ISRES Publishing

The Eurasia Proceedings of Educational & Social Sciences

EPESS

VOLUME 26 IConSED CONFERENCE

e-ISSN: 2587-1730

ISBN: 978-605-72832-6-9

IConSED 2022: International Conference on Special Education and Diversity (IConSED)

August 25 - 28, 2022

Istanbul, Turkey

Edited by: Muhammad ZAYYAD (Chair), Al-Qasemi Academic College of Education, Israel

The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

IConSED 2022 AUGUST

Volume 26, Pages 1-43 (August 2022)

The Eurasia Proceedings of Educational and Social Sciences (EPESS)

e-ISSN: 2587-1730

Address: Istanbul C. Cengaver S. No 2 Karatay/Konya/TURKEY

Website: www.isres.org

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Conference: IConSED 2022: International Conference on Special Education and Diversity (IConSED)
Conference website: https://www.2022.iconsed.net

Dates: August 25 – 28, 2022
Location: Istanbul, Turkey
Edited by: Dr. Muhammed Zayyad

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Aims & Scope

In the current century, with the effect of technological developments, studies on the development and implementation of individual education programs are increasing day by day. Considering the learning difficulties, it can be said that almost every individual needs special education. However, when special education is mentioned, education to be given in disability situations such as Autism Spectrum Disorder, Down syndrome, Hearing-Impaired and Deaf Children, Mentally Handicapped and Intellectual Disability, Vision Impairment and Blindness, Physical Disability, Specific Learning Disability and Chronic Health Conditions comes to the fore. At the same time, gifted and talented students are considered within the scope of special education. The focus of this conference is individual programs, training given to gifted and talented students and the physically and mentally handicapped.

The aim of this conference is to bring together academicians, researchers, educators and administrators from different countries, and to discuss theoretical and practical issues in all fields of special education. At the same time, it is aimed to enable the conference participants to share the changes and developments in the field of special education with their colleagues.

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Educational & Social Sciences (EPESS)
ISSN: 2587-1730

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Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2022

Volume 26, Pages 1-10

IConSED 2022: International Conference on Special Education and Diversity

A Depiction of Handwriting Intervention Guideline for Children with Handwriting Difficulties in Malaysia

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Abstract: Handwriting skill is the major occupational therapy intervention executed by occupational therapists who are working with children. This article aims to describe a newly developed handwriting intervention guideline for occupational therapy service delivery in Malaysia. The handwriting intervention guideline is set up to be applicable for children aged four to nine years. The guideline is presented to support children with handwriting issues in terms of handwriting readiness and writing criteria specifically on capitals, lowercase, and numbers. This article provides a description of the handwriting intervention guideline such as the rationale of this guideline, content structure, and activity modules to guide clinical practice. The guideline has been implemented on a group of children with pre- and post-measures. The outcome findings are demonstrated to show the viability of the guideline to be used by occupational therapy practitioners. This depiction of handwriting intervention guidelines is expected to assist occupational therapy practitioners in conducting handwriting intervention for children to suit our socio-cultural background and educational system.

Keywords: Handwriting, Occupational therapy, Intervention guideline, Children

Introduction

Handwriting difficulties might be the important components of learning problems and other neurological issues that affect children in academic and school-related tasks (Milone, 2007). Handwriting skills were included in 30-60% of tasks in schools for children (McHale & Cermak, 1992). The definition of handwriting difficulties was declared as the issues of letter formation that involve dyslexia and dysgraphia characteristics among children (Zainol et al., 2021).

The indicator of a child having handwriting difficulties is a score of below 80 percent from the overall score in handwriting performance using any standardized tool such as The Print Tool, Test of Handwriting Skills-Revised, or Evaluation Tool of Children's Handwriting (Chang and Yu, 2017; Prunty & Barnett, 2017). The prevalence range of children having handwriting difficulties across the world varied in literature within the range of 5-35% (Overvelde & Hulstijn 2011; Volman et al., 2006; Brossard-Racine et al., 2011; Duiser et al., 2020). Handwriting legibility is the main issue among school children with handwriting problems (Lam et al., 2011; Shih et al., 2018).

Handwriting Performance Area

Handwriting skills performance involved perceptual-motor function (Volman, Van Schendel & Jongmans, 2006) fine motor skills (Smits-Engelsman et al., 2013), visual motor integration (Weintraub, 2004; Kaiser, Albaret & Doudin, 2009; Duiser et al., 2020) and cognitive function in relation to the poor and slow speed of handwriting (Biotteau et al., 2019; Volman et al., 2006). The effect of handwriting difficulties was found in poor academic performance (Feder & Mejnemer 2007; Barnett et al., 2018; Rosenblum et al 2019), low self-esteem (Prunty & Barnett, 2019; Rosenblum, 2019) low motivation (Brossard-Racine et al., 2012; Waelvelde et al., 2012; Missiuna et al., 2017), reduced life skills (Reta & Elliot, 1994) and behavioral problem (Sandler 1992; Waelvelde et al., 2017). Occupational therapy or physical therapy was claimed to have a positive effect on handwriting skills (Volman et al., 2006; Lahav et al., 2013).

The occupational therapy handwriting intervention in these areas was stated to improve handwriting performance skills which were visual motor integration skills (Berninger et al., 1997; Voman et al., 2006), cognitive approach (Robert et al., 2014; Waelvelde et al., 2017), motor skill approach (Denton, Cope & Moser 2006; Robert et al 2014; Waelvelde et al., 2017) and behavioral approach (Furman, 2006). However, there were few studies to support behavior approach to be effective in improving handwriting skills performance. Furthermore, there is limited evidence of the involvement of parents and teachers to escalate handwriting skills performance among children with special needs (Polatajko et al., 1995; Waelvelde et al., 2017). A very recent study suggested that occupational therapy intervention in handwriting should be integrated with the school curriculum and carried out in the school setting for optimum benefits for children with handwriting difficulties (Kadar et al., 2020).

The Focus of Handwriting Intervention

Occupational therapy intervention programs for children focus on two dimensions which were legibility and quality (Capodieci et al., 2018; Shih et al., 2018; Rosenblum, 2019). Handwriting legibility acquires visual and perceptual skills. Handwriting legibility comprises of letter formation, letter reversals, spacing, size, slanting of letters, and alignment (Lam et al., 2011; Tourigny, 2016; Shih et al., 2018). Meanwhile, handwriting quality consists of motor planning and executive functioning skills. Motor planning skills requires the right amount of pressure, good timing, correct muscle function, and perfect force to complete handwriting task (Overvelde & Hulstijn, 2011; Brossard-Racine et al., 2012). Executive functioning skills demand attention, inhibition, working memory, initiation, and behavior to perform handwriting activities (Overvelde & Hulstijn, 2011; Dea et al., 2019; Rosenblum, 2019; Duiser et al., 2020). Figure 1 summarises the OT handwriting intervention and its underpinning theoretical background.

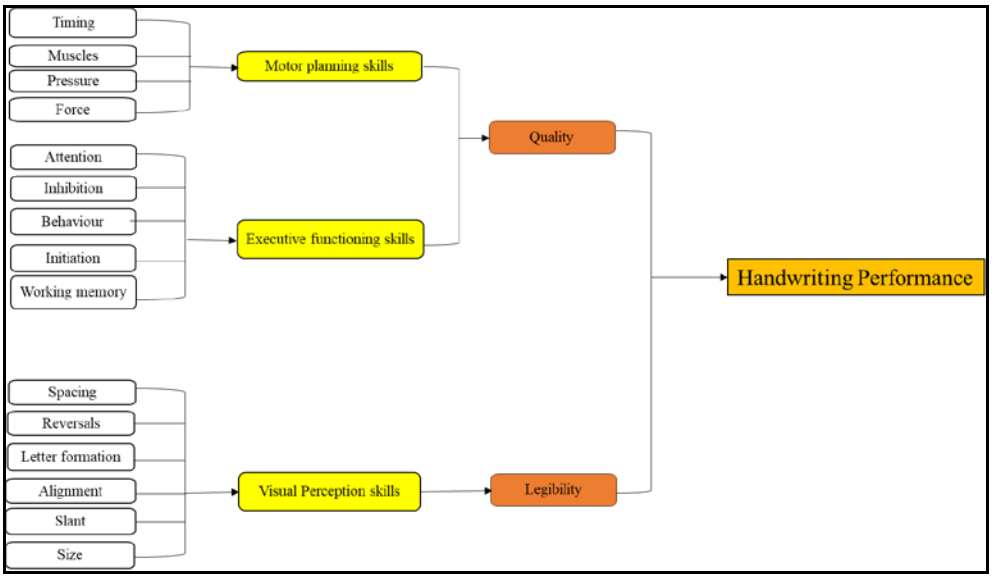

Figure 1. Summary of handwriting intervention underpinning theories

The handwriting intervention approach that has a positive impact on handwriting skills are sensory play skills, visual-perceptual-motor skills, adapted writing tools, and collaboration between occupational therapist, teachers, and parents in handwriting activities (Engel et al., 2018). These handwriting programs propose that handwriting

performance needs to address legibility and speed that are incorporated into the school curriculum (Engel et al., 2018). Based on this information on issues related to handwriting skills, the purpose of this study is, (1) to explore the need of developing a handwriting intervention guideline according to the Malaysian context of practice, (2) to construct a comprehensive handwriting intervention guideline, and (3) to investigate the effectiveness of the developed guideline for children's handwriting.

Method

Need Analysis for Handwriting Intervention

The analysis phase explored the need to develop an occupational therapy-based handwriting intervention guideline for children. Needs analysis ensured that there is a critical need to develop the guideline for handwriting intervention in the Malaysian context. The needs analysis phase in this study utilized a qualitative methodology using semi-structured interviews among school teachers, occupational therapists and parents (Polit & Beck, 2009; Chee, 2016). The justification to use the qualitative interview method was to explore experiences, perceptions and suggestions in practices that had paradigm value in the handwriting intervention (Restall et al., 2019).

Design and Development of a Handwriting Intervention Guideline

The design and development phase is the second phase in this research. This stage was aimed to develop and validate the handwriting intervention guideline. The design and development phase produced a prototype or draft document that has not been tested for implementation and effectiveness. The main methodology at this stage was to obtain expert agreement on the content structure of the developed handwriting intervention guideline. This design and development phase uses a practical approach with a combined methodology of qualitative and quantitative methods (Shannon-Baker, 2016). Qualitative data collection was executed and followed by quantitative data collection. The method has two levels namely (1) focus group discussion (qualitative) and (2) Content Validity Index (CVI) score (quantitative). The CVI scores were performed with one round of validity after corrections were made following the focus group discussion (Polit et al., 2007).

Evaluation of handwriting intervention guideline

The evaluation phase was to evaluate the effectiveness of the developed intervention guideline. The effectiveness phase used quantitative methods through the implementation of a cluster randomized control trial on treatment and control groups. Pre- and post- measures were taken before and after the intervention guidelines were given to all participants.

Results and Discussion

The results were structured into the rationale of having an intervention guideline, the content structure, and the effectiveness of the intervention guideline to support children with handwriting difficulties. The discussion emphasizes the description of the handwriting intervention guideline including activity modules to guide clinical practice.

The Rationale for a Handwriting Intervention Guideline

Three themes were derived from the interviews to highlight the need for a handwriting intervention guideline. The needs are: (1) to enhance children's potential in handwriting skills, (2) to provide comprehensive guidance for professionals, and (3) to synchronize practice in handwriting intervention among professionals. The themes are shown in Figure 2. The rationale is to increase the potential of children in handwriting skills by accelerating their motivation, reducing the risk of handwriting withdrawal, and assisting in technical aspects of handwriting performance. Furthermore, the rationale is to furnish professional practice such as therapists, teachers, and parents with a comprehensive and standardized guideline in handwriting intervention. Moreover, the rationale is to align intervention practice to establish a valid and reliable guideline with a holistic focus to address handwriting issues among children (Zainol et al., 2021).

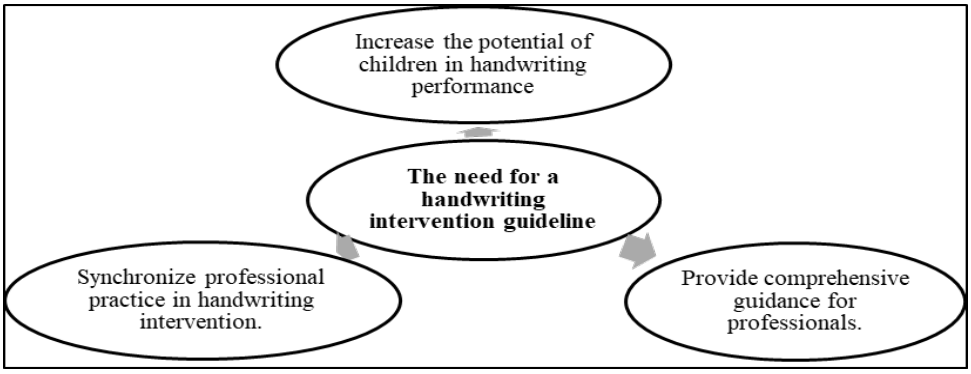

Figure 2. The need for a handwriting intervention guideline.

The Content Structure of the Handwriting Intervention Guideline

The handwriting intervention guideline was designed and developed according to the established framework and model for children's handwriting performance (Chu, 1997; Roston, 2020). The guideline has five sections to navigate clinical practice in handwriting intervention. Section A is the introduction section. This section indicates the handwriting issues among children and theoretical occupational therapy solutions to address handwriting problems.

Section B encompasses the essential procedure for conducting handwriting intervention. It includes a principal guide in handling handwriting screening, assessment, planning, intervention, and evaluation procedures. Expert panelists agreed to simplify the procedure through a clear flow chart on conducting a handwriting intervention program from beginning to discharge. As this program will be used in Malaysia, experts agreed that the selected sentence for the copying skills activity during screening should use a sentence in the Malay language. The use of the national language of the intervention guideline provides a novel aspect in the development of a guideline for local commercial value.

Section C consists of handwriting readiness skill intervention. This section comprises handwriting development, pre-writing skills, and motor skills activities in preparation for handwriting. For this section, each of the intervention strategies is indicated accurately according to the children's developmental age. In addition, the section emphasizes the five handwriting skill phases: scribbling, imitation, tracing, copying, and writing from memory (Amundson, 2005). This section also includes motor skills activities. It was claimed that activities for gross motor skills should allow the therapist to perceive the child's level of sensory modulation (Danna &Velay, 2015), visual perception (Bara & Bonneton-Botté, 2018), and attention span (Palmis et al., 2017). It is suggested that the theoretical aspect and procedure of conducting gross motor intervention activities should be clearly defined (for upper and lower limbs). Therefore, the section provided with detailed diagram and explanation for each intervention activity. Moreover, this section included a variety of sensory-motor activities with multi-sensory materials to increase handwriting readiness skills (Chu, 1997; Woodward & Swinth, 2002; Taras et al., 2011).

Section D contains a depiction of the pragmatic approach to using correct handwriting tools, promoting functional pencil grasp, facilitating ideal posture and position, and demonstrating the best method of writing capitals, lowercase, and numbers. In this section, detailed explanations of a child's needs in handwriting intervention are described such as (1) the importance of proper sitting position, (2) the significance of using selected adaptive handwriting tools, and (3) the essence of intrinsic (motivation) and extrinsic (environmental condition) requirements during handwriting intervention. Specific information is structurally incorporated into the manipulation of handwriting tools in terms of its advantages and the criteria needed to allow the use of tools during handwriting activities.

The best explanation is on how handwriting strategies can differ for left-handed writers to guide practitioners in their intervention program. For example, left-handed writers can draw lines from right to left instead of the reverse (Olsen & Knapton, 2006). Furthermore, this section includes a manual to instruct letter formation activities with audio-visual (letter storytelling) techniques. The language used to describe pencil movements during letter formation activities is congruent with the proposed strokes. Moreover, safety precaution notes include at the bottom page of each intervention activity related to physical and motor movement.

Section E incorporates the entire program into a series of handwriting activities to be carried out with the children (a module-like version). This section had six sub-sections: (1) Development of Handwriting Skills Activities, (2) Pre-writing Skills Activities, (3) Gross and Fine Motor Skills Activities, (4) Writing Capital Letters, (5) Writing Lowercase Letters, and (6) Writing Numbers. In this section, the module highlights the importance of start and sequence during alphabet writing concerning intervention in the letter formation aspect (Olsen & Knapton, 2006). Overall, the handwriting intervention module represents the main objective of the entire handwriting intervention program.

To conclude, the construction of the handwriting intervention guideline is established at this stage. The proposed intervention domain such as handwriting readiness skills and handwriting skills intervention is recognized and re-arranged. Therefore, the content structure of the developed handwriting intervention guideline received excellent expert consensus.

The outline of handwriting intervention guideline

Practical Execution

Each participant was given a handwriting intervention workbook after taking pre-assessment measures. The handwriting intervention guideline is set up to be applicable for children aged four to nine years. The study involved forty-two children with clearly defined handwriting difficulties. The guideline is presented to support children with handwriting issues in terms of handwriting readiness and writing criteria specifically on capitals, lowercase, and numbers. The guideline has been implemented on a group of children with pre- and post-measures. The handwriting intervention workbook consisted of six handwriting modules (as explained in Section E) completed within 10 weeks with the occupational therapy facilitators. The therapist worked together with the participant on an individual or group basis. The module could be brought as home program material for parents and school programs for classroom intervention. The module's completion was monitored every week through text-messaging reminders to the therapist in charge.

Materials

The proposed strategies and material were mini-board and chalk for writing capitals and numbers and a double-lined board for practicing lowercase writing (Olsen & Knapton, 2006). Please see Table 1 for detailed weekly intervention outline activity in the module. The intended duration of fulfilling the handwriting intervention module was 30-60 minutes per session. Each participant was required to complete all activities in the module before proceeding to post outcome measures.

Treatment Fidelity during the Intervention

The execution of handwriting intervention guideline usability was supervised through the use of a treatment fidelity checklist. The treatment fidelity checklist was used to monitor the accuracy of the intervention provided based on the guideline. Occupational therapy facilitators had successfully adhered to the constructed treatment fidelity. The intervention activities offered in the guideline are systematic, consistent, and relevant to support goals in handwriting performance skills. All participants substantially completed intervention activities in the guideline. Therefore, this indicated a high level of child involvement in the implementation of the handwriting intervention guideline across the intervention period. The use of a treatment fidelity checklist highlighted that the intervention satisfies the recommended frequency of handwriting interventions (Hoy et al. 2011; Brevoort, 2018; Engel et al. 2018).

Table 1. Detailed weekly intervention outline activity in the module.

Content Summary of Handwriting Intervention Guideline
Section A: Introduction to Handwriting Skills - Problems related to handwriting - Factors in handwriting issues - Suggested frequency for handwriting intervention - Target group

Section B: Occupational Therapy Service Procedure for Handwriting Intervention
- Screening
- Checklist
- Assessment
- Planning
- Intervention
- Re-evaluation

Section C: Intervention for Handwriting Readiness Skills
- Handwriting development
- Pre-writing skills
- Gross motor skills activities
- Fine motor skills activities
- Motor visual skills activities

Section D: Intervention for Handwriting Skills
- Handwriting tools
- Pencil grasp
- Posture and position
- Hand dominance
- Writing capitals, lowercase, and numbers
- Handwriting speed

Section E: Handwriting Intervention Module
- Session 1: Development of Handwriting Skills Activities
- Session 2: Pre-writing Skills Activities
- Session 3: Gross and Fine Motor Skills Activities
- Session 4: Writing Capital Letters
- Session 5: Writing Lowercase Letters
- Session 6: Writing Numbers

Effectiveness of the Handwriting Intervention Guideline

The effectiveness of using the developed handwriting intervention guideline was measured using a valid and reliable instrument. The outcome measure was assessed using The Print Tool (TPT) before the intervention began and after the intervention (Olsen & Knapton, 2006). The Print Tool assessed the overall handwriting performance of writing capitals, lowercase, and numbers. Overall, handwriting skill performance in both groups (treatment and control) showed improvement before and after the intervention period. This is not surprising because handwriting skill performance is influenced by (1) time (Waelvelde et al., 2017a), (2) daily routine activities (Coutinho et al., 2017), (3) other interventions (Montgomery & Zwicker, 2020), and (4) the physiological and physical maturity (Smits-Engelsman et al., 2018). Nevertheless, the handwriting performance in the treatment group was significant after the intervention using the guideline as compared to the control group (using natural occupational therapy intervention). In this research, the effect of developmental maturation and other intervention at the same time of the research duration might influence the outcome. However, there were some studies that reported that handwriting performance demonstrated negative improvement in the control group (Pfeiffer et al., 2015; Hunter & Potvin, 2020).

In supporting this research outcome on the effectiveness, both treatment (twenty-one children) and control (twenty-one children) groups were structured for handwriting skills interventions such as fine motor skills, visual motor, visual perception, and sensorimotor. On the contrary, the differences in the treatment group using the developed guideline were the arrangement of intervention activities that were more (1) systematic, (2) focused, (3) aligned with the child's current development, and (4) appraised the collaboration between parents, teacher, and therapist. In contrast, the control group used standard occupational therapy intervention without structured modules and guideline. However, both interventions supported the foundations of handwriting interventions with established theoretical and clinical knowledge.

Conclusion

This article provides a description of a newly developed handwriting intervention guideline for occupational therapy service delivery in Malaysia. This depiction of handwriting intervention guidelines is expected to assist

occupational therapy practitioners in conducting handwriting intervention for children to suit our socio-cultural background and educational system. The guideline has proven its effectiveness to improve the performance of children handwriting performance. This research has implications for theory using an organized and structured research approach. The procedure in the approach outlined three fundamental phases, need analysis, design and development, and evaluation. The process involving each phase is sufficiently accomplished through the exploration of developmental needs, followed by content design approved by a certified panel of experts, and the determination of effective use of this guideline on children. In conclusion, the developed handwriting intervention guideline was aimed to focus on improving the legibility and quality of handwriting performance. Thus, with satisfactory handwriting performance, children would be able to optimize participation in the school curriculum.

Recommendations

The limitation of this study was that the sample size was small (forty-two children). Thus, the results obtained cannot be generalized to a larger population. Suggestions for further research are the implementation of the experimental method with: (1) a greater number of participants, (2) comparison with other modules of intervention guidelines, and (3) longer intervention duration.

Besides, the limitation of this study is that it used only measurement instruments for handwriting skills performance. Therefore, the results obtained are limited to aspects of handwriting skills in writing capital, lowercase, and numbers only. Recommendation for future research is to support the measurement of handwriting performance with visual perceptual (i.e. Test of Visual Perceptual Skills-4) and motor skills performance (i.e. Movement Assessment Battery for Children version 2) (Jaikaew & Satiansukpong, 2019).

The limitation of this study was the neglect of the additional effects of other interventions (treatments) on participants during the research duration. The intervention given to participants may be contaminated with academic interventions from teachers and activities at home with parents. Recommendations for future research need to address the contamination factors of these interventions to improve the reliability and validity of the effectiveness result of this study.

Finally, the limitation of this study is the lack of adequate statistical analysis to detect the relationship of writing components between capital, lowercase, and numbers. The results analyzed in this study focused on the overall performance of handwriting. Thus, the recommendation for future research is to investigate the relationship or correlation between the scores in the handwriting components (Bara & Bonneton-Botté, 2018).

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Special Education and Diversity (www.iconsed.net) conference held in Istanbul/Turkey on August 25-28, 2022

* The authors would like to thank the experts for their participation in the study. A note of thanks to the Educational Planning and Research Development (EPRD), Ministry of Education Malaysia for giving permission to conduct the study KPM.600-3/2/3-eras(8087). A big thank you to the Ministry of Higher Education Malaysia for the study research grant under the Fundamental Research Grant Scheme, code FRGS/1/2020/SSI0/UKM/03/2.

Declaration of Conflicting Interest

The authors declared no potential conflicts of interest with respect to the research and/or publication of this article. The authors report no declaration of interest. The authors declare that the research was conducted in the absence of any risk or harmful situation to both facilitators and children.

Statement of Contributor Ship

MZ researched literature, involved in protocol development, participant recruitment and wrote the first draft of the manuscript. MK, NAR, FWY, and NAA supervised, reviewed, edited the manuscript, and approved the final version of the manuscript.

Funding

This study is for a PhD in Occupational Therapy, which is funded by Ministry of Education, Malaysia and Faculty of Health Sciences, Universiti Kebangsaan Malaysia.

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To cite this article:

Zainol, M., Kadar, M., Razaob, N.A., & Wan Yunus, F. (2022). A depiction of handwriting intervention guideline for children with handwriting difficulties in Malaysia. *The Eurasia Proceedings of Educational & Social Sciences (EPESS)*, 26, 1-10.

The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2022

Volume 26, Pages 11-18

IConSED 2022: International Conference on Special Education and Diversity

Gender-Positioning within the Visual Network: How (Non-) Inclusive Can EFL Materials Get?

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Abstract: Much of the research on gender representations in language teaching materials has focused on providing frequency-based accounts of character appearances, familial/occupational role attributions and sexist language use. However, gender discrimination, when communicated visually, might more readily drop off the already overburdened teacher's radar. Therefore, this study concentrated not just on the depiction of coursebook images but also on their relation to the learners, and aimed to discover the latent sexism in three thematically similar units from one global and two locally-produced coursebooks widely used in the Turkish and Iranian EFL contexts. A critical analysis of 41 images with Van Leeuwen's (2008) framework revealed that male overrepresentation prevailed throughout all three resources, though to a lesser extent in the global coursebook. The characters mainly avoided direct contact with the viewers by averting their gaze and offered themselves as visual cues for denotative meanings. The global and Turkish-made series tended to position them both closer to the young readers and at their eye level to help build intimacy with more relatable role models. In their Iranian counterpart, the male and female characters were yet socially distanced from them through long shots taken from low and high angles respectively, in which case men were portrayed as authority figures to be looked up to, and women as the diminished other to be looked down on by the students. While both genders were oftener seen frontally in the Turkish EFL material with mixed-gender authorship, the all-male author teams preferred to show the male characters from an oblique angle to further detachment in the global and Iranian contexts. In establishing relatively closer, more personal and engaging interactions with both boys and girls visually, the global and Turkish EFL materials can be claimed to encode a more inclusive and equitable worldview than their Iranian counterpart.

Keywords: EFL coursebooks, Gender representations, Image analysis, Inclusiveness

Introduction

Despite long being a bone of contention especially in foreign language education, published coursebooks still remain indispensable for assisting teachers with the provision of core content for both advantaged and disadvantaged students as economically as possible. In that regard, they make lifelong teaching/learning partners independent of the content-area being studied. And when considered as any other component of mass media, such pervasive influence requires careful examination of not only their texts, as is often the case, but also the visual elements that encode knowledge and ideologies simultaneously. There are some that concentrate on the role of textbooks in the reproduction of existing gender bias within the society through explicit and implicit messages they convey, whereas others are more concerned that ESL materials, in particular, are produced by one culture (i.e. the UK/US) but often "absorbed" in a very different context from their source culture, with culture-specific gender roles and power structures (Bag & Bayyurt, 2015; Dahmardeh & Kim, 2019; Giaschi, 2000, p. 33). In either case, the linguistic and nonlinguistic choices made in the content of the materials can seriously affect the moulding of students' attitudes towards their own and others' social positions, as well as their academic, personal and eventually professional development, and any form of gender bias in their texts and images should therefore be scrutinised and challenged by gender-sensitive teachers in the EFL classroom (Giaschi, 2000; Lee, 2018; Lee & Mahmoudi-Gahrouei, 2020; Mustapha, 2012).

Much of the research on gender representations in language teaching materials has relied on documenting frequency-based accounts of gender inequality predominantly in the written texts, as reflected by the male-to-female ratio of total character appearances, central characters, character mentions, familial and occupational role attributions, and also by the number of sexist linguistic realisations, i.e. in the use of pronouns, names, titles, generics, firstness and adjectives (e.g. Bag & Bayyurt, 2015; Barton & Sakwa, 2012; Dahmardeh & Kim, 2019; Lee, 2014a; Lee, 2014b; Lee & Mahmoudi-Gahrouei, 2020; Simsek, 2022a). If, besides the written texts, their illustrations were subjected to content analysis, ample examples of stereotypical visualisations and mostly superficial information as to the population and concentration of men and women in different social settings were then provided again based on character counts (e.g. Barton & Sakwa, 2012; Dahmardeh & Kim, 2019; Lee, 2014a; Lee & Mahmoudi-Gahrouei, 2020; Simsek, 2022b). However, visual communication should not be subordinated to verbal communication, for the image, embodying a thousand meanings and "nonrational, nonlogical nature", can surpass the printed word in expressive power, and prove "even more difficult to challenge" (Giaschi, 2000, p. 35; Mustapha, 2015). As a result, gender discrimination, when communicated visually, might more readily drop off the already overburdened teacher's radar in the EFL classroom.

It may be true that compared to the written texts, their illustrations have received less attention in the EFL coursebook literature, but the role of the images as part of the hidden curriculum should not be underestimated in gender-positioning (Mustapha, 2015). A closer look at recent research also indicated that in only a few studies from non-European contexts, coursebook images were rigorously evaluated in terms of genderedness, and two different analytical frameworks by Giaschi (2000) and Kress and Van Leeuwen (2006) were mainly adopted for deciphering the hidden messages in men's and women's activities, eye-directions, body language, clothing styles, social distance, status and spaces (e.g. Adel & Enayat, 2016; Azad, 2020; Bakhtiari & Saadat, 2015; Levine & Sullivan, 2010; Mustapha, 2015). Unlike existing studies, which tended to focus on the critical image analysis of one set of EFL materials and depiction of the illustrated people in either global or locally-produced series, this study sought to reveal latent sexism in three thematically similar units also through the relation of the depicted coursebook characters to teenage learners as the viewers and demonstrate how gender-(non)inclusive both types of EFL materials can get in comparison to another. The research questions were thus formulated as follows: How do male and female depictions differ in visibility and attribute assignment? How do their relations with the viewers differ in distance, angle and contact?

Method

For comparative purposes, a total of 41 images were selected from three thematically similar units in one global (G) (i.e. OUP's best-selling series for teenagers, *Solutions*) (Falla & Davies, 2018) and two locally-produced coursebooks (i.e. Turkey's MONE-approved material, *Count me in*, and Iran's state textbook, *Vision 1*) (Cimen et al., 2021; Moghaddam et al., 2020) that were widely used by pre-intermediate secondary students in the Turkish (TR) and Iranian (IR) EFL contexts. Since the units on science were considered capable of providing role models to whom tenth-graders would aspire to become, the corpus of this study was comprised of all gendered images featuring human characters – 9 images from *Unit 9* of the global EFL material, 18 images from *Theme 9* of the Turkish EFL material, and 14 images from *Lesson 3* of the Iranian EFL material, to be more precise (Cimen et al., 2021, pp. 108-116; Falla & Davies, 2018, pp. 96-105, 116; Moghaddam et al., 2020, pp. 73-95).

Due to its practicality in capturing the intricacies of visual communication, Van Leeuwen's (2008) framework was employed in the current image analysis. Despite the previous emphasis on the depiction of the people in the pictures, Van Leeuwen (2008) identified a parallel dimension of visual representation, the relation of the depicted people to the viewers. Accordingly, the interactions between the represented participants and the viewers are determined by these three parameters: the social *distance* they keep from the viewers, *angle* from which the viewers see them, and finally the *gaze* the depicted people offer/demand in the pictures (Van Leeuwen, 2008). It becomes possible to position certain groups (i.e. women) as others through the systemic choices the image producer makes between: *close* and *long shot*s, views from above (*high angle*), below (*low angle*), or at *eye level*, and from the front (*frontal angle*) or sideline (*oblique angle*), and also looks at (*direct address*) and away from (*indirect address*) the viewers (Van Leeuwen, 2008). Therefore, all the gendered coursebook images were assigned at least one functional label during their analysis on all three levels of visual representation, and their occurrences were also counted to concretise observations on male and female depictions. As a unit of analysis, the image can still be "difficult to challenge on a rational basis", and its examination inevitably involves discussion of "feelings and impressions" (Giaschi, 2000, p. 36). Because of the subjective nature of image interpretation, a primarily qualitative approach was taken in this study, but quantitative indicators, i.e. male-to-female ratios ($m/f_{G/TR/IR}$), were calculated and presented where appropriate.

Results and Discussion

The critical image analysis with Van Leeuwen's (2008) framework revealed that independent of coursebook origin, women were always outnumbered by men (m/f_G= 8/6; m/f_{TR}= 12/7; m/f_{IR}= 19/14) and tended to be negatively stereotyped in varying degrees as the weaker sex because of their liability to agitation (e.g. the mother figure returning a hand mixer to a shop) (Falla & Davies, 2018, p. 104) depression (e.g. Mary, feeling homesick and complaining about her new city life to Susan) (Cimen et al., 2021, p. 113) overexertion (e.g. "Melika try[ing] hard to learn English") (Moghaddam et al., 2020, p. 77) and victimisation (e.g. Leila, an unlucky pedestrian, getting hit by a male motorcyclist) (Moghaddam et al., 2020, p. 88). Although a variety of science careers (e.g. astronauts, chemists, doctors and engineers) were thematised across the texts, it was women that were still assigned subservient positions as white-aproned, lace-hatted waitresses and heavily-painted airline clerks (Falla & Davies, 2018, p. 99) in the images of the global coursebook.

Figure 1. Negative stereotyping of women in coursebook images

As can be seen in the above collage from the global (Falla & Davies, 2018, pp. 97, 104) Turkish (Cimen et al., 2021, pp. 110, 113) and Iranian (Moghaddam et al., 2020, pp. 77) EFL materials respectively, men were, on the other hand, presented as the epitome of jollity (e.g. converting doors into ping pong tables), commitment and success (e.g. Iran's male youth donning PPE and conducting lab experiments). In bearing and wearing innovative technologies (e.g. *Google Glass* on a middle-aged man's face) (Falla & Davies, 2018, p. 100) and also defeating their country's rivals in sports and elsewhere (e.g. Turkey's Olympic and World champion wrestler, Taha Akgul, and martyred soldier, Omer Halisdemir) (Cimen et al., 2021, pp. 108, 110) the male characters were elevated to heroic status, and served to suggest that progress in science and many other areas owes more to men than women.

When the interactive meanings gendered images conveyed in these EFL materials were further analysed with respect to the first dimension of *gaze*, it was found that the majority of the represented participants, irrespective of their sex, did not look directly in the eyes of the viewers, and basically offered themselves as visual cues for denotative meanings (m/f_G= 7/4; m/f_{TR}= 9/4; m/f_{IR}= 15/12). For example, the photo of a graying black man, whose hands were resting on an old white man's arm and shoulder, was used in the pre-listening activity of the global material for creating an authentic situation where the students, as oblivious onlookers to their existence, were led to match the speaker's intention (e.g. "to comfort") with a given sentence (e.g. "Don't worry, everything will be fine") (Falla & Davies, 2018, p. 99). In the few instances, where women were able to establish direct contact with the viewers, other representational choices in illustration style and social distance could also impede visual interpersonal relationships.

In Figure 2, of the three portraits, belonging to inspirational women like Ada Lovelace (Falla & Davies, 2018, p. 116) Idil Biret (Cimen et al., 2021, p. 110) and Tahereh Saffarzadeh (Moghaddam et al., 2020, p. 82) only the first two were addressing the students directly, while the last one was shown totally engrossed in her work. In preference to her two known photos, the global coursebook used Ada Lovelace's drawing in a Victorian evening dress with a coquettish mantilla, red blush and lipstick, and demanded that the world's first computer programmer would rather be regarded preliminarily as a popular romantic figure (i.e. Lord Byron's daughter, *Countess of Lovelace*). In Idil Biret's case, further distanciation, despite her broad smile, had a moderating influence on her communicativeness, however.

Figure 2. The female gaze in coursebook images

The systemic classification of the interactive meanings of the coursebook images by the second dimension of *distance* also demonstrated that the represented participants, whether they were celebrities or noncelebrities, were shown more frequently in close-up (m/f_G= 6/3; m/f_{TR}= 8/5; m/f_{IR}= 9/4), as if they were actually acquainted with the young readers of the global and Turkish-made series, whereas their Iranian counterparts were shown more impersonally in long shot (m/f_G= 2/3; m/f_{TR}= 4/2; m/f_{IR}= 10/10), as if strangers would keep their distance from each other in real-life communication. Friendly encounters with the viewers were also made more interactive in the global and Turkish case through the dominant use of the eye-level perspective, and the students were consequently provided with more accessible role models that they could relate to rather than revere alone (m/f_G= 7/6; m/f_{TR}= 12/7; m/f_{IR}= 10/5). However, the Iranian EFL material did not use the eye-level perspective for representing almost half of the male characters and over half of the female ones. Instead, power differences were encoded through the use of low- and high-angle pictures as in the below collage (Moghaddam et al., 2020, pp. 75, 84).

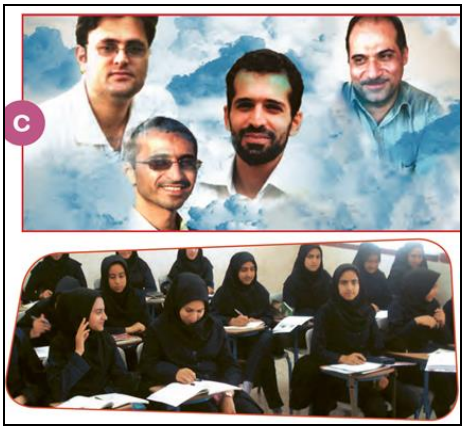

Figure 3. Othering women in coursebook images

It can be observed from Figure 3 that despite both being close shots, the four male scientists were photographed from a lower angle than the coursebook's feminine ideal, Tahereh Saffarzadeh in Figure 2, and by literally looking down from the heavens, they stood a better chance of exerting power over a teenage audience than their more down-to-earth female peer. These male authority figures also stood in sharp contrast to the female students in Figure 3, who were apparently photographed from a higher angle, and would thus be looked down on by the viewers of their own kind, i.e. girls who had to learn English using the given material. In Figure 3, two more strategies of othering were used to diminish women's image, namely, homogenisation and cultural categorisation. Compared to the four male scientists, depicted as specific individuals (i.e. distinguishable by their haircut, facial hairstyles and eyewear), the female students were depicted as a generic group of look-alikes, and further robbed of their individuality through the exaggerated focus on their all-black clothing and head coverings. Nevertheless, two girls on the right still managed to stand out in the crowd with their direct gaze/address, as the rest were typically seen shying away from the viewers.

Figure 4. Masculine detachment in coursebook images

The coursebook images were ultimately examined in terms of the degree of detachment expressed by the horizontal angle. In Figure 4, pioneers such as Thaddeus Cahill (inventor of the world's first electrical musical instrument) (Falla & Davies, 2018, p. 103), Elon Musk (the world's richest tech entrepreneur) (Cimen et al., 2021, p. 108), and Rhazes (medieval Persian polymath and head of a Ray hospital) (Moghaddam et al., 2020, p. 76) were all presented in a totally opposite fashion to those in Figure 3. In placing them sideways, the image creators got these male figures to reciprocate the viewers' intent looks with utter indifference. Perhaps, they wanted to give the impression that unlike women keener to face the audience, men as people of purpose remained aloof because they were engaged with professional transactions in the textbook world, too. It was also worth noting that the male-authored global and Iranian EFL coursebooks had a greater tendency to adopt an oblique point of view in the visual representation of the male characters (m/f_G= 6/3; m/f_{TR}= 3/0; m/f_{IR}= 12/3), whereas the Turkish EFL coursebook, having been authored by more women than men, chose to position both genders more frontally, perhaps due to their feminine interest in involving (learners) and getting involved (m/f_G= 2/3; m/f_{TR}= 9/7; m/f_{IR}= 7/11).

As a result of the current image analysis on textbook sexism, the global and Turkish-made series can be claimed to establish relatively closer, more personal and engaging interactions with both boys and girls visually, and encode a more inclusive and equitable worldview than their Iranian counterpart. At the same time, it was once again observed that neither the global nor locally-produced coursebooks managed to ensure 50/50 gender equality in character portrayals, and male overrepresentation, though to a lesser extent in the former, continued to be the foremost strategy for institutionalising male supremacy in the visual sphere. Two other image analyses of the same series produced in Iran also demonstrated that men occupied two-thirds of the pictorial space, and discrimination against women survived in new editions and through coursebook levels (Dahmardeh & Kim, 2019; Lee & Mahmoudi-Gahrouei, 2020). In Simsek's (2022a) corpus-based comparison of L2 reading materials for refugee learners, the change in the type of learning context (TSL/ESL) made no change in the outcome, for the locally-produced storybooks for young learners of Turkish were similarly outperformed by their New Zealandian peers for young learners of English in both increasing the visibility of women (i.e. through more female illustrations) and supporting equal sharing of the visual sphere (i.e. through mixed-gender illustrations).

Negative stereotyping through role-relationships was another common strategy that came to be applied by the present EFL coursebooks in the visual representation of women. Previous research, too, have shown that in spite of a slight increase in the overall number of female appearances, English language learning materials, especially produced in the periphery, still imposed male dominance by assigning the more diverse and powerful roles to men, and confining women to positions of lesser prestige (Bag & Bayyurt, 2015; Dahmardeh & Kim, 2019; Lee & Chin, 2021; Lee & Mahmoudi-Gahrouei, 2020). In Mustapha's (2015, p. 161) and Azad's (2020) visual analyses of Nigerian and Iranian L2 materials, men made more active, "inherently superior" participants, especially in the work-environment, while women became the goal of others' actions except in domestic activities. The situation appears to have not much improved since the early 2000s, when Giaschi (2000) firstly focused on agency in the images of the mass-market ESL coursebooks, and discovered consistent placement of men as the doers in managerial positions and women as the passive receivers except in the field of fashion. Since textbooks do not necessarily mirror the actualities of gender realisations in a given community, the persistence of gender stereotypes through visual imagery demands urgent attention in the (L2) classrooms of developing countries due to their more insidious influence on female students' career choices (Brugeilles & Cromer, 2009; Dahmardeh & Kim, 2019; Simsek, 2022b).

Apart from male overrepresentation and negative stereotyping, the analysed language teaching materials exploited different combinations of Van Leeuwen's (2008) three major strategies of othering. The first of these, *objectivation*, concerned the direction of gaze. Although indirect address was the dominant pattern in the coursebook characters' interactions with the viewers, overall men still turned out to be looking away from the viewers more frequently than women in the present study. Adel and Enayat (2016) who explored gender-positioning in the images and texts of the UK-produced ESP series on commerce, nursing, technology and

tourism, likewise found that women were more inclined to gaze at the viewers, especially in technology and tourism texts, and regarded the female gaze at the viewers as a sign of weakness. Giaschi (2000, p. 40) also indicated that where men were "looking off into the distance" and women "usually up at them", such portrayals, as "a photographer's trick", served to intensify their status differences, and entailed female dependency in juxtaposed images. The current finding was, however, in direct contrast with Azad's (2020) results in that while indirect address again became the norm, more female than male characters looked away from the viewers, and their visual presentation was yet appreciated as culturally appropriate in the case of Iran's *Prospect* series.

Distanciation was the second major strategy that the given EFL materials exploited to distinguish friends from strangers, and enjoyed much popularity with women rather than men, and even more with the Iranian female characters within the textbook corpus. Van Leeuwen (2008) on the other hand, identified it as a common technique in school textbooks concerning social issues like immigration. In his example, a Dutch secondary geography textbook depicted three women with headscarves in a long shot, but an interracial couple in a close-up, thereby estranging the former party from the world of the (host) students (Van Leeuwen, 2008). According to Azad (2020) the same technique was, this time, used for keeping women away from the viewers and emphasising male prominence through the Iranian coursebook images. Lee and Chin (2021) who investigated gender imagery in Hong Kong's English readers for primary schools, similarly revealed that fathers were placed at a greater distance from children and made less visible than mothers so as to naturalise women as the default caretaker in the family.

In addition to differential use of social distance and the gaze, *disempowerment*, displaying people from beneath our eyes, and/or from the front, was the last strategy that got to be used more efficiently in the representation of women across the given texts (Van Leeuwen, 2008). In point of fact, all the materials, whether global or local, had their share of downplaying women's presence in visual communication by either sparing low-angle pictures for male scientists, and high-angle ones for look-alike Iranian schoolgirls, or aligning the viewers more with female figures overall. Van Leeuwen (2008) observed a similarly unfair treatment of women after 9/11, when a large, culturally homogenised group of Muslim women were photographed from a high angle, and so looked down upon by the *Guardian Weekend*'s readers. In Bakhtiari and Saadat's (2015) study of gender portrayals by 16 random photos from another global English coursebook (*Interchange*), women were viewed not only as the leading agents of trivial and domestic activities, but also from the front, as part of the viewers' world, so that men, even if they were nursing or cooking, could be shown from the oblique angle, as no agreed-upon reality.

Conclusion

On the basis of evidence from the current image analysis of global and local EFL coursebooks, neither type of English language learning materials can be claimed to achieve at least 50/50 gender balance within their character networks, and though to a lesser extent in the global course, male dominance was still imposed overtly through two well-known techniques, overrepresentation of men in powerful/prestigious positions, and negative stereotyping of women with vulnerabilities and subservient roles. Independent of the particular learning context they were produced for, all the materials used in different combinations Van Leeuwen's (2008) more covert strategies for othering women. The coursebook characters mainly avoided direct contact with the viewers by averting their gaze and offered themselves as visual cues for denotative meanings, but overall, slightly more men than women became the subject of objectivation. By positioning them both closer to the young readers and at their eye level, the global and Turkish-made series helped build intimacy with more relatable role models. Distanciation was nevertheless found most popular with the Iranian female characters, and long shots, when coupled with high-angle pictures, further served to portray women as the diminished other to be looked down on by fellow students/citizens. While both genders were oftener seen frontally and so more involved with the viewers in the Turkish EFL material with mixed-gender authorship, the all-male author teams preferred to show men from an oblique angle to empower them with detachment in the global and Iranian contexts.

It can thus be concluded that in establishing relatively closer, more personal and engaging interactions with both boys and girls visually, the global and Turkish EFL materials endeavoured to present a more inclusive and equitable worldview than their Iranian counterpart. Considering that all the choices the coursebook teams make in the verbal and visual contents are more or less value-laden, even the most diverse materials, in terms of gender representations, may hurt the feelings of others that are not foreseen by their writers, illustrators and publishers. However, despite lack of control over coursebook compositions most of the time, the reflective teacher's choice between coursebook candidates is not ideology-free, either. For this reason, starting with their pre-service education, L2 teachers as the immediate arbiter of classroom justice should be trained to diagnose

gender-biased textbooks, and armed with the essential skill set for adapting materials in order for their learners to fight against more subtle forms of inequities in and beyond their schooling.

Recommendations

Since the present study focused on exploring the latent sexism in the human images of only three thematically similar (science-themed) units from one global and two local secondary English textbooks, the size of the corpus (41 images), sampling method (purposive sampling), the origin, proficiency (pre-intermediate) and grade level of the selected materials can be listed among its limitations. Therefore, future researchers might consider replicating the analysis with a larger corpus of more diverse materials (e.g. with different skills focus, or for lower-level/grade students), involving not just selected units but all the coursebook texts and images in the analysis, and comparing gendered realisations across different learning contexts both qualitatively and quantitatively.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the author.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Special Education and Diversity (www.iconsed.net) conference held in Istanbul/Turkey on August 25-28, 2022

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To cite this article:

Simsek, M. R. (2022). Gender-positioning within the visual network: How (non-)inclusive can EFL materials get? *The Eurasia Proceedings of Educational & Social Sciences (EPESS)*, *26*, 11-18.

The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2022

Volume 26, Pages 19-27

IConSED 2022: International Conference on Special Education and Diversity

An Empirical Examination of Universities' Strategies for Supporting Students with Special Learning Disorder in Developing Countries: A Predictive Model Using Mixed-Methods Research

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Abstract: Educational statistics have shown a growing number of students with special educational needs (SEN), such as learning disorders accepted into different university programs; empirical evidence indicates that they still face difficulties in adapting to the learning environment and education process. In contrast, little empirical research in developing countries has tested strategies that universities can adopt to support these students. Nevertheless, our preliminary study revealed that many Egyptian universities remain unprepared to deal with disabled students. This study has taken a further significant step in contributing to both theory and practice and helps address some gaps in the current body of literature through: (a) Providing a deeper understanding of students with SEN, explicitly learning disorder in developing countries. (b) Outlining some supportive strategies needed to be addressed by universities to meet the needs of these students before and during their course study. (c) Developing and validating a mathematical model predicting and examining the perceived effectiveness of these strategies. The current study used mixed methods research (MMR) as a methodological research paradigm for gathering, assessing, and mixing both qualitative and quantitative approaches to enhance the integrity of the research finding and comprehensively understand a research phenomenon. The developed questionnaire was pretested, and feedback from the pretest and the panel of experts was used to revise the survey instrument. The reliability of instruments was assessed and showed high using internal consistency (Cronbach's alpha > 0.8). Multiple regression analysis with its associated statistical inference tests was applied. Based on our findings, the study has made a number of important managerial and academic implications. These findings provide valuable guidance for researchers and practitioners, open areas for future research, and add empirical weight to research addressing developing countries.

Keywords: Differentiated teaching strategy, Mixed-methods research, Special educational needs, Special learning disorder, Virtual learning environment strategy

Introduction

Educational statistics have shown that a growing number of students with special educational needs (SEN), such as learning disorders, are accepted into different university programs. Now most universities and higher-educational institutions in western countries are developing supportive strategies and plans addressing the needs of their students with disabilities to provide effective individualized learning environments that maximize academic and social development (e.g., Lenkeit et al.,2022; Annemarie & Cate, 2011; Dermody & Majekodunmi, 2011; Mauceri et al., 2011; Bossaert et al., 2012; López et al., 2013; Madaus et al., 2022; Atkins, et al., 2022). In this context, Lenkeit et al. (2022) stressed the importance of educators finding an integral approach to support.

However, empirical evidence indicates that students with Special Learning disorders rate are increasing and still face difficulties in adaptation to the learning environment and tend to achieve poorer outcomes in terms of final degree classification, despite having comparable qualifications to other students when entering the same university (e.g., Madaus et al., 2022; Brittle, 2020). Therefore, individualization in the learning process is

necessary, and universities need to adopt academic and administrative strategies for these students and need to ensure that such strategies are implemented effectively. Given that the current literature suggests that the potential adaptive strategies required may quite differ for different disabilities, and students with SEN should not be discriminated against or substantially disadvantaged by higher-education institutions (e.g., Taylor et al., 2010; Ghergut, 2011; López et al., 2013). Therefore, there would seem to be some merit for more studies to empirically examine the perceived effectiveness of strategies regarding students with special educational needs at unstudied developing countries to enhance their learning outcomes. The current research is an attempt at this direction.

Research Problem, Objectives and Plan

Although studies regarding strategies for students with SEN are increasing, related models offered in the academic literature concerning its applications in universities are mainly conceptual, and recommendations remain disproportionately less effective (e.g., Tarantino et al., 2022). In contrast, little empirical research has tested it from the perspective of these students.

On the other hand, little empirical research in developing countries has tested strategies universities can adopt to support these students. Contreras et al. (2022) indicated that few studies had examined this issue outside of the United States. Nevertheless, our preliminary study revealed that many Egyptian universities remain unprepared to deal with disabled students. Therefore, our research attempts to narrow this research gap in the current body of literature by identifying and examining the critical adaptation strategies for students with SEN, as well as suggesting recommendations to enhance their learning outcomes

In sum, the present investigation contributes to literature and practice through achieving the following objectives: (a) providing deeper understanding about students with SEN, specifically in developing countries, (b) outlining a number of adaptive strategies needed to be addressed by universities to meet the needs of these students before and during their course study, (c) developing and validating empirically a mathematical model predicating and examining the perceived effectiveness of these strategies.. With these objectives in view, the current paper has been organized as follows: the literature and relevant studies were reviewed and analyzed. Then hypotheses were formulated to be tested in the study. This was followed by an explanation of the procedures used to obtain data, measurement, and validation processes, as well as the testing of the hypotheses stated. Finally, based on our findings a series of conclusions with managerial implications and final thoughts that emphasize the great interest in the topic under analysis were presented; and then certain limitations and future lines of research with regard to this issue were highlighted.

Literature Review

Relevant literature, which provided the conceptual foundation for this paper and past research, was extensively reviewed and integrated sequentially, including a wide range of recently published works, to develop the study hypotheses more effectively. For the current study purpose, the literature review is organized to address the following streams:

Theoretical Background and Related Works of SEN

In current literature, students with SEN are defined as students with various (combinations of) difficulties in participating in education (Bossaert et al., 2012). More specifically, when they have more difficulty than the rest of their classmates in accessing specific learning in the curriculum that corresponds to their age or require special education and related services to achieve their fullest potential, and their disabilities range from speech and language impairments to mental retardation (López et al., 2013; Vassiliki et al., 2011).

Similarly, Nash and Norwich (2010) suggested that the term Enhancing the Effectiveness of Adaptive Strategies for Special Educational Needs Students: An Empirical Examination and Proposed Predictive Model SEN is used officially to refer to those students who require additional or different provision for their learning difficulties and disabilities, given that some researchers prefer using the terms “inclusive education” and “barriers to learning” instead.

Academic Advisory Strategy

For students with SEN, the transition process from school to a full-time university course can potentially be more daunting. Ideally, students with a disability applying to university should declare their disability on their application form. This can assist the academic advisors' system in making appropriate adaptive strategies or plans before the teaching process starts. However, for a variety of reasons, not all students declare their disability on entry to the university (Taylor et al., 2010). Hence, academic advisors should conduct panel interviews will all students applying to the university and organize regular meetings with the parents of students who market as disabled or need a particular educational treatment to develop a plan for supporting them throughout their course.

Virtual Learning Environment Strategy

Today, the virtual learning environment evolves in parallel with the rapid development of informatics technology and has been conceptualized and defined in multiple ways in literature as a distance learning environment that uses the Internet technology to interact with remote learners and deliver educational material electronically to support students and universities goals and enhance knowledge transfer (Ahmed, 2013; Cihak, 2011; López et al., 2013). From students with SEN perspectives, a virtual learning environment provides them a more flexible and convenient method of delivery of learning materials unrestricted by location and time, enhancing the acquisition of skills and providing an opportunity to engage in communication activities matched to their individual needs and abilities. The range of virtual learning environment tools includes tools that permit a course to be housed "online," with access by password to a repository of course instructions, readings, lecture recordings, and other resources linked by the internet. Also enable lecturers and students to initiate communication and to interact synchronously "live, in real-time", and asynchronously "ready when time permits" (see Small et al., 2012; Brown & Charlier, 2013; Hassanzadeh et al., 2012; Jonas & Burns, 2010; Owens & Price, 2010; Chen & Huang, 2011; Wu et al., 2010; Chen & Tseng, 2012; Özyurt et al., 2013).

Differentiated Teaching Strategy

In a differentiated teaching strategy, higher-educational lecturers accept that each student learns in a particular way and has significant needs, so they adjust the curriculum, promote different learning styles, and try to engage all students in the learning process. Under these circumstances, lecturers should take into consideration the learning profile of their students, which is based on their interests, their performance, and the particular way they learn when designing each teaching hour as the needs vary from lesson to lesson, even for the same students (Vassiliki et al., 2011). These arguments are consonant with the results of other works (e.g., Mavrou, 2011), which support the effectiveness of differentiated teaching in helping students with SEN cope with learning difficulties. As concluded by López et al. (2013) curriculum adaptations are contextualized educational strategies to facilitate the teaching and learning process in students with special educational needs, making modifications to the regular curriculum.

Developing Hypotheses and Research Model

The hypotheses formulation process was based not only on a comprehensive review of the specialized literature but also on the data collected from a series of qualitative studies in the preliminary stages of the current research. In the light of this process, three hypotheses were formulated as follows:

H_1: Implementing an academic advisory strategy for students with Special Learning Disorder positively influences their perceived effectiveness in the transition process.

H_2: *Implementing a virtual learning environment strategy for* students with Special Learning Disorder *needs* influences their perceived effectiveness in the transition process.

H_3: *Implementing a differentiated teaching strategy for* students with Special Learning Disorder influences their perceived effectiveness in the transition process.

The proposed research model in figure 1 presented integrated the three predictor constructs derived from previously validated studies and our preliminary study to be examined simultaneously, as symbolically shown in the multiple regression equation (*EQ1*), to predict the perceived effectiveness of the transition process (the

criterion variable: Y_{PTP}), served as regress, given known values from a set of predictor variables, used as regressors

$$Y_{PTP} = a + b_{ADS}\ ADS + b_{VLE}\ VLE + b_{DTS}\ DTS \quad (1)$$

Where:
ADS= Academic advisory strategy
VLE= Virtual learning environment strategy
DTS= Differentiated teaching strategy
Y_{PTP}= Perceived effectiveness of transition process

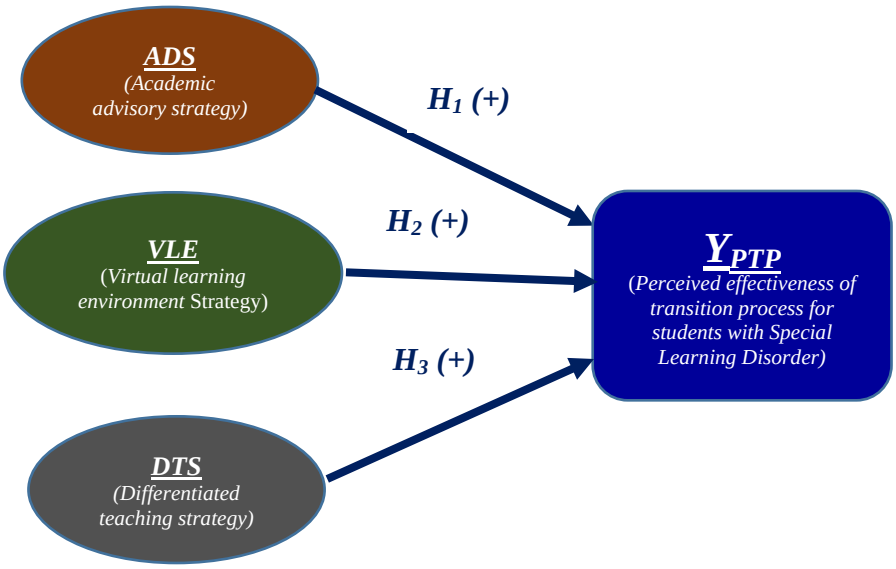

Figure 1. Research model

Research Methodology

This empirical study employed a mixed-methods research design, combining elements of quantitative and qualitative methodologies to enhance the integrity of the research finding and broaden the research possible (e.g., McLaughlin et al., 2016; Taguchi, 2018). The multivariate statistical technique, structural equation modeling (SEM), was applied to simultaneously examine all the latent variables (constructs) and the multiple indicators variables that constitute our model. This method was viewed to be the most appropriate for analyzing the structural relationships between latent constructs, which are multidimensional and measured variables (e.g., Kim et al., 2020; Kursunoglu & Onder, 2019; Lee, 2018; Clark, 2019; Qureshi & Kang, 2015; Yuen et al., 2019). Before conducting this analysis, statistical tests for multicollinearity, normality, and linearity were carried out to ensure the data used in the empirical data met the requirements of multiple regression analysis. Thus, the research process involved multi-stage procedures as follows.

Qualitative Study

Preliminary qualitative study data were collected using the focus group, complemented by a series of in-depth face-to-face interviews. The aim was to get a deeper understanding of the phenomenon under consideration, support hypotheses development, and establish the criteria and relationship constructs relevant to our empirical study. Issues arising from this stage were used as a basis for the subsequent quantitative study.

Quantitative Study

The quantitative research design in the form of a questionnaire survey involved a cross-sectional methodology. The study was conducted over three months to collect empirical data. The target population was undergraduate students with Special Learning disorders at the Egyptian universities that adopted the credit hours' system, as this system allows the student to study according to his own pace and abilities.

Unlike the fixed format teaching many Egyptian universities follow, the credit hour system enables students to select several courses from a well-planned academic program. Each student is assigned an academic advisor who guides him in planning his study program, monitors his progress, and helps solve any problems that may be encountered. To increase generalizations, the participants were spread across four universities in Egypt during the academic year. To gain as many representative samples as possible, participants were drawn from various courses.

Instrument, Validity, and Reliability

Before the survey, this current research took steps to ensure reliability and validity. The scales used for the measurement process were developed after reviewing the related literature, and an initial set of items was adapted from well-established validated survey items of previous works to operationalize each construct of interest in this study.

Measurement items were modified and translated into Arabic to fit the current study context better. In line with prior works (e.g., Javed & Wu,2020; Francionia et al., 2018) research variables were measured by multiple items using a 5-point multi-item Likert scale. The questionnaire was pre-tested among 30 academicians and practitioners. A pilot test followed this step. Based on pre-test and pilot test feedback, modifications had been made to improve readability and appropriateness. The revised questionnaire was again pre-tested, the final version was found to work well, and the instrument has confirmed content validity.

The reliability and validity of the constructs were evaluated. Cronbach's alpha coefficient test was used to assess the internal consistency reliability. The reliability analysis results of the present paper showed that the value of Cronbach's alpha of every construct is more significant than 0.8 (ranging from 0.85 to 0.96, indicating adequate convergence of internal consistency and constructs were proved to be sufficiently reliable for analysis. Also, exploratory factor analysis was used to evaluate the construct validity, demonstrating the acceptable standard.

Research Design

The research design for this study involved a cross-sectional survey methodology. Among a total of 120 questionnaires that were randomly distributed, 56 valid responses were received and used in data analysis after removing invalid answers, yielding a usable response rate of 46.66 percent for the overall survey. The demographic profile of the sample was mainly male (73.21 percent), and the median age was approximately 19 years. Despite the relatively low response rate, which is thought to be expected in social sciences surveys, the fact that the respondents were as representative of the population as possible led to their contribution being regarded as providing information applicable to the larger population.

Data Analysis, Testing the Research Model and Results

The empirical data collected by the survey was analyzed and tested using statistical software packages (SPSS). Due to the presence of more than one predictor in the study, multiple regression models were built to examine the joint and independent influence of the predictors on the criterion variable and model relationships. The associated statistical inference tests of multiple regression analysis (F test and t-test on b) were applied to prove the significance of the variables included in the research model. To avoid violating the basic assumptions underlying the method of least squares used by the classical linear regression, a P-P plot for assessing the assumption of normality was conducted.

Multicollinearity Test

Before conducting the multiple regression analysis, tests concerning multicollinearity among the independent variables included in the research model, normality, and linearity tests were carried out to ensure the data used in the current study met the requirements of multi regression analysis. The values revealed no severe multicollinearity problem among the regressors, which suggested that predictors were tolerated in the criterion variable.

The Results of Hypotheses Testing

The results of the multiple regression analysis in table 1 led to accepting the hypotheses mentioned earlier, while the statistical significance test supported this acceptance.

Table 1 Reg. summary outputs and ANOVA

Coefficients a	Symbols	Values
Model Summary a		
Multiple correlation coefficient	Multiple R	0.93757282428057
Coefficient of multiple determination	R^2	0.87904280082944
Adjusted R Square	Adjusted R^2	0.87206450087724
Standard Error	SEE	0.80845071464999
Observations	N	56
ANOVA b		
Regression	SS_{reg}	246.995329840202
Residual	SS_{res}	33.9868130169404
Total	SS_{total}	533.1223776
F-test overall model	F	80.982142857143*
Degrees of freedom	df1, df2	3, 52

a Criterion variable: Y_{PTP} b. Predictors: (constant), ADS, VLE, and DTS

*p<0.00000000 levels of significant

A solid significant, meaningful correlation is found between the perceived effectiveness of the transition process and the above-mentioned independent variables (Multiple correlation coefficient: *Multiple R*=0.93757282428057). The *F statistic value* (F=125.96804477556 at p < 0.000000 level) is statistically significant, indicating that the model's results could hardly have occurred by chance. Thus, the goodness-of-fit of the model is satisfactory. The coefficient of determination and *multiple R-square* showed that these predictor factors explained the significant proportion (87.90 %) of the variability observed among perceived effectiveness of the transition process (R^2=0.87904280082944), which reinforces our confidence in the hypotheses testing results and provides support for the association mentioned above.

Furthermore, the *adjusted* R^2 of the model, which is a more conservative estimate of variance by considering error variance, is 0.872064500877299. This reinforces our confidence that the overall explanatory power of the research model is considered high and quite capable of explaining the observed variance among the sample. For easy comparison and assessing the relative impact of each predictor variable on the criterion variable, standardized beta coefficients and *t-test* values were summarized in table 2.

Table 2. Regression coefficients of the research model and significance tests

Constructs [a]	Non-standardized Regression Coefficients		standardized Beta Coefficients **β**		t-test	
	Symbol	Value	Symbol	Value	Value	Sig.
ADS	B_{ADS}	0.6359791	β_{DEC}	0.364	5.354563	0.00000000*
VLE	B_{VLE}	0.5152989	β_{VLE}	0.241	3.710234	0.00050476
DTS	B_{DTS}	0.0431290	β_{DTS}	0.132	0.349093	0.72842859
Intercept	a	0.8291771				
df	n-k-1	52				

a Criterion variable: INT *p<0.00 levels of significant

More specifically, academic advisor system (*Beta* $_{ADS}$ *=0.364, p < 0.000000*) had the highest effect on smoothing the transition process, followed by the virtual learning environment (*Beta* $_{VLE}$ *=0.241 p < 0.00050476*). Using the values of the regression coefficients presented in table 2, the future perceived effectiveness of transition process can be predicted, in this study, by the following final equation (EQ2):

$$Y_{PTP} = 0.83 + 0.63\ ADS + 0.51VLE + 0.04\ DTS \quad (2)$$

Normal Probability Analysis

A P-P plot of regression standardized residual for assessing the assumption of normality was conducted, to see if the error term ϵ is normally distributed (e.g., Schmidt, 2018). The plot, in figure 2, showed that the data met the assumptions of normality, quantile pairs fell nearly on a straight line and quite close to the 45-degree line. Thus, it can be concluded that the data used in this research are approximately normally distributed, and the fitted model is appropriate

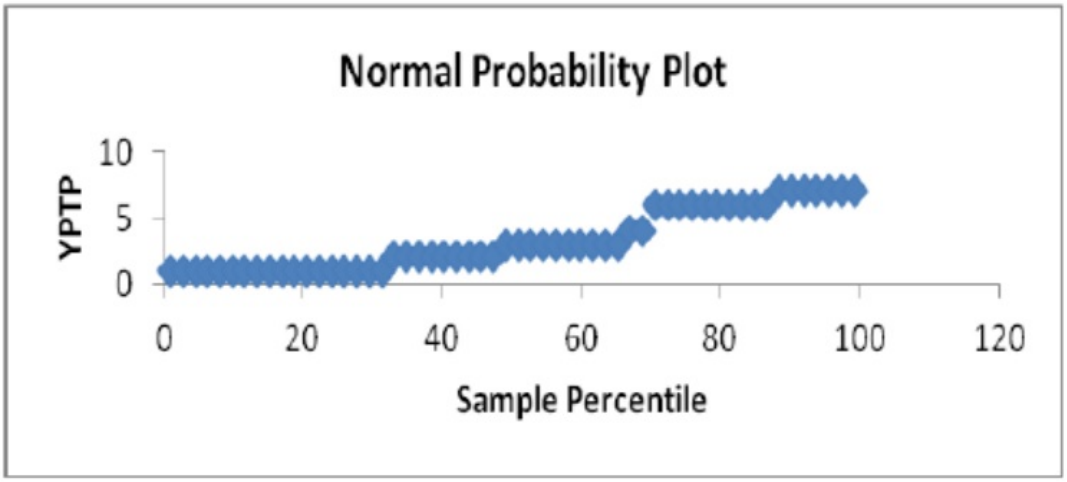

Figure 2: Normal P-P Plot of regression standardized residual

Discussion, Findings, and Implications

General Discussion

This paper contributed to both theory and practice concerning special education. The current study may help to fill some gaps in the existing body of literature, specifically in developing countries, and offers several practical implementations and theoretical contributions.

Practical Implications

From a practical perspective, the results presented in this paper emphasized some strategies that need to be addressed by universities concerning meeting the needs of students with Special Learning Disorder both before and when they start their course of study. It is hoped that the topics covered in this paper may be helpful to higher-education institutions in developing countries to make them aware of the potential adjustment transition strategies that may be required for such students. As it was found that the academic advisor system (had the highest effect on smoothing the transition process, so if the university advisors use their knowledge of students' strengths, interests, and talents to engage them in at least one or two classes, the students may prefer, benefits may ensue.

Theoretical Implications

The current study is considered among the first to empirically examine strategies for Supporting Students with Special Learning disorders in Developing Countries in Arab literature. The results successfully supported the proposed model's validity and the suitability of the mixed-methods research design used in this study. The current study provides empirical evidence and validation for the existing specialized literature concerning disabled students. Also, the findings of the empirical study provide support for the research model and the hypotheses regarding the directional linkage among its variables. The high overall explanatory power of our model indicated that this model is capable of explaining the high proportion of variance observed in the perceived effectiveness of the transition process.

Limitation and Further Research

Despite the practical implications and theoretical contributions, the current study has some limitations that indicate directions for future research. Since the survey is cross-sectional, future research could use a longitudinal field study method to examine the hypothesized relationships. Second, the research model was validated using empirical data gathered from Egypt. Therefore, the findings may be much contextualized toward the culture in this developing country.

Apart from the above, we must point out that although the majority of the hypothesized relationships were validated and significant, and the proposed model yielded a relatively high level of coefficient of multiple determination (multiple R-square), there is still a need to find additional variables, to compensate for this limitation and improve the model's ability to predict. However, there are other opportunities to build on this study in future research. Suggested areas include re-examining the proposed model in other countries with different cultures, and making comparisons, to see whether it can be applied. Also, it would be valuable if future research could use other theoretical bases or different methodologies and samples to derive more predictions.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Special Education and Diversity (www.iconsed.net) conference held in Istanbul/Turkey on August 25-28, 2022

* The author would like to thank all faculty deans who facilitated his take in collecting data from their faculties. Also, the author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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To cite this article:

Ahmed, T.T. (2022). An empirical examination of universities' strategies for supporting students with special learning disorder in developing countries: A predictive model using mixed-methods research. *The Eurasia Proceedings of Educational & Social Sciences (EPESS), 26*, 19-27.

The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2022

Volume 26, Pages 28-33

IConSED 2022: International Conference on Special Education and Diversity

Using Multimedia Learning Objects in Special Needs Classroom

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Abstract: The research project highlights the use and creation of multimedia learning objects to improve the learning of special needs students. The researcher investigated how the audiovisual context had progressed into a new approach to learning that sharpens the analytical reasoning and rational social skills of special needs students. This research proposed a two-group pre-test – post-test qualitative research to measure the impact of multimedia learning objects in improving the learning abilities of students with special needs in schools. The experiment aimed to see that a multimedia education paradigm may benefit two groups of students with different learning impairments. It was aimed toward students with Autism or Down Syndrome under the age of 15. Many of these students are taught in ordinary special needs classrooms without special intervention tools. The findings suggest that multimedia technology in learning can assist students with learning disabilities. The well-thought-out system benefited autistic students, demonstrating the educational potential of a multimedia system. A plan targeted to one particular disability group may be more effective than a comprehensive system that tries to fulfill the needs of many different disability groups.

Keywords: Multimedia learning objects, Special needs, Autism, Down syndrome

Introduction

There are millions of students worldwide who are affected by Autism. However, extensive research has been undertaken to provide appropriate techniques, such as therapy and education, to aid children and people with Autism (Cadoni et al., 2014). The Picture Exchange Communication System (PECS) and the Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) were created in the United States and are now widely used across the world to assist persons with Autism in managing (TEACCH). As a result, a large number of people throughout the globe utilize these two applications (Botturi et al., 2008).

Autism affects students in various ways, including their communication capacity. The ability to talk may never develop in some students, while others during their lives. PECS is a technique developed by the Delaware Autistic Program in the United States (Forni, 2008). Through artifacts and symbols, this technique helps children learn to speak. Six primary steps comprise the system, which is considered cost-effective to utilize.

TEACCH, a program developed in North Carolina in the 1960s, is another example. This program aims to equip children with Autism to perform independently at home, at school, and in society. This organized education program can assist in managing the child's surroundings by delivering transparent, tangible, and relevant visual information (Heldsinger & Smith, 2005). Furthermore, the method is founded on the idea that most Autistic persons learn visually rather than via written or spoken data. Even if a child doesn't want to answer a straight question, parents may provide a variety of alternatives for breakfast. Instead of stating what they want for breakfast, the children might point to the image. The researcher designed a series of multimedia learning objects for students with Autism or Down Syndrome. An ed-tech guidebook, best practices, and the results of real-world teaching situations were used to construct the multimedia learning objects (Khan & Knight, 2010). The

researcher then assessed if there was evidence of diverging levels of study from each set of students to determine how best to serve these individuals. An overview of the study's findings is provided in this publication as an explanation of the research's possible outcomes.

Background

This project aims to create multimedia instruction for students with Autism or Down Syndrome. As a result, it is vital to investigate the theory behind multimodal learning. As defined by Richard Mayer, Multimedia learning is learning through the use of words and images (Mayer, 2001). According to him, "*multimedia messages built with the human mind are more likely to lead to effective learning than those not.*" (p.41) In his cognitive theory, two channels, a finite capacity, and active processing are all assumptions Mayer made by multimedia learning. The research effort is focused on a dual belief, which holds that people have two different ways of acquiring knowledge: visual and aural representations. The Dual-Channel assumption states that there are two other channels of pattern recognition: visual and auditory/verbal. When delivering educational content to learners, it is preferable to use both auditory and visual channels rather than just one. This notion is especially relevant for students with a hearing disability, who depend significantly on their sense of touch. To be clear, the Mayer approach was developed for typically developing children and makes no effort to cater to the requirements of those who have special needs. Consequently, these theories must be tested to see whether they apply to students with special educational conditions, such as Autism or Down Syndrome. They have a greater need to reduce their reliance on their auditory senses.

Cognitive load refers to the total amount of brain processing required to keep our memories operating at a particular moment (Sweller & Chandler, 1991). The cognitive load hypothesis of Sweller and Chandler states that appropriate instructional material increases learning by directing mental resources toward learning-related activities instead of activities that are preliminary to training (Paas et al., 2003). As a result, when inefficient instructional material designs are provided to the learner, it might place an excessive mental burden on their working memory, making it difficult for them to learn. When dealing with autistic students, it is vital to manage cognitive load or Down Syndrome since they have poorer auditory and visual balance than ordinarily developing learners. When creating multimedia communications for students with exceptional needs, difficult or irrelevant material must be minimized further and far more than typically developing learners.

Literature Survey

A literature study was done for the objectives of this fact sheet to analyze existing approaches for developing and designing multimedia projects. Moreover, multiple studies addressed different areas of multimedia development in higher levels of education, and a concise set of rules depicting the creation process for multimedia learning objects is lacking.

Models for Multi-media Development

A paradigm would provide an organized structure for the practice of design curriculum, which can be a daunting endeavor. Stoney and McMahon (1998) in one growth strategy, utilized Gould's (1995) model of multimedia development and classified the four primary phases as follows: (1) information design, which includes content planning and audience analysis, (2) interface design, which helps connect the student with the subject matter in the most workable and straightforward way possible, (3) navigation, which connects the pages of content in a structured way, and (4) interaction design, which defines how the program works as well as how the student uses the program. Alessi and Trollip (2001) developed a four-phase approach that included (1) delivering knowledge, (2) directing the learner, (3) practicing, and (4) monitoring learning.

Multi-Media Learning

Among several, Clark and Mayer's (2003) work mentions multimedia creation and has made substantial contributions to our knowledge of how the cognitive functions of processing visual and audio information might affect learning. Their instructions on combining pictures, audio, video, textual and spoken narration are critical to constructing multimedia learning objects. With this basic knowledge, practitioners may critically assess multimedia components to avoid cognitive overload, inhibiting teaching (Clark & Mayer, 2003). Aside from the

learning issues, there is evidence that multimedia training may be more motivating, entertaining, and available at any time and location than traditional learning approaches (Zheng, 2009; Astleither & Hufnagl, 2003). Furthermore, Bernard and colleagues (2004) found that students who were actively interested in their homework were more driven to achieve higher levels than those who were not engaged. Lui, Toprac, and Yuen (2009) highlighted five components that contribute to intrinsic motivation to promote this engagement: (1) problem-solving skills, (2) having a great time or playing, (3) data processing, (4) self-restraint or voluntarily acting, and (5) socializing.

Table 1. Multi-media learning principle

Principle	Description
Personalization	A more meaningful learning experience is provided to the audience when the speaker speaks in a conversational rather than formal way.
Redundancy	People learn more effectively from multimedia lectures when visuals are communicated only through audio narration rather than voice and on-screen text.
Modality	When audio storytelling is utilized to explain visuals in multimedia classrooms rather than on-screen text, students learn more effectively and retain more information.
Coherence	Students learn more effectively when the distracting narrative, graphics, and music are eliminated from multimedia lectures.
Contiguity	Similar printed words and visuals are displayed on the screen near one another or when audible words or visuals are shown simultaneously.
Multimedia	Exposure to both words and visuals makes them more likely to retain information.

Methodology

One week of research was conducted in a Malaysian school for students with moderate learning disabilities (MLD). This specific institution caters to the special educational needs of students as young as fifteen. In this case, frequent contact with the end-user was inappropriate due to their communication difficulties (Sutton, 2011). Instead, requirements were generated from user observations, discussions with classroom teachers, and other research. Regulators forbade audio recording, so these remarks had to be recorded verbatim. Four of the school teachers were questioned on the best ways to instruct their students, and the researcher gleaned their advice from them. Teachers who worked with students with learning problems were well-versed in Autism and Down Syndrome (Yim et al., 2019). The school's comparable ability courses formed two groups of seven students. Despite the lack of pre-testing or profiling for this planned research, the school had included these students in the sample. It determined that they were at comparable ability levels in the particular domain of the Ecosystem without prior teaching.

Data Collection

The school watched a group of Autistic and Down Syndrome students to determine if they utilized different learning tactics for various obstacles. Teaching and communication methods, including Makaton symbols and phrases, were the most often used for Autistic and Down Syndrome students. Both groups of students like and understand these tactics. The teacher also promised to use the same instructional techniques for students. Everyone used the same instructional methods (Kopp & Forni, 2012). Also, both teams are instructed to use the same techniques. Teachers and administrators at the school endorsed Makaton symbols, commonly used for homework and classroom assignments. The most effective teaching method included pictures and Makaton signs with words, similar to Mayer's multimedia approach.

Research Result

Experiment 1:

In Experiment 1, the researcher looked at how long it took students on average to answer a set of questions after learning the strategy and how many times they had to try until they got it right. In this post, you will find the

results. Compared to individuals with Down Syndrome, students with Autism made much fewer efforts to respond correctly. Once, an autistic student had to make two attempts before answering correctly. Autistic students answered faster than Down syndrome students.

The hypotheses were tested using a t-test. The tests compared the number of tries made by Autistic and Down Syndrome students to answer problems correctly. It was shown that there was a significant disparity between the cognitive efficiency of the Autism and Down Syndrome groups (number of attempts). There were two different groups of 7 students in each group. The amount of time it takes for participants with Autism and those with Down Syndrome to deliver their replies varies widely. A two-tailed test was used in the hypothesis with ***t=2.449*** and ***p=0.05***. As a result, both data demonstrate considerable differences in learning performance. There is evidence that students perform differently when using the same multimedia learning objects. The learning objects were created to accommodate both categories of students based on research, observations, and interviews.

Revised Learning Objects

The learning objects were rebuilt based on the findings of a usability study and observations made to determine where potential difficulties could arise in the future. Following this, the plan was modified following the results.

Experiment 2:

The multimedia learning objects were modified, and the test was carried out once more. The time and number of tries were both recorded under identical conditions. The Autistic group just needed one effort to provide answers accurately. It was more difficult for those with Down Syndrome to answer questions accurately. Compared to students with Down Syndrome, the participants with Autism took less time to complete the questionnaires. The hypotheses were once again tested using an independent t-test. The multimedia learning objects were tested using the same students. The results, with p=0.05, are as follows. As a result of this initial test, it may be concluded that there is still a significant gap in the learning abilities of students with Autism and those with Down Syndrome. There was a substantial difference in the time it took the two groups to respond to questions in the second trial (time taken). To conclude, the findings reveal that the null hypotheses have merely been rejected to establish that there truly is a difference in the performance level of the students when the same multimedia technology is utilized for learning.

Experiment 1 and Experiment 2 Paired t-tests:

Two t-tests were performed to compare the results of the Downs Syndrome cohort using the first system (Experiment 1) to the group's performance using the dual system. This test used the number of tries and the time it takes (Papagno, 2014). There is no significant difference in learning performance for the Down syndrome group for the first and second systems (Experiments 1 and 2) depending on the number of tries. Because the hypotheses were two-sided (the t was estimated at ***2.35***), the critical threshold of ***3.182*** is substantially lower than obtained.

Time:

It is clear from the estimated **t-test** value of ***3.000*** that it is significantly less than the critical value of ***3.182***, indicating that there is no statistically significant difference between the Down Syndrome group's performance in learning from the first and second systems on the time it takes to respond to questions (Furukawa et al., 2016). To conclude, both findings suggest no real learning is taking place. There is inadequate data to demonstrate that the second method improved learning performance in the Down Syndrome group.

Research Discussion

The statistical findings indicate that the two groups should not utilize the same system. There is substantial evidence that when groups with varying learning needs use the same multimedia learning objects, the learning performance varies significantly. Despite the modifications to the second procedure to make it more acceptable

for the Down Syndrome group, no statistically significant variations in their academic performance were found (Eristi, 2007). However, it has been identified because the outcomes of tests 1 and 2 demonstrate advantages. The multimedia learning objects benefited Autistic students.

According to the research, this could explain why autistic students performed better than those with Down Syndrome. As the first experiment results demonstrate, students' reliance on the teacher's aide to repeat the questions supports this assumption. This has been noticed several times. When answering questions in the second trial, it was found that the students often used the repeat button. If this is the case, it might be because they had difficulty hearing the question read aloud (Baddeley et al., 1998). By not overburdening their auditory channels and providing them with a minimal story, the strategy helped the students. Unluckily, the students require additional acoustic help to overcome their challenges.

According to Portsmouth University, short-term memory loss is common in children with Down Syndrome. This is another factor that may have had a role in the exam failure of these students. Using less text and more screen graphics, the system tried to assist students in this area (McEwan et al., 2006). Several learning objects that presented much information were problematic for the students in this initial testing. Consequently, when the learning objects were updated, some content was deleted to lessen the cognitive burden on students' working memory (Crichton et al., 2006). Moreover, there was always a sign at the bottom of each frame to remind the students of the task that they were doing. This is done so they don't have to recall what they're doing.

Despite efforts to assist the students and prevent this issue, their performance was impacted. This finding shows that students with Down Syndrome require improved cognitive load control. Students with Autism, on the other hand, benefited from the multimedia learning objects (Sasaki et al., 2008). The literature and background study revealed that they use visual strategies to aid their learning. As a result, the multimedia learning objects used a range of visuals, symbols, and animated representations to assist the students (Frey et al., 2007). Furthermore, the ideas of cognitive load theory were used to help autistic students effectively meet the challenges of the class, considering that working memory is highly restricted.

Conclusion

To summarize, the findings suggest that there can't be two different special needs groups using this approach. Because of the visual-oriented design and extra assistance for cognitive loading, both students found the multimedia learning objects fun and intriguing. On the other hand, the Down Syndrome group could not convert their pleasure into educational opportunities, and having fun was the only thing on their minds (Yim & Samuel, 2009). Even though all groups were considered equally competent by the school, the data suggest that each group needed a different approach to learning. According to the research, they have different learning needs, yet both groups may benefit from the same instructional methods. It has long been accepted that a single treatment may be given to those with Autism Spectrum Disorders and Down Syndrome. According to the findings, this method is not beneficial and is especially problematic when developing computer-based learning objects utilizing the same multimedia learning system (Churchill et al., 2016). Abstract thinking is a problem for students with Autism Spectrum Disorder. Thus, they require concrete items to help them. Students with Down Syndrome have additional challenges such as hearing impairment and decreased short-term memory, necessitating other care in these areas. According to the findings, improved diversity of learning methods is needed for students with Autism and those with Down Syndrome since they cannot use the same multimedia system (Leacock et al., 2007). According to the research findings, multimedia learning objects may help students with disabilities if the programs are sufficiently specific and concentrated because diverse diseases, although appearing to have comparable learning demands, necessitate specialized and unique teaching support.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgments or Notes

* This article was presented as an oral presentation at the International Conference on Special Education and Diversity (www.iconsed.net) conference held in Istanbul/Turkey on August 25-28, 2022

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To cite this article:

Ong, Joei., & Yahaya, N. (2022). Using multimedia learning objects in special needs classroom. *The Eurasia Proceedings of Educational & Social Sciences (EPESS), 26*, 28-33.

The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2022

Volume 26, Pages 34-43

IConSED 2022: International Conference on Special Education and Diversity

Effectiveness of the Formal Aspect of the Torrance Test Identifying Levels of Creative Thinking among Tenth Grade Students: A Case Study

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Abstract: This qualitative study aims to identify levels of creative thinking, including the skills of fluency, originality, details and flexibility, among a group of tenth grade students in Palestine from Jerusalem and Ramallah schools, according to the gender variable, using the formal aspect of the Torrance test of creative thinking. The study sample consisted of students females selected from Secondary School for Girls and males from one of the Excellence School. The results differences in the degree of originality, flexibility and details in favor of female students, and a difference in the degree of fluency in favor of male students, which reflects the societal context with regard to their creative thinking skills. In light of these findings, the researchers recommend the manner of presenting the educational curricula be reconsidered and that teachers be given training in the use of creative thinking strategies and enrichment activities during the presentation of educational content, thus also enhancing creativity among their students.

Keywords: Torrance test, Creative thinking, Higher Order Thinking

Introduction

A gifted and talented child is a gift from God to the family in particular and to society in general. All that we witness of development is the result of the thought of talented people who knew the problems of their societies, and produced inventions that developed the means of progress, advancement and prosperity. Obviously, caring for the gifted child is a joint, reciprocal and integrated responsibility between the family, the school and the gifted (Al-Khamisi, 2007).

There is a growing feeling among educators that thinking is a skill that should receive immediate attention, and that thinking is a skill that can be developed through the practice of some basic skills (Al-Surour, 2007). It appears that high IQ scores are not thinkers, and on the other hand, people with lower IQ scores are more effective thinkers (Faydi, 2007). Teaching and training gifted thinking aims to prepare individuals who are capable of creative thinking and directing their ideas towards progress and growth rapidly; This requires preparing students through many programs prepared for this field (Al-Husseini, 2012). The issue of talent has received great attention from educators, and many theories have emerged that explain talent, including Renzulli's theory (Al-Surour, 2007).

In light of the developments that the contemporary world is witnessing in various fields of knowledge, it is necessary to pay attention to creative and talented people who are able to solve problems and adapt to the change that occurs in the surrounding environment in order to keep pace with that and provide everything new in various fields.

In addition to dealing positively with the changes of the times to serve the modern trends, there are many motives for paying attention to thinking and developing its skills, including the production of learners who possess self-learning tools and the motivation to search for knowledge. (Al-Khamisi, 2001).

Creativity metrics are important to measure the creative abilities of different students in creative drawing or writing. Accordingly, there were many tests, some of which include verbal situations and some include explanatory situations Rousan (2001) argues that there are a number of measures to determine creativity such as the Torrance Scale, Guilford Scale, Wasch, Kogan, Klaus-Erian, and others.

We have a case study to compare the creative thinking of tenth grade students in Al Majeda Waseelah High School and the School of Technological Excellence by applying the Torrance formal Aspect Test Model (B). We will talk about the proposed program for developing creative thinking among students and the role of the school in developing creative thinking. This study aims to reveal the level of creative thinking among tenth grade students in different Palestinian environments, and for this purpose, the formal aspect of Torrance Test of Creative Thinking will be applied to a group of tenth grade students from Al-Majda Waseelah High School for girls in Ramallah and the School of Excellence in Science in Jerusalem. It also aims to develop the basic skills of teachers by training them in metacognitive skills and strategies that help students think creatively. The importance of this study lies in the importance of revealing the level of creative thinking of students and their selection to enroll in special educational programs. It gives those in charge of the educational process the need to reconsider the curricula and present them with new methods that focus on active learning. In addition to the need to provide enrichment activities that raise the creativity level of students.

Defining Creative Thinking and Explanatory Theories

The concept of creative thinking is a broad concept, with researchers differing in its definition. Therefore, there is no single concept defined for this term; In fact, there are several concepts associated with thinkers, and each of them has its own way of looking at the nature of the study that deals with creative thinking. A third team of scientists think creatively through the mental matters that directly interfere in its formation, and the following are several definitions of creative thinking. Whereas, creative thinking is “the individual’s ability to produce that is characterized by the greatest intellectual fluency, flexibility, originality and far-reaching ramifications, in response to a problem or exciting situation (Khairallah, 1981). It is also known as the “ability to produce something new and come up with of useful information (Joane, 1993). It is also indicated that creative thinking is “the thinking through which we get to the new ideas or results that no one else has preceded, and the creative individual may reach them with independent thinking, and the results are irrelevant.” Thus, it is also believed that he is heading towards his goal in a disorganized and unpredictable way, because it does not go within specific steps, and this is what distinguishes it from others (Adas, 1996). The studies paid special attention to the level of students' intelligence and creative education, as (Paul Torrance) created a program to solve future problems in schools by presenting a project that contains creative solutions to future problems by focusing on students' creative strengths and talents. students in a variety of ways (Treffinger et al., 2012). Paul Torrance traveled on his intellectual journey in 2001 to explore psychology and ancient science, including Native American traditions, to create a foundation for inner intelligence. And work to develop and enhance ways of creative thinking through the focus of children in the pre-school stage. Even Paul Torrance in his study of seven ways to develop creative thinking and raise the level of intelligence in children; Among the most important of them: a section that examines the effort made in the process of developing creative thinking in children. And a department that studies leadership for the process of inner intelligence and creative thinking as well as the ability to use a multi-sensory approach, including intuition, reasoning, and visualization to draw on children's inner knowledge about how to solve problems (Sisk, 2016). A study (Grantham, 2013) confirmed that at the national level, the dark-skinned male community is underrepresented in gifted programs compared to others (U.S. Department of Education, Office of Civil Rights, Civil Rights Data Collection). This is attributed to the unconstitutional segregation system in schools in the country. This article draws attention to how Torrance appreciates different types of intelligence in students who are unfamiliar with society, and uses his scholarship to highlight creative ways students of color think using Torrance's workgroup as a guide.

The study also aimed (Basileh, 2015) to reveal the role of creative thinking and the ability to solve problems in the achievement in mathematics for the secondary stage during 2012-2013. The results showed that there were statistically significant differences at the level of significance of 0.05 between the average scores of students with regard to creative thinking and ability On solving problems as reflected in the average. In light of these results, the researcher recommended using teaching strategies that develop creative thinking and problem-solving skills, and holding training courses for mathematics teachers.

The Importance of the Societal Context in Increasing Creative Thinking

The creative thinking process is greatly influenced by society and the environment in which individuals live, and is influenced by customs, traditions, political and social conditions and cultural heritage. There are societies that encourage independence and self-reliance and encourage development and progress without restrictions, while there are societies that do not encourage independence and intentionally suppress abilities. While humanity seeks to modernize, there are a number of factors that can increase the individual's motivation and motivate him to think creatively, or perhaps hinder him in some individuals, including:

- Subjective factors: They are divided into:

- The biological structure of the individual, which helps creativity due to the person having above average mental abilities and a high IQ.
- Feeling of freedom and security, which is one of the basic needs. Wars make the student feel frightened, confused, and distracted.
- The concept of self-actualization: Individuals who know their abilities correctly have a high self-concept and are therefore able to achieve their goals and show their creativity.
- The ability to analyze and synthesize by analyzing things into their basic parts and then installing them to be an integrated unit. Fixing concepts to form relationships refers to creativity.

- Environmental factors:

It is related to society, its culture and the surrounding environment such as family, school and classroom, where the development of creativity requires a teacher who cares about students, takes into account individual differences, values their achievements, creates opportunities for them and motivates them to interact and interact with society. It is divided into:

- Economic and cultural level: If the individual has a good economic and cultural level, awareness and culture, his ability to achieve and produce creativity increases.
- The educational method: If the method of teaching that takes into account individual differences when teaching students is absent, there will be a weakness in creativity and difficulties in emotional expression will appear.

Explanatory Theories (Theoretical Framework):

Although constructivist theory has added new dimensions to learning; Researchers moved towards new ideas based on cognitive psychology, and as a result of these developments, a supra-mental approach to education emerged in the early seventies, based on the work of some researchers such as John Flavel, who developed some ideas about how learners understand themselves, and how they reveal learning processes Above the underlying mindset of acquiring knowledge, this interest in this concept developed in the eighties, and it continues to receive great interest at both the theoretical and applied levels, as it has proven effective in various academic and educational fields (Flavel, 2004). However, the nature of the learner's culture is clearly visible in the educational system. The educational process cannot be separated from society and culture. Understanding the ecosystem - as Bernfrunber mentioned - provides a deep understanding of how and why students interact with near and far situations and how they learn from them. It also has an impact on moral development and the relationship of students with each other, because the student develops through his environment that affects his behavior, as the individual is not only affected by genetic formation, but also includes his social culture and the influence of people around him (Brendtro, 2006). And this was confirmed by Renzulli. In his model, which made important additions, such as expanding the concept of talent and excellence, and also highlighting the role of motivation in increasing the level of achievement and highlighting the importance of interaction between general abilities, creativity and motivation (Renzulli, 1999).

Description and significance of the Torrance Test of Creative Thinking:

The Torrance Test of Creative Thinking, established by Torrance in 1966, is one of the most widely used measures of creativity and innovation, and has been selected internationally for being free of cultural bias. The Torrance test has been translated into several languages, so during our study we used the test in Arabic, and the

Torrance test is divided into two parts. The second section is formal: it includes three tests (sub-activities), namely: building pictures, completing the picture, parallel lines.

The utility and importance of the Torrance Tests of Creative Thinking is that it is a way for researchers to identify and select talented students to enroll in their educational programs. Gifted and gifted students need educational care and services distinct from the traditional programs and services available in regular schools (Obeid, 2000). The philosophy of establishing special programs for the education and education of the gifted and talented is based on justifications, the most important of which are the shortcomings of public education curricula and the welfare and development of society (Judge, 2008). The teacher seems to have practically no choice but to focus on the majority, which is usually in the middle. Perhaps the teacher pays more attention to those who have below average abilities, but the superior students have no chance but to be occupied with additional tasks and issues of the same level given to the majority at best (Mukhtar, 2005). Studies have shown that gifted students require differentiated educational care in addition to what is normally provided in regular school programs. Adjustments to the educational system are necessary to solve the problem of students who are at the bottom of the ability ladder, and Gifted psychologists use the same logic in their defense of the need for talented and talented individuals for special programs.

Gifted and gifted children represent a very important national wealth that should not be wasted due to neglect and lack of care (Ferrman, 2005). The position of society in facing the challenges posed by the nature of age depends to a large extent on the extent of care provided to this group and the provision of appropriate educational opportunities that can help each child reach his full potential. It is no secret to anyone that the current and future conflict between the countries of the world is governed by their capabilities in the scientific, technical, economic and military fields. There is no doubt that minds can play a prominent role in achieving national achievements at these levels. Through this role, the gifted and talented contribute to the well-being and development of society and ensure its security and future (Al-Qadi, 2008).

Configuration Test Validation for Torrance B Test:

This scale consists of several pages. The first includes basic data about the student, and instructions for applying the test. The second includes the test that the student will answer in the specified time. The test executor makes sure that each student writes down their data and asks the students to continue while reading the instructions. The time allowed is 10 minutes. This test consists of three dimensions: fluency, flexibility, and originality, and each dimension has a different correction method. In fluency, responses must be reviewed before starting the test correction to exclude what is repetitive, as well as to determine the appropriateness of the response in the stimulus and to exclude what is irrelevant in the stimulus, the fluency score is calculated by calculating all responses minus repetitive or irrelevant responses to the stimulus. Flexibility is calculated by adding the number of categories in which the responses are, taking into account the fee produced by the examinee. The number of response categories is calculated by classifying the drawings he produced, such as human, animal, celestial, flower...etc. These categories are also included in the sample. college prior to awarding the degree. As for originality, its degree is estimated based on the rarity that emerged from the performance of the study sample. It depends on the responses of others, and the frequency of the response between the group. An answer cited with a score of 5% or more gets a score of zero, an answer cited with a score (4-4.99%) takes a score of 1, and an answer reported (3%-3.99%) is a score of 2. The response that was mentioned at a rate of (2%-2.99%) takes a degree of 3, and the response that was mentioned at a rate of (1%-1.99%) is given a degree of 4, and the response that was mentioned at a rate of less than 1% takes a degree of 5.

In this study, the test was standardized, so that we only analyzed the formal aspect of the test by focusing on the following: fluency, flexibility, originality, detail, and title. Fluency: Every picture drawn takes a degree.
Flexibility: The number of categories in the drawing is determined for the student (human, animal, plant, buildings and each category takes a grade.
Originality: Estimated up to 5 degrees according to the response rate in each drawing.
Details: A score is calculated for each meaningful part, not counting the duplicate parts.
Title: Calculate up to a maximum of 3 marks depending on the accuracy and strength of the description and analysis.

Method

The two researchers used the qualitative approach (case study) on a sample of ten students of the tenth grade in Palestine, five students from Al-Majda Wassila Secondary School, and five students from one of Beit Hanina schools. They were selected intentionally, taking into account some characteristics such as gender and place of residence to enrich the study and the possibility of a more holistic understanding, and in order to preserve the privacy of the respondents, they were given pseudonyms. The researchers used the formal aspect of the Torrance test of creative thinking. This study was conducted during the second semester of 2022.

Participants

First: Y.M

Y.M from the tenth grade c is studying at Al-Majda Waseelah, her academic level is excellent, she lives in a middle-income family, loves to read and learn about ancient civilizations and myths, she feels that she knows about the personality of others, so she tends to read in the field of psychology. She participated in a few competitions for family reasons, and when she was able to participate, she wins or advances to advanced stages. She loves to make friends, loves to make others happy, loves to be always positive and optimistic, loves to prepare food and eat delicious food.

Second: S. A

S.A., born in Palestine in Ramallah and Al-Bireh Governorate, from a middle-income family, studies at Al-Majda Wasila Secondary School for Girls, Birzeit in the tenth grade. Before that, she joined two schools: the first in one of the Latin Patriarchate schools, and then an UNRWA school, she loves to study and research outside the academic framework She loves to research social matters, self-development, mind and business management, and keeping pace with technological development in harmony with the times on this planet. It includes a course of design professions, a course on converting psychological stress into a motivating friend, and a course on setting goals and making decisions she also aspires to take courses in programming and artificial intelligence, where her friend and she participated in the Palestine Science and Technology Fair and got eighth place out of a thousand projects at the national level. Music and reading a book, and she also loves watching football. No wonder we are the sons of the great Palestine, and we must be children worthy of it.

Third: SH.P

SH. P. 16 years old, she studied from the first to the seventh grade in a public school, then moved to live in Birzeit, then moved to the agency school until the ninth grade and then a government school, from Hebron she live at the present time in Birzeit. Her hobbies are drawing, reciting poetry, reading books, loves her cats, Her family, her friends, the music, the books, the calm.

Fourth: A. O

A.O. From the northern West Bank, she studies in a government school, imbued with Islamic, national values and adhere to them, familiar with the local and international arena, and economic and sports news, writer in the Syrian literary magazine Shaheb electronically, member of the Arab Culture Club with a card signed by the Ministry the culture, she won first places in speaking and writing competitions, attended the first youth cultural conference that was held at the Military University with twenty training hours, concluded the ambulance course from Medical Relief with sixteen training hours, read nearly two hundred books, and wrote hundreds of thoughts, some of which were published in magazines and books Culturally, she achieved an advanced position with my colleague in the International ISEF program and we aspire to patent. she branches out in the field of programming and artificial intelligence, the next global language. She conducted several interviews and appeared on several Arab and local screens.

Fifth: M. p

M.P. A student in the tenth grade at Al-Majda Wasila Secondary School for Girls. She studied the eighth and ninth grades in an UNRWA school. She loves sports of all kinds, is good at writing and speaking, and tries hard to develop herself in all these matters.

Sixth: Yazan

He is considered one of the most outstanding students, as his average has not been less than 95 in recent years. He likes to feel respected among people. He loves pranks and humor and he feels like the humor empties part of his inner frustration. He doesn't feel reassured in this country, knowing that her best friend was martyred two years ago, so his ambition is to become successful in the matriculation, study abroad and become a programming engineer. His hobbies are reading, she memorized four parts of the Qur'an, and his favorite place is the mountains.

Seventh: Hamza

He lives in a good environment, he has the support of his parents, but he beards a great responsibility, as he is the eldest among his brothers and often he is responsible for them, knowing that his mother and father work. He feels that he integrates more than his friends, his goal is to establish a contracting company with his friends so that he is the builder, and his first friend is responsible for the water, and his friend is responsible for laying the pipes, and the last is the construction official, his favorite place is trees and nature and his hobby is mountaineering.

Eighth: Rami

He lives in the old town, and his family income is low, so during summer vacation he helped my father to work to improve their income. When he felt sad he went to sleep but his favorite place when he was in the sea. His hobby is swimming and he has a great passion for cars. His goal is to become an electronics engineer in a leading company.

Ninth: Muhammad

He is a student who tends to scientific disciplines more than literature. He loves horse riding and his hobby is playing football. His ambition is to become a computer engineer, so he feels that he has to make a great effort in scientific subjects such as mathematics. He will be good with his family and friends. When he was sad, he preferred to go out with friends, and his favorite place is the sea.

Tenth: Ahmed

He is considered an average student, as his average was not less than 80 during the previous years. His favorite color is black because he felt that it expresses his leadership personality, even though he is the youngest among his brothers. He lives in a psychologically supportive environment and has a good relationship with everyone. His goal in life is to become one of the football stars, especially a goalkeeper. It's hard for him to feel sad, but when he did, he turned on his computer and start talking to friends.

Schools Background

It is also necessary to know a brief about each school and its educational policy in which students study. The following is a brief description of each one:

About the First School

The school was established in 1977 in the town of Birzeit. It is a girl secondary school. It includes the scientific and literary branches. This school has taken its approach to keep pace with the human race, which is based in the fields of thought, production and creativity, and includes the scientific and literary specializations. A national, scientific, cultural, systematic thesis, and the majority hold a master's degree, and this helps to improve the students' achievement performance and provide them with valuable information that helps them improve their job performance in their future working lives and the lives of its students. Advanced and equipping classrooms and laboratories in proportion to high-quality education, the school also engages the local community in planning and engaging in the activities held by the school constantly, where one of the priorities is the extracurricular activities, which develop the student's perceptions, help them discover themselves, improve their approach, and develop their talents, as they help guide students' tendencies and help them choose the appropriate disciplines for them.

About the Second School

A school located in Beit Hanina. It is a mixed secondary preparatory school under the supervision of the Jerusalem municipality. It is worth noting that the school is able to select students who apply for it. It accepts grades above (85) and teaches the Bagrut curriculum.

It contains scientific disciplines such as physics, chemistry, biology, engineering disciplines, cartoons, Programming, Bio and Technology. Mathematics majors 3, 4 and 5 units. It is worth noting that the school encourages creative thinking through systematic activities by designing electronic graduation projects that contain patents, and making permanent laboratory experiments, in addition to encouraging students to technological education during educational lessons. The school also focuses on guiding students towards creative thinking in extracurricular activities. Such as the artificial intelligence project, adventures, photography, and psychological empowerment programs.

Results and Discussion

Table 1. Results of the first school

Name	First question			Second question				Third question				
	originality	details	fluency	originality	flexibility	details	title	fluency	originality	flexibility	details	title
Y.M	100%	100%	80%	66%	80%	80%	60%	78%	60%	100%	100%	81%
S.A	100%	100%	80%	74%	90%	100%	96%	100%	83%	100%	100%	88%
SH.P	100%	100%	100%	88%	80%	80%	90%	94%	75%	100%	100%	81%
A.O	100%	100%	90%	82%	90%	100%	80%	83%	75%	84%	84%	88%
M.P	100%	100%	80%	84%	80%	80%	100%	94%	59%	100%	100%	70%
Average	100%	100%	100%	79%	84%	88%	85%	90%	70%	97%	97%	82%

Table 2. Results of the second school

Name	First question			Second question				Third question				
	originality	details	fluency	originality	flexibility	details	title	Fluency	originality	flexibility	details	title
Yazan	80%	100%	100%	60%	60%	90%	63%	100%	52%	88%	88%	60%
Hamza	90%	100%	100%	47%	83%	77%	46%	100%	52%	40%	100%	63%
Rami	70%	100%	100%	32%	50%	80%	47%	100%	62%	94%	89%	44%
Mohammad	90%	100%	100%	64%	70%	90%	73%	100%	72%	83%	88%	70%
Ahmad	100%	100%	100%	62%	90%	70%	50%	100%	44%	77%	66%	43%
Average	86%	100%	100%	53%	70.6%	81.4%	55%	100%	56.4%	76.4%	86.2%	56%

The previous table shows that the percentage of authenticity for females ranges between 70%-100% for each question, while for males it ranges between 53%-86%, and this is due to the low percentage of male response among females.

As for the percentage of details for females, it ranged between 88% - 100% for each question, and for males, the percentage of details for them ranged between 81.4% - 100%, and this is due to the accuracy and distinction of details in the drawings presented by the females, and this is also due to the attention of females to details. As for the fluency among females, it ranged between 90%-100%, while for males it was not less than 100%, and this is due to the males' interest in quantity and not quality. As for flexibility, it ranged from 84% to 97% for females and from 70.6% to 76.4% for males, due to the diversity of drawing categories among females more than males.

Finally, with regard to the title, for females it ranged between 82%-85%, while for males it ranged between 55%-56%, due to the lack of use of abstract expression and feelings in the presentation of titles among males.
It was found from the previous that there are differences for females in originality, flexibility and details, and this result is attributed to the fact that female students are interested in everything new, and female students are characterized by passion and motivation more than males in performing tasks, as creative thinking requires that the student be active and involved and has diverse ideas for discussion and out of the ordinary , which leads to arousing motivation towards problem-based learning, and this is consistent with a study (Basilah, 2015).

We also note that the environment in which the students live has a great impact on their way of thinking and their outlook on life, and this was revealed by watching the details of the drawings submitted by the students. Females had a creative appearance due to the fact that the environment in which the students live is a supportive and stimulating environment, both at the school level, through the teacher's support for the student in his self-reliance and his help in participating in methodological and non-curricular activities that worked to develop their creative abilities, and the family by providing good care and communication Positive relationship between parents and their children and appreciation of their achievements and harmony with them. As for the societal level, by integrating them into cultural paths that support their ideas and make them implementable. This led to the crystallization of a creative personality for them, Here, the student feels like a small scientist discovering knowledge and has a sense of achievement and self-respect, which raises her level of ambition and earns her more knowledge and creativity.

The students were also selected from a community environment under occupation. This was noticed through their drawings of violence, due to the daily attacks by the occupation, demolitions, sieges and permanent confrontations. This led to a decline in the creative energy of males. Knowing that the school's policy is working hard to create a supportive and purposeful academic atmosphere and an attempt to permanently integrate students into extracurricular and curricular activities, but it seems that the students' lack of safety and freedom suppresses the creative abilities of males, which leads to a weakness in the student's confidence and fear of failure, so students tend to resist new ideas for fear that these ideas will reflect on their security and stability, so he considers these creative ideas to be nothing but a waste of time and destabilization of their gains. Consequently, the spirit of competition and cooperation among students is absent, which hinders his creativity.

Obstacles and Linking Them to the Palestinian Reality:

- There was a difficulty in submitting the test due to the lack of educational activities, art and drawing at the secondary level in schools, and the lack of massive promotion of extracurricular activities, as our Palestinian educational system suffers from some problems in the educational foundations on which the evaluation process depends. The greater reliance is on the quantity of what the student achieves and not on its quality, and there is another problem related to the Palestinian educational system's lack of focus on measuring non-cognitive aspects, especially since the focus in the philosophy of education and the philosophy of building curricula is on the learner's retention of information and not its activation or representation and compatibility with it. Which makes the teacher a transmitter of information and not a facilitator of it. Thus, the teacher seeks to measure the extent to which the student possesses or retains the information, and not the extent to which the information affects the various aspects of the student's personality.
- The impact of the living conditions on the students during the test presentation, which was evident from their drawings and the way they were presented.
- Schools lack educational activities that develop students' creative thinking during the educational lessons, so we see the separation of extracurricular activities from the educational content.
- Lack of teachers' enrollment in creative programs through which creative thinking is communicated to students, noting that the teacher is the guide and guide for students in their way of thinking.

The Obstacles that the Students Faced during the Application of the Test:

- When applying the test, not all students took the exam with a high level of seriousness
- The wording of the questions was not clear and smooth
- Students complained about the number of test items
- There was not enough time for some students
- Students were not used to such standards before.

Recommendations

- The results of the study indicated that the students' creative thinking skills were revealed. Accordingly, the two researchers see the importance of generalizing the experience to all schools.
- The results indicated that the percentages of creative thinking components are higher among females than males. Therefore, the researcher recommends researching the reasons that led to the decline in results among males. And work to intensify educational activities for males in schools.
- The two researchers recommend reconsidering the adopted curriculum and working on re-designing it in line with the progress of creative development of students. And highlight the critical analytical aspects of the curricula and the ability to keep pace with the developments of the twenty-first century.
- The two researchers recommend conducting training programs for teachers, and qualifying them by holding intensive creative thinking courses during the summer vacation.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPESS journal belongs to the authors.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Special Education and Diversity (www.iconsed.net) conference held in Istanbul/Turkey on August 25-28, 2022

* This study was supported by the Education Department at Birzeit University. The authors would like to thank their supervisor Dr. Bihan Qaimari for supporting this work and providing helpful comments on the draft of this art.

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To cite this article

Qaraeen, M.M., & Omar, I.I. (2022). Effectiveness of the formal aspect of the Torrance test identifying levels of creative thinking among tenth grade students: A case study. *The Eurasia proceeding of Educational& Social Sciences (EPESS),26,* 34-43.