

WISC-R, Stanford Binet, Leiter are some of the instruments used in Turkey. These have been used in the first year of the adaptation. It is a deficiency that has not been updated in years (Arı, 1999). The use of these tests within the same norms and criteria for many years has risen to questions about reliability. In this sense, the MEB has standardized the Wechsler Non-Verbal Test / Wechsler Nonverbal Talent Test (WNV) and the Kaufman Brief Intelligence Test / Kaufman Short Intelligence Test (K-BIT). These tests have been used in the selection of students for BILSEM in recent years (Alma, 2015).

Early education of gifted and talented individuals also benefits their families and teachers. The energy of gifted and talented children, the willingness to ask questions and learn leaves their teachers and families in a difficult

situation. Early identification of superiority can help parents and teachers to map the pathways on how to live with these children (Cutts & Moseley, 2004; Dağlıoğlu, 2010; Heller & Schofield, 2008).

Most of the studies on gifted and talented education focus on primary education and older ages (Alma, 2015). Most of the studies on gifted and talented education focus on primary education and older ages. There are no researches that analyze these researches in a multi-factorial way in the article and thesis dimension and synthesize them qualitatively. This study will ensure that the researches working on this topic will be aware of the work they will undertake in the field and have knowledge of the content and methodology of their work.

The Importance of the Research

As a result of this research, we explain in detail what type of studies conducted for gifted and talented children in Turkey, what years those studies are conducted, what kind of objectives these studies have, what methods to be used in the studies, and what outcomes are obtained, therefore, it will be a sort of guideline for the experts who work on this topic.

The Objective of the Research

The main objective of this study to synthesize regarding with early childhood area gifted and talented children masters and doctoral theses made in turkey and published scientific articles in various journals. For this purpose, answers to the following questions were sought:

- What are the types of the studies conducted on gifted and talented children in early childhood period?
- What are the years of the studies conducted on gifted and talented children in early childhood period?
- What are the most common issues of the studies conducted on gifted and talented children in early childhood period?
- What are the participants / research groups of the studies conducted on gifted and talented children in early childhood period?
- What are the objectives of the studies conducted on gifted and talented children in early childhood period?
- What are the methods of the studies conducted on gifted and talented children in early childhood period?
- What are the outcomes of the studies conducted on gifted and talented children in early childhood period?

Method

The Design of the Research

In this study, a meta-synthesis study was used from the content analysis types as it was aimed to analyze the studies about giftedness and talent in early childhood in Turkey by qualitative methods and to determine general tendencies. The aim is to conceptualize the data obtained from the scientific studies in the content analysis. Coding of concepts under certain headings, determination of themes, the arrangement of categories, identification and interpretation of findings from the obtained categories (Yıldırım & Şimşek 2011). Meta-synthesis is a study that is included in the content analysis studies and it is the interpretation and synthesis of the works done on the same topic with a critical point of view by creating themes or main templates (Çalık & Sözbilir, 2014). Meta-synthesis studies are studies in which qualitative aspects of only qualitative studies or mixed method studies in which a small number of studies are addressed and an in-depth study is made (Polat & Ay, 2016).

The Scope of the Research, Collecting Data and the Criteria for Including the Data in the Study

The scope of the research consists of 37 scientific studies in Turkey, including 20 articles, 12 master thesis, and 5 doctorate thesis carried out by Turkish researchers in the years between 2002-2017. Keywords "early childhood" and "gifted and talent" were used during the literature review. Despite the absence of early childhood concepts in the titles of the studies, studies in which gifted and talented individuals were formed and/or family and teachers were included in the early childhood period of the sample group were also evaluated and included in the study. Thus, all the studies related to early childhood gifted and talent in terms of keywords and sample/study group and data sources were tried to be investigated. The National Thesis Center, TUBITAK ULAKBİM Dergipark, Google Scholars, EBSCOhost-ERIC, and SPRINGER databases were used in determining the studies to be included in the research. While the studies were determined within the scope of the research, the sample was determined according to the purposeful sampling method. Criteria for determining the studies; a- the studies are made by the Turkish researchers in Turkey, b- whether the research is for the children aged 0-6 /8 and their families and teachers, c- the studies are either thesis studies or published in journals with the editorial board.

The Analysis of the Data and Coding Process

In the study, the steps of the meta-synthesis work were applied sequentially and systematically. These steps are listed below:

- Determination of the subject and writing of research questions
- Selection of the articles to be included in the study.
- Reading the chosen articles.
- Creating common themes
- Synthesis of the common themes
- Writing reports about the process and the findings (Polat & Ay, 2016).

It is thought that the visualization of the data in the form of graphics and tables will facilitate the reader's sense of meaning. In content analysis, the main objective is to collect the themes and the data that are similar to each other in the studies and, to organize these operations in the most comprehensive way that readers can understand. It is necessary to achieve a healthy synthesis by editing and interpreting this data appropriately. In the study, firstly the themes were formed from all qualitative and quantitative studies that were examined after determining the research questions. The themes obtained are presented in the graphics and tables with their categories, frequencies and, percentage values.

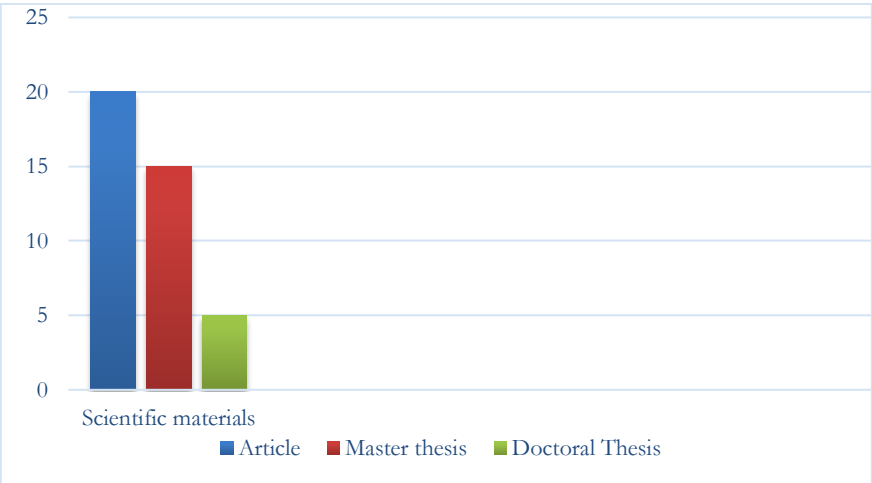
In the coding process, each study included in the research was first read in detail and examined according to the research problems and coded according to each theme and recorded in the computer platform. Each study examined is coded as A1, A2, A3 ... A37. The data were read over and over again and unnecessary parts were removed.

The Validity and Reliability of the Research

The objectives and research questions of the study have been expressed clearly in order to ensure validity and reliability. The method of data collection and the criteria have been included in the collection of data to ensure the validity of the findings. It has been presented in tables and graphics to ensure the reader understands easily. The analysis of the data and the creation of common themes are explained in detail. Subcategories related to the subject, purpose, study group, and results of the studies have been created and an internal reliability study was conducted by evaluating consistency between evaluators. During the evaluator disputes, the agreement has been achieved by reviewing the subcategories together with the evaluator. All studies were checked by comparison by two investigators. The studies that have been determined by an unbiased assignment are independently re-evaluated by the expert to evaluate the inter-study reliability.

Results

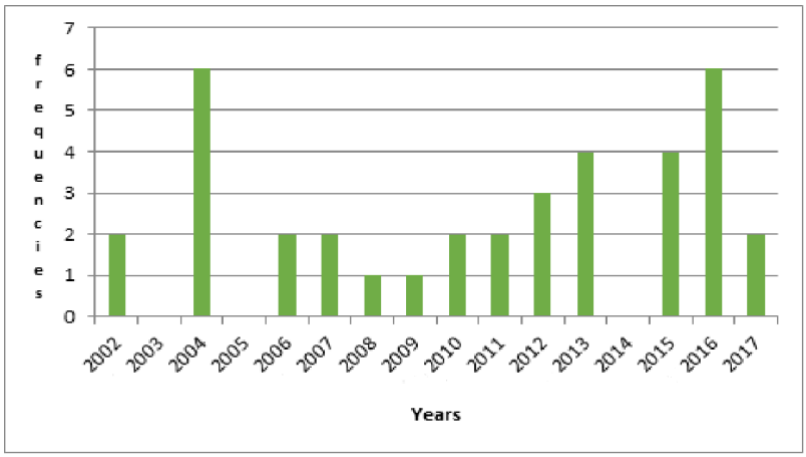
In this section, findings obtained from the analysis of the data are presented.



Graphics 1.

Distributions of the Study by Types

The distribution of scientific studies conducted with gifted and talented children in early childhood period in Turkey is shown in Table 1. According to Table 1, 20 of 37 studies analyzed were scientific articles (54,05%), 12 of them were master thesis (32,43%), and 5 of them were doctoral theses (13,51%).



Graphics 2.

Distribution of the Study by Years

Graphics 2 shows the distribution of scientific studies conducted in Turkey with respect to gifted and talented children in early childhood according by the publication year. Among the 37 studies examined according to Graph 2, the most studied studies were conducted between 6 and 24 years between 2004 and 2016, while the least studied years were 1 year and the 2008-2009 years were the opposite. Again, according to Graphics 2, it is seen that in 2003, 2005 and 20014 there was no study of gifted and talented children in early childhood.

Table 1.

Distribution of the Studies in Turkey by Subjects

Subjects	Studies	f	%
Effects of Parent and/or Teachers	A23	1	2,70
Detecting perception, attitude and ideas of the parent or/and teachers.	A17, A18, A20, A22, A26, A28, A32, A33, A36	9	24,32
Education Applications towards Over Talented Children and The Effects	A9, A15, A33	3	8,10
Determining and Diagnosis of gifted and talent in Early Childhood	A1, A2, A4, A5,A6, A10, A11, A14, A16, A19, A21, A24, A25, A29, A34, A37	16	43,24
Intelligence Test/ Scale Adjustment	A8, A12, A13, A27, A31	5	13,51
Case Determination	A3, A7,A30	3	8,10

The distribution of gifted children in early childhood by subjects is shown in Table 1. In Table 1, the study of the talents of early childhood has been divided into 6 different themes in terms of the total of 37 study subjects. It is seen that the most studied subject is "Identifying and diagnosing gifted and talent characteristics in early childhood" (n=16, 43,24%). Considering all the studies in our country regarding gifted and talented in early childhood, it is noticed that this topic of the studies is almost half of the topic of all the studies. This is followed by studies on "Determination of parent and / or teacher perception, attitudes and opinions" (n=9, 24,32%). Apart from these subjects, aspects such as "Intelligence test / Scale adaptation" (n=5, 13.52%), "Educational practices and effects for gifted children" (n =3, 8,10%), "Case detection" are observed. Other than these, the least observed / studied subjects were "Parent and / or teacher education / effects" (n=1, %2,70).

Table 2.

Distribution of the Studies by Working Groups

Working Groups	Studies	f	%
Normal, Gifted and Talented Children in early childhood	A6, A8, A10, A12, A13, A14, A15, A16, A27, A29, A31, A34	12	32,43
Gifted and talented Children in early childhood	A1, A2, A4, A5, A9, A11, A19, A25,A37	9	24,32
Preschool Teacher	A17, A20, A23, A26,A28, A32, A33, A36	8	21,62
Parent of gifted or talented Children in the early childhood	A21, A22.	2	5,40
Preschool Teacher and Parent of gifted or talented Children	A18, A24	2	5,40
Gifted or talented Children in the early childhood ad his/her family	A35	1	2,70

The classification of the 37 studies by participants is shown in Table 2. It was determined that 32.43% of the studies (n=12) were "normal, gifted and talented children in early childhood period" and 24.32% (n=9) were in "gifted and talented children in early childhood period". However, the study groups of the other researches are respectively: "Preschool teacher" (n=8, %21,62), "Parent with gifted and talented child in early childhood" (n=2, %5,40), "Parent with gifted and talented child who has a preschool teacher" (n=2, %5,40) and finally only one study "Gifted and talented child and family in early childhood" (n=1, %5,40).

Table 3.

Distribution of the Studies by Objectives

Objectives	Studies	f	%
Determining the gifted and talented children in early childhood	A1, A2, A5, A6, A13	5	13,51
Adaptation the scale in determining the gifted and talented children in early childhood	A8, A12, A13, A27, A31	5	13,51
Determining the gifted and talented children in early childhood	A10, A14, A18, A35.	4	10,81
Analysis of the perceptions, attitudes and opinions of preschool teachers and/or parents towards gifted and talented children in early childhood	A17, A20, A28, A32	4	10,81
Information about differentiated curriculum for gifted and talented children in early childhood	A3, A30	2	5,40
Determining the developmental characteristics of superiors during early childhood / babyhood	A4, A11	2	5,40
Examination of gifted and talented children according to different demographic characteristics in early childhood	A4, A19	2	5,40
Analysis of the effect of art education program on drawing skills of gifted children in early childhood	A9, A19	2	5,40
Comparison of some features from children with normal development and gifted and talented children	A16, A34	2	5,40
Giving information to parents and teachers about gifted and talent in early childhood	A7	1	2,70
Analysis of the correlation between intelligence level and motivation	A12	1	2,70
Researching on the contributions of an enriched English learning program	A15	1	2,70
Analysis of the correlation between parent's attitudes and intelligence	A22	1	2,70
Analysis of the efficiency in the education given to preschool teachers	A23	1	2,70
Analyzing the opinions of gifted children's teachers on the preschool education given to the gifted and talented children	A26	1	2,70
Analyzing the effects of intelligence on receptive and expressive language skills in early childhood	A29	1	2,70

The relationship between self-efficacy levels of pre-school teachers and attitudes towards education of gifted children	A33	1	2,70
Examining the effect of social skills training program on social skills development	A35	1	2,70
Determining the opinions of pre-school teachers about using the enrichment method as an intervention method	A36	1	2,70
Examination of non-simultaneous development, identification of possible problems and solutions	A37	1	2,70

Table 3 shows the distribution of gifted children in early childhood by the objectives of the study. When the studies were examined, the objectives were collected under a total of 20 category headings. In the studies examined, it is seen that studies are mostly aimed at the categories "to determine the gifted ones in mathematics in early childhood" (n=5, %13,51) and "to adapt the scale to determine giftedness and talent in early childhood" (n=5, %13,51). Beginning new concepts of giftedness and talent in early childhood in our country can be seen as one of the reasons for the excessive aim of talent and intelligence determination studies. Indeed, the first step in the process of studying and examining the outputs is identification. The following objectives have been identified as categories of "identifying gifted and talented children in early childhood" (n=4, %10,81) and "examining the opinions, perceptions and attitudes of pre-school teachers and / or parents about gifted and talented children in early childhood" (n=4, %10,81).

The objectives as two at a time are the following (n=2, %5,40): "To give information about differentiated curriculum related to early childhood", "To determine developmental characteristics of early childhood period", "To examine gifted and talented children in early childhood according to different demographic characteristics", "Studying the effect of the art education program on the skill of drawing gifted children in early childhood", "Comparison of some characteristics between normal developing children and gifted and talented children".

The categories of the objectives are arrayed as one at a time as following (n=1, %2,70): "Giving information to parents and teachers about gifted and talented children in early childhood", "The relationship between intelligence level and motivation styles", "Researching the contributions of an enriched English teaching program", "Analysis of the correlation between parent's attitudes and intelligence", "Analysis of the effectiveness of education given to preschool teacher", "Analyzing the views of gifted children's teachers about gifted students in pre-school education", "Analyzing the effects of intellect on receptive and expressive language skills in early childhood", "The relationship between self-efficacy levels of pre-school teachers and attitudes towards education of gifted children", "Examining the effect of social skills training program on social skills development", "Determine the opinions of pre-school teachers about using the enrichment method as an intervention method" and "Examination of non-simultaneous development, identification of possible problems and solutions".

Table 4.

Distribution of the Studies by Outcomes

Outcomes	Author	f	%
Parent / teacher opinions are influential in determining giftedness.	A18, A21, A10, A17, A28	5	13,51
Preschool teachers need to be informed, trained and supported about giftedness and talent.	A17, A20, A26, A32, A37	5	13,51
Some demographic differences are influential in determining gifted and talented children in early childhood.	A5, A6, A16, A19, A34	5	13,51
Scales adapted to determine gifted and talented children in early childhood are valid and reliable.	A8, A12, A13, A27, A31	5	13,51
Scale / questionnaires used are effective in determining relevant skills in early childhood.	A1, A2, A6, A10	4	10,81
Candidate children in early childhood match general characteristics of giftedness and talent.	A4, A8, A24	3	8,10
Parents are more successful than teachers in determining intelligence and creativity characteristics.	A1, A11, A14	3	8,10
There are significant differences occurred after the training sessions.	A23, A35	2	5,40
There were no significant differences after the training.	A9, A10	2	5,40
Preschool teacher / teacher candidates have positive perceptions	A32,A33	2	5,40

and attitudes towards gifted students.			
Intelligence is effective on receptive and expressive language skills.	A26, A36	2	5,40
Pre-school gifted and talented students have unusual interests and ideas.	A25	1	2,70
Parent / teacher attitudes are predictors of giftedness in early childhood.	A22	1	2,70
There is a significant relation between intelligence and motivation styles.	A12	1	2,70

Table 4 shows the distribution of gifted children in early childhood period by outcomes. When all of the study results were examined, it could be collected under 14 categories. The outcomes of the categories suggest the following findings are the most popular ones: "Parent / teacher opinions are influential in determining gifted and talented.", "Preschool teachers need to be informed, trained and supported about giftedness and talent.", "Some demographic differences are influential in determining giftedness and talent in early childhood.", "Scales adapted to determine superior intelligence and ability in early childhood are valid and reliable." (n=5, %13,51).

Following this, some other outcomes from the categories are listed as: Scale / questionnaires used are effective in determining relevant skills in early childhood" (n=4, %10,81), "Candidate children in early childhood match general characteristics of giftedness and talent" (n=3, %8,10) and, "Parents are more successful than teachers in determining intelligence and creativity characteristics." (n=3, %8,10), "There are significant differences occurred after the training sessions." (n=2, %5,40), "There were no significant differences after the training." (n=2, %5,40), "Preschool teacher / teacher candidates have positive perceptions and attitudes towards gifted students." (n=2, %5,40), "Intelligence is effective on receptive and expressive language skills." (n=2, %5,40) and as one outcome a time: "Pre-school gifted and talented students have unusual interests and ideas." (n=1, %2,70), "Parent / teacher attitudes are predictors of giftedness in early childhood.", "There is a meaningful relationship between intelligence and motivation styles.".

Table 5.

Distribution of the Studies by Methods

Methods	**Design**	**Studies**	**f**	**%**
Quantitative	Survey	A1, A2, A4, A5, A11, A16, A19, A22, A32	9	24,32
	Experimental	A9, A15, A23, A29, A35	5	13,51
	Scale Adaptation	A12, A13, A27, A31	4	10,81
	Correlational Research	A6, A10, A12, A13, A14, A18, A28, A33, A34	9	24,32
Qualitative	Case Study	A24, A26, A37	3	8,10
	Phenomenology	A17, A20, A21, A25, A36	5	13,51
Mix Method		A8	1	2,70
Literature Review		A3, A7, A30	3	8,10

The classification of the 37 articles analyzed is presented in Table 5. More than half of the work on in the general framework seems to be applied to quantitative methods. As for the majority of the quantitative studies (%n=924,32), it is seen that the survey and correlational research design are preferred among the quantitative methods. The least used quantitative research method is the experimental model (n=5, %13,51). When we look at the qualitative studies, it is seen that the case study (n=3, %8,10) and the phenomenology (n=5, %13,51) design are preferred. Apart from this, it is seen that in the three studies, the field literature review and the mix method are used. It is seen that almost all of the studies using the survey method have collected data with a few measuring instruments and tried to determine the current situation with short-term studies and trying to determine normal and gifted and talented children.

All of the 3 compilation studies (A3, A7, A30) consisting of articles are presented in Table 5. Qualitative method was applied in 10 of the articles examined while 7 of them were applied to quantitative method. The experimental design (A23) in one of them, the scale development (A31) in one of them, the survey model (A2, A4, A5, A16) in five of them and the correlational survey models (A6, A18, A22) in three of them were used in only one of the quantitative methods used in the models. Qualitative methods used in 7 articles are four examples (A17, A21, A25, A36) and three case studies (A24, 126, A37). Experimental design (A2, A15, A35) were preferred in three out of five

doctoral theses made on the field, one mix method (A8) and one survey method (A1) were used. Four of his doctoral theses were based on quantitative (A1, A2, A15, A35) and only one composite (A8) method. While quantitative methods were used in eleven of the 12 graduate thesis, in only one of them, qualitative method was preferred. Five of these are the ones where the correlational research method is used (A10, A14, A28, A33, A34), three of them recruit scale development studies (A12, A13, A27), two of them recruits survey method (A11, A32) and finally only one of them recruits experimental method (A29).

Discussion and Conclusion

In this section, the results obtained in the research are discussed in the context of research problems. A total of 37 studies were analyzed in this study covering the teaching and services offered by gifted and talented children, families, and teachers in early childhood (0-6/8 years) in Turkey from the years 2002 to 2017. It is seen that the first study was done in 2002 when giftedness or talent was obtained in the early childhood period in our country. Given the scientific work on gifted and talented children in early childhood in general, only 37 studies have been conducted for a total of 16 years since 2002 reveal that in our country, studies are quantitatively insufficient. Although there has been a general increase in awareness and the number of studies conducted with gifted and talented children in recent years in our country, studies on giftedness and talent in early childhood are not sufficient and qualitative. However, the identification of early childhood giftedness and talent is important in early education in these fields, yet this is stated both in foreign and domestic studies (Dağlıoğlu, 2002; Gür, 2006; Çetinkaya 2012, Saranlı 2017; Schofield & Hotulainen, 2004; Stapf, 2003).

When the distribution of scientific studies by types is examined, it is seen that 20 of them are articles, 12 of them are master thesis and 5 of them are doctoral theses. When the distribution of all the studies done by years is examined, it is noteworthy that the years of 2004 and 2016 are determined as the most concentrated years with 6 studies each, on the other hand, no studies have been reached between the years 2003, 2005 and 2014. However, when we look at the work done in these years, in 2016, there are three graduate theses and one doctorate thesis. The concentration of the work done at the graduate level is considered promising in this sense. In addition, the increase in work after 2005 is a sign that researchers are increasingly interested in this issue. It is important that field researchers are directed to work at the doctoral level in order to reach more qualified and effective studies. Studies conducted in the field and in our country suggest that the studies on gifted and talented children should be continued in early childhood.

When the distribution of researches by study groups is examined, it is seen that most studies were made with children. These studies are usually studies aimed at determining children's gifted and talent areas by applying certain scales. Studies conducted with families of children gifted and talented in early childhood are limited. Studies conducted with preschool teachers are few, and studies conducted with this group have generally received opinions for children who have gained gifted and talent in early childhood. As in every child in early childhood, gifted and talented children cannot be denied the importance of the environment. In this age range, the environment covers the family and teacher relationship intensively for one individual (Damasio, 1999; Miklewska, Kaczmarek & Straleu, 2006; Weiten, 1995). It is estimated that in new studies to be done parents, children, and teachers/specialists will considerably increase the quality of studying to be involved in the same work.

When we look at the distribution by methods, it is seen that a significant part of the studies is handled with quantitative methods. Researchers emphasize that quantitative methods are preferred over qualitative methods in studies (Selçuk, Palancı, Kandemir & Dündar, 2014). However, when the quantitative studies in the research are examined in detail, it is seen that the studies focused on the survey studies using data collection tools such as scale, questionnaire are emphasized. It is seen that in some studies the methodological tendencies of the articles and theses are less favorable than the survey method in the quantitative researches (Varışoğlu, Şahin & Göktaş, 2013; Karadağ, 2010). This can be attributed to the fact that the cost of survey work is low in terms of time and effort. Very few of the studies on gifted and talented children in early childhood have used experimental pattern which aims to reveal the change in the process. Especially when the articles are examined, it is seen that the studies carried out with the experimental designs are so small that there is no work to be done. The difficulty of reaching children with gifted and talent recognition in early childhood as a result of the small number of experimental designs in quantitative studies and therefore the group can be expressed as the strength of the design of experimental studies. Qualitative studies have been reached even though they are not sufficient in numbers. Büyüköztürk et al. (2013) emphasize that qualitative research types will provide more in-depth information in comparison with quantitative research and that

questions in response to quantitative methods will lead to a better expression of problem questions. It is thought that qualitative researches take a considerable amount of time and cannot be preferred due to the difficulty of data analysis. However, studies on gifted children in early childhood are thought to be able to reveal problems, thoughts, and perceptions on this subject in a healthier way and to include qualitative research to describe the situation more in detail.

Given the distribution of the studies examined, it was generally seen that early gifted and talented children were selected from a group of children and their characteristics were taken into consideration. Another issue that has been intensively preferred is to determine parents' and teacher's attitudes and opinions to the child who is gifted and talented in early childhood. Scale adaptations are also a preferred research topic by researchers in order to identify early intelligence and talent areas. There seems to be little to be said about the issues that aim to develop a teacher and family education program for these children. It is being trained as an instructor who will plan and implement early post-childhood education determined to be gifted and talented in our country. However, the number of experts who plan and implement the training of gifted and talented children in the early period is almost none. Due to this reason, it is necessary for academicians and experts working in the field to prepare a teacher training program in this regard. Also, the development of differentiated educational programs for gifted and talented children in this period and studies that test effectiveness will help policy practitioners to draw attention to this topic.

When we focus on the results obtained from the studies, there is a quantitative surplus in the category numbers generated under the resulting base. The reason for this is that the goals and problems of a small number of studies can be carrying different qualities. The scales adapted to determine giftedness and talent in early childhood are valid and reliable in terms of use, according to the results of the reviewed studies. In a large majority of studies examined, it is seen that different demographic characteristics affect determining giftedness and talent. It is observed that the scales applied to the children who were nominated by their teachers or their families give the same results, and it was observed that the parents give effective results in the nomination process compared to the teacher. About this, in the studies related to preschool teachers, teachers also state that they need some information and support certain on this subject. According to another research result, there was a correlation between preschool teachers' self-sufficiency levels and their attitudes towards the education of these children. Between intelligence and motivation styles, according to the results of some studies: significantly significant differences between intelligence and early mathematics education were found.

Recommendations

This study on gifted and talented children in the early childhood period aims to reveal the general situation in our country, as well as to reveal the educational and social needs to show the path to the ones who work in this field. In our country, it is possible to see and detect the deficiencies in the field of education regarding gifted and talented children in the early childhood period, and to establish new commissions and solutions for this. A researcher who wants to work in the early childhood period may be able to recognize the deficiencies and increase their focus and tendency on this field. The research also reveals that the studies on giftedness and talents in early periods in our country are limited. Yet, the awareness level of early childhood diagnoses is very significant. It will be beneficial to organize projects and volunteer base activities through internet websites and social media to create and raise awareness.

When studies on gifted and talented children in early childhood are examined, it is observed that such studies are usually tried to be determined by using a measuring tool in our country. It may be suggested that the studies carried out in this respect be improved by using differentiated training programs. However, in early childhood, healthy diagnosis instruments are needed. Beyond using a single scale, new work on early detection should cover different measurement instruments that have validity and reliability and that can be measured with different parameters. In studies, it is seen that in order to identify giftedness and talent in early childhood, these intelligence scales and some scales recruited from abroad are used. The healthier outcome may be achieved by a domestic identification instrument.

The place of the family in early childhood period is undeniable. Families with gifted children in early childhood period need to be informed about the characteristics and educational needs of such children. Researchers should work on educational programs to inform families on these issues. It is thought that parents having sufficient knowledge about this issue and identify the children on time will increase the probability of studies to prevent and interventions.

In order to ensure the early childhood identification and children's nomination by teachers correctly, teachers should be informed about giftedness skills. In this respect, the focus should be the teachers' awareness and training on giftedness and talent in early childhood. Therefore, it will be beneficial if the ministry organizes such training programs. Gifted and talented children may have kindergartens offering full or part-time differentiated education. Also, in our country, it is the primary school period when the children are admitted to the science and art centers where the gifted and talented students are in. In the early period, however, education is vital to all gifted and talented children in special education services as much as for all children. Due to these reasons, the training process for gifted and talented children should be started from an early age.

Gifted and talented children identified at an early age should be educated with an enriched curriculum accordingly and, it is important to test the educational programs developed in this subject with experimental design. If researchers create educational programs for children identified as such in their early childhood period and if those children can get education according to their situation, this will be beneficial both as materially and morally for our country. Therefore, it is suggested that the differentiated curriculum should be increased in order to focus on pre-school education apart from the primary and high school.

The Limitations of the Research

The research covers theses written in Turkey or the articles addressed in Turkey in the field of gifted and talented children early childhood period in 2002-2017. This research is limited to a total of 37 studies including 20 articles, 12 master thesis and, 5 doctorate thesis. In terms of research and research groups, the amount of data covered in the field of gifted education in early childhood was used. The generalizability of the findings is limited to the review articles and postgraduate theses.

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Appendices

Appendix 1.

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Research Article

The parenting attitudes and effects on their gifted children: a literature review

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Abstract

Family is essential for physical, emotional, social developments of the gifted children. The parenting attitudes could affects the child's emotional and social development. This literature review was conducted to examine parenting attitudes and effects on their gifted children. According to inclusion criteria, 11 studies were included in study. Gifted children perceived parental attitudes as tolerant and democratic, while peer groups perceived them as authoritarian and permissive. It was also found that the authoritarian attitudes of the parents of the gifted children have negative impacts on children mental developments, anxiety level, sense of self, inter-family relations and on level of well-being. The having democratic, tolerant attitudes of parents of gifted children will increase the academic performance, self-esteem, well-being, and relations among the family members. It has been determined that the partnership of the parenting attitudes of the mother and the father should be and the mother-child interaction is important.

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Introduction

The concept of intelligence can be defined as a common component of the score acquired from a test, adaptation to surrounding stimuli, problem-solving skills, and innate and acquired skills of the individual (Akkan,2012; Ozbay, 2013). Whereas children who score high on intelligence tests are referred to as gifted children, since the concept of talent covers the concept of intelligence and the intelligence scores determine the academic success of individual in recent years, usage of the expression of gifted child is now preferred, rather than the expression of genius child (Ataman,2012; Ozbay,2013; Levent,2013). As the matter of giftedness is a complex and multifaceted subject, there is no universally accepted single definition for "gifted child". The generally accepted definition for "gifted child" is children with an IQ score of 130 and above, who are successful in multiple fields and who have special superior skills in specific areas. The gifted children representing 4-5% of societies make different developments in comparison with their peers. Active throughout a baby, early language development, having an early and advanced vocabulary, abstract thinking, ability to generate original ideas, extraordinary problem-solving skills, perfectionism, creativity, vast imagination, being open to new ideas and high academic success are among the traits of gifted children (Rosenberg, Robokos, & Kennedy, 2010; Levent, 2013; Davis, 2014).

Gifted children are defined as extraordinary children due to their special skills. These children may also face with numerous positive situations, as well as negative ones, in their family, school and social environments due to their unique understanding, thinking and perception capacities. As gifted children mostly do not have any problems related to academic and language development, they can experience emotional and social problems. Gifted children

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may also have problems with their parents and family members, in addition to their peers and teachers. Gifted children need special support from their teachers and parents because of their emotional and social problems (Morawska & Sanders, 2009).

Giftedness is a dynamic concept that emerges as a result of interaction between the child and family characteristics. Parents' awareness of the developmental characteristics of children and approaching them accordingly is a significant factor for their social and emotional development. A positive parental attitude makes a substantial contribution to the child's development and the child is satisfied with his/her life, is brought up as a healthy and happy individual. As in the case of all children, family is a highly important factor for the gifted children, in terms of their physical, emotional and social development (Rudasill, Adelson, Callahan, Houlihan, & Keizer, 2013). According to Sowa and May (1997), family is the place where a gifted child finds a meaning for himself/herself. Children's having special skills as different from their peers may negatively impact the children, family members and domestic relationships (Clark, 2015).

The children's being perceived as a different person by the environment they live in, not being raised in accordance with certain rules, desire to occupy themselves with something continuously, getting bored when they are free, frequently changing areas of interest, distraction, vulnerability and oversensitivity, non-parallelism of their mental development with their social and emotional development, having an idea on every subject and speaking out (Karakus, 2010; Ogurlu & Yaman, 2013).

The underlying reasons for the problems encountered by parents include not having a thorough command of the concept of gifted children, not accurately understanding the children's developments, failing to be aware of the children's needs and inability to meet them, supporting their developments insufficiently, planning the children's needs incompletely and failing to exhibit a proper parental attitude (Levent, 2013). Besides, parents have difficulty in the following: neglecting their children's requests to spend time with their peers, failing to ensure their participation in social events, the parent's insufficient educational and socioeconomic levels for the child, spending time with the child is tiring, exhausting, and taking up so much time of the family members and guiding the child in planning the events and activities for the gifted children (Karakus, 2010).

The conducted studies determined that differences between the parental attitudes of gifted children and their peers (Morawska & Sanders, 2008; Rudasill et al. 2013; Yazdani & Daryei, 2016). The differences in the parental attitudes may affect academic successes, motivations and social environments of children (Dwairy, 2004; Morawska & Sanders, 2009). A democratic parental attitude is associated to high academic success and grade point average. An authoritarian parental attitude can adversely affect the academic successes and grade point averages of children. Positive attitudes towards children may positively impact the social development of children (Huey, Sayler, & Rinn, 2013; Olszewski-Kubilius, Lee, & Thomson, 2014). The attitudes exhibited by parents towards their gifted children also have various effects on the mental health of children (Dwairy, 2004; Morawska & Sanders, 2009).

Parents play a critical role in the organization and provision of enriched early interventions, child-appropriate education, and long and sustainable development practices (Kiewra and Rom, 2019; Witte et al. 2015). They play an important role in preventing and finding solutions for the problems related to children's education and they may face with difficulties in fulfilling their roles during the process of raising children (Morawska & Sanders, 2009; Jolly & Matthews, 2012). It is very important for parents to support and create a supportive environment in order for children to cope with the problems they experience and to form a self-concept (Luo and Kiewra, 2020; Mammadov et al. 2013). Although studies focusing on the educational requirements of gifted children and their parents' perceptions of education have been carried out, there is a limited number of studies about the difficulties encountered by the families of gifted children and their parental attitudes (Morawska & Sanders, 2008, 2009; Pilarinos & Solomon, 2017). The aim of this literature review is to examine parenting attitudes and effects on their gifted children.

Method

This literature review was conducted on the following databases: Pubmed, Medline, SAGE Journals Online and Science Direct. The key words were "Gifted/talented Children", "Parents Attitues", "Parents Effects" and "Family Style". Inclusion criteria were as follows: Studies, 1) conducted between 2008-2020, 2) published as full text in English, 3) accessed on the databases of Pubmed, Medline, SAGE Journals Online and Science Direct, 4) investigating the parenting attitudes and effects on their gifted children. After searching, it was reached 30 articles

but found after searching, total of 11 met inclusion criteria and thus, 11 studies were included in study. The studies were evaluated in terms of year, country, sample size and characteristics, and significant results.

Results

All gifted children representing the sample of studies analyzed as part of the research are children who receive a special education for gifted children at relevant educational institutions. Considering the number of samples in the conducted studies, the study carried out by Olszewski-Kubilius et al. (2014) has the highest number of samples (n=1526). The study carried out by Wu (2008) has the lowest number of samples (n=5). The study samples were gifted children and his/her parents in four studies; only the gifted children in three studies; and only the families in two studies. The sample group consists of parents and caregivers in one of the other two studies; and the gifted children and his/her peer group in the other study.

The studies included in the research were conducted in the USA (4), Italy (1), England (1), North Korea and the USA (1), Australia (1), China (1), Iran (1), Australia and New Zealand (1). The age range of children involved in the studies is between 4 and 17. There are studies revealing that there are differences in the perceived parental attitudes of gifted children and their peers. It has been determined that gifted children perceive the attitudes of their parents as tolerant and democratic, while the peer group perceive them as authoritarian and permissive. It has also been found out that the attitudes of gifted children's parents are less authoritarian than their peers' parents and the IQ level of children are inversely proportional to the authoritarian parental attitude. The studies determined that authoritarian parental attitude negatively affect the mental developments, anxiety level, sense of self, domestic relationships and well-being levels of the gifted children. Along with the authoritarian attitude, a permissive family structure also negatively affects domestic relationships and the academic successes of children. It has been found that a democratic parental attitude have a positive effect on the academic success of children. It has been determined that a democratic attitude and a high interaction between the mother and the child play a significant role in the cognitive development of children. It detected that supportive and respectful family environment towards the gifted child has positive impacts on the development of interpersonal skills of children and contribute to their relationships with their peers. The studies stated that parents' high level of confidence in their children is an important factor for observing less emotional problems, stress, depression and parent-child conflicts. In addition, it has been observed that the parents of gifted children have been advised to their children and parents who listen and share their children's problems.

It has been found out that a positive parental attitude along with the gift factor, the parents' supporting their children and establishing a warm relationship increase the academic success of children and enhance the motivation of children and their parents. There are studies expressing that, in order to increase the motivation of children, teachers need to perceive children sufficiently and parents need to give autonomy to their children and support them. As the ages of children decrease, they perceive their parents' attitudes as permissive. It was determined that girl children perceive their parents as more authoritarian than boy children. Moreover, it has been further found that being a boy child, educational level of the mother and low confidence of the parents in their children are an important factors in observing behavioral problems.

The studies have detected that parental attitudes vary depending on the values, beliefs and culture of the family, as well as its ethnical structure, and that culture prevails in parental attitudes. While black children evaluate their mothers as more authoritarian, Chinese families regard themselves as primarily responsible for the academic successes of their children and encourage them. Even if the gender status does not affect academic success, it has been indicated that being a male child and parents' supporting the child in his/her educational process raise the expectations of the family. The studies state that an extended family structure is important for the development, education and support systems of gifted children. On the contrary this situation, an extended family structure is considered to cause communication problems for children with their peers, as a source of stress for both the child and the family. Another source of stress for the child and the family, ıt has stated that is the lack of consistence between the parents and disruption of family routines. Summary of 11 articles researched as a result of the literature review is given in Table 1.

Discussion

As a result of the literature review, 11 research articles have been accessed in order to determine the health, caring and family problems observed in gifted children, published between 2008 and 2018. It has established that there are

differences in perceived parental attitudes between gifted children and peers. The study performed by Rudasill et al. (2013) sets forth how gifted children identify their parents' attitudes as tolerant and democratic, whereas the peer group identifies the same as permissive and authoritarian. The study carried out by Yazdani & Daryei (2016) has ascertained that gifted children perceive their parents' attitudes as less authoritarian than their peers.

Parental attitudes are an important factor for the development of children. It has been seen that the most appropriate parental attitude for gifted children is the democratic attitude. It has been determined that a democratic and tolerant parental attitude has a positive impact on the academic successes and cognitive development of children. The study conducted by Huey et al. (2013) has designated that the democratic parental attitude has a substantial effect in increasing academic success. The authoritarian and permissive attitude, on the other hand, negatively affects the mental development, sense of self and well-being levels of children. The study performed by Yazdani & Daryei (2016) found out that an authoritarian parental attitude negatively affects the mental health, sense of self and well-beings of adolescents and leads to a high level of depression and anxiety.

Perfectionism in gifted children is affected by various factors. Margot & Rinn (2016) determined that the relationship between perfectionism and gender, birth order, and age/grade level. The examined studies wasn't found that relationship between perfectionism and parental attitude. However, researchers have demonstrated that correlation between positive and negative perfectionism and authoritative parenting style (Besharat et al. 2011; Biran & Reese, 2007). Basirion, Abd Majid & Jelas (2014) indicated that positive perfectionism is influenced by the authoritarian attitude of the father and the authoritarian attitude of the mother. the authoritarian attitude of the mother is more effective in the development of negative perfectionism than the authoritarian attitude of the father. Also, permissive parenting style positively and negatively do not affect perfectionism (Basirion et al. 2014).

It was stated that supportive and respectful family environment towards the gifted child and a high confidence in the child by his/her parents, as well as parents' supporting and encouraging their children, have positive impacts on the development of interpersonal skills of children contribute to their relationships with their peers, reduce emotional problems and increases motivation (Olszewski-Kubilius et al. 2014; Huey et al. 2013). The study conducted by Olszewski-Kubilius et al. (2014) has determined that supportive and respectful family environment towards the gifted child has positive impacts on the development of interpersonal skills of children and contribute to their relationships with their peers. A study by Morawska & Sanders (2008) indicates that parents' high level of confidence in their children is an important factor for observing less emotional and sensual problems, stress, depression and parent-child conflicts. A study by Koshy, Smith & Brown (2017) found out that parents' supporting their children and establishing a warm communication with them are important in terms of increasing the motivation of the child and the parent. Garn, Matthews, & Jolly (2010) suggest in their study that children need to be sufficiently understood by their teachers, supported at home and given autonomy, in order to increase their motivation. Eren, Cete, Avcil & Baykara (2018) indicated that parents of gifted children are more supportive of their children and show sufficiently love, respect and attention to their children.

Along with a democratic attitude, it has been determined that parental attitudes which are observed condemnations in families of gifted children. A study by Morawska & Sanders (2009) was determined that the gifted children gave advice to their parents, the children expressed themselves to their parents comfortably, and the problems they experienced were shared with their parents.

It has been also established that ages and genders of children are influential in the perceived parental attitudes. A study by Rudasill et al. (2013) states that as the ages of children decrease, they consider their parents' attitudes as permissive and that girls find their parents more authoritarian than boys. Being boys, an only child or a first-born have been observed to be effective factors in parental attitudes. The study performed by Margot & Rinn (2016) indicated that being a first-born or only child increases the concerns for making mistakes and raises parents' expectations and personal standards. The study carried out by Morawska & Sanders (2008) revealed that being a male child, a first-born or an only child, mother's level of education and parents' low confidence in their children are important factors in observing behavioral problems.

Ethnical structure of families, their racial, and cultural values have been identified as factors affecting parental attitudes. A study conducted by Wu (2008) suggested that Chinese families regard themselves as primarily responsible for the academic successes of their children and encourage them to receive education. In addition to that, the study made by Rudasill et al. (2013) established that black children consider as more authoritarian their mothers.

It has been observed that an extended family structure has both positive and negative impacts on children. The study performed by Koshy, Smith & Brown (2017) stated that a majority of families believe that an extended family structure will not help gifted children's educations, only one mother says that having an extended family structure will help children's educations and it is an indirect support system. The study made by Renati & Bonfiglio (2017) established that having an extended family structure and relatives' failure to use an appropriate means of communication causes stress in the child and the family. It has been stated that the main source of stress in the family results from a lack of alliance between parents and irregular family routines.

Table 1. Summary of the Studies Related to The Parenting Attitudes and Effects on Their Gifted Children

Author/Year/Country	N	Sample Characteristics	Method	Results and Conclusion
1. Rudasill, Adelson, Callahan, Houlihan, & Keizer (2013) The USA	332	-Girls: About 60% -Boys: About 40% - About 67% whites - About 23% black	-Title "Gifted Students' Perceptions of Parenting Styles: Associations With Cognitive Ability, Sex, Race, and Age" -Students attending Virginya University Summer Camp -A descriptive study	-It has been determined that gifted children perceive the attitudes of their parents as tolerant and democratic, while the peer group perceive them as authoritarian and permissive. -It found that the attitudes of gifted children's parents are less authoritarian than their peers' parents and the IQ level of children are inversely proportional to the authoritarian parental attitude. -Democratic parental attitudes and child-parent interaction play an important role in the cognitive development of children. -As the age level decreases, children's attitude of their parents is considered as permissive. -Girls found their parents to be more authoritarian than boys. -Black children were found to be more authoritarian in their mothers.
2. Yazdani & Daryei (2016) Iranian	233	-Gifted children:118 (36 boys, 82 girls) -Their Peers:115 (38 boys, 117 girls) - Grade 6-9	-Title "Parenting styles and psychosocial adjustment of gifted and normal Adolescents" -Conducted in a school for gifted children and in a primary school -A descriptive study	-It has been found out that the attitudes of gifted children's parents are less authoritarian than their peers' parent -Authoritarian parental attitude negatively affect the mental developments, anxiety level, sense of self, domestic relationships and well-being levels of the gifted children. -Permissive and authoritarian parental attitudes have been found to be not suitable structures for family relations and well-being of gifted children.
3. Huey, Sayler, & Rinn (2013) The USA	88	-Girls: 34 (38,64%) -Boys: 54 (62,36%) -Age range: 14-17	-Title "Effects of Family Functioning and Parenting Style on Early Entrants' Academic Performance and Program Completion" -Conducted at Texas Academy of Mathematics and Science -Working time 2 years -A descriptive study	-It determined that gender has no effect on academic achievement. -Democratic parental attitudes were found to be associated with an increase in children's grade point averages. -Authoritarian and permissive parental attitudes have been found to have a negative effect on children's grade point averages. -Family and parent attitudes along with the skill factor have been found to have a significant effect on the success of children.

4. Olszewski-Kubilius Lee, & Thomson (2014) The USA and South Korea	1526	-1526 (52.5% Boy, 47.5% Girl) -Grade 5 and 12 -Students, mothers or fathers	-Title"Family Environment and Social Development in Gifted Student" -Conducted in a university and a center for talent development summer, weekend, and distance learning programs. -A cross-sectional study	-An affectionate, supportive and respectful family environment influenced positively the development of interpersonal ability and peer relationships for the gifted children. -Parent's positive attitudes had positive effects on behavioral development of the gifted children.
5. Morawska & Sanders (2008) Australia & New Zealand	278	-Gifted children: 278 -Age range: 2-6 years -Children with IQ>130: 214 -409 Parents	- Title"Parenting Gifted and Talented Children: What are the Key Child Behaviour and Parenting Issues?" -Conducted in a school for gifted children and in a primary school -A descriptive study	-Being a boy, having a mother with a low education level and having lower level of parental confidence were important factors related to behavioral problems. -Higher levels of parental confidence were important in less emotional problems, less stress and depression and less conflicts over parenting.
6. Koshy, Smith & Brown (2017) England	21	-Mother: 19 -Father: 1 -Caregiver: 1 -Age range: 12-16 years	-Title "Parenting 'gifted and talented'children in urban areas: Parents' voices." -Conducted in a university. University Based Intervention Program -A qualitative study. - They started the program at the age of 12. Lasted 4 years	-It has been found that some families have a large family structure of gifted children and that they do not help children's education. -In addition, some families have stated that having a large family structure will help children's education and increase their support systems. -Parents' support for their children and a warm communication have been found to be important in increasing the motivation of the child and parent.
7. Garn, Matthews, & Jolly (2010) The USA	59	-Parents: 59 -30 parents completed the interviews -Gifted Children: 39 -Girls: 20 -Boys: 19 -Age range:4-17	-Title "Parental Influences on the Academic Motivation of Gifted Students: A Self-Determination Theory Perspective" - Thirty-one of these 59 parents (53%) agreed to interview requests sent to the e-mail address or telephone number. -A qualitative study.	-It was determined that negative attitudes of parents of gifted children towards academic motivation teachers were not sufficiently understood by the children. -It was found that parents applied autonomy and control strategies to create academic motivation environment at home.
8. Morawska & Sanders (2009) Australia	6	- The average age of mothers: - The average age of fathers: - Eight mothers started the program but six people finished. - Gender of children are boys and their average age: 6	-Title "Parenting Gifted and Talented Children: Conceptual and Empirical Foundations" -South Tasmanian schools and families from the Tasmanian Union for gifted children attended. - A qualitative study.	- The parents of the gifted children advise their children to their children, children express themselves to their parents comfortably, share the problems they have with their parents; It was found that there were appropriate parental attitudes and that children improved their problem-solving skills, self-esteem and improved peer relationships.

9. Margot & Rinn (2016) The USA	96	-96 (47 Girls, 49 Boys) -Grade 7 and 12 -70% Caucasian	- Title"Perfectionism in Gifted Adolescents: A Replication and Extension" -Conducted in a rural middle and high school -A descriptive study	-The gifted who were only or first born children had increased levels of anxiety about making a mistake, higher parental expectations and personal standards. -The parents of the gifted boys had higher expectations.
10. Wu (2008) China	5	- Five parents living in America for over five years. -Three families live in a university town	-Title "Parental Influence on Children's Talent Development: A Case Study With Three Chinese American Families" - The interviews were made via telephone. - All interviews were made in Chinese as the mother tongue of the families. -A semi-structured study	-It determined that parental attitudes change according to family values and beliefs and cultures and their culture is dominant. -It found that Chinese families regard themselves as primarily responsible for the academic successes of their children and encourage them and children are to be more successful in the academic field. -It was found that parents supported children's education and parents increased their academic success expectations from children.
11. Renati & Bonfiglio (2017) Italia	49	-Mother: 26 -Father: 23 -Age average: 44 - 62% of parents are university graduates	-Title "Challenges raising a gifted child: Stress and resilience factors within the family" - Conducted in Fronez Center for Potential Development and Endurance in Milan, founded by the Italian National Association for Gifted and Talented Children. -A semi-structured study - Talk time: 20min	- One of the main sources of stress in the family is the lack of consistency between parents and the lack of regular family routines. - It is determined that families have a large family structure and that relatives do not use appropriate communication methods cause stress in children and families.

Conclusion

In order to reduce the negative effects of parental attitudes on gifted children, parents need to be evaluated from the perspective of appropriate parental attitudes. Creating positive parental attitudes will result in a higher motivation for both the child and the family, reduction in stress factors and consistence between parents. Consultation should be made reducing the effects of the extended family structure on the child and increasing the interaction between the mother and the child. In addition, support programs for the challenges of gifted children and families should be developed and efforts to be carried out in this area should be increased.

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Review Article

The schoolwide enrichment model for reading (SEM-R) framework

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Abstract

Educators and researchers have suggested that the Schoolwide Enrichment Model for Reading (SEM-R) is an appropriate approach that helps in meeting their needs. SEM-R was developed from the general SEM model. It was designed to emphasize reading enjoyment and reading skill development (Reis et al., 2008). The SEM-R consists of three phases: (a) Phase I: Exposure, (b) Phase II: Supported Independent Reading, and (c) Phase III: Choice Components. Separate studies have demonstrated the effectiveness of the SEM-R on increasing gifted students' reading fluency, achievement, and attitude toward reading. Therefore, the purpose of this paper is to provide a brief literature review exploring the researched effects of the SEM-R on gifted students' reading fluency, achievement, and attitude toward reading.

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Introduction

Around 5 million students are identified as gifted in the United States; however, many of them are disadvantaged in the sense that they frequently are not given the chance to reach their full achievement (Dweck, 2008). Although they possess higher levels of intelligence, many of them are disadvantaged in the sense that they frequently are not given the opportunity to reach their full potential (Farmer, 1993). The research has demonstrated that gifted students spend most of their day in regular classroom settings (Cox et al. 1985). Unfortunately, traditional classroom instruction does not meet their needs appropriately (Archambault et al. 1993; Cox et al. 1985; Westberg et al. 1993). This situation may result in disappointment, a loss of self-esteem, weariness, languor, and underachievement (Knight & Becker, 2000).

Gifted readers, who are characterized as individuals having an extraordinary reading ability and are able to understand the complexities of language above their age (Mason & Au, 1990), face the same issue. These individuals read differently for different reading purposes. Levande (1993) described gifted readers as children with extensive vocabularies who read two or more years above their grade level. In addition, gifted readers utilize higher-order thinking skills, such as analysis, synthesis, and evaluation (Catron & Wingenbach, 1986). Unfortunately, traditional reading curricula do not help these readers to develop their reading abilities. Usually, gifted readers have little to gain from the reading materials and reading activities in a regular classroom (Witty, 1985). Further, many gifted readers develop their reading skills outside the school (Jackson, 1993). Therefore, to obtain real growth in reading skills and secure school success, educators must provide gifted readers with appropriately challenging instruction, instructional tools, and learning experiences (Anderson et al. 1985).

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Fortunately, researchers have demonstrated that there are strategies and programs to meet the needs of gifted students. Programs based on enrichment models and projects are the most ordinarily used method in gifted education (Reis & Renzulli, 2003). Enrichment programs are "richer and more varied educational experiences" that modify a curriculum "to provide greater depth and breadth than is generally provided" (Davis & Rimm, 2004, p.120). Enrichment programs can provide gifted students with appropriate education in different methods (Olszewski-Kubilius & Lee, 2004; Schenkel, 2002). Reis and Renzulli (2003) stated that enrichment programs could have a positive effect on students in general education since these programs address 21st-century skills such as complex thinking strategies and problem-solving. Furthermore, enrichment approaches are the key component of reading instruction for gifted students (Mangieri & Madigan, 1984).

Over the last 20 years, researchers and educators have tested different enrichment approaches. Both educators and researchers have suggested that the Schoolwide Enrichment Model (SEM) is capable at serving gifted learners in a variety of educational environments (Karafelis, 1986; Reis et al. 1995). The SEM was developed to support and incres creative outpot in gifted students. This model was developed using Renzulli's Enrichment Triad (Renzulli, 1977; Renzulli & Reis, 1985, 1997). The SEM consists of three types of enrichment: (a) Type I: general exploratory activities, (b) Type II: group training activities, and (c) Type III: individual and small group investigation of real-world problems.

For gifted readers, educators and researchers have suggested that the Schoolwide Enrichment Model for Reading (SEM-R) is an appropriate method that helps in meeting their needs (Reis et al. 2008; Reis et al. 2007; Reis et al. 2011). SEM-R was developed from the general SEM model. It was created to confirm reading enjoyment and reading skill development (Reis et al. 2008). The SEM-R consists of three phases: (a) Phase I: Exposure, (b) Phase II: Supported Independent Reading, and (c) Phase III: Choice Components. The Exposure phase typically involves book talks and other methods of exposing students to different books, genres, and authors in ways that spark their interest (e.g., stopping at a cliffhanger). During Phase two, students read independently from their selected books while each student or a small group of students take turns participating in individual conferences with the teacher to be sure that their choice was appropriately challenging. It is during Phase II that the teacher provides differentiated instruction and has students practice their fluency. Lastly, in Phase three, students participate in extension or enrichment activities related to their reading. These activities directly correlate to the third enrichment type of Renzulli's Enrichment Triad Model. Some examples include creating a boem related to the lesson, creating a book, and developing a project.

Additionally, separate studies have demonstrated the effectiveness of the SEM-R on increasing gifted students' reading fluency, achievement, and attitude toward reading. Reading fluency is defined as the ability to read text fast and minutely (NRP, 2000). Nathan and Stanovich (1991) pointed out, reading fluency enables speed that frees memory and helps to increase comprehension and analysis of the written word. Reading researchers emphasize the existence of strategies that contribute to the development of reading fluency. The SEM-R has been found to be effective at rising reading fluency, and in some schools, understanding (Reis & Boeve, 2009; Reis et al. 2008; Reis & Housand, 2009; Reis et al. 2007).

In addition, reading achievement is a widely used term in education. It refers to being able to use the skills that are needed to read grade-level material fluently and with understanding. Gifted learners' achievement development results from complex, advanced, and significant content provided (Little, 2012; Tomlinson, 2001, 2003, 2012; VanTassel-Baska, 2012). Reis et al. (2010) stated that SEM-R increases reading achievement.

Finally, the SEM-R is effective in increasing academic attitude toward reading, which is defined as "reading for the acquisition of knowledge about content areas, correct language usage, and understanding grammar" (Moore & Lemons, 1982, p. 48). Attitudes toward reading affect the growth of reading skills and result in academic achievement. Reis et al. (2008) found that SEM-R develops reading enjoyment, which helps to increase reading skill development and supplement.

The purpose of this paper is to provide a brief literature review exploring the researched effects of the SEM-R on gifted students' reading fluency, achievement and attitude toward reading. An additional purpose of this paper is to provide implications for practice and give suggestions for future research.

Literature Review

Understanding the complex needs of gifted readers and what programs work (or something like that?) is critical to the provision of support in educational contexts. The following section provides a brief review of the literature related to the impact of SEM-R on gifted students' reading fluency, achievement, and attitude toward reading.

Fluency

Reis and Boeve (2009) conducted a mixed-method study to investigate an afterschool enriched reading program among five gifted readers in grades 3–5. Researchers implemented the Schoolwide Enrichment Model–Reading (SEM-R) to present challenging reading activities for two days each week in a 6-week afterschool program. In addition, researchers administered observations, parent and teachers' interviews, school records, the Elementary Reading Attitude Survey (ERAS; McKenna & Kear, 1990), and curriculum-based measures of oral reading fluency. Findings indicated that students' reading fluency scores improved after implementing the SEM-R. The findings confirmed the effectiveness of the SEM-R on increasing elementary students' reading fluency.

Moreover, Reis et al. (2008) conducted an experimental design to evaluate the effect of the Schoolwide Enrichment Reading Model (SEM-R) on oral reading fluency (ORF), reading comprehension, and attitudes toward reading for students in two elementary schools. A total of 31 teachers and 475 students from Grades 3-5 were randomly assigned to either the SEM-R treatment with one hour of SEM-R and one hour of basal instruction or to the control group with two hours of basal instruction. The researchers utilized the Iowa Tests of Basic Skills (ITBS), the Elementary Reading Attitudes Survey, and the oral reading fluency assessments. Results showed that the treatment group scored significantly higher than the control group in reading fluency. In addition, there were no significant differences in reading comprehension or attitudes toward reading between the two groups. The results suggest that SEM-R produces higher oral reading fluency than a standard program and does no harm in terms of reading comprehension and attitudes.

Finally, Little et al. (2014) evaluated the effectiveness of the Schoolwide Enrichment Model–Reading (SEM-R) approach on students' reading fluency and comprehension. The researchers conducted a multi-site cluster-randomized design among 2,150 students and 47 teachers in four middle schools. Participants were randomly assigned to treatment or control conditions. Researchers implemented pretest and posttest. Additionally, they administered the oral reading fluency (ORF) and the Gates–MacGinitie Reading Tests (GMRT). Results indicated that the SEM-R resulted in similar or higher scores for fluency and similar scores for comprehension between the groups. The results indicated the effectiveness of the SEM-R in increasing middle school students' reading fluency.

Achievement

Little and Hines (2006) sought to determine the effect of the Project Expanding Horizons, which is based on the Schoolwide Enrichment Model-Reading (SEM-R) on reading achievement. The researchers conducted an experimental design among 155 students in grades 3–6. Further, the researchers administered standardized fluency passages obtained from the AIMSweb program through EdFormation Results showed statistically significantly higher scores for third and fifth graders. No differences were founded in fourth and sixth graders' scores. These results suggested that participating in this project may have result in further support to students' developmen in reading achievement.

Further, Reis and Housand (2009) examined the effect of the Schoolwide Enrichment Reading Framework (SEM-R) on students' reading achievement and fluency by using a quantitative, randomized design. A total of nine teachers and 260 third and fourth-grade students participated in this study, and they were randomly assigned to treatment and control conditions. The researchers utilized observations, the Measures of oral reading fluency (ORF), and the Iowa Tests of Basic Skills (ITBS). Results indicated that statistically significantly higher scores in oral reading fluency and reading comprehension for the treatment group in all grades. Results emphasize that the SEM-R produces higher oral reading fluency and reading achievement than the traditional programs.

More recently, Shaunessy-Dedrick et al. (2015) conducted an experimental design to explore the effects of the Schoolwide Enrichment Reading (SEM-R) on fourth-grade students' (n = 786) reading comprehension and attitudes toward reading. Eight schools were randomly assigned to treatment or control conditions. Treatment schools utilized SEM-R for eight months, whereas control schools utilized the district curriculum. Researchers administered the Iowa Tests of Basic Skills (ITBS), the Reading Skills Survey and the Elementary Reading Attitude Survey (ERAS). Two results were found. First, there were no statistically significant differences in students' attitudes toward reading. Second, treatment groups had significantly higher scores on the comprehension test than control groups. Based on the results, the SEM-R may increase students' reading achievement.

Attitude Toward Reading

Reis et al. (2007) conducted a randomized design to examine the effect of the Schoolwide Enrichment Model–Reading (SEM-R) on 226 urban elementary students' (third through sixth grade) reading comprehension, oral reading fluency, and attitude toward reading in two elementary schools. Fourteen teachers were randomly assigned to teach either the

treatment or control group. The researchers administered the Iowa Tests of Basic Skills (ITBS), the Elementary Reading Attitudes Survey, and the oral reading fluency assessments. The results demonstrated that after implementing the SEM-R, the treatment group reseved higher score than the control group in reading fluency and attitude toward reading. The results support the use of the SEM-R to increase students' fluency and reading enjoyment.

Additionally, Reis et al. (2011) investigated the effect of SEM-R on students' oral reading fluency, comprehension, and attitudes toward reading. A total of 63 teachers and 1,192 seconds through fifth-grade students across five elementary schools participated in this investigation, and they were randomly assigned to treatment or control conditions. The researchers administered the Measures of oral reading fluency (ORF), the Iowa Tests of Basic Skills (ITBS), the Reading Comprehension subtest (Form A), and the Attitudes and Practices Survey (TRAPS). Results indicated that the SEM-R increased students' attitudes toward reading. Further, results showed that both the enrichment reading approach and differentiated instruction were effective. Based on these results, the most significant benefit of the SEM-R was increasing students' enjoyment of reading.

Last, Reis et al. (2010) conducted a qualitative study to examine the SEM-R in 11 elementary and middle schools. Researchers administered qualitative comparative analysis with multiple data sources, including observations and interviews. Findings indicated that SEM-R was beneficial for both teachers and students. The finding showed that teachers had positive attitudes about the implementation of SEM-R. Further, over 95% of the teachers reported positive changes in students' attitudes toward reading. This study supported the implementation of the SEM-R to increase students' reading enjoyment.

Summary of Brief Literature Review

As seen through this brief review of selected literature, the SEM-R impacts students' reading fluency, attitude toward reading, and in some cases, reading achievement. The SEM-R has received a wealth of attention from researchers using a diverse range of methods (e.g., Reis et al. (2010) conducted a qualitative study; Reis & Boeve (2009) conducted a mixed-methods study; Rise and Housand (2009) used a quantitative, randomized design). Further, each one of these studies focused on different group ages. Little et al.'s (2014) study included middle school students, and Shaunessy-Dedrick et al.'s (2015) research was on elementary school students.

Regardless of whether the study was quantitative, qualitative, or mixed-method, all of the studies described above present data that indicated the relation between the SEM-R and students' reading fluency,achievement, and attitude toward reading.

Implications for Practice and Suggestions for Future Research

In this section, I will discuss the implications for practice and discuss suggestions for future research to enhance practitioners' and other researchers' understanding of the impact of SEM-R on gifted reading fluency, achievement, and attitude toward reading.

Implications for Practice

Many of the studies highlighted in this paper provided implications for practice that were important for gifted reading fluency, achievement, and attitude toward reading. Reis and Boeve's (2009) results indicated that gifted students need time to learn self-regulation strategies that encourage them to read challenging texts independently. In practice, this implies earlier intervention might help these students to react more positively to challenge and to acquire self-regulation strategies at a younger age. In addition, Rise et al.'s (2004) finding emphasizes that the success of the SEM-R is significantly dependent on teachers' skills. Therefore, teacher training and professional development are important since they contribute to the success of the SEM-R.

Suggestions for Future Research

The studies included in this brief literature review incorporated many suggestions for future research related to the SEM-R. First, most of the studies investigate the use of the SEM-R for couple weeks; therefore, Rise et al. (2011) suggest that future research investigates the use of this tool for a full academic year. Second, Rise et al.'s (2011) study was done on elementary school students; therefore, researchers suggested future research on the impact of the SEM-R on high school students. Finally, since there is a wide range of fidelity of implementation across classrooms, Little et al. (2014) recommended additional research on the SEM-R to study aspects of implementation more closely to determine critical levels of fidelity of each aspect of the intervention.

Conclusion

In conclusion, the highlighted studies indicate several factors related to the impact of the SEM-R on gifted reading fluency, attitude toward reading, and in the same cases achievement. The implementation of the SEM-R increases

students' reading fluency (Reis & Boeve, 2009; Rise et al. 2008; Little et al. 2014). In addition, there is a correlation between the SEM-R and reading enjoyment. The application of the SEM-R increases students' reading enjoyment. (Reis et al. 2010; Reis et al. 2007; Reis et al. 2011). Unfortunately, the effects of SEM-R on student reading achievement is inconclusive as some studies showed improvement while others showed it caused no harm (Little & Hines, 2006; Rise & Housand, 2009; Shaunessy-Dedrick et al. 2015). Therefore, in future SEM-R research, we hope to investigate the effect of this approach on students' reading achievement.

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Research Article

The mediating role of emotion regulation in the relationship between executive functions and self-regulations of gifted and nongifted students

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Abstract

The main purpose of this study is to examine the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation of students with and without in the Science and Art Center (SaC) (called BILSEM in Turkish) which trained gifted students at Turkey. The study is a descriptive study in which predictive correlational research, one of the types of correlational research model, is used. The study group of the research consisted of the students studying in the province of Istanbul in the 2020-2021 academic year. In the sample, 6,7 and 8th grade students who are gifted in SaC (59 females, 64 males in total 123) and those who are not in SaCs (89 males 95 females, 184) 6, 7th and 8th grade students are included. Appropriate sampling method was used for participation in the study. In the study, Behavioral Rating Inventory of Executive Function (BRIEF) Parent Form, Difficulties in Emotion Regulation Scale (DERS) and The Adolescent Self-Regulatory Inventory (ASRI) were used. In the research, the data were analyzed using the PROCESS macro plug-in of Hayes with the SPSS 20 package program.For the mediation model created in line with the results, Bootstrap method was used to see the indirect effects. In the study, also the moderated mediation effect model analysis was used to. İn result, the direct, indirect and total effects of emotion regulation difficulties were found to be statistically significant in the relationship between executive functions and self-regulation skills of secondary school students with and without in SaC. It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect.

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Introduction

In recent years, it has been observed that there has been an increase in studies on executive functions, self-regulation and emotion regulation in the field of social sciences, educational sciences and psychology (Sinatra, Broughton & Lombardi, 2014). In the studies, each of these concepts are used with many different names and this situation makes it difficult to understand the concepts. It can also be said that these concepts are used interchangeably and that meaning shifts are experienced (Jones, Bailey, Barnes & Partee, 2016; Jones, Bailey, Meland & Brion-Meisels, 2019). In addition, while indicating the diverging aspects of these concepts, the relationships between them should also be looked at through direct and indirect effects (Hofmann, Schmeichel & Baddeley, 2012; Eisenberg, Hernández & Spinrad, 2017).

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These concepts have been included in studies that address diverse groups such as autism, learning difficulties, special abilities, and poor children (Ekşi-Sınır, 2020; Jones et al. 2016,2019; Leana-Taşcılar & Cinan, 2012; Nathalia, 2011; Rocha, Almeida & Perales, 2020; Tercanlı-Metin, Harma, Gökçay & Bahçivan-Saydam, 2017). In the literature respectively executive functions, self-regulation and emotion regulation have been associated with concepts such as intelligence and success (Best, Miller & Naglieri 2011; Finders et al. 2021). It is also said that executive functions are associated with fluent intelligence especially rather than crystallized intelligence, which expresses more learned knowledge (Diamond, 2013; Diamond, 2013; Zelazo, Blair & Willoughby, 2016). In order to observe these relationships, it is stated that studies comparing executive functions between gifted and normal individuals should be increased (Leana-Taşcılar & Cinan, 2012).

If we give information about the variables of the study, executive functions are seen as skills that enable people to control their thoughts and actions and to direct their behaviors to long-term goals. It is also argued that the executive function is a collect of neurocognitive skills within high cognitive processes (Carlson, Zelazo & Faja, 2013; Hendry, Jones & Charman, 2016). Cognitive neuroscientists often define executive functions as a set of mental processes located in the frontal cortex region of the brain used for targeted behavior (Fuster, 2008; Miyake et al. 2000). According to this definition, it is seen that there are many components in executive functions. In the literature these components are: shifting/flexibility, response inhibition, working memory (Bayliss & Roodenrys, 2010; Hughes, 2002), speed / arousal, sustainable attention, planning, serial ordering and sequencing, initiation and self-generation, set-shifting and cognitive flexibility (Brocki & Bohlin, 2004; Hanna-Pladdy, 2007).

Emotion regulation explains what emotions we have, when and how. It also deals with the process of how we experience and express emotions. It is also said that emotion regulation may involve maintaining, increasing or decreasing negative or positive emotions. It is explained that emotions are not good or bad by nature (Gross, 2002). In emotion regulation, people try to reroute the spontaneous flow of their emotions. Emotions are understood here as valuable (positive or negative) responses to events that people perceive about their ongoing anxiety. Emotions in this understanding include multiple components, including behavioral and physiological responses, as well as specific thoughts and feelings (Cacioppo et al. 1992; Frijda, 2006; Mauss et al. 2005). It is stated that emotion regulation is also based on cognitive resources that constitute executive functions as a process. It is said that the emotion regulation process will be disrupted in problems experienced in areas related to executive functions (Şahin, 2020).

Self-regulation is defined as the process of deliberately directing one's actions, thoughts and feelings towards a goal (Carver & Scheier, 2011). It requires a range of skills, including self-regulation, planning, and other executive functions. However, these skills are not limited to. Successful self-regulation also includes the capacity for motivation, such as wanting and enjoying behaviors that match the goal (Berkman, 2016). When people self-regulate, they often face potentially emotional situations. Self-regulation processes are therefore closely related to emotion regulation processes (Koole & Aldao, 2016). When the place of emotions in learning is investigated, it is suggested that regulating one's emotions is as important as regulating cognition, metacognition and motivation. In fact, given that focusing on emotions is new in the educational psychology literature, current definitions of self-regulation now include emotion regulation as one of the key components of self-regulated learning (Usher & Schunk, 2018)

Learning how self-regulation interacts with emotion regulation will likely generate important new insights for both processes. This will lead to a deeper understanding of how people can successfully express themselves in their environment. It is also stated that the relationship between emotions and self-regulation is by no means one-sided. It is said that too much self-regulation over a period of time can increase emotional responsiveness and this may impair the individual's ability to regulate their emotions (Wagner & Heatherton, 2014). For this reason, self-regulation research can shed light on how people are actively involved in managing their emotional lives. Conversely, emotion regulation research can shed light on how people navigate their actions in emotional contexts (Koole & Aldao, 2016). At this point, it is thought that paying more attention to moderation and mediation processes will clarify the relationship between self-regulation, executive functions and internalization problems (Eisenberg et al. 2017). Jones et al. (2016) They developed a model called "An Integrated Model of Regulation" in their work on executive functions, effortful control and self-regulation skills. According to this model, executive functions are in the cognitive domain, including simple and complex cognitive skills. Effortful Control refers to the ability to deliberately manage thoughts, attention, emotions and behaviour (Lengua, 2008). And these skills are stated to be in the area of emotion, which is the more complex skills (Jones et al. 2016). Self-regulation is defined as an umbrella term that reflects other regulatory structures such as impulsivity, conscientiousness, self-control, delayed pleasure, carelessness-hyperactivity, executive function, and willpower (Moffitt et al. 2011). Jones et al. (2016) states that new models are needed especially to

understand executive functions, self-regulation and other concepts and to better explain the relationships between them.

Here, it is thought that working models can be created in order to see the effects of these variables on SaC students. SaC's are private education institutions that serve specially talented students, affiliated to the Ministry of National Education, General Directorate of Special Education and Guidance Services. Students are recruited to SaCs in the fields of general mental ability and special ability (Visual Arts and Music) through diagnosis. In the study, students studying in the field of general mental ability were included in order to see the interactions of the related concepts with the concept of giftedness. Students in the field of general mental ability are determined at the Guidance and Research Centers by expert staff with intelligence test practitioner certificate. Students who score 130 and above in the intelligence test register to SaC in the field of general mental ability (MEB, 2016). Studies indicate that these variables have different effects according to developmental stages. For example, it is said that more complex skills such as organization, self-regulation and emotion regulation skills are acquired more quickly in late childhood (11-13) and adolescence than in early and middle childhood (Bailey & Jones, 2019). Considering late childhood and adolescence, models that address executive functions, self-regulation and emotion regulation skills are needed on different groups. In this way, children will be helped to fulfill the tasks that they need to realise due to their developmental periods (Jones et al. 2016, 2019).

Importance of Research

In the study, in line with both the information in the literature and the "An Integrated Model of Regulation", a new model was created in which executive functions are the independent variable, emotion regulation difficulties are the mediator variable and dependent variable's self-regulation. It has been considered to examine the model created according to both SaC students and 6,7 and 8th grade students who are not in SaC. When the literature is reviewed, it is seen that there are studies on executive functions, self-regulation and emotion regulation variables. However, there isn't found study examining all of these variables in the direction of a model. Here, it will be checked whether the model has a significant effect for both groups. The direct, indirect and total effects of the model will be examined for both groups. It will has been also look at the moderated mediation model. With these aspects of the study, it is thought that it can be an example in terms of method. The purpose and sub-problems of the research are given below.

The Study Problem

The main purpose of this study is to examine the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation of students with and without in the SaC. Also, the moderated mediation effect of with and without in SaC will be looked at.In line with the stated purpose, answers were sought for the following problems:

- Are the direct, indirect and total effects of emotion regulation difficulties in the relationship between executive functions and self-regulation of secondary school students with SaC statistically significant?
- Are the direct, indirect and total effects of emotion regulation difficulties statistically significant in the relationship between executive functions and self-regulation of secondary school students without in SaC?
- In the relationship between executive functions and self-regulation, is there a regulatory effect of being in the science and art center in the indirect effect of emotion regulation difficulties?

Method

In this section, the titles of research model, study group, data collection tools, data collection and analysis are included.

Research Model

The study is a descriptive study in which predictive correlational research, one of the types of correlational research model, is used. Predictive correlational studies are approaches that focus on indirect-mediating effects besides direct effects (Büyüköztürk et al. 2020). In the study, the mediating role of emotion regulation difficulties in the relationship between executive functions and self-regulation skills of SaC and non-SaC students was examined through the Process Macro Model-4 diagram of Hayes (2018). In addition, Model-14 was used to test the regulatory effect of with and without in SaC or not on the indirect effect. Model diagrams are given below.

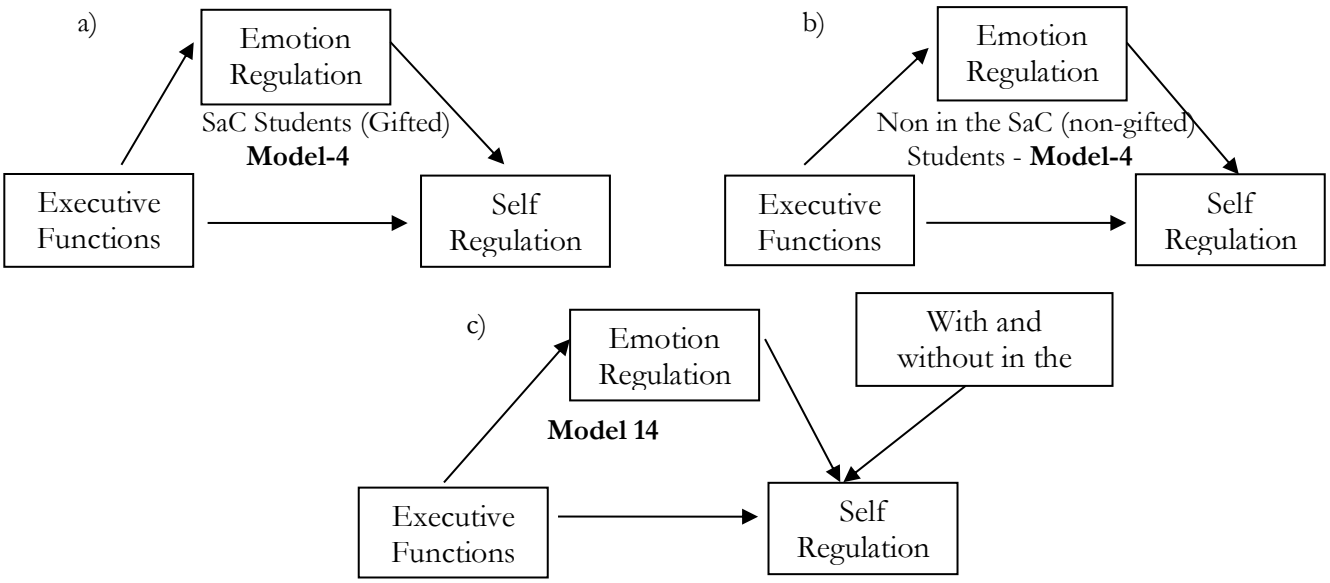

Figure 1.
Model-4 Diagrams Created for Secondary School Students with and without SaC and Model-14 Diagram Created for the Regulatory Mediator Effect of with and without In SaC

With and without in SaC (moderator), executive functions (independent variable), difficulty in emotion regulation (mediator) and self-regulation (dependent variable) in Figure-1 are.

Participitans

The study group of the research consisted of the students studying in the province of Istanbul in the 2020-2021 academic year. In the sample, 6,7 and 8th grade students who are gifted in SaC (59 females, 64 males in total 123) and those who are not in SaC (89 males 95 females, 184) 6, 7th and 8th grade students are included. Appropriate sampling method was used for participation in the study. Information about the working group is shared in Table 1 below.

Table 1.
Socio-demographic Characteristics of the Study Group

Variable	SaC		Normal		Total	
	n	%	n	%	n	%
Gender						
Male	59	48	89	48.4	148	48.2
Female	64	52	95	51.6	159	51.8
Class						
6th	80	65	83	45.1	163	53.1
7th	29	23.6	61	33.2	90	29.3
8th	14	11.4	40	21.7	54	17.6
Mother Education						
Primary School	20	16.3	58	31.5	78	25.4
Secondary School	9	7.3	32	17.4	41	13.4
High School	31	25.2	60	32.6	91	29.6
Undergraduate	51	41.5	34	18.5	85	27.7
Graduate	12	9.8	0	0.0	12	3.9
Father Education						
Primary School	11	8.9	50	27.2	61	19.9
Secondary School	18	14.6	24	13.0	42	13.7
High School	32	26.0	77	41.8	109	35.5
Undergraduate	42	34.1	30	16.3	72	23.5
Graduate	20	16.3	3	1.6	23	7.5
Total	123	40.1	184	59.9	307	100

Data Collection Tools

Behavioral Rating Inventory Of Executive Function (BRIEF) Parent Form

BRIEF Parent Form, It is a 3-point Likert-type inventory consisting of 86 items in total in which parents with children aged 5-18 evaluate the behaviors of their children regarding their executive functions. The inventory has 2 comprehensive indexes and 8 subscales. In addition, there is a total index score in which 72 items are included in the assessment. Developed by Gioia, Isquith, Guy & Kenworthy (2000) the internal consistency of the parent form of the scale was found between .80 and .97 in a healthy sample. The adaptation of the scale to Turkish and its validity and reliability studies were carried out by Nazlı-Köylü (2010). The internal consistency of the parent form of the scale was between .60 and .94 in the healthy sample. Within the scope of this research, the internal consistency coefficient for the total score was found to be .96.1. High scores on the scale indicate a high level of dysfunction.

Difficulties in Emotion Regulation Scale (DERS)

It is a 5-point Likert-type scale developed by Gratz & Roemer (2004) consisting of 36 items and 6 factors. The internal consistency coefficient of the original form varies between .93, and the values of the sub-dimensions vary between .88 - .89. Test-retest reliability was found to be .88. Adaptation study to Turkish was done by Rugancı & Gençöz (2010). In this study, it was found that the 6-factor structure of the scale explained 62.4% of the total variance. Also, the Cronbach Alpha was found to be .94. It was observed that the internal consistency coefficients of the subscales varied between .90 and .75. Test-retest reliability was found to be .83. The study for adolescents was conducted by Sarıtaş & Gençöz (2011). The overall internal consistency coefficient of the scale was found to be .93, similar to the original scale, and the test-retest reliability was found to be .83. Within the scope of this study, the internal consistency coefficient for the total score of the Difficulty in Emotion Regulation was found to be .92.5.

The Adolescent Self-Regulatory Inventory (ASRI)

Moilanen (2005) developed the scale to evaluate self-regulation skills in adolescents. The scale is a 4-point Likert type instrument consisting of 32 items. There are 2 factors, "Self-Regulation Success" and "Self-Regulation Failure". The internal consistency coefficient of the scale was found to be .89. The scale was adapted to Turkish by Harma (2008). The internal consistency of the self-control success subscale was .85, and the self-control failure sub-dimension was .80. Within the scope of this research, the internal consistency coefficient for the total score of the scale was found as .88.8. When both dimensions of the scale are found to be related, the items of failure in self-regulation can be reversed and an evaluation can be made in one dimension under the title of successful self-regulation. In this case, high scores from the scale indicate successful self-regulation skills (Tercanlı-Metin et al. 2017).

Data Collection and Analysis

The data were collected online through measurement tools created on Google form. Informed consent forms were prepared for parents and young people to participate in the study. After the necessary consents were obtained, the stage of collecting data was initiated. In the research, the data were analyzed using the PROCESS macro plug-in of Hayes with the SPSS 20 package program (Hayes, 2018). In analyzing the data, descriptive statistics were calculated and Pearson Product Moment Correlation Coefficient was examined to calculate the correlation between continuous variables. Before the mediation analysis, the relationships between variables were examined using stepwise linear regression and multivariate regression analysis methods. For the mediation model created in line with the results, Bootstrap method was used to see the indirect effects. In contemporary statistical approaches, much more attention is paid to whether the indirect effect (a.b) is significant or not. Contemporary approachs; In the Baron and Kenny method, they do not look for conditions related to the steps required to be carried out and they criticize these conditions. Contemporary approaches argue that even if these conditions are not fulfilled, the mediating effect (indirect effect = a.b) may occur. In the contemporary approach, it is recommended to test the indirect effect with the Bootstrap technique, which produces stronger and valid results than the Sobel test. (Hayes, 2018). In order to have meaningful results in this method, the lower and upper limits of the confidence interval should not include the "0" value. If the result does not contain a value of zero, it is concluded that mediations, direct and indirect effects are significant (Gürbüz, 2019). In the study, the moderated mediation effect model analysis was used to examine whether the moderated variable has an effect on the indirect effect. The effect model that shows in which situations the indirect effect of the independent variable "X" on the dependent variable "Y" through the (mediation variable) "M" is called "moderated mediation effect model" (Gürbüz, 2019).

Results

In this section, firstly, descriptive statistics, assumptions and relationships regarding research variables are presented. According to the research diagram, direct, indirect and total impact results are shared. Finally, in order to show the effect of the moderated effect on the indirect effect, the moderated mediator effect model was tested and the findings were presented.

Table 2.

Descriptive Statistics, Correlations and Assumptions Regarding Variables

Variable	Descriptive Statistics				Correlations(r)			
	Mean	Ss	Skewness	Kurtosis	1.	2.	3.	Cronbach's α
SaC								
1. EF	124,86	27,189	,561	-,254	1	,408**	-,535**	,96.6
2. ER	78,59	22,690	,436	-,474	,408	1	-,610**	,92.6
3. SR	86,71	14,205	,207	-,271	-,535**	-,610**	1	,88.5
Normal								
1. EF	123,49	24,192	,082	-,452	1	,492**	-,639**	,95.7
2. ER	81,79	23,016	,379	-,373	,492**	1	-,723**	,92.4
3. SR	84,88	15,215	,250	-,472	-,639**	-,723**	1	,89.0

** p<0.001; Note: **EF**: Execautive Functions, **ER**: Emotion Regulation, **SR:** Self Regulation, S**aC**: Gifted Students' School, Normal: Nongifted students or not enrolled SaC

In this study, secondary school students' who are in the SaC and secondary school students' who are not in the SaC were examined the scores of in terms of executive functions, emotion regulation difficulties and self-regulation skills. According to Table 2, The average scores of secondary school students educated in the field of general ability in SaC are as seen in executive functions ($\bar{X}$ = 123.49), self-regulation ($\bar{X}$ = 84.88) and emotion regulation difficulties ($\bar{X}$= 81.79). The average scores of secondary school students not in BİLSEM are as seen in executive functions ($\bar{X}$= 123.49), self-regulation ($\bar{X}$= 84.88) and emotion regulation difficulties ($\bar{X}$= 81.79). It was observed that the skewness and kurtosis values of the variables for both groups were between the -1 and +1 points accepted for normality. In addition, the linearities between variables are examined through scatter diagrams. It has been observed that the variables show an elliptical linear distribution. In this case, it is seen that normality and linearity are met (Büyüköztürk, Şekercioğlu & Çokluk, 2018; Karagöz, 2019). The extreme values were examined taking into account the z values and mahalanobis values and no extreme values that could be deduced from the study were found. The VIF values are 1,320 and the tolerance values are 758 for the group whose multiple connectivity and singularity between variables are not in SaC. For the group with in SaC, VIF values were found to be 1.199 and tolerance values were found to be 834. It is desirable that the tolerance values should not be smaller than 0.333 and VIF values should not be greater than 3. (Tabachnick & Fidell, 2013). Autocorrelation was checked with Durbin Watson value and for the group not in SaC (dw: 1931); The value (dw: 2.123) was found for the group with SaC. These values are stated to be within normal ranges (Küçüksille, 2014). According to Tabachnick and Fidell (2013), the number of participants in the regression analysis was given as N≥104 + m. "m" is used for the number of variables. Since there are 3 variables in the study, there should be at least N ≥ 107 people in two groups. 123 in SaC in the research; Since there are 184 secondary school students who are not in SaC, it is seen that this condition is met. In this case, it can be said that the assumptions required for multivariate statistics are met. Correlation values were also examined in the study. In Table 2, for the group in SaC, it was found that there was a moderately positive significant relationship between the scores of executive functions and emotion regulation difficulties (r = .408, p <.01). It was found that executive functions scores had a moderately negative significant relationship with self-regulation(r = -.535, p <.01). It was found that emotion regulation difficulties scores had a moderately negative significant relationship with self-regulation scores (r = -.610, p <.01). For the group not in SaC, the scores of executive functions scores were found to be positively moderate with emotion regulation difficulties scores (r = .492, p <.01) and moderately negative with self-regulation (r = -.639, p <.01) It was found to have a significant relationship. It was found that emotion regulation difficulties scores had a highly level negative significant relationship with self-regulation scores (r = -.723, p <.01).

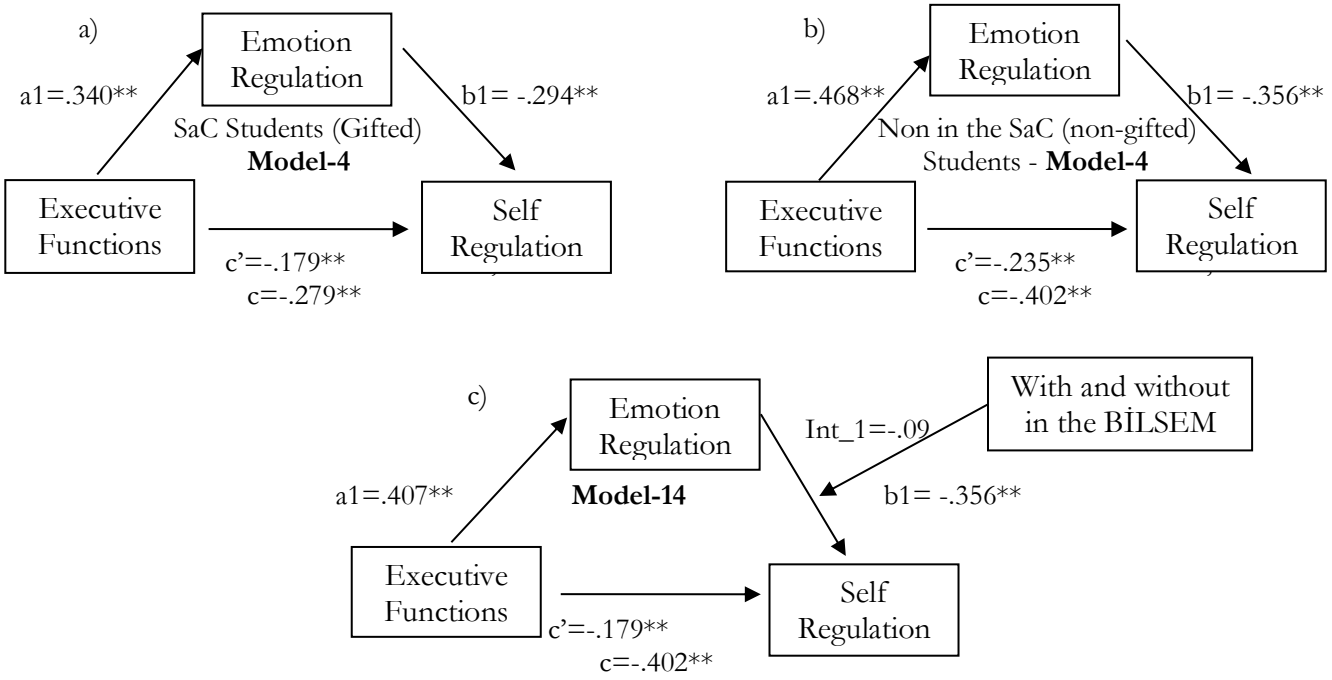

Figure 2.
Model-4 and Model-14 Mediation Analysis Results for Gifted and Nongifted Students Enroled Secondary School Level

In Figure-2a and 2b, the a, b, c and c 'ways of emotion regulation difficulties in the relationship between executive functions and self-regulation skills and regression coefficients related to these paths are given. Considering the findings of middle school students both in with and without SaC in Figure-2a and 2b, it is seen that the executive functions, which are the predictor variables, significantly affect the emotion regulation difficulties, which are the mediator variable (SaC, b=.340, %95 CI [.2032,.4775], p<0.001; Not in SaC, b=.468, %95 CI [.3472,.5894], p<0.001). In the next section, the combined effects of emotion regulation difficulties (b-path) and preditors executive functions (c 'path), which are the mediator variables for both groups, on self-regulation skills, which are the dependent variable have been examined. According to this; Emotion regulation difficulties were observed to significantly and negatively level affect self-regulation skills for both groups. (SaC, b=-.294, %95 CI [-.3846, -.2042], p<0.001 ; Not in SaC, b=-356., %95 CI [-.4244,-.2888], p<0.001). In addition, it is seen that executive functions significantly and negatively affect self-regulation skills for both groups (SaC, b=-.179, %95 CI [-.2545, -.1040] p<0.001; Not in SaC b=-235., %95 CI [-.2996,-.1706], p<0.001). In Figure-2c, PROCESS macro Model-14 is used to see whether the indirect effect depends on the moderated variable. Here, the analyzes were carried out over data set of 307 people. Moderated was examined through the variable of with and without at SaC. According to the results, the significance level of the "b" value of the Int_1 variable, which consists of the interaction of emotion regulation difficulties and the moderator variable, was examined. Accordingly, it was seen that the moderated effect of the variable was not significant (b=-.090, %95 CI [-.1888, .0083], p>.05).

Table 3.
Mediation Analysis Results: Direct, Indirect, Total And Moderated Mediation Effects

Effect	B Coefficient	Lower bound[a]	Upper bound[a]
SaC			
Total Effect	-.279**	-.358	-.200
Direct Effect	-.179**	-.254	-.104
Indirect Effect	-.100**	-.153	-.054
Non in the SaC	B Coefficient	Lower bound[a]	Upper bound[a]
Total Effect	-.402**	-.472	-.331
Direct Effect	-.235**	-.299	-.170
Indirect Effect	-.167**	-.227	-.113
SaC- Moderated Mediation Effects	B Coefficient	Lower bound[a]	Upper Bound[a]
Index of Moderated Mediation	-.037**	-.085	.008

**p<0.001; Note= B. Coefficient: bootstraping regression coefficient=5000 bootstrap based on sample., CI, [a] %95 bootstrap confidence interval.

According to Figure-2a, 2b, 2c and Table 3, direct, indirect and total effects were found to be significant for both groups with and without in SaC [(SaC= total effect (b=-.279, %95 CI [-.358, -.200], p<0.001); direct effect (b=-.179, %95 CI [-.254,-.104], p<0.001); indirect effect (b=-.100, %95 CI [-.153, -.054], p<0.001), (Not in SaC= total effect (b=-.402, %95 CI [-.472, -.331], p<0.001); direct effect (b=-.235, %95 CI [-.299,-.170], p<0.001); indirect effect (b=-.167, %95 CI [-.227, -.113], p<0.001)]. That is, it is seen that the mediating effect of emotion regulation difficulties is statistically significant for both groups.

In order to test whether the indirect effect is due to the moderated effect or not, the moderated mediation indexes were examined in the moderated mediator effect model analysis. It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect (b=-.037, %95 CI [-.085, .008]).

Discussion and Conclusion

This section is with and without in SaCs in Turkey and executive functions of middle school students and the results of the mediating role of emotion regulation in the relationship between self-regulation skills were discussed.

The direct, indirect and total effects of emotion regulation difficulties were found to be statistically significant in the relationship between executive functions and self-regulation skills of secondary school students with and without in SaC. In addition, it was found that there was a positive and significant relationship between executive functions and emotion regulation difficulties for both groups. We can say that decrease in executive functions will decrease emotion regulation or increase in executive functions will increase emotion regulation. When the literature is reviewed, it is seen that similar results were found in studies on executive functions and emotion regulation (Thompson & Calkins, 1996; Barish, 2012; Öztemür, 2018). In the study, a negative correlation was found between emotion regulation difficulty scores and self-regulation scores in two groups. According to this result, we can say that as the emotion regulation difficulty scores increase, self-regulation scores will decrease, and as the emotion regulation difficulty scores decrease, self-regulation scores will increase. Koole & Aldao (2016) and Wagner & Heatherton (2014) made statements supporting the results in their studies. In the study, a negative relationship was found between executive functions and self-regulation for both groups. We can say that the decrease in executive functions scores will increase the self-regulation scores, while the increase in the scores of executive functions will decrease the self-regulation scores. Hofmann et al. (2012) mentions the existence of a relationship between executive functions and self-regulation.

If we evaluate the model in general, we can say that executive functions predict both emotion regulation and self-regulation. In this case, it is seen that emotion regulation is a mediating variable in the relationship between executive functions and self-regulation skills of secondary school students with and without SaC. That is, part of the effect of executive functions on self-regulation skills is through emotion regulation control. According to the result, it can be said that the studies to be done to develop executive functions may have a positive effect on self-regulation skills, but developing them together with emotion regulation skills can increase this effect. Jones et al. (2016) focused on the relationships between executive functions and inhibitory control in their research, and stated that these two skills were effective on self-regulation skills, similar to the results of the research. There is no study in the literature that examines executive functions, emotion regulation and self-regulation variables together and looks at the relationships between them through a mediation model. It was observed that especially one of the variables in question was considered and there were studies to compare different groups. In studies comparing gifted students and normal groups, executive functions (Leana-Taşcılar & Cinan, 2012), self-regulation skills for scientific learning, self-regulated learning strategies (Kanık, 2017), executive functions (Al-Hmouz & Abu-Hamour, 2017; Rocha et al. 2020) like variables has been found to be used. With the increase in neurocognitive studies, the contents of concepts such as, executive functions, self-regulation and emotion regulation are expanding. However, interest in these concepts has started to increase gradually in different disciplines. However, there may also be confusion about the concepts arising from different uses. Establishing a language unity on the subject can increase the number of studies to be done. In addition, the use of contemporary statistical approaches such as situational mediation analysis, structural equation models, and indirect impact analysis with bootstrap method is newer. This situation may explain the limitations of the studies.

It has been observed that the moderated variable with and without in SaC or not a significant effect on the indirect effect. In this case, we can say that emotion regulation difficulty plays a mediating role in the relationship between executive functions and self-regulation. However, in this relationship, it can not be said that with and without in SaC makes a significant difference in terms of the effect of the model. In summary, it can be concluded that the model created creates statistically similar effects in both groups. There is no found similar study about SaCs in the literature. The research will be an example for the studies to be done in this aspect. In addition, there are different institutions abroad that support gifted students. İt can use working in these institutions as an example. The fact that the model

created for both the gifted group and the group not identified as gifted yielded significant results for both groups is also important for the generalizability of the study.

Recommendations

It may be more effective in terms of student development if teachers, families and experts examine executive functions, emotion regulation and self-regulation studies together. In future studies, researchers can develop new models in which they consider executive functions, emotion regulation and self-regulation variables and components together. The effect of the model can also be examined in different groups (special learning disability, autism, mental disability, etc.).

Limitations of Study

Due to Covid-19 process, parental inventory was used instead of performance tests to determine executive functions. The teacher inventory was not preferred because it consists of 86 items and will be filled in for each student. These situations can be evaluated in future studies.

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Research Article

The effects of using games on teaching vocabulary in reading comprehension: a case of gifted students

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Abstract

Using educational games for the improvement of the students' vocabulary retention has been widely used in the educational setting for many decades. The acquisition of vocabulary as part of the subskills of the English language is considered a vital part of learning any target language. Hence, this research study aimed at exploring the effects of using games to teach vocabulary in reading comprehension among freshmen students at Takhar University. This study has employed mixed-method research involving pre-test, post-test, and a semi-structured interview. The researcher employed descriptive statistical analysis to analyze the frequency and percentage of the respondents and inferential statistical analysis to mainly T-test to figure out whether there is any significant difference in the mean score of the pre and post-test across gender. In addition, the inference method of the content analysis is also used for the semi-structured interview to identify whether games are motivating the students to enhance their vocabulary knowledge of the student. The targeted group was 20 freshmen students from the English department. The findings of the present study revealed that employing games are effective and beneficial for teaching vocabulary in reading comprehension. Moreover, the findings showed no significant difference in the mean score of the pre and post-test across gender. The study also indicated that games improved students' motivation in acquiring new vocabulary. Besides, it is hoped that educational games are more attractive, fun, and helpful in teaching and as well as building the vocabulary knowledge of the students. It is proposed that teachers should look for educational games and techniques to involve their students in the use of the creative expression in the enhancement of vocabulary knowledge.

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Introduction

Reading comprehension is one of the key strategies of reading skills that allow students to make written texts meaningful (Hashemi and Kew, 2020). It is proposed that understanding through participation in written language is the process of creating and making sense. It is a system that allows students to make sense by communicating with the text. Reading comprehension is an essential component that involves students reading and understand a given text. It highly assesses the reading ability of learners and their aptitude to understand a text. Research has shown that students who lack vocabulary, will impede their comprehension of reading (Semtin and Maniam, 2015). This is because vocabulary teaching has always been a daunting activity for teachers and students, as vocabulary in the ESL classroom is given limited emphasis. Educational games are, therefore, one of the strategies in ESL classrooms to teach vocabulary. Educational games have been used in educational contexts for many decades (Pekalongan, et al. 2019). Therefore, employing educational games is hoped to be beneficial for students of the English department at Takhar University, Afghanistan.

In addition, Vocabulary Acquisition is regarded by students as one of the hardest components of learning the language. However, vocabulary is considered one of the sub-skills of the language (Orfan, 2020). Although, there is

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not much attention paid to making it simpler and easier for enhancing the vocabulary knowledge of the students. Moreover, vocabulary knowledge helps improve the social potential of the student and also in improving the communicative skills of the student. For students to develop their vocabulary skills, different ways and techniques can be helpful. But there are no clear rules that allow vocabulary to be learned by students. Every student has their way of building vocabulary knowledge. Various studies have shown that learning new vocabulary by using games has helped to increase vocabulary retaining and make language learning fun and inspiring (Hoa and Trang, 2020; Ma and Yodkamlue, 2019; Selvi and Çoşan, 2018).

However, using educational games for the enhancement of the vocabulary skills in the upper classes of the Afghan classroom is not given much consideration and attention. Furthermore, the acquisition of vocabulary in the Afghan context is more based on the traditional way. According to Orfan, et al. (2021), grammar translation method is considered as the dominant approach among Afghan university lecturers. The teachers are used to teach vocabulary by repeating its pronunciation and meaning several times and as well as requesting the students to follow the same rule to memorize the vocabularies. Following in the footsteps of prior studies on the use of educational games to teach vocabulary, the study was carried out to teach vocabulary in reading comprehension using educational games. This paper, therefore, targeted three topics to be explored in the Afghan context, which are educational games, reading comprehension, and motivation to figure out the effects of using games in teaching vocabulary and as well as to identify how educational games motivated the students to build their vocabulary knowledge. In this regard, the focus of our attention in the current study is to teach vocabulary through games, the encouragement of the student, and the impact of vocabulary on reading comprehension. Therefore, the current mixed-method research helps to find out the results of employing games in teaching vocabulary and motivation among Takhar University freshmen students to learn vocabulary.

Literature Review

The emphasis of every student and instructor has recently been on improving vocabulary awareness through games. Donmus (2010) suggested that games have significant value in enhancing the vocabulary skills of students in educational toys. Similarly, the results of a study by Barabadi and Khajavi, (2017) suggest that the combination of education and games can be both educational and entertaining. The world of the class can be made more communicative when learning vocabulary through games. Besides, Murray and Ian, (2018) accepted that engaging students in activities such as using games allows learners to more quickly recall new vocabulary. Game-based education helps the learning process to be fearless and meaningful. The acquisition of vocabulary by using games has encouraged students to contribute with each other and enhance the knowledge of their vocabulary (Ebrahimzadeh and Alavi, 2016). They are also supportive in keeping teachers to be boring and also helping them feel free to instruct students in an expressive way of learning.

In learning new vocabularies, games have plenty of advantages and effectiveness. For all students in the class, games will create a friendly atmosphere where every student is interested in a fun and competitive way of the supportive learning environment. In this way, in a group, the students will have the ability to assist each other to solve the issues posed when working together. They will also stimulate the imagination of students and develop their capability to practice the language entertainingly (Rasti-Behbahani and Shahbazi, 2020; Akramy, 2020). As can be seen, it can bring pleasure and motivate both teachers and learners to make the learning process significant and comprehensible by teaching vocabulary through games. In a language teaching classroom, it is not possible to disregard the essential role of games in educating and learning new vocabulary.

Learning vocabulary plays a vital role in reading comprehension. To understand the text as easily as possible, reading comprehension needs enough vocabulary awareness. The researchers claimed that reading skill as the main skill of the language and vocabulary skill as the sub-skill are interrelated with each other. Lack of vocabulary will affect learners' understanding of reading, and reading comprehension is considered a major necessity and vital factor (Hashemi and Kew, 2020). Ibrahim et al. (2016) recognized that there is a relation between vocabulary and reading comprehension as student concurrently develop their vocabulary knowledge. Thus, reading comprehension and vocabulary are the dependable elements that can make the learning process simple and understandable.

Rolletschek (2020) claimed that it was easier for those with a strong background in vocabulary knowledge to understand the text comparing to those who lack vocabulary knowledge. Moghadam et al. (2012) studied the vital role of vocabulary in reading comprehension in the Malaysian context, it was found that learning vocabulary is the primary goal of language learning, whether it is a second or a foreign language. Researchers accepted that vocabulary competence is the fundamental factor for skilled learners and suggested that those with excellent vocabulary

knowledge would be effective in comprehending the reading text (Camacho &Vásquez 2019; Ovalle et al. 2020; Kamnardsiri et al. 2017; Li & Cummins, 2019; Miyazaki, 2019). Likewise, a study by Kameli & Baki (2013) investigated the effect of the level of vocabulary awareness on EFL reading among Iranian students. They claimed that vocabulary awareness has an influence on reading comprehension at different levels of learners.

Several methods and techniques help students to enhance their vocabulary skills. Motivation, whether intrinsic or extrinsic motivation, is one of the main factors in enhancing the vocabulary knowledge of the students in reading comprehension (Franciosi et al. 2016). There are also several ways, however, to inspire learners to actively engage in learning and developing their knowledge of vocabulary. This objective can be accomplished by using games for the enhancement of the vocabulary knowledge of the students in the classroom. It is also distinguished that educational games can be inherently and extrinsically driven to provide an enjoyable atmosphere. This learning process can be over-learning and can inspire learners to learn and to promote the learning process for the teachers. (Bakhsh, 2016) thought that it offers a social function and social meaning to inspire students by using games in learning vocabulary. Student interpersonal skills and even verbal engagement in a cooperative manner with group learning.

Definition of Reading Comprehension

Reading uses receptive abilities and defines the language potential of a learner. Chung and Bidelman, (2021) described reading as the text implementing values from written documents. This desires the unity of the multifarious initiation of knowledge connected with it. Sowell (2018) strongly supports this view, explaining reading as a mechanism of conceiving meaning that includes the existing awareness of the reader, text content, and text reading. Meanwhile, Shimono (2018) claimed that reading is a mutual `progression between readers and reading texts that result in a fluent reading of the text. In this regard, while reading readers can often communicate with the texts as they can derive the meaning by using different kinds of information, such as bottom-up processing and top-down processing. Dindar et al. (2021) also indicated that reading aims to obtain correct information from a reading background that the writer intended to attain from the reader. Li and Cummins (2019) argued that reading creativity can be described as an intellectual skill a person can use when engaging with the circumstance they are reading. Most importantly, reading is a cognitive and productive activity as the students need to connect written symbols and use his/her prior experience to understand and extract meaning from the sense of reading and the author's purpose. Reading, as a result, helps learners understand a text.

Comprehension refers to the process of acquiring and making meaning through communication and written language participation (Miyazaki, 2019). He described comprehension as the growth in the mind of the reader to design meaning by engaging with the context. Readers do this through the combination of their previous knowledge and experience, text details, and their views on the text. In the meantime, Chung and Bidelman (2021) claimed that understanding of reading refers to a growth in a text's context. The reader's primary objective is to obtain an interpretation of the text as opposed to knowing the meaning of sentences. Reading comprehension is thus a process of formulating language, recognizing, and responding to what is written in a particular text.

Strategies of Reading Comprehension

Besides, three styles help to explain reading: interactive, bottom-up, and top-down. The cognitive mechanism that occurs when readers interrelate with the text is clarified by these models. A decoding method and a set of written symbols into aural sounds is the principle of the bottom-up reading model (Barabadi and Khajavi, 2017). In other words, the emphasis of this method is first on letters, then on sentences followed by phrases in the text. According to this approach, the comprehension of the text is accomplished based on the number of details in each paragraph. The top-down model, however, is the opposite of the bottom-up one, since readers use their previous experience to refer to a new text in this top-down model. This method, therefore, starts by concentrating on larger aspects of the document, such as the title, basic points, and then focuses on reduced features of linguistics in the text. An interactive strategy of the reading model is the third model. This reading model refers to an example of reading that requires the concurrent involvement of both top-down and bottom-up procedures. As Pourhosein and Gilakjani (2016) claimed that sufficient reading entails processing both top-down and bottom-up. Teachers can look for guidance in reading based on this model to boost the abilities of L2 students.

In reading comprehension there are limited methods that play an important role: applying and stimulating context information, aggravating and asking questions, creating an inference, anticipating, epitomizing, visualizing, and tracking comprehension. One of the methods that help the reader's previous knowledge to better interpret a reading text is to stimulate and apply context knowledge. This understanding consists of the interactions of individuals with their principles of understanding how the written text works, including word recognition, print concepts, word sense,

and how the text is created (Gilakjani, 2016). Another technique for reading comprehension is creating and answering questions. Readers would like to ask themselves some important questions to get a clearer understanding of the text they are reading. This approach allows readers to recognize the main concept and essential details in a text (Davenport et al. 2017). Making inferences is another approach to reading comprehension (Tarchi, 2015). In this method, readers need to infer from data in a text. The data from the text and their previous information will be combined.

Predicting is another skill of the reading techniques that help readers to guess by getting information about a text. To learn new information from the text, the readers use their prior knowledge. The content may be expected by readers based on the author and the title of the text. Davenport et al. (2017) once mentioned that for readers to remember the text they read quickly, encapsulating is a critical technique. By doing this, readers can incorporate all the data into a reading text and describe it using their own words. As readers use this approach, they can understand the text's structure, the text's emphasis, and the way opinions are connected. Effective narrative text summarization involves topics such as connecting events in a plot or recognizing basics that stimulate the activities and behavior of a character. As one of the techniques, visualizing helps readers to imagine to grasp a text. Readers who imagine when they read without any assistance, recall the content of the text and as well as help them remember some non-concrete points and significant names (Rasti-Behbahani and Shahbazi, 2020). Finally, monitoring is one of the successful techniques that enable readers to use acceptable and different strategies in various categories of manuscripts. Besides, it allows learners to make the best decision-maker, as they can select and use a suitable strategy when appropriate.

Educational Games

Vocabulary in the English language is considered to be one of the sub-skills of the four integrated skills (writing, reading, speaking, and listening). It is also recognized among learners as a hard part of language learning. There is also no clear and effective rule and method for helping students to learn the vocabularies and terminologies. More precisely, this study aims to figure out how to teach vocabulary using games, how to inspire students to learn vocabulary to enhance their ability to communicate, and how successful vocabulary in their academic contexts is to understand any reading text.

It is very fun to learn vocabulary through games and has garnered a lot of popularity among teachers and students. Sowell (2018) believed that because they support making language education enjoyable, the importance of educational games has increased in language education. He noted that it can be entertaining and educational when a game is selected as a medium for teaching and educating students to improve the classroom atmosphere. As Riahipour and Saba (2012) accepted that typical practices such as memorizing long lists of words, derivations, translation, word repetition, fill-in-the-blank exercises are all hard and repetitive to recall for students.

Similarly, the impact of games on the level of development of Iranian EFL vocabulary awareness among kindergarten students was investigated by (Aslanabadi and Rasouli 2013). Their aim of the research was to find out about every realistic and enjoyable way to learn vocabulary. To perform their study, the researchers covered two kindergartens. The researchers then split the students into two experimental and control groups. An online language teaching game is given to the experimental group and periodic class lectures are given to the second group, which is the control group. Their study results showed that game teaching not only retains the class alive and enjoyable but also helps learners to enhance their skills and trust in vocabulary. Besides, Hoa and Trang (2020) reported that those who use games in the classroom to teach new words to their students have fun and a pleasant environment rather than those who teach their students the traditional language.

Techniques are not commonly used to teach and practice vocabulary, such as using games. They are only used by both teachers and students for a time or occasion that can be powerless and useless. Learning vocabulary through games is helpful and has many advantages. Prabha and Abdul Aziz (2020) stressed that games should provide learners with a learning experience that is fun-filled and calming. Students can use language in a non-stressful way after studying and using new vocabulary. Although students learn vocabulary and their emphasis is on the message rather than the language. Therefore, the linguistic forms don't matter to them and they just feel free to preserve the theme. This would remove the fear of publicly assessing or evaluating students negatively and this may be the primary reason for students to reduce their anxiety and learn more in a friendly environment (Miyazaki, 2019).

Research Questions

- Is there any effect of using games on teaching vocabulary in reading comprehension?
- Is there any significant difference in the scores of pre and post-test across gender?
- How is the motivation of games in enhancing the vocabulary knowledge of the students in reading comprehension?

Method

The Design of the Research

The study employed a mixed-method design, qualitative and quantitative (experimental research) to achieve a comprehensive understanding of the research topic. The qualitative data is obtained through the use of interviews and whereas the quantitative data comes from the pre and post-test. Descriptive and inferential statistical analysis is employed to analyze the data in the study. For the qualitative analysis, the researcher employed a semi-structured interview analysis through the content analysis method where certain themes have been inferences to be categorized. The qualitative approach is used to delve further into the minds of respondents and ask more open questions, and as well as it allows the researcher for more intense and accurate data to be collected (Daqiq and Hashemi, 2021).

Participants

The researcher employed convenience sampling and purposeful sampling techniques to choose the participants. Convenience sampling is a time constraint and easy to meet the students (Semry and Mahendran 2015). The present research also used purposeful sampling, which is also known as judgment sampling. Based on their results in the previous exam, the samples are selected (Ilker et al. 2015). From the same 20 participants selected earlier, 16 participants participating in the pre-and post-test, and 4 participants are chosen for the interview session.

Data Collection Procedure

The pre and post-test and as well as interview sessions are used as the methods for collecting the data in this study. Kelly (2019) indicates that the pre-test shows the degree of comprehension of a student before teaching, while a post-test assess the learning process of the students. Before and after the implementation of the action, the pre-test was conducted by using games as the experimental group where the students were expected to match the vocabulary with their meanings. While the control group was given the treatment as the traditional way of teaching. To show the progress and development in the performance of the students, the number of correct answers and percentages were used. In addition to the pre-and post-test methods, a semi-structured interview was used to assess how successful are games in motivating the students for the enhancement of their level of vocabulary knowledge in reading comprehension. Kallio et al. (2016) clarified that a semi-structured interview allows participants the ability to articulate their point of view. It boosts two-way contact in which the interviewer may ask questions about those being questioned.

Materials and Instruments

Before and after the implementation of the action, the pre and post-tests were carried out using five distinct games such as memory game, ladder, snake and bingo, Pictionary, and wheel of fortune where the students were expected to align the vocabulary with their meanings in the pre-test and the traditional method of teaching vocabulary was followed in the control group. None of the students managed to pick or fit all 10 terms to the correct meaning from the pre-test result. The lowermost percentage recorded by the students in the pre-test is 20 percent, where that individual student will correctly select or match 2 out of 10 words to their context.

Data Analysis

The analysis of the data was carried out through the Statistical Package of Social Science (SPSS) software, version 26. The descriptive statistical analysis was used to compute the frequency, percentage, and mean. Besides, the inferential statistics were employed to examine the differences of pre and post-test scores across gender and as well as for comparing the pre-test and post-test scores. Moreover, semi-structured interview sessions were conducted with four students, especially about how it helped them to develop their vocabulary knowledge by reading comprehension. The researcher analyzed the outcomes of the data obtained from the semi-structured interview through the content analysis method.

Results

Table 1.
Descriptive Statistics for Respondents' Age

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	10	50.0	50.0	50.0
	Female	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

The participants of the present study were 20 Afghan university EFL students including male and female from freshmen class at Takhar University. There were equally 10 male participants and 10 female who participated in the study.

Table 2.
Descriptive Statistics for Respondents' Gender

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-20	9	45.0	45.0	45.0
	20-23	7	35.0	35.0	80.0
	23-25	4	20.0	20.0	100.0
	Total	20	100.0	100.0	

According to Table 2, the age of the respondents ranged from 18 to 25 where all the students at the undergraduate level fit between these ages. There were 9 respondents who had 18-20 years old and 7 respondents whose ages ranged between 20-23 years old. While 4 respondents had 23-25 years old.

Pre-Post Test

According to Table 3, students, S7, S9, and S13 recorded the same percentage in the pre-test, which is 20 percent. The lowest percentage scored by the students in the post-test is 70 percent, where that certain student will correctly choose or match 7 out of 10 words to their context. Only one student, S13, had a post-test score of 70%. For post-test, the lowest percentage of the pre-test is 20 percent, while 70 percent indicates that the action works and is successful for students to develop reading comprehension vocabulary. As can be seen from the results, all the students in the post-test managed to select or fit more than 6 terms correctly to their meanings.

Table 3.
Descriptive Statistics of the Students Before and After the Implementation of Games

Respondents	Number of Correct Answers	Pre-Test Scores (100%)	Number of Correct Answers	Post-Test Scores (100%)
S1	4	40	9	90
S2	5	50	8	80
S3	5	50	10	100
S4	4	40	8	80
S5	3	30	9	90
S6	4	40	10	100
S7	2	20	8	80
S8	3	30	8	80
S9	2	20	8	80
S10	4	40	8	80
S11	3	30	8	80
S12	6	60	9	90
S13	2	20	7	70
S14	3	30	9	90
S15	3	30	8	80
S16	5	50	10	100
S17	3	30	8	80
S18	6	60	10	100
S19	3	30	8	80
S20	6	60	10	100

This indicates that in reading comprehension, there was a great increase in the vocabulary skills of the students. In the pre-test, the highest percentage scored by the students is 60% where that specific student can correctly select or match 6 out of 10 terms to their meanings. In the pre-test, three students, S12, S18, and S20, scored 60%. On the other side, where 5 students scored maximum marks, the highest percentage scored by the students in the post-test is 100 percent. These 5 students can correctly pick or fit 10 words to their meanings.

Table 4.
The Descriptive Statistics of Respondents

		N	Mean	Std.Deviation	Std.Error	Lower	Upper	Minimum	Maximum
Pretest	Male	10	2.4000	1.34990	.42687	1.4343	3.3657	1.00	5.00
	Female	10	3.7000	1.05935	.33500	2.9422	4.4578	2.00	5.00
	Total	20	3.0500	1.35627	.30327	2.4152	3.6848	1.00	5.00
Posttest	Male	10	8.2500	.95015	.30046	7.5703	8.9297	7.00	9.50
	Female	10	7.8000	.91894	.29059	7.1426	8.4574	7.00	10.00
	Total	20	8.0250	.93857	.20987	7.5857	8.4643	7.00	10.00

Table 4, illustrates the mean differences between male and female respondents. As can be seen, the mean score of the male respondents was 2.4 in the pretest while the same respondents' mean scores have been dramatically changed to 8.25 in the post-test. Similarly, the mean score of the female respondents was 3.7 in the pretest while the mean score of the female respondents in the post-test was considered 7.8.

Table 5.
The Significant Difference Between the Pre and Post-test

	F	Sig.	t	df	p	Mean	Std. Error	Lower	Upper
Pretest	.750	.398	-2.396	18	.028	-1.30000	.54263	-2.44002	-.15998
Posttest	.355	.559	1.077	18	.296	.45000	.41800	-.42818	1.32818

As can be seen in Table 5, the result of the T-test shows that the P-value for the pre-test was greater than the alpha level p=0.39>0.05. Therefore, it can be concluded that there is no statistically significant difference in the pre-test scores between males and females. Similarly, concerning the post-test, the P-value based on Levene's Test for equality of variance is greater than the alpha level p=0.55>0.05. Therefore, it can be also concluded that there is no statistically significant difference in the post-test scores across gender.

Semi-Structured Interview

The researcher decoded three themes that were motivation, the interest of students, and the features of games. These three themes allowed us to understand how games in reading comprehension helped students to develop their vocabulary. The emerging theme, first and foremost, was motivation. The students were motivated and get inspired through the use of games, and as well as able to understand the meaning of the words. The evidence from the interview showed that games increased the incentive of learners to develop vocabulary in reading comprehension. For example, when the answer was happy, happier, S15 felt proud. Similarly, S1 thought the same as well. The reaction was "happy." Next, it is indicated that games prompted the interest of learners to learn or understand the sense of vocabulary by playing games for the second subject. The proof can be seen in the reply from S11, who said, "Yes, it's easy." Finally, the theme extracted from the interview sessions was the games' characteristics.

Table 6.
Content Analysis of Student's Interview Sessions

Themes	Keywords/Categories	Participants	Transcription
Motivation	happy	S1	Happy
		S15	happier
	proud	S11	I am proud
	excited	S16	I am excited
Students' Interest	Easy	S11	Yes, it is easy
	Helpful	S11	Yes, helpful
		S16	Yes, helpful
	interesting	S15	Yes, interesting
	understandable	S1	Yes, I understand the words
	Like	S1	Yes, I like it because can understand the words
		S15	Yes, I like the games
Features of The Games	Visual	S11	Yes, I like it because it has pictures

It was clear that pictures served as guides to grasp the significance of words for students. Maryam (2012) supported this by stating that positive images helped to explain the textual content and encouraged learners to create bridges between verbal (text) and non-verbal (illustration).

Discussion and Conclusion

Concerning the first research question on whether there are any effects of using games on teaching vocabulary in reading comprehension or not. The findings of the study indicated that educational games have improved the vocabulary knowledge of the students. Their comprehension and understanding of the vocabulary have also been enhanced. The findings of the study are similar to the studies conducted by (Alhajaji et al. 2020; Camacho Vásquez and Ovalle, 2019; Karaaslan et al. 2018; Miyazaki, 2019) who indicated that educational games are the key factors to improve vocabulary knowledge. Before this, they felt it was hard to learn English, but when the use of educational games was introduced in the classroom, students felt more energetic and excited to join in in the lesson given to them. The findings of the study also show that a variety of educational games benefited students in learning and building

new vocabularies and as well as help them to comprehend the reading text efficiently. This finding is in line with the findings of a study carried out by Allen et al. (2015) who believed that using proper games while teaching students can enhance their comprehension and as well as their ability to build their vocabulary knowledge. Students are always stressed that they and other students who don't focus in class should improve a little bit of their vocabulary knowledge. To ensure that all students engage in the lesson and learn new vocabulary through playing games, it would be better to strengthen their memory to be able to memorize it by just reading it the normal way.

Besides, the findings of the current study show that students are more likely to play educational games or a kind of language game that makes them feel interested in learning vocabulary knowledge. For children and adults, educational games have always been common and fun activities, it will be more interesting because students will focus on various activities to ensure the learning process is going well. Thus, this study indicated that educational games have motivated students to take part in each session of vocabulary learning. Hence, the findings of this study are consistent with these studies conducted by (Derakhshan and Davoodi Khatir, 2015; Ebrahimzadeh and Alavi, 2016) where they indicated that educational games motivated students and increased their participation in learning vocabulary. In this regard, it is for teachers to use language games to enhance the vocabulary knowledge of the students in reading comprehension, as the vocabulary provides a lot of value. In this respect, educational games are not going to delay the lesson but rather help the students to comprehend the reading text easily and effectively. Most importantly, the findings of the study show that educational games that were employed once should not be used again within a week, because they will feel bored and will not participate every day. This finding is confirmed by (Dindar et al. 2021) who focused on using games only once to teach the students. By using educational games, the students can improve their engagement, memorize new words, and as well as explain the new words.

Moreover, educational games have positive implications for learning and enhancing the vocabulary knowledge of the students. This is because students do not feel bored when learning these new words through educational games. The findings of this study are in line with the study conducted by Chen and Hsu (2020) where they have agreed on the effects of games in teaching vocabulary. Students can also be more excited when educational games are being used in the classroom and need to memorize the words they are learning immediately. In the sense of encouragement, educational games have a great influence on learners' vocabulary enhancement and memorization as well as on their psychological side in reading comprehension. This proved to be a successful way for both teachers and students to consolidate and use new lexical objects. As for the second research question on whether there is any significant difference in the mean scores of pre and post-test across gender. The findings of the study showed that there is no statistically significant difference in the pre and post-test scores of the respondents across gender.

Considering the third research question on how is the motivation of games in enhancing the vocabulary knowledge of the students in reading comprehension. The findings of the study in this respect indicate that motivation is a key factor for the enhancement of the vocabulary knowledge of the students in reading comprehension. This finding has been supported by (Elaish et al. 2019; Khalidiyah, 2017; Shahriarpour and Kafi, 2014) who believed that using games can motivate the students to improve their vocabulary knowledge. Vocabulary terms are not for a day's study, but the students need to practice them every day so that they can use the words and know how to use them. In other words, for a specific student, vocabulary is very important because it takes some time to acquire the skills to learn something new. In the classroom, we just need to concentrate and the students can apply the urge to learn something new. There will be a time when students will not take part in the lesson as they tend to be in their way, we as a teacher should know how to draw the attention of the students so that they can come and take part in the learning process. Since the students will be left out if the students do not participate, students will not be able to offer an example or clarify in their own words when it comes to explaining the meaning of the new words.

Considering that, vocabulary is a sub-skill of English language skill, especially for beginners who try their best to learn new words as much as possible, the instructor should use all his background to teach this skill in various ways. He or she needs to select a method that correctly collects all the factors that make it easier for them to understand. Several studies have agreed that language games, as a teaching tool, have a significant influence on improving the vocabulary of learners (knowledge, memorization, and use) as well as on their psychological side (motivation, relaxation, and self-confidence). The current research is carried out to illustrate the effects of using vocabulary through games in reading comprehension. In conclusion, learning vocabulary through games has been considered more effective in reading comprehension and will be more energetic for students who are willing to enhance their vocabulary knowledge in a strategic and fun way. On the other hand, employing games for teaching and learning vocabulary allow the students to participate more frequently.

The goal of the current study was to examine the impact of using games on students' vocabulary knowledge in reading comprehension and to find out the efficacy of games in encouraging students to develop their vocabulary knowledge in reading comprehension. Therefore, the results of this study showed that the use of five different games in reading comprehension steadily increased the vocabulary skills of the students. In addition to that, without the help of facilitators, the students were able to understand and recall the words. This helped to inspire the students to learn the vocabulary when playing the games introduced during the class. Therefore, on the other hand, teachers have to take responsibility for attending to the needs of all students to maximize their vocabulary learning. It has also been shown that in reading comprehension, educational games have a significant influence on the vocabulary skills of students. In conclusion, the results of the current study have indicated that teaching vocabulary through educational games can increase the motivation of students as it provides them with enjoyable activities.

Recommendations

This paper has some recommendations for the use of educational games by students and teachers to enhance the vocabulary knowledge of the students. It is proposed that teachers should look for techniques to involve their students in the use of creative expression. Students may use the language more communicatively by using vocabulary games. Due to their benefits, educational games are widely recommended for both teachers and students to use in enhancing the vocabulary knowledge of the students. Because, they offer students accountability and the chance to be physically and mentally involved, and are student-centered rather than teacher-centered, easily attract the interest of children, promote their engagement, and are fun to play in the structured academic phase, and socialize students. Students often learn or grow several skills, such as taking turns, working independently, and working as a team with others for a common goal.

The Limitations of the Research

The present study is limited to several limitations number such as the number of participants was one constraint and less N= 20. Another limitation was, the researcher selected all the students from the same class (freshmen). Hence, the power of the study was lower than desired with the small number of participants (N=20). Moreover, this analysis was limited to one university whereas the large population from many universities could be more effective and generalizable. This university may not be representative of other universities, therefore, it restricts the generalizability of the results to other universities. Finally, it should be remembered that introducing more games into language classes to promote learning is a new strand of study. It is possible to consider the impact of learning concrete and abstract words through various games as another line of study. Mobile-assisted language learning apps can help learners develop their vocabulary domain, so the influence of various mobile applications on vocabulary learning is a good area of research to find out.

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Research Article

Greening the school for sustainable development: Tshwane North District case

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Abstract

The aim of the study was to answer the question that arises about what knowledge do role players have about sustainable development through greening schools. The research employed qualitative multiple case study design in three purposefully sampled schools at Tshwane North District, Gauteng Province of South Africa. Besides literature review and theoretical framework of sources, the data was collected through focus group interviews, direct observation and document analysis. Data collected was analysed with thematic content analysis. The results revealed that school role players have little knowledge on greening schools to ensure sustainable development; and opportunities and threats need to be addressed by role players. These were attributed by lack of policy framework and capacity building on how greening schools should be implemented. The study recommended creation of an integrative assessment of green schools that embraces practical activity plan on curriculum and infrastructure. Further research studies in the area of greening schools are recommended for effective sustainable development on school resources.

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Introduction

The original work of the field of Environmental Education (EE) embracing sustainable development (SD) was pioneered in the twentieth century by the Stockholm conference (1972). The United Nations Development Programme (UNDP) emphasises SD to be achieved by all member states by 2030. The 17-point sustainable development goals (SDGs) were adopted by United Nations (UN) member states in 2015 (Kariaga et al. 2013, p. 246), due to the failure of most countries to achieve their set of targeted millennium development goals by 2015 (Ogenokokwo, 2017). We are currently in the era of UNDP (2015-2030) and SDGs create a positive image of the future by targeting good living conditions for all by 2030 (Luetkemeier et al. 2021, p. 1). The challenges humanity faces today, especially in the countries of the South Sahara, are unprecedented (Luetkemeier et al. 2021, p. 1). From the South African context, the Constitution of South Africa (SA) emphasised SD and enshrined the right of a healthy environment for all citizens (Act 108, 1996). The Academy of Science of South Africa (ASSAf) report shows that there is no shortage of the South African policy documents that supports the notion of green for SD, namely, the New Growth Path, the National Development Plan (NDP), and the Green Economy Accord, to name but a few (Diab, 2015, p. 1).

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The current Curriculum Assessment Policy Statement (CAPS) has EE topics in all learning areas of the curriculum which supports SD (Department of Basic Education, 2014). Basic needs like air, water, sanitation, energy and food, if they are not met, then the school generation suffers (Le Grange, in Stevenson, et al. 2013, p. 128). The World Decade on Education for Sustainable Development (WSSD, 2005, 2014) proposed a way of signaling that education and learning lie at the heart of approaches to SD (Kariaga, et al. 2013). Based on these global declarations, SA released the NDP: vision 2030, identifying nine challenges the country faces (National Planning Committee, NPC, 2013). Among them is the slow progress on sustainable resources and intensive economy (NPC, 2013, p. 15). This study reminds all leaders and role players of their responsibilities to protect the vulnerable environment we all share through sustainability of resource consumption through SD and greening. Since the fruits of education ripen slowly, the leaders of tomorrow must be educated today by tirelessly reminding all people that they share the same destiny and must unite to protect the planet Earth, whose resources have sometimes been overestimated, and that is the task of education (UNESCO/UNEP, 1978, p. 77).

In SA, the Department of Environmental Affairs (DEA, 2010, p. 4) was given mandatory to ensure that SA effectively manages the environment and natural resources in a manner that ensures economic and social sustainability for current and future generations. Irwin and Lotz-Sisitka (in Loubser, 2014, p. 59) state that the Department of Basic Education (DBE) ensured that every learning area in the school curriculum has an environmental focus embedded in it. Environmental concerns are considered to be one of the main vehicles for teaching EE and education for sustainable development (ESD). Education is at the heart of SD (Loubser, 2014, p. 133). Therefore, ESD is a subset of EE and green school is another way of promoting SD.

Empirical Studies

Over the past decades there has been an increased demand of green schools both is SA and internationally (Wildlife Environment Society of South Africa, WESSA News, 2018). The study by Kerlin et al. (2015) state that a 'green school' is a label given to a school building whose occupants focus on sustainable development with regard to energy consumption. Additionally, they contemplate that it is a building that is wireless, fuel-less, which utilise solar energy power, rainwater catchment, vegetative roofing, geothermal heating and cooling systems primarily for sustaining resources (Kerlin et al. 2015). Similarly, the study of Earthman (2009) and United States Health Report (2015) refer to green schools as high performance and sustainable schools that reduce incidents of illness and absenteeism. A similar study by Hens et al. (2010) was conducted in SA and developed Environmental Management Systems for rating a green school in 39 primary schools in the northern Gauteng and southern Limpopo provinces. In this regard, the conceptual understanding of green schools became the point of focus of this study. Therefore, there is indeed a need for green schools in order to ensure sustainable development that will result in protecting future generations from resource depletion.

Theoretical Framework

Although theories are generally used to explain phenomena or conceptual perspectives (Trafford & Leshem, 2011), this study explored issues experienced by role players at the school in the implementation of SD plans. Aligned to the emphasis on greening school and sustainable development, this study adopted the ecological democracy theory by Kensler (2012), which integrates ecology, democracy and greening school phenomena. Secondly, the sustainability theory (Jenkins, 2009; Department of Environmental Affairs, 2012) to understand how green schools sought to find sustainable consumption patterns in the school ever-growing demand on learner teaching support materials, energy, water and others, since greening schools and sustainable development. Thirdly, the leadership complexity theory (Lichtenstein, et al. 2006; Morrison, 2002) was also adopted since the complexities that arise in the educational endeavour concern not only the physical but also the normative questions of how leaders' responsibility is taken and assigned at school. These theories underpinned the study and enabled to develop an argument that was conceptual.

Research Problem Statement

This study is rooted in and academic interest of the researchers regarding green schools and ESD interests. We experienced depletion of school resources due to the school's lack of knowledge about greening schools. The current study came about when the school experienced periodic and recurring resource depletion especially during the last quarter of the year when learners were about to write their final year examinations. Combining experiences on resource depletion, EE and knowledge, the researchers pursuit this topic to project what might have been accomplished if the school was a green school. Future generations are at risk if the present generation does not take action and efforts to ensure that better environmental learning and actions are sustained and become part of how schools are managed (Ringdahl, 2008, p. 36). Green development is not about the way the environment is managed, but about who has the

power to decide how it is managed (Adams, 2009, p. 379). The school role players have the authority to initiate greening the school (South African Schools Act, 1996). Kensler (citing Ferreira, Ryan & Tilbury, 2006, p. 8) argues that

> *"in their initial training, teachers may learn about sustainability in science, geography, or studies of society and environmental curricula. However, sustainability does not feature in educational leadership, management, psychology or sociology classes, thereby limiting the potential for whole school approaches"* (DE, 2012, p. 794).

Research Questions, Aims and Objectives

The main research question of the study is:

What are the strengths, weaknesses, opportunities and threats in greening the school for sustainable development?

The following sub-question unpacked the main research question:

- What is the nature of the knowledge of the role players in the school about greening the school?

The main aim was to: Explore the strengths, weaknesses, opportunities and threats in greening the school for sustainable development. The objective of this study is to:

- Examine the nature of knowledge of the role players in the school about greening the school.

Method

Research Design

Informed by the literature review, the research process provided details about two phenomena, namely, greening schools and SD situations which were explored through qualitative multiple case study design to understand the contextual factors that hindered schools to effectively achieve SD. The qualitative and exploratory methods were used since these methods provide significant contributions to both theory and practice (McMillan & Schumacher, 2014, p. 344). To understand how schools implement their respective sustainability practices, we focused on school role players' knowledge of SD and greening schools to identify the strengths, weaknesses, opportunities and threats for greening schools to promote SD. According to Zikmund and Babin (2010, p. 82-84) exploratory research produces qualitative data or is used when new insight is needed to reach an appropriate decision statement and research objectives. We chose the case study design due to its ability to involve issues explored through one or more cases within a bounded system, meaning, setting or same context (Creswell, 2007, p. 73).

Research Location

This research was conducted at three primary schools each from city, township and rural schools of the Department of Basic Education in Tshwane North District. Tshwane North district is located at the Northern direction of the city of Pretoria, the capital city of SA in Gauteng Province. It is bordered by Anlin in the north and Wonderboom town in the south. The research location can be seen on the following map.

Figure 1.

Case study context: Tshwane North District

Retrieved from: https://www.google.com/maps/place/Department+of+Education+-+Tshwane+North+District+D3/@-25.716748,28.1898713,15z

Participants

Four to six participants from each school were sought from both the school management team (SMT) and school governing body (SGB) members of each participating school. Furthermore, we used purposeful sampling which selected people who are holders of data needed for the study (Maree, 2012, p. 79; Creswell, 2013, p. 156) according to table 1 below:

Table 1.

Components of SMT and SGB Members

SMT	SGB
1.Principal	1.Parents or guardians
2. Deputy principal	2. Teachers
3. Heads of Departments	3. Learners
4. Senior teachers	4. Non-teaching staff
	5. Co-opted members

Source: Education Employment Act, 2007; South African Schools ACT, 2007

Both the SMT and SGB were selected because they are the holders of data needed for the study (Maree, 2012, p. 79; Creswell, 2013, p. 156). The SGB is allocated financial powers, staffing including educators' promotions (South African Schools Act, 1996) and the SMT manage professional matters of the school and resources needed to provide quality teaching and learning (Educators Employment Act, 2007).

Data Collection Tools

The study employed a series of semi-structured focus group interviews in phase one. The structured observation in conjunction with an environmental audit tool and document analysis was phase two of this study, in order to achieve triangulation and increase trustworthiness (Brundrett & Rhodes, 2014, p. 30). Triangulation implies comparing many sources of evidence in order to determine the accuracy of information, a means of cross-checking data to establish its credibility (Briggs et al. 2012, p. 84).

Focus Group Interviews

This study employed web-based focus group interviews using e-mails or internet. Four to six participants per school were interviewed as a group, rather than each person individually (McMillan & Schumacher, 2014, p. 389). The participants debated and argued about the topic to provide interaction on realities as defined in group context; and on interpretations of events that reflect the group input (Frey & Fontana, 1991, p. 175).

Observation

The semi-structured observations were employed in conjunction with an environmental audit tool with questions drawn from green features in the study of Kerlin et al. (2015). The study used items which met the Leadership in Energy and Environmental Design certification standards (Kerlin, et al. 2015).

Document Analysis

The documents analysed were CAPS and the school environmental management policy aimed at providing a larger data base and methodological rigor (Frey & Fotana, 1991, p. 178).

Trustworthiness

Even though the aspects of trustworthiness are separated, they should be viewed as intertwined and interrelated (Graneheim & Lundman, 2004, p. 109). The credibility of the study increased by the researcher's prolonged stay in the field until data saturation. Transferability was enhanced by providing detailed information on the research procedures; and sampling those participants who have the best knowledge regarding the research topic. Dependability was achieved by outlining and discussing in detail the processes of data collection; asking the same questions for all participants in interviews. Confirmability was enhanced by transcribing the interviews verbatim with latent content; allowing field notes on observational data to offer a reliable record that corroborate text interviews and transcripts.

Coding

The coding framework has been decided deductively emanating from the theoretical frameworks from the three theories mentioned above underpinning the study. Data was analysed through thematic content analysis since this analysis is suitable for relatively low level of interpretation, in contrast to grounded theory, in which a higher level of interpretive complexity is required (Vaismoradi, Turunen & Bondas, 2013, p. 399). Five predetermined thematic areas developed by the researcher were used as the unit of analysis in the focus group interview guide to ensure that conclusive results could be made. The researcher transcribed all online and text-based interviews of each participating

school verbatim according to the predetermined themes in the interview guide. Setting code was used to code participating schools as *SC* (city school), *ST* (township school), and *SV* (village school). Participant perspective code was given to every participant in each focus group and coded as *P1, P2, P3*, and so on according to the Table 2 below. Categories coded C1 and C2 emanated from Kensler's theory for describing, explaining and predicting a continuum of development from more traditional schools to green schools (DE, 2012, p. 790). C3 – C6 emanated from the sustainability theory; C7 from the complexity theory and C8 emerged inductively.

Table 2.

Coding of Participants and Cases

Cases and Participants	Codes
City school	SC
Township school	ST
Village school	SV
Participant 1	P1
Participant 2	P2
Participant 3	P3
Participant 4	P4
Participant 5	P5
Participant 6	P6
Category 1 (Ecological principles)	C1
Category 2 (Democratic principles)	C2
Category 3 (Economic)	C3
Category 4 (Social)	C4
Category 5 (Political)	C5
Category 6 (Spiritual)	C6
Category 7 (Complex environmental problems	C7
Category 8 (Biography)	C8

Own source coding analysis, 2020

The transcripts were written in question-by-question format to enable the researcher to capture what each participant in each group had to say regarding each question (Maree, 2012, p. 92) where possible. The group, not the individual was the fundamental unit of analysis (Morgan, 2013, p. 60). Focus groups are not isolated individuals but are engaged in a conversation (Silverman, 2016, p. 176). Therefore, neither the individual nor the group constitutes a separable unit of analysis.

Results and Discussion

The results are presented in threefold, namely: focus group interviews, observations and document analysis of each participating school. Each case is presented as *P1- SC* to *P4 - SC*; *P1 - ST* to *P6 - ST;* and *P1 - SV* to *P5 - SV*.

Focus Group Interview

Theme 1. Sources of School Funding

The results indicated clearly that the role players are knowledgeable about the sources of funding in their schools. This is evident in the statement of all schools who reported government funding (*P4 – SC; P2 – ST*) whereby *SV* reported 100% government funding and non-governmental organisations (*P2 – SV*). *SC* further reported payment of school fund (*P4 – SC*). Another source of funding emanated from fundraising (*P4 – SC; P1- ST*; P2 – SV). These methods of fundraising did not promote green and SD, since learners wore casual clothes on Fridays and donated R2. 00 to the school coffers (*P2- ST*). The fact that all schools needed extra funding, indicated that the schools' basic source of funding was not sufficient to operate efficiently as it was reported that

> "*the school ended-up topping government funding by recruiting different businesses to support the school*" (*P5 – SV*).

Theme 2. Experience on Resource Depletion

A variety of participants' statements revealed that schools were not self-reliant with resources and there were inconsistencies from government and non-governmental organisations funding which were not reliable. *P1 - SC* stated that:

> "*Parents are persuaded to pay school fees through constant letter reminders and during the Annual General Meetings. However, many of them still struggle to pay or no payment at all is made.*"

P3 – ST stated that they even borrowed resources from neighbouring schools. From all participants, *P5 – SV* singlehandedly disagreed and stated that

> *"schools need proper planning, sharing of ideas, teamwork, time management and making estimates when running fundraising projects."*

Theme 3. Experience of Using School Resources

P1 - SC calls it *"a nightmare",* stating that these resources run out before the expected time. Contrary to that, *P2 - SC* stated:

> "*Sometimes we have to out-source from other schools or request from the SGB for new ones."*

P3 - ST reported that burglary and theft were causing constraints to school resources. In addition, *P2 - SV* stated that they experienced learners who damage or loose books.

Theme 4. Educational Experience on Resource Use

Three participants out of four in *SC* stated that they learnt a lesson about the areas where school expenses were channeled such as furniture, textbooks, photocopiers, infrastructural maintenance etc. (*P1; P2; P4*), whereas *P3* complained that

> "*most teachers did not study Accounting at school*."

Only four participants from all cases reported that they learnt how to use resources sparingly (*P1 - SC;* P4 - *SV*; *P2 - SV* and *P3 - SV*), and only one of the participants highlighted that they improvised where there is shortage of resources (*P2 - SC*). On the other hand, one participant reported that he realised the importance of fundraising and donations because they boost the school income for effective running of the school (*P4 - SC*). However, the results revealed that the lessons learnt by these groups are not green and poses a threat to sustainable resources.

Theme 5. Sustainable Development or Sustainability

Concerning which resources must be sustained, the groups listed a number of resources, namely, infrastructure, natural resources, learner teacher support materials and electricity. The rationale was based on the fact that

> "*they are expensive to replace or service; are the basic needs of the school; they are scarce and valuable*" (*P5 - SV*)

and that resources should be able to cater for future generations (*P4 - SV*).

The Environmental Audit

The results of the environmental audit clearly indicated that all groups were knowledgeable that electricity could be saved on lights and computers. All participants in all groups agreed that water could be saved by harvesting rain water. Only two participants in *ST* are knowledgeable about recycling taking place at school as recyclers came to collect bottles (*P2* and *P4*); whereas *P1* and *P3* indicated that they do not know about recycling; and *P5* and *P6* did not comment about recycling. *SC* and *SV* did not report recycling. Electricity green saving mechanisms were not applied in all cases. This is evident whereby all cases reported that their schools did not use energy saving lights.

Observation Results

The observation schedule revealed the following results per school in Table 3 below:

Table 3.

Observation of School Sites

Criteria	Comments
Were water tanks installed?	Water tanks installed for storing borehole water (*SC*) and harvesting rainwater (*ST*; *SV*).
Were there planting plants programmes?	Trees, lawn and flowers were planted around the building and sports grounds (*SC*); few indigenous plants and flowers (*ST*); there was visibility of more trees, green grass, flower plants, citrus fruits and vegetables (*SV*).
Were there appropriate waste reduction methods?	*SC* used municipality bins for waste removal and office waste paper was shredded and recycled; *ST* sorted waste for recycling; and *SV* composted waste to fertilise the gardens.
Was the school located far from public transport?	In *SC* and *SV* public transportation was far from the school and *ST* was closer to it. There was no land degradation in all cases.

Based on the observations, only SV had efficient managed fruits and vegetable gardens and none at *SC* and *ST*. Irrigation took place in all cases and leaking taps were addressed. All schools were not registered as eco-schools, did not partake in auditing waste or use solar energy. When renovating or building, *ST* and *SV* used local people and *SC* sometimes out-sourced. The air quality was compromised in all cases whereby *SC* and *ST* only used air conditioners in the administration offices but none in the classrooms and no indoors plants in all cases. It was revealed that energy conservation strategies used by the schools were not sufficiently environmentally friendly.

Document Analysis

According to Merriam (1998) the researcher has the authority to judge whether the document is appropriate as a data source by finding out whether the information in the document has information pertinent to the research question and whether it can easily be acquired. CAPS curriculum is the current South African curriculum document which determines which content must be taught and assessed in all school subjects since its implementation in 2012 (DBE, 2014). Table 4 below shed light on the subjects' themes in the curriculum with EE topics which supports SD.

Table 4.

Grade 4, 5, 6 and 7 ESD Content in the Curriculum

Subject	Theme
Natural Science Social Sciences Life Skills Life Orientation Economic and Management Sciences Technology	Water, Energy, Food and Security, Biodiversity, Ecology, Natural Resources, Waste and Pollution, Health, Values, Ethics, Action Competence and Careers

Adapted from Department of Environmental Affairs (DEA, nd)

It is clear from the table above that ESD was integrated in the curriculum (DEA, nd). One of the general aims of the curriculum which embraced SD is "Human rights, environmental and social justice" (National Curriculum Statement, 2012). It is evident that the DBE made a decision to include ESD in the curriculum. Mathematics and Languages themes were not included since Mathematics is a language that makes symbols and notations to describe numerical, geometrical and graphical relations (CAPS, Mathematics, 2011, p. 8). The results revealed that the concepts "EE, ESD or green" are not mentioned in the curriculum content topics, however, their content is variably integrated in all curricular subjects across the grades. The results revealed that the operational methods on waste management of the schools do not show a positive relationship between curricular content and practice or behavior (DBE, 2014). For example, the curriculum has included water cycles and roles of water in ecosystems and wetlands, but all schools observed do not have any evidence of using harvested water for wetlands where frogs and other species can co-exist. There is no action plan made for direct implementation of environmental topics in the curriculum. The curriculum emphasised content and assessment with no planning of environmental activities evidence. This study further revealed that non-renewable and renewable energy sources and impact topics are in the curriculum, however all schools observed are operating with non-renewable energy sources. Additionally, strategies of implementing green features and SD skills are not suggested in the curriculum.

The curriculum is aimed at promoting cognitive skills for promotional purposes. The focus is on knowledge assessment, since it does not suggest sustainable strategies and implementation is not action-centred. Although knowledge is fundamental in promoting positive sustainable behaviour, CAPS did not provide guidelines for achieving the ability to solve environmental problems. There are no mechanisms established in the curriculum to assess the effectiveness of environmental programmes in the curriculum. In contrast, not all role players are teachers, and not all teachers in the SMT are ESD specialists experienced in the interpretation of ESD content in the learning areas they are teaching and thus they are unable to come up with creative and innovative approaches to develop green and sustainable sites at schools.

Strategies such as fieldwork are hindered by contextual factors such as resources, CAPS policy contradictions and teaching time as stipulated by the curriculum. It appears that there is a gap between the curriculum and role players' job descriptions if they might make efforts to implement SD through the curriculum content. As a result, it would be difficult for role players to identify SD themes in the curriculum and put them into practice.

It is apparent that ESD is not practical, but used as a tool for teaching and learning topics. This could be a reason for poor visibility regarding a variety of environmental and sustainable practices. Furthermore, it is evident that EE or ESD topics were taught only for skills (writing, reading etc.), assessment and promotion purposes.

Although CAPS suggest inquiry-based learning opportunities and suggest that learners do practical tasks regularly, its major assessment objective is knowledge based and continuous assessment (DBE, 2012, p. 62). Although knowledge is fundamental in developing sustainability literacy, CAPS did not inform guidelines for assessment of skill competencies in taking actions towards solving unsustainable environmental problems.

Environmental Policy

Only SV Environmental policy was submitted and provided the following inputs:

The policy was given an effective date of January 2019 and was supposed to be reviewed in September 2020. The preamble was aligned to the Constitution of SA within its Bill of Rights that it provides all citizens with the right "to a healthy environment that is not harmful, protected for the benefit of the present and future generations." The preamble was also aligned to the White Paper on Education and Training (1995) which highlighted EE, involving interdisciplinary approach to learning.

The policy's purpose emphasized:

- *To improve and include environmental components in the curriculum*
- *To provide opportunities for learners to study local environmental issues*
- *To implement an environmentally responsible purchasing policy*
- *To reduce waste*
- *To maximise the school's energy efficiency*
- *To encourage the planting of vegetables at the school*
- *To optimise and control the use of water at the school."*

The results on the environmental policy revealed that this policy was formulated and signed by SMT and SGB chairpersons. From the researchers' point of view, it is uncertain to verify that all members of the SGB and SMT participated in the formulation of this policy.

The Nature of the Knowledge of the Role Players in the School about Greening the School

From the literature study of greening schools, most studies acknowledge the definition of sustainable development as defined by the Brundtlant report, that it is "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (Kensler, 2012, p. 792; Ogenokokwo, 2017; Foo, 2013; Loubser, 2014, p. 124). This relates to *P4 - SV*, who asserted that

> *"school resources like buildings and fencing need to be protected because many generations can still make use of them."*

All participants are knowledgeable that the state is the main source of funding according to the national norms and standards for school funding (2018). However, according to the participants in all cases, they acknowledge that these funds are not sufficient to run day-to-day operations of the school. *ST* and *SV* are no-fee paying schools in quintile two and one respectively in accordance with the NDP (NCP, 2013, p. 51) and the official guide to SA in Education (Government Communication and Information System, 2018/19, p. 94). *SC* is in quintile 4 and charges school fees as determined by the SGB according to the South African Schools Act (1996).

The majority of the participants acknowledged that they lack knowledge and experience on challenges to achieve efficient fundraising methods for sustainability of school resources. It is revealed that participants have no knowledge that there are local companies in Tshwane local municipality that provided recycling bins for bottles, paper, plastic and tins. The waste is separated, weighted and schools are reimbursed for waste recycled as observed in *ST*.

SV used green sustainable practices with the food garden. The role players generate sufficient funds by selling organic vegetables to communities. These practices are healthy and reduce incidents of illness and absenteeism (Earthman, 2009, p. 264; US Health Report, 2015). Unfortunately, *ST* would not be able to erect a food garden because of the limited space. It can be easily assumed that *SC* with a large school yard did not understand that vegetables and fruits could be planted, produced and sold locally.

All schools further revealed that they lack knowledge of using a renewable energy source, lights are switched on at night in *ST* and in *SV* and they did not use energy efficient lights. This is aligned to the participants' report that:

> *"Money is depleted by services such as water bills, electricity bills, photocopying machines, paper, stationary, transport for teacher workshops, fuel for the generator" (P3 - SC).*

Furthermore, *SC* revealed that their computers are left in standby mode when not in use. Literature revealed that machines left in standby mode still draw 20% of the power they do when fully operational (Gear, 2009). In addition, *SC* needs to install roof gutters to channel rainwater into water tanks which may be used for irrigation and filling the

swimming pool. The swimming pool needs to be covered with a pool cover to also reduce water evaporation, pollution and wastage. However, installation of boreholes in *SC* and *SV* are environmentally and eco-friendly, green, sustainable and reduce unnecessary water bills in to a certain extent.

Strengths, Weaknesses, Opportunities and Threats Analysis on Greening the School Field Notes Results

Exploring greening schools in three schools provided a valuable insight into what the overall strengths, weaknesses, opportunities and threats (SWOT) are regarding sustainable development. The researcher examined areas that shows evidence of positive or best practices and interpreted them as strengths for greening the school. The negative or worst environmental practices are interpreted as weaknesses. Those practices that could guide or provide local planning approaches to achieve sustainable development were interpreted as opportunities. Finally, those practices that were dangerous practices and showed health and safety risks were interpreted as threats. Holistic coding as an exploratory method was used based on what the researcher deductively assumes may be present in the data (Miles et al. 2014). The researcher used deductive thematic content analysis with five pre-determined themes drawn from the South African Green Schools Programme (Bizcommunity, 2017). The start list of themes (in bolded caps font) and then categories numbered *C1 - C10* (in small caps) were provided according to display figure 2 below:

Table 5.

List of Themes and Categories for SWOT Analysis

Theme 1. Waste Management
C1: reduce
C2: reuse
C3: recycle
Theme 2. Energy Efficiency
C4: audits
C5: saving criteria
Theme 3. Water Conservation
C6: rain water harvesting
C7: Irrigation methods
Theme 4. Landscaping Tree Planting & Beautification
C8: carbon offsetting
Theme 5. Institutional Management
C9: instil knowledge and skills
C10: instil awareness

Source: South African Green Schools Programme (Bizcommunity, 2017).

The SWOT results across all cases are summarised according to thematic discussion in Table 6 below:

Table 6.
SWOT Thematic Analysis

Themes	SWOT analysis
Waste management	The results revealed that *SC* did not practice the best waste management methods of reducing, reusing and recycling waste. The question that could be raised as a concern to *SC* is why they have to bury resources in landfill sites that can be used for socio-economic upliftment of the school. *SC* and *SV* did not use efficient sorting of waste materials for recycling. However, *SV* used waste material for organic gardening which was efficiently managed. *ST* implemented effective waste management method whereby recycling bins were sorted at source. Therefore, disposal in landfill site was the least, since waste was used for economic and social upliftment of the school and did not risk the integrity of the environment.
Energy efficiency	The results revealed that all cases used non-renewable energy source which was costly. There was no evidence of site wind power plants or solar panels in all cases which implies high taxation on electricity bills. This induces threats of depleting electrical power and denying future generations to benefit. However, *SV* implemented fossil energy in a form of gas for reducing costs on the school nutrition kitchen stoves and *SC* had a giant generator installed on site to alleviate costs and for backup purposes.
Water conservation	The results indicated that water was conserved in an effective way in all cases, since all water leaks were addressed. *ST* and *SV* installed water tanks to harvested rain water and used this water in different positive ways. *SV* put rain water runoff to good use in irrigation and having fruits and vegetable garden. The negative approach revealed in all cases was that the schools did not create wetland plants from rain water runoffs where learners can identify different species like frogs, birds and insects which can help to improve environmental learning and action through the curriculum. There were also no water reduction methods in all cases through water surveys or audits.
Landscaping, tree planting and beautification	The school' surroundings were used as learning tools and for beautification as more trees including indigenous trees were planted in *ST* and *SV*. This revealed that the outdoor air quality was environmentally healthy and supported the whole local ecosystems and biodiversity conservation within the school. The results also revealed that there were no indigenous medicinal plants in all cases and these deprived learners to learn about the uses of different medicinal plants around their area.
Institutional management	Only *SV* had an environmental management policy which provided the basis on how environmental matters are managed at school. It was very unfortunate that *SC* and *ST* did not have such a policy to be analysed.

Source: South African Green Schools Programme (Bizcommunity, 2017)

Discussion of the SWOT Analysis

Theoretically, this study is environmental in nature, integrating ecological democracy (Kensler, 2012), sustainability (Jenkins, 2009; Department of Environmental Affairs, 2012) and complexity leadership theories in education (Lichtenstein et al. 2006; Morison, 2007). Coded categories were deductively derived directly from these theories underpinning the study, guided by research questions through discovering manifesting patterns of particular expressions of meaning and ideas in the data which allowed for exploration of narratives in the data (Ngulube, 2015, p. 18). Deductive approaches in this study involved using predetermined frameworks to analyse data (Burnard et al. 2008, p. 429).

The strengths on waste management practices were evident in *ST* who cut down on waste by recycling bottles, paper and plastics to reduce waste. The participants in *SC* lacked knowledge that there are local recycling companies in Tshwane local municipality, like Nampak (Ringdahl, 2008, p. 36) and Collect-a-Can that has obtained local and international acclaim for its contribution towards protecting the environment, as well as its significant contribution to job creation and poverty alleviation (official guide to SA in Education, 2018/19, p. 114). Food and garden waste was composted in *SV* and reused for the school garden which sold vegetables to the local community. The role players in *SV* generated extra funds by selling organic vegetables to Tshwane North communities. The findings by Hens et al. revealed that vegetable gardens were used by the schools studied to support their feeding schemes (2010, p. 666). This

resonates with Earthman (2009, p. 264) and the findings by the US Health Report (2015) who state that these practices reduce incidents of illness and absenteeism. *ST* school gate showed "Recycle Here" indicating that the school practices recycling of waste.

There were serious weaknesses and threats whereby all cases used non-renewable energy source. A study by Le Roux (2014, p. 111) reported that an increase in energy demand in SA led to the increase in electricity prices seen yearly. This is aligned to the participants' report during focus groups interviews stating that electricity and electrical appliances extort school finances (*P3 - SC* and *P5 - SV*). This is similar to the study by Tsikra and Andreou (2017, p. 207) stating that using artificial lighting significantly increases the operating costs.

Water conservation strategies were quite remarkable in all cases with few threats. There were water decanters in each class at *ST* and jelly water cans in each class at *SV*. Water tanks were visible in all cases with no visibility of dripping taps. Landscaping by trees, flowers, grass, fruits and vegetables in *SC* and *SV* was physically greening the school and also promoted positive sustainability behaviour. Indigenous trees visible in both cases are cost effective because most of them are drought resistant. This resonates with the findings of Carvello (2009), who established that vegetation supports the ecosystem within a school with curricular benefits on biodiversity study and is also aligned with global SDGs; and Eco-school themes of nature; biodiversity; and healthy living. In addition, plants provide shelter to people and habitats to biodiversity; are home to 80% of terrestrial biodiversity; provide building materials to 300 million people; maintain global climate; are sources of medicines and clean water; and are the lungs of the Earth, which add to the oxygen content of the atmosphere (South African National Biodiversity Institute (SANBI), 2018). Tree planting is supported by the study of Le Roux (2014), who stated that plants should not be overused or exploited, but protected for atmospheric stability. This process improves air quality, provides shade to the school play grounds, reduces water runoff, storm water pollution and improves the appearance of the school. The results in *ST* with limited tree planting pose a health threat which does not align to the Constitution (1996) that gives South Africans the right to a healthy environment that is not harmful to their health or well-being. A study by Kensler (2012, p. 797) revealed that when the environment is not protected, the results are horrifying whirlwinds, record-breaking tornados, coastal flooding, drought and wildfires.

It should be noted that resource management is regulated by legislation at a national level, however implementation does not take place at a national level (Makokotlela, 2016, p. 55) but rather at a grass root level by school policies. Schools need to register as eco-schools with WESSA (2018) and celebrate environmental commemoration days to promote and encourage activism in schools and communities.

Conclusion

In conclusion, education is the best vessel or vehicle to bring about the paradigm shift from unsustainable behaviour to green efficient sustainable schools. Education needs to be at the forefront to lead and fulfill the responsibility of protecting the environment as endorsed by the Constitution. However, the education system cannot achieve positive results if its implementation is done in isolation. All citizens need to be taken on board irrespective of their age, educational and economic backgrounds. Sustainable development and greening need to become a way of life of all South Africans. The current schooling system in South Africa is not yet paperless. There is a trail of e-waste generated from old technology that still needs to be addressed, whereby less than 20% of e-waste is recycled, resulting in global health, environmental risks and loss of scarce and valuable natural material (World Economic Forum Annual Meeting, 2020).

Finally, collective responsibility is an important part of our heritage to survive in the planet Earth. Change to sustainable development and green lifestyles are a global need, it must happen; we cannot ignore or neglect it. Greening and sustainable development in our schools and communities is the only hope to reverse the damage already done to planet Earth.

Recommendations

The following recommendations are suggested:

- An introduction of school awareness campaigns on greening schools programmes.
- Participation and community empowerment for all role players.
- The creation of an integrative assessment of green schools in South Africa that embraces practical activity plan on curriculum and infrastructure.
- Research in the area of greening schools in accordance with global sustainable development goals need to increase.

Limitations of the Study

The limiting factors are listed below:

- The difficulty in finding adequate 8 participants in the focus group interviews.
- The collection of data through face-to-face focus group interviews was interrupted by the unprecedented COVID19 pandemic that forced the researchers to use online text-based interviews.
- South Africa is a vast country with nine provinces, many races, diverse cultures and religions of valuable research direction that would have been included.

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Appendices

Appendix 1.

The Focus Group Interview Guide

The Focus Group Question Guide

Theme 1. Sources of Funding (Economic)

- What processes do you follow in generating money in the school's coffers?

Probing if necessary: school fund, state funds or NGOs.
Is it difficult to generate funds?
Probing: If so, in what ways? How do you deal about it?

Theme 2. Experience When Resources Are Depleted

- Tell me about causes of depletion.
- During depletion, how do you overcome these constraints/challenges?
- How did the DBE and NGOs assist in these matters?

Theme 3. Experience of Using School Resources (How Do You Extort/Deplete Resources On)

- LTSM and Equipment;
- Infrastructure, behaviour, awareness and attitudes.

Theme 4. Educational Experience on Resource Use

- How do you rate your capabilities with regard to sustainability of school resources in the scale of 1-10?

Probe: since most of you are not from entrepreneurship profession.

- Ever since you suffered resource depletion/constraints, has your attitudes towards being in the school leadership changed?

Probe: how? In what way?

Theme 5. Sustainable Development/Sustainability

- What must be sustained? Why so? How?

Probing: Which goods must be protected? Why so? How?
What is the rationale of doing so?

Appendix 2.
Environmental Audit Tool

Score	Yes	Sometimes	No	Comments
Are you aware that switching off lights during school hours saves electricity?				
Are you aware that switching computers off after school saves energy?				
Are you aware that rain water harvesting saves water and electricity?				
Do you implement strategies to save water and electricity?				
Do you practice recycling of paper, water, electricity, machines, e-wastes, plastics, bottles, uniform etc?				
Do you make your own food garden, for NSNP or for fundraising?				
Do you use HVL globes at school or CFLs?				
Do you know which materials are recyclable or places where to recycle?				
Do you have a school environmental or green policy?				
Are you registered as a green school or Eco-school?				
Do you audit waste relating to water, paper, energy, travel?				
Do you use renewable energy like solar energy?				
When building or renovating, do you use local people and products?				
Researcher's reflections:				

Appendix 3.

Observation of School Sites

Criteria	Yes	No	Comments
Were water tanks installed to collect rainwater/for water harvesting/use rainwater runoff to good use like creating a wetland in their garden? *SC*		√	Water tanks were installed for storing ground water from the borehole. Rainwater was not harvested and no rainwater runoff were used for good use. No visibility of fountain, garden or wetland
ST	√		Only two tanks available for harvesting rainwater which was used only during municipality water stoppages
SV	√		Rainwater harvested was used to water the gardens and cleaning of classrooms and toilets. There were no wetlands in their gardens
Were there planting plants programme or indigenous fynbos /indigenous medicinal plants at site? *SC*	√		Trees, lawn and flowers were planted around the building and sports grounds. There was visibility of indigenous acacia trees plants and no medicinal plants
ST	√		Some plants are visible with visibility of some indigenous plants and few flower plants. No medicinal plants
SV	√		Trees, green grass and flower plants are planted for shade, beautification, soil erosion prevention and for fundraising especially citrus fruits and vegetables. The latter were also used to support the school nutrition programme. No evidence of medicinal plants
Were there irrigation systems that conserved water and leaking taps addressed? *SC*	√		Leaking taps were not visible and irrigation took place in the mornings to conserve water
ST	√		Irrigation was done in the morning and leaking taps were addressed because learners used water containers available in their respective classes
SV	√		Irrigation was done in the morning and leaking taps were addressed. Water was stored in water containers for all classes for learners
Were there lighting systems that conserve fossil fuels and maximise the use of renewable energy like solar panels or LED lights? *SC*		√	Solar panels were not installed and the lighting systems used were not energy saving lights
ST		√	There was no visibility of energy saving lights and solar panels
SV		√	No evidence of renewable energy system and energy saving lights
Were there appropriate waste reduction methods to minimise landfills and reduce resource depletion? *SC*	√		The school used municipality bins for waste removal. Office waste paper was shredded and recycled

ST	√		Waste was sorted in four waste bins for recycling of bottles, paper, plastic and solid waste
SV	√		Waste bins were used for collection of solid waste to a landfill inside the school yard which was converted to compost to fertilise the gardens. Paper and steal waste from desks were recycled for fundraising purposes. Damaged desks are repaired.
Was the school located far from public transportations to reduce pollution and land degradation? *SC*	√		Public transportation was far from the school, so there was no air, noise, pollution and land degradation
ST		√	Taxis and buses pass in front of the school gate causing noise pollution. There was no land degradation because the roads were tarred
SV	√		The school was not next to public transport and most learners walk to school because they resided in the neighbourhood. Those who were residing far from school, used local transport and lift clubs
Was there an indoor environmental quality that provides occupants with thermal comfort and acoustic, visual and air quality? *SC*		√	They used air conditioners in the administration offices but none in the classrooms or any plants planted indoors
ST		√	Air conditioners were installed only in the administration offices. There were no indoor plants in classes and offices
SV		√	They relied on natural air plants by opening windows to support indoor air for occupants. One class was using an electrical fan and the offices used ceiling mounted fans; no air conditioners installed and no plants planted indoors.

Appendix 4.
Grade 4, 5, 6 and 7 ESD Content in the Curriculum

Subject	Theme	Grade	Content
Natural Science	Water	5 6	Water cycle Water, role of water in ecosystems, wetlands
	Energy	5 6 7	Renewable and non-renewable sources Energy, renewable and non-renewable energy Energy, renewable and non-renewable energy impact
	Biodiversity/ecology	4 5 7	Plant and animal rights, IK in relation to biodiversity Food chains, lifestyles Extinct spaces in SA; biosphere
	Natural resources	4 5	Earthworms, animals and soil Soil erosion
	Waste and pollution	7	Extraction and use of materials, including pollution; sorting and recycling materials; Impact on the environment.
	Values, ethics and action competence	4 6	Caring for plants and animals, animals used by man-value and responsibility to care for them Healthy environment important for the healthy planet
Social Sciences	Water	4 5 7	Water in SA: sources, access, storage, pollution, quality Rivers, activities, dams, rainfall in SA. Water: need, supply and catchments
	Food and security	4	Food and farming in SA
	Biodiversity/ecology	7	Marine reserves
	Natural resources	4 5 7	People and resources Mining and minerals, deforestation Natural resources and conservation in SA
	Waste and pollution	5	Waste disposal
Life Skills	Health	4 6	Personal health and hygiene caring for the environment, caring for animals Beliefs about purpose of life, people, and animals, role of religion: opportunities for volunteering, moral obligations
Life Orientation	Health	7	health and safety
	Values, ethics and action competence		
	Careers		Careers
Economic and Management Sciences	Natural resources	7	Sustainable use of resources
Technology	Waste and pollution	7	How to recycle and use goods to satisfy needs and wants, use of recycled material
	Natural resources	7	Use of natural resources for shelter, food, etc.
	Waste and pollution	7	Recycling scrap metals and design recycling scheme

Adapted from Department of Environmental Affairs (n.d)

Appendix 5.
Document Analysis Tool

Name of Document:
Document Creator:
Date of Analysis:
Data to be analysed:

Development, implementation and monitoring of the policy

- Who is involved in the development, implementation and review of the policy?
- What actions are taken to meet the aims and objective of the policy?

Curriculum

- How is environmental education teaching and learning guided in greening the school in the policy?
- What environmental education teaching and learning opportunities are available for learners to promote greening of the school?
- What teaching and learning activities around learner projects, fieldworks and curriculum excursions are undertaken by the school to promote greening the school?
- What curricula content directly **refer to resource use such as water?**

Sustainable Waste Management Systems

- How is the school's waste managed and monitored?

Water Sources

- What are school's water sources and how are they managed and monitored to promote sustainability?

Energy Sources and Usage

What are the sources of energy and how are they managed and monitored to promote sustainability?

Transport

Are they promoting sustainable development?

Purchasing PolicyAre they buying from local and green companies?

The outdoor activities

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Research Article

Factors bolstering the implementation of environment and sustainability education: A South African case study

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Abstract

Scholars, globally, acknowledge environment and sustainability education (ESE) as a key vehicle towards addressing the myriad of environmental challenges. This paper is premised on empirical evidence which succinctly points to the dearth of literature that focuses on the implementation of ESE in the realm of early childhood education (ECE). The approach adopted for this inquiry is a multiple-embedded case study, underpinned by an interpretivist qualitative research paradigm which focussed on four institutions enlisted for investigation. One-on-one interviews, participant observations and document analysis were used for data generation while thematic and domain analyses were used for data interpretation. The findings of this inquiry suggest that there are numerous factors that support the teaching of ESE. The researcher asserts that the findings highlighted in this paper corroborate those of numerous studies conducted elsewhere in the world. However, based on the findings, the researcher also notes and can thus conclusively aver that there is a dearth of research that focuses on enablers of ESE. Furthermore, the researcher recommends that more research be conduct which focuses on the investigation of the factors that support the environment-inclined pedagogy.

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Introduction

The first Intergovernmental Conference on Environmental Education held in Tbilisi (Georgia, USSR) in 1977 adopted a declaration which included, inter alia, the guiding principles of Environmental Education (UNESCO 1978). One of the key propositions advanced by these principles is the notion that Environmental Education (EE) should be a lifelong process that cuts across all stages of human development and education levels. Indeed, this call for sustained and impactful environment-inclined education, which was made for the first time by the UN Conference on the Environment of 1972 held in Stockholm, has been heeded by various counties across the globe. Nevertheless, the state of the environment has continued to decline. Globally, there is a myriad of environmental challenges, these include climate change, pollution, excess waste production, population explosion, a decline in biodiversity, water shortage and etcetera (Casinader 2021; Sagala, Nuangchalerm, Saregar & El Islami, 2019). For this reason, various environment–inclined efforts have been undertaken in many countries and various environment–inclined conferences and meetings also called for impactful action towards addressing environmental challenges (Sikhosana, Mudau and Msezane 2020; Mandikonza and Lotz-Sisitka, 2016).

Over the past few years, studies have been conducted which demonstrate that, to some degree, EE is being implemented at certain primary and secondary schools in various countries around the globe (Green and Somerville, 2015). For example, in Southern Africa, just like in other parts of the world, studies have been conducted which

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focused on the implementation of EE (Mathenjwa 2014; Mokhele 2011; Motshegoa 2006). Also, in the same region, numerous empirical investigations have highlighted barriers that impede the teaching of EE (Mwendwa 2017; Velempini 2016; Joseph 2014; Kanyimba, Hamunyela & Kasanda 2014; Agnes & Nor 2011). These studies have focused on older children and adults such as teachers.

Contrariwise, literature also indicates that the realm of early childhood education (ECE) has experienced a very slow and intangible uptake of EE (Sawitri 2017). The snail pace in the uptake of EE in ECE can be attributed, at least in part, to the virtual absence of research that focuses on EE in this vital field of education. Accordingly, to underscore the lamentable dearth of research of EE in ECE, Davis (2009) uses the phrase '*gaping research hole'* as a metonym for this shortcoming. Recent research supports Davis's (2009) findings that EE in ECE is neglected and, that more research is needed in this area (Sawitri 2017). This is essential because researchers have little idea concerning what works or does not work in enabling the advancement of EE in ECE. The selective implementation and non-implementation of EE is, without doubt, not helpful as the conditions of the environment continues to deteriorate.

The on-going decline of the environment could be attributed to the fact that for many years, worldwide, there has been sustained focus on and the application of education *about* and education *in* the environment (Agnes & Nor 2011) rather than on education *for* the environment. Various studies distinguish between the 'triumvirate approach' to environmental education, namely education *about* the environment, education *in* the environment and education *for* the environment (Kopelke, 2012; Palmer 1998; Lucas, 1972). Education *about* the environment focuses on equipping learners with knowledge and facts about, *inter alia*, what the environment entails, how it works and the challenges of the environment while education *in* the environment provides learners with opportunities to interact with the environment, for example, by interacting with various fauna and flora in the outdoors. Arguably, both education *about* and *in* the environment are less advanced forms of environmental education. Thus, the continued decline in the state of the environment accounts for the greater focus on these two forms of environmental education with minimal attention given to 'advanced' environmental education.

In its 'advanced' form, environmental education manifests as education *for* the environment (Kopelke 2012; Le Grange, 2002). Education *for* the environment has been 'rebadged' by some scholars as education for sustainable development (Robottom, 2007) or environment and sustainability education (ESE). This form of environmental education empowers the learner to actively participate in bringing about social change *for* the betterment of the environment. Education for sustainable environment is characterised by, among other characteristics, pro–environment activism emanating from advanced awareness of the challenges affecting the environment, positive attitudes towards the environment and application of skills acquired, over time, to advocate for the well-being of the environment. Therefore, in its advanced form, environmental education enables individuals and groups to work towards ameliorating the negative impact that human beings have on the environment by fostering and promoting environmental sustainability for future generations and the well–being of all components of the environment. Furthermore, ESE is transformative, dynamic, all–inclusive, accommodates diversity of opinion and knowledge and, it advocates for justice and social change (Tilbury, 2004). In its content and form, the agenda advanced through Sustainable Development Goals (SDGs) is in line with education *for* the environment (Ferguson, 2020; Sikhosana, Mudau and Msezane 2020). Accordingly, in this article the concept ESE is preferred as it acknowledges 'real' environmental education in the form of education *for* the environment.

Previous work

The literature reviewed in preparation of this paper suggests that there are numerous factors that could be considered as enablers of EE. These factors could be classified into the following main categories, namely, an enabling curriculum framework, teachers' training background and teaching experience, leadership and support, cooperation, and collegiality, and learning and teaching support materials (LTSM).

Even though it is the view of this researcher that each of the enablers discussed in this paper is as important as any other, an enabling curriculum framework seems to be more important. By its nature, the curriculum framework is cardinal in providing guidance to the teacher within the realm of pedagogy. It is the blueprint that carries the mandate and guidelines on what the teacher is expected to do in the classroom situation (Kuzich et al. 2015). Research suggests that, in the main, the schools that incorporate EE in pedagogy, across the world, do so based on tangible investments made by governments in shaping curricula in the way that directs the schools, implicitly and/or explicitly, on the importance of EE in pedagogy (Kuzich et al. 2015; Evans et al. 2012). Likewise, school subject policies that are, ordinarily, crafted in line with the school curriculum also serve to enable EE in pedagogy (Joseph 2014; Gajus-

Lankamer, 2004). Therefore, the nexus between the school curriculum and the various school subjects offered in a school enhances the possibility of EE implementation.

In addition to an enabling curriculum, literature also points to the importance of teacher training background and teaching experience in enhancing the possibility of EE implementation. Gajus-Lankamer (2004) argues that for teachers to be able to implement EE, they need to be trained and prepared for this role. The extent of teacher education and preparedness should be discernible from, inter alia, expertise in sustainability issues, pedagogical competencies and innovative strategies employed in the practical integration of EE in pedagogy (Kuzich et al. 2015; Joseph 2014; Evans et al. 2012; Walshaw 2012). Incontrovertibly, the realisation of preceding ideals hinges on, inter alia, '*appropriate*' teacher training and teaching experience accumulated by the teacher, over time, in the field of teaching.

An on-going in-service professional leadership and support provided, both from within and beyond the school setting, is considered one among various elements that serve to complement the pre-service training and teaching experience of individual teachers in enabling EE implementation. Literature suggests that within the school setting, the leadership and support provided by the principal and co-managers plays a vital role in enabling EE. Likewise, from 'outside' the school, government authorities, particularly, education departments also play an important role in providing leadership and support to assist teachers in the implementation of EE. Evans et al. (2012) point out that school principals and government authorities play various cardinal roles in empowering and supporting teachers in their quest to advance effective implementation of EE in Australia. For example, in Australia, both the federal and state governments are credited for offering, inter alia, grant schemes while school managers see to the provision of expert needs of teachers regarding sustainability education (Evans et al. 2012). Joseph (2014) also noted that in Namibia, government authorities play a critical role in facilitating the implementation of EE by, for example, presenting in-service workshops to empower teachers.

The importance of cooperation and formation of partnerships among teachers as well as between teachers and community organisations is another important enabler of EE (Hart, 2006). For example, in their research with a focus on the inclusion of education for sustainability in selected schools in Australia, Green and Somerville (2015) observed that to expand their knowledge of sustainability, teachers often reach out to the broader neighbourhood by collaborating with various stakeholders such as parents, civic organisations, businesspeople, local government and environment preservation groups. Likewise, Kuzich et al. (2015) also noted, in their research conducted in Australia, that EE-inclined programmes were initiated and structured in a way that enables collaboration between schools and communities in areas such the supply of teaching resources, staff training and reporting on the results of sustainable education programmes. Equally, Joseph (2014) points to the importance of collegiality and support among teachers in enabling EE in the classroom. Accordingly, Joseph (2014) asserts that her study participants indicated that teachers supported one another in a quest to integrate environment-based pedagogy in their schools.

The selection and/or designing of 'appropriate' learning and teaching support materials (LTSM) are other elements that are considered key enablers in the implementation of EE (Kassabolat et al. 2020). There are various forms of LTSM that can be used to support EE in pedagogy. These include, inter alia, textbooks and workbooks that are designed with environmental issues in mind (Joseph 2014) and, an enabling infrastructure (Kuzich et al. 2015). Kuzich et al. (2015: 187) assert that the schools that implement EE effectively have physical infrastructure that is "purposely created to support EfS". Typically, to enable action-based environmental learning (Fisher-Maltese, 2016), these schools would have features such as vegetable grounds, water recycling systems and used water stratagems in place (Kuzich et al. 2015).

Problem of the Study

As indicated in the preceding paragraphs, empirical evidence suggests that there is exiguous and narrow implementation of ESE in primary and secondary schools and the scarcity of ESE research in ECE is acknowledged. Apart from the dearth of ESE research in ECE, literature also suggests that there are several barriers that impede the implementation of ESE (Anderson and Jacobson 2018; Lasen et al. 2017), not only in ECE but, across various levels of education universally. However, on the opposite side of the scale, based on the literature reviewed for this paper, there seems to be a paucity of research that focuses on the factors that facilitate the implementation of ESE across various levels of education, particularly in ECE. Accordingly, this paper seeks to answer the question: What are the factors that enable teachers to implement ESE in the realm of ECE?

In an attempt to answer the preceding question, a research project was conducted to investigate the teaching of ESE in ECE. This paper therefore seeks to address the following objectives, namely, to provide an outline of factors, based on empirical research conducted, that can be considered as drivers of ESE and to draw a link, if any exists,

between these factors that enable ESE and literature. Arguably, an attempt to answer the above question should help to uncover the enablers of, obstacles to and prospects of education for sustainable environment in the realm of early childhood education (Davis, 2009). This process is essential as it serves to enhance the prospects of ESE pedagogy.

Method

Research Model

This research is located within a broader context of a doctoral project conducted by the researcher to investigate the implementation of EE in selected Grade R (known elsewhere as kindergarten or the preschool class) centres in one geographical region of the North West Province of South Africa. The interpretive qualitative paradigm, which aids a researcher to obtain a deeper understanding and varied perspectives on phenomena under investigation (Dean, 2018), was used in this research. To facilitate the generation of rich context-based information that is reflective of the 'real' life world of respondents (Thanh and Thanh 2015), the multi-embedded case study design (Yin, 2006) was identified as an appropriate vehicle for this inquiry.

Participants

Maximum variation, an element of purposive sampling strategy (McMillan and Schumacher, 1997), was used in the selection of cases for this inquiry. This approach helps the researcher to access an extensive variety of deviations, forms, and views on the subject under inquiry. The researcher used a set of predetermined criteria (Patton, 1990), as informed by the demographics of the geographical location of this investigation, to identify the four grade R centres, which took part in this inquiry. From each institution, one grade R teacher was chosen to voluntarily partake in the investigation.

The four research sites were selected from the grade R centres that fell under the jurisdiction of the Maquassi Hills Education Area Office, a component of the Dr. Kenneth Kaunda education district. This is one of the four education districts of the Northwest Province of South Africa. For ethical reasons, and in line with the wishes of participants, pseudonyms are used to refer to each of the cases in this research. Site A was a grade R centre attached to a rural primary school while Site C was attached to a township (a settlement designated for African people under the erstwhile laws of segregation) primary school. Both centres used Setswana, one of the eleven official languages of South Africa, for pedagogy. Furthermore, these institutions obtained funding from the provincial government. On the other hand, both Sites B and D, respectively, were based in urban areas. Site B was attached to a comprehensive school, which catered to classes ranging from grade R to grade 12 and used English as the language of pedagogy. Site D was attached to a primary school and used Afrikaans (another official language of South Africa) for instruction. Concerning funding, Site B received no government funding while Site D was partly funded by the government.

In respect of participants, some connections and disparities were also noted. Two of the four respondents (Respondents W and X) did not possess the minimum qualification recognised by the South African National Department of Higher Education (DHET) for teaching purposes. According to the norms and standards that regulate teaching, the diploma in grade R teaching or an equivalent qualification, usually a three-year teaching qualification obtained after the completion of grade 12, is recognised for teaching purposes in South Africa (DHET, 2015). Respondents Y and M, attached to Sites C and D respectively, possessed teaching qualifications recognised by the DHET for teaching purposes. Likewise, these respondents had accumulated more teaching experience compared to both Respondents W and X. As illustrated in the findings of this inquiry, some of these demographic details have a bearing on the implementation of EE. The preceding demographics are summarised in Table 1.

Table 1.

Respondents' Profiles

Participant	Grade R Centre	Teaching Qualifications	Age	Grade R and/or other teaching experience
Respondent W	Site A	Grade 12	< 30yrs	4 years
Respondent X	Site B	ECD[1] Level 4	41 – 50yrs	2 years
Respondent Y	Site C	PTC; SED; HED	51 – 60yrs	36 years
Respondent M	Site D	PTD and HED	51 – 60yrs	36 years

*The following is a brief explanation of the acronyms referring to various teaching qualifications as used in table 1, above: ECD Level 4 is a one-year post-Grade 12 Early Childhood Development certificate; PTC = a two-year post-Grade 12 Primary Teachers' Certificate; PTD = is a three-year post-Grade 12 Primary Teachers' Diploma; SED = a three-year post-Grade 12 Secondary Education Diploma; HED = is a one-year Higher Education Diploma awarded to someone who would have obtained a three-year post-Grade 12 qualification before enrolling for such a teaching qualification.

It needs to be noted that to enhance the findings the principals of the four institutions selected for this research were also interviewed. However, since they were not central to the inquiry, their profiles were not requested. The following pseudonyms are used to refer to the principals, namely, Respondent J (Site A), Respondent K (Site B), Respondent L (Site C) while Respondent M doubled as a grade R teacher and principal of Site D.

Data Collection

In this inquiry, participant observations, semi-structured one-on-one interviews, and document analysis were used for data collection. Guided by an observation protocol, the researcher recorded the pedagogical processes that took place in respective classroom contexts. Due to field dynamics, the observation period varied from centre to centre, and it ranged from three to five full days per institution.

After the completion of observations, one-on-one interviews were conducted with each of the grade R teachers and school principals. With permission from each respondent, the interviews were audio-recorded. These interviews were conducted at the convenience of participants, and each respondent had the latitude to be interviewed in their preferred languages. Additionally, to enhance the richness of data, numerous documents (lesson plans, LTSM, learner-activity books) were requested from each of the four grade R teachers and analysed.

Data Analysis

Data analysis was done thematically through text reduction (Attride–Stirling, 2001), coding, categorisation and noting of various themes or patterns (Alhojailan, 2012). The nexus between the themes was determined through constant comparison (Leech and Onwuegbuzie, 2007) as the analysis unfolded. However, some of the data collected during observations and analysis of documents could not be analysed in the manner already mentioned, and domain analysis (Neuman, 2011) was thus employed to facilitate the 'extraction' of some examples of environmental issues from the pedagogical activities observed and the documents provided by participants.

It is worth noting that the processes mentioned above commenced in the field. Accordingly, the field notes were examined meticulously and organised into meaningful words, phrases, and sentences to ease data analysis. Likewise, there was a process of transcription of all audio-recorded interviews, and the translation of those interviews that were recorded in languages other than English.

Trustworthiness

Data and methodological triangulation alongside an audit trail of raw data, field notes and data analysis procedures were used to ensure three elements of trustworthiness, namely, credibility, dependability, and confirmability of the findings (Creswell, 2012; Daymon and Holloway 2011). To enable the transferability of findings to other settings, the researcher provided a comprehensive and substantive account of research setting and events.

Ethical considerations

Prior to data collection the researcher met and interacted with each respondent to provide them with detailed information on the purpose of this study and to obtain their consent to participate in the study. The participants were assured anonymity and confidentiality and, their identities were concealed, instead; alphabets were used to identify each participant. Furthermore, the participants were assured that they were free to recuse themselves from participation in the study at any stage if they so desired.

Findings

The analysis of data generated through all three strategies used in this inquiry produced the findings that could be summed up into the following main headings, namely, enabling curriculum framework, teachers' training and teaching experience, leadership, support, and collegiality, and learning and teaching support materials (LTSM). It is important to point out that since it is not the intention of this paper to reflect on the evidence that demonstrates the implementation of EE but to highlight the factors that enable EE implementation, the researcher will only take a cursory reflection on such evidence only when he deems it essential to do so. This is done since the evidence drawn from this inquiry, which suggests that participant-teachers did accommodate EE in their respective classes, is extensive and would thus require a 'special' paper dedicated only to it.

An Empowering Curriculum Framework

Evidence generated from this inquiry indicates that the curriculum pursued in all four learning sites enabled the integration of EE in grade R. Among the four sites, three sites (A, C and D) followed the curriculum assessment policy statement (CAPS) of the South African national Department of Basic Education (DBE) while Site B pursued the Accelerated Christian Education (ACE) curriculum designed by ACE ministries (www.aceministries.co.za). It is also important to note that the DBE curriculum has an expressed commitment toward EE. Among its principles,

which are found in all its CAPS documents, it has one that stands out expressing the intent "to produce learners that are able to use science and technology effectively and critically showing responsibility towards the environment and the health of others" (DBE, 2011b: 5).

Based on data produced from this research, both curricula are designed in a way that enables the integration of EE in grade R classrooms. The topics that are accommodated and can be used to facilitate the teaching of EE in grade R include *weather*, *stories,* and *songs* (DBE, 2011a), *water*, *seasons*, *healthy environment*, *animals*, *birds*, *reptiles,* and *other wild animals* (DBE, 2011b). The findings of this investigation indicate that some of these topics were treated either in the presence of the researcher or prior to his visit to the respective schools. Additionally, it is also essential to note that at least two of the school principals who participated in this inquiry, noted that the already-mentioned curricula allow for the integration of EE in grade R. For example, Respondent J of Site A pointed out that EE "*is being integrated in CAPS*". Likewise, Respondent K of Site B suggested that the ACE curriculum does enable the teaching of EE by asserting, "*I think a lot of that is worked in, into our program, through the stories and through the activities…there is some emphasis on Environmental Education.*"

Professional Teacher Training and Teaching Experience

The ability of a teacher to effectively integrate issues of environmental concern in a specific subject depends on the knowledge content of the teacher in that specific subject and on numerous other proficiencies. Competent teachers have deep subject content knowledge, are skilled in the teaching profession, know how various learners learn different subjects, can apply an array of pedagogical strategies (Lupascu et al. 2014; Yilmaz, 2011), and are also able to help learners draw a link between the subject content and lived experiences (Edwards et al. 2016). Some studies also suggest that to a certain degree, there is a positive correlation between effective teaching and teaching experience (Kini and Podolsky, 2016; Rice, 2010). The teaching competencies mentioned above are very important in the learning of EE because environmental learning is best learned experientially. However, this does not suggest that only experienced teachers are effective or that experienced teachers are necessarily effective teachers.

In this inquiry, three Respondents (M, X and Y) demonstrated some level of effectiveness in their teaching by undertaking an in-depth covering of certain topics. For example, each of the three respondents would begin their daily lessons by vigorously and meticulously engaging learners in some reflection on various elements of the day's weather and their effects on humans and surroundings. These engagements, which could be conceived as learning *about* the environment, demonstrated, inter alia, that the learners had developed some level of awareness that, for example, the choices of clothes worn on a specific day depend on weather conditions, strong winds can shake tree branches and etcetera. The contributions made by the learners in these and numerous other lessons in the classrooms of the three Respondents (M, X and Y) seemed to give credence to a point made by McBer (2000: 11) who argues that "in classes run by effective teachers, pupils are clear about what they are doing and why they are doing it". Furthermore, some authors aver that the effectiveness of a teacher in the classroom is predicated on their level and quality of both pre-service and in-service education and training (Metzler and Woessmann 2010; Rowe, 2006) and teaching experience. Accordingly, it can be argued that the apparent effectiveness of the three respondents (M, X and Y) could be credited to their training and teaching experience. Respondents M and Y respectively, had undergone professional teacher training that exceeded the minimum training required for a person to teach kindergarteners, and had more than 36 years of teaching experience at ECE level. By her own admission, which was corroborated by her manager, Respondent X had no training in the teaching of grade R. To mitigate this shortcoming, she attended "*annual conventions with workshops*" (Respondent K) aimed at enhancing pedagogical effectiveness. Also, she relied on on-going support from the principal and senior colleagues within the school.

Leadership, Support and Collegiality

The findings of this inquiry also suggest that collaboration between teachers and the support given to teachers by various stakeholders also contribute towards enabling teacher effectiveness, and by extension, the accommodation of EE in pedagogy. Literature intimates that teachers who collaborate and interact by, inter alia, sharing knowledge, ideas, and experiences on lesson planning, problem-solving, selection and use of LTSM, and observation of colleagues at work tend to be effective in their teaching (Kini and Podolsky, 2016; The New Teacher Project, 2013). Additionally, factors such as support from school-based leaders and office-based (that is, outside the school) education authorities are also considered important in facilitating teacher effectiveness (TNTP 2013; Pretorius, 2010).

In this inquiry, inter-teacher collaboration interspersed with support from other stakeholders seemed to have contributed to classroom effectiveness. This effectiveness observed in pedagogical activities of three respondents (Respondents M, X and Y) includes the integration of environmental issues. With respect to Respondents M and Y, collaboration with colleagues within their respective school settings seems to be one of the reasons for their classroom

effectiveness. The following assertions by the two respondents highlight the collegiality between them and their respective colleagues. During the interview, Respondent M underlined the collegiality between her and her grade R colleague at Site D by stating, *"We do our planning together. It helps a lot because our work is the same. When there are problems in terms of specific children or groups, we discuss them and find solutions together*". Respondent Y amplified this interdependence by stating that as colleagues in Site C "*we do sit and discuss whatever*" needs to be discussed and share ideas, and "*if we don't get any solution we go to the Head of Department*".

As it was the case with Respondent M and her colleague, there was also an indication that Respondent Y does her lesson planning with her three colleagues. Regarding Respondent X, although she had no grade R colleague with whom she could collaborate to enable her to become effective in her teaching, she had support from her seniors. It is also worth noting that on more than one occasion during the visits to the two centres (Sites C and D), the two respondents (Y and M respectively) would be seen sitting down doing their planning with their grade R colleagues just at the end of their class lessons.

Learning and Teaching Support Materials

Kassabolat et al. (2020) highlight the importance of LTSM in promoting and enabling pedagogical competence by asserting that schools must provide teachers with adequate and pliant teaching resources to enhance teaching effectiveness and attainment of lesson objectives. Likewise, Akiri and Ugborugbo (2009) contend that effective teaching depends on copious dynamics, and these include the availability of pedagogy-enabling setup and teaching resources at the disposal of the teacher. Hence, Jones (1998) concurs that to fortify a lesson framework, and thereby, promote effective pedagogy, teachers need pertinent learning and teaching resources. Additionally, an absence of resources that 'fit in' with the lesson plan objectives and activities, should nudge an effective teacher to resort to innovation by augmenting the pedagogical program by either, innovatively, developing new resources or adapting existing ones (Green, 2017; Edwards et al. 2016; Jones, 1998).

Evidence from this investigation suggests that although Respondent X did receive some LTSM designed 'to fit into' her daily lesson plans from curriculum developers (ACE), she also developed some resources such as weather charts to supplement these resources. These resources aided learning *about* the environment. Likewise, to complement the limited pedagogical resources such as learner workbooks and wall charts supplied by the DBE, Respondents M and Y developed most of their teaching resources. These resources included, inter alia, flash cards, wall charts, cartoons, material photocopied from personal or library texts, and etcetera. These resources also contributed towards enabling learning *about* the environment. For example, as part of her LTSM, Respondent Y had some A4-size cards that depicted changes in a tree over the four seasons of the year, which she effectively used in her lessons. She also had a wall chart with the title "*where do I live?*" This chart portrayed the "homes" of various animals, for example, a river for the crocodile, a kennel for a dog, and so on. Likewise, Respondent M also had numerous wall charts, which she used effectively in the classroom. For example, among the resources she developed there was a wall chart, entitled *Night Animals*. This wall chart depicted some night-time creatures that could be found in the immediate environment of the learners. These included, inter alia, an owl, a cat, a bat, a lion and a jackal.

Discussion and Conclusion

This paper was an attempt to contribute towards ameliorating the dearth of literature tilted towards identifying facilitators of EE in pedagogy. The findings of this inquiry corroborate several views ventilated by literature concerning the factors that serve as vehicles of EE. Accordingly, in this inquiry, the following factors were identified as supportive of the implementation of EE within the context of ECE settings that formed part of this inquiry, enabling curricula, professional teachers' training and teaching experience, leadership, support, and collegiality and, the appropriate selection of teaching resources. Furthermore, it could be argued that even though there are numerous barriers to EE, which this paper deliberately overlooks as their exploration was not within the scope of this paper; there are evidently numerous factors, as already indicated, which could be taken advantage of, and strengthened, as they serve to expedite EE pedagogy. Significantly, as highlighted in this study, there is a shortage of literature which focuses on identifying factors that enable EE pedagogy. For this reason, more research is essential in this area.

The literature reviewed for this paper also identified the preceding factors as enablers of EE. For example, literature suggests that those in authority are the ones who shape the curriculum to facilitate (or inhibit) the implementation of EE in pedagogy. In essence, one of the key points raised in literature is that if EE is to be implemented then the curriculum should highlight, explicitly or implicitly, the importance and need to teach EE (Kuzich et al. 2015; Joseph 2014; Evans et al. 2012). Additionally, a well-designed curriculum provides opportunities for teachers to, innovatively,

incorporate science and environmental learning (Masters and Park Rogers, 2018). As presented in the results above, the curricular followed in all the sites referred to in this paper were designed to enable EE-inclined pedagogy.

However, for teachers to be able to integrate EE, they need to be well-trained, competent and experienced. Also, the teachers' subject content knowledge and competence, which hinge mainly on professional training and teaching experience, largely, determine classroom pedagogical effectiveness (Hill and Chin, 2018). Therefore, for teachers to effectively implement EE, they need to be professionally competent, have knowledge of sustainability issues and teaching experience. Evidence from this study suggests that three teachers (Respondents M, X and Y) were able to integrate EE in their classrooms while one teacher (Respondent W) could not do so. This could be attributed to the fact that the three teachers had an edge over Respondent W due to their level of training, work experience and the subject content knowledge, which the latter teacher did not possess. These findings corroborate previous and current research (Maidou et al. 2019; Hill and Chin, 2018), which amplifies the value of professional teachers' training, teaching experience and content knowledge in the integration of EE in pedagogy.

Likewise, the three teachers (Respondents M, X and Y) had support from their colleagues and leaders while Respondent W did not have such support. This could be another reason why, as discerned from classroom observations, the three teachers were more effective and were able to infuse environmental learning in pedagogy while Respondent W had shortcomings in this area. The findings corroborate previous and more recent research. Various studies underscore the importance of providing meaningful institutional leadership and support to teachers and the impetus of collegiality in fostering teacher pedagogical effectiveness, including factoring EE in the classroom (Kassabolat et al. 2020; Kuzich et al. 2015; Joseph, 2014). Likewise, recent studies underscore the significant role played by institutional leadership in supporting efforts aimed at ameliorating environmental challenges (Woo and Kang, 2020).

The findings presented in this paper also suggest that Respondents M, X and Y used a variety of learning and teaching resources to cultivate meaningful and effective learning and teaching, including the incorporation of EE, in their classrooms whereas Respondent W relied only on the meagre resources provided by the department of education. In their quest to incorporate real-life experiences to pedagogy, the three respondents selected and designed 'appropriate' teaching and learning resources. As outlined in the presentation of results from this research above, these resources included an array of media that were used to incorporate environmental learning. Accordingly, these findings just like various literature reports amplify the central role played by the selection and designing of appropriate and relevant learning and teaching resources in enabling EE (Heliawati et al. 2020; Kassabolat et al. 2020; Kuzich et al. 2015).

Limitations of the Study

This research, like numerous other inquiries, had its own limitations. Accordingly, two main limitations can be noted, namely, the limited amount of time spent in the field and the non-participation of education officials from the North West Department of Education (NWDE) in the study. As pointed out earlier in this paper, due to field dynamics, the time spent by the researcher in the field varied from one site to the other and the researcher is of the view that the time spent on the field was inadequate. Hence, the researcher is of the view that it is probable that had he spent more time at each site, a deeper understanding of the factors that could be considered enablers of EE would have been obtained.

The other point worth mentioning is that the researcher had intended to enlist the participation of office-based (that is, education department offices outside of the school terrain) officials of the NWDE in this inquiry, particularly those responsible for providing curriculum support to teachers. However, due to undisclosed reasons, they were unwilling to participate in the inquiry. It was the wish of this researcher to find out from them how the department of education ensures the realisation of the ideals and aims enshrined in curriculum policy documents that point to the commitment of the South African National Department of Education to EE.

Despite the above-mentioned limitations, it is the view of this researcher that the purpose of this investigation was fulfilled. The findings highlighted in this paper affirm this assertion.

Recommendations

Based on the findings mentioned in preceding paragraphs, this researcher would like to underscore the need for more research that focuses on factors that contribute to the implementation of EE, not only within the realm of ECE but across the spectrum of education levels. This need derives from the fact that, as stated earlier in this paper, there is a dearth of literature that seeks to identify the factors that facilitate the implementation of EE. Accordingly, it is the

view of this researcher that to broaden the knowledge of teachers, and all the stakeholders who are interested in the advancement of EE, it is necessary to conduct more research that focuses on enablers of EE. This should be done to help all stakeholders with an interest in education obtain a broader perspective regarding the factors and approaches that work to facilitate the implementation of EE, particularly in ECE and, generally, in other levels of education. Arguably, knowing what works and what does not work would best serve the purpose of strengthening the effectiveness of existing practices that advance EE and circumvent those that derail EE. Thus, it is the view of this researcher that to make inroads towards advancing the implementation of EE, especially in early childhood education, the existing enablers of EE should be put to good use, but more importantly, more enablers of EE need to be 'uncovered'.

Furthermore, since the South African public school curriculum policy framework does not provide explicit guidelines on how EE should be integrated in teaching, policy developers need to enhance the curriculum by incorporating tangible guidelines on how environmental learning should be accommodated and advanced in pedagogy. Accordingly, it is the considered view of this researcher that some of the enabling factors underscored in this paper could be tailored to help in the crafting of environment-oriented curriculum directives. Arguably, this approach could be adopted by countries globally where environment and sustainability inclined pedagogy is disenfranchised.

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