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Contact
Bartin University Faculty of Education
74100 BARTIN – TURKEY
e-mail: buefad@bartin.edu.tr
Tel: +90 378 223 54 59

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Solution Focused Brief Therapy Training

Ümüt ARSLAN*[a], İhsan Çağatay ULUS[b]

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Abstract

Solution Focused Brief Therapy (SFBT) is a therapy model that has been practiced since the 1980s. Unlike traditional therapy models, it focuses on solutions instead of problems. With the growing interest in SFBT in recent years, specific trainings in this area have begun to be provided. Though there are SFBT Association standards regarding the content of SFBT training, it usually takes two days of training in Turkey. In this study, it is aimed to evaluate the SFBT training by investing view of counselors and counselor candidates, who participated in an SFBT training. To do this, 76 participants were asked about the educational evaluation of the Northwest Brief Therapy Training Center via internet, and 50 people completed to answer these questions. This study is researched by the qualitative research design, and it is preferred to collect data by open-ended questionnaires using the case study method. Results are displayed on the internet and coded in response to given responses. In conclusion, for most participants, practicing in counseling under supervision is the reason to attend the training, counseling practice activities that they are most satisfied with, and they thought more counseling practice activities could be in training. It has been observed that the SFBT training has had a positive impact on some of the participants' professional and personal opinions about themselves and encourages participants to improve themselves in their fields.

Çözüm Odaklı Kısa Süreli Terapi Eğitimi

Makale Bilgisi

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Öz

Çözüm Odaklı Kısa Süreli Terapi (ÇOKST) 1980'lerden beri uygulanan bir terapi modelidir. Geleneksel terapi modellerinin aksine, problemler yerine çözüm üzerine odaklanır. Son yıllarda ÇOKST'ye artan ilgiyle birlikte, bu alanda eğitimler verilmeye başlanmıştır. Bu eğitimlerin içeriğine dair Uluslararası ÇOKST Derneği'nin standartları var olmasına rağmen, Türkiye'de genellikle iki günlük eğitimler verilmektedir. Bu çalışmada, ÇOKST eğitimlerinin değerlendirilmesi amaçlanarak bu eğitimlere katılan psikolojik danışmanların görüşleri incelenmiştir. Araştırma kapsamında, ÇOKST eğitimini tamamlayan 76 katılımcıya Kuzey Batı Kısa Süreli Terapi Merkezi'nin eğitim değerlendirmesi soruları internet üzerinden sorulmuş ve 50 kişi bu soruları cevaplamayı tamamlamıştır. Nitel araştırma deseniyle yürütülen bu çalışmada, durum çalışması yöntemi kullanılarak açık uçlu anket ile veri toplanması tercih edilmiştir. Sonuçlar internet üzerinden görüntülenmiş ve verilen cevaplar doğrultusunda kodlama yapılmıştır. Sonuçlar incelendiğinde, katılımcıların çoğu ÇOKST eğitimi sırasında süpervizyon eşliğinde yapılan danışmanlık uygulamalarının eğitime gelme nedenleri olduğunu, genel olarak uygulama etkinlerinden memnun kaldıklarını ve daha fazla uygulama etkinliği olması gerektiğini belirtmişlerdir. Ayrıca, ÇOKST eğitiminin bazı katılımcıların kendileri ile ilgili mesleki ve kişisel görüşlerinde olumlu etki yaptığı, katılımcıları alanları ile ilgili kendilerini geliştirmeleri için cesaretlendirdiği görülmüştür.

***Corresponding Author:** umut.arslan@idu.edu.tr
[a] Asst. Prof. Dr. Izmir Democracy University, İzmir, Turkey, http://orcid.org/0000-0002-3611-9607
[b]Asst. Prof. Dr. Bartın University, Bartın, Turkey, http://orcid.org/0000-0002-9610-4562

Introduction

In its first instance, Solution Focused Brief Therapy (SFBT) is developed by De Shazer et al. (1987) at the Brief Family Therapy Center in Milwaukee. By the end of the 1980s, in North America and Europe, psychological counselors and therapists showed deep interest in training programs that they can learn how to use this approach. (O'Connell, 2005). The causes of SFBT had drawn field workers' attention is its distinctness in finding the cause of problem behavior and not to reveal the causes of this behavior sometimes. From this point of view, for the solution of the problem, the concept of the exception had come into view. It's stated that even if in critical, stable or chronic problems, there can be exceptions and clients can have solution seeds in themselves (Iveson, 2002). Against traditional therapy techniques, SFBT at present should be concentrate on finding solutions and investigating the prudential expectations for solving individuals'' problems quickly (Corey, 2005). This therapy method is one of the psychotherapy approaches that focus on developing solutions instead of focusing on the problem itself (Iveson, 2002).

De Shazer et al. (1986) has interested in determining this method's objectives. When determining the objectives of SFBT at the same time, they aim to come in with making clients also have the information of when the therapy process starts and overs. De Shazer et al. (1986) emphasize that, when the objectives of the client are clear, they can be successful as well. Also, it points out that, revealing future objectives and being support for finding or trying new ways for the individual is one of the crucial fundamental components of SFBT.

Rather than existing and past problems of the individual, SFBT puts more emphasis on existing sources and future expectations. This therapy distinguishes as a psychological consulting method that, instead of concentrating on the problem, it concentrates on a solution, and make its clients see this point (Arslan and Gümüşçağlayan, 2018; Doğan, 1999). From this point of view, when trying to solve his/her problems a client who thinks problem-focused, may ignore existing or future solution alternatives. Also, a client who thinks problem-focused may behave self-handicapping. Due to these reasons, the therapeutic focus of SFBT method, rather than problems of the past or existing conflicts, dwells on the client's desired future. As De Shazer (1998) implies, knowing the origin of the problem is not necessary for the point you find the solution to it. So, it is not necessary that solutions and problems correlated with each other.

Generally, SFBT is a therapy method that lasts between one and twenty, and ideally six sessions (Doğan, 1999; Karahan, Bakalım ve Yoleri, 2017). In this method, clients are encouraged to increase their existing useful behaviors. Contrarily to traditional therapy, SFBT highlights the hypothesis that clients have the capacity that makes them have rational solutions and enriching their own lives (Varah, 2015). The results of this method can be observed in a short period. In this method, developing an individual's behavioral change in a short time points out, because the counselor directly focuses on the solution of the client's problem and also the client is highly motivated from the beginning of therapy. Owing to this solution-focused systematic approach, the client should comprehend that one has both the source and solution of the problem (Corey, 2005).

According to Corey (2005), the undermentioned hypothesis gives us the basis of SFBT;

a) The counselors who apply this method have important advantages because this therapy focuses on positive solutions in the future. Owing to this reason, concentrating on strong points and solution speeches increases the possibility that the therapy lasts a short period.

b) Individuals who came therapy have the capacity of acting effectively but this capacity blocked temporarily by negative cognitions.

c) There are exceptions to problems or troubles, in other words, there are circumstances that one is not faced with any problem.

d) Clients tend to show only one side of the problem. Solution-focused therapists try to make their clients show the other side of the problem.

e) One of the essential perspectives of this therapy method is emphasizing small changes that promote big changes.

f) Clients want to chance, they have the potential for it, and they do their best to experience change.

g) All individuals are unique, because of that, there can be differences in a solution to their problems (Corey, 2005).

The solution-focused therapist concentrates on the solution of a problem instead of how and when the problem has aroused. Owing to this reason, this method's area of usage is wide. The solution-focused approach concentrating on "what is useful" and as an important factor for changing, highlights the action, so this therapy can be short-termed. This also provides clients, who have a typically fast pace of lifestyles, can be a well-integrated approach in the present day's condition. (Kim, 2014). Due to these, SFBT is used successfully to problems like drug dependence, alcohol addiction, depression, relationship problems, relationship breakdown, eating disorders, anger and crisis management, etc. In addition to this, solution-focused approaches have used effectively on various client groups like children, families, couples and requisite clients and they still go ahead with this method (Corey, 2005).

SFBT practice has shown up with the idea that solutions can appear in an individual's social network. Postmodernism promotes questioning the superiority of the therapist's position and universal truth and it succeeds in changing the therapeutic relationships, therefore the client is known as the expert on his/her live. In the client-counselor relationship during the consultation process, it creates a collaborative approach and it establishes a connection with solution-focused practices that can be developed during the consultation process (Bertolino & O'Hanlon, 2002).

SFBT aims to help people who suffer from psychological problems as managing their symptoms and finding instruments that make a cope with the difficulties. Even individuals can change their lives, they need help for improving their abilities and for the determination and removal of symptoms. This therapy to some extent defines what changes people need in their lives and practitioners of this therapy help individuals to make clear their targets (Kim, 2014; Lee, 2013). SFBT practitioners help individuals to dream about their desired future. Then, they try to collaborate with clients to help to develop a series of steps to make real their dreams and targets. Therapists bring forward existing subjects that are less harmful and more manageable for clients in the treatment process. Factors which are different in the past or solutions which had been possible is evaluated. It's aimed to help individuals to make time identification in their lives (Corey, 2005).

This therapy method involves, firstly, developing a vision for the future and then for reaching the desired result, determining how an individual can improve one's initial abilities. Counselors who practice SFBT methods guide their clients throughout the recognition process which they can see what they try for. They try to encourage them to investigate the best way for the solution (Kim, 2008). This therapy method, including different age groups, applied to people with introverted and extraverted behavioral problems, and interpersonal relationship problems, etc. (Franklin, Trepper, Gingerich & McCollum, 2012).

In the first meta-analysis study in this area, Stams, Dekovic, Buist, and De Vries (2006) investigated 21 studies and the number of participants was 1421 in total. In this meta-analysis study, they found that relative to other approaches SFBT does not create a big effect, but it's also stated that it reaches solutions to problems sooner than other approaches. In another meta-analysis study, Gingerich and Peterson (2012) review 43 studies for investigating the effectiveness of SFBT. According to the study results, it's stated that this method is an effective therapeutic approach for various behavioral and psychological results, and they have also strong evidence on this therapy is faster and cheaper than alternative approaches. Subjects of 43 studies collected under 6 group titles. Those titles can be stated as children's academic and behavioral problems, adult mental health, marriage and family, professional rehabilitation, health, and aging and crime/ committing a crime. Also, in recent years, we can see that the number and development of this therapy method consistently increasing. In their meta-analysis study which they investigate 15 studies, Gingerich and Eisart (2000) detected that SFBT practice has positive effects.

If we look at the studies that have been carried on, rather than problem SFBT concentrates on directly the solution and, a contrast to traditional consultancy methods, its contribution to the psychological consultancy process concerning time is significant. When we consider the number of students in schools and the number of psychological counselor workers, this therapy method can be by psychological counselors in schools. At the same time, we can see that for the solution of individual behavioral problems of students, personal concerns, academic failures, time management problems, school fights, substance dependences, bullying problems and compulsory attendance problems and so on, this approach is used frequently (Birdsall & Miller, 2002; Brasher and Schools, 2009; Franklin, Streeter, Kim & Tripodi, 2007; Kim & Franklin, 2009). Thus, it can be seen clearly, psychological

counselors at schools need to get training of SFBT approach to apply the method in the right way and they can use this approach as a brief psychological intervention for reducing the problems they face/may face with at school. Also, Meydan (2013) says that universities' can offer Solution Focused Brief Therapy as an elective course at their psychological counseling and guidance undergraduate program and it would be beneficial for candidates who plan to work at schools.

Training of SFBT around the World and Turkey

Solution Focused Brief Therapy Association develops a guide for the practitioners of this method. In this guide, three main components of his method explained as "(a) disuse of the speeches that concentrated on client's concerns, (b) concentrating on speeches that focuses creating new meanings with respect to client's perspectives and (c) to help clients structure their preferred future visions, with the use of special techniques and methods, by indicating past success and difficulties, for helping the solution of problems" (Kim & Franklin, 2009 p. 464). The techniques and main components of this therapy are (a) using the miracle question, (b) using scaling questions, (c) evaluation and giving compliment to client, (d) giving homework, (e) focusing on strengths or solutions, (f) setting targets and (g) questioning about rare cases (de Shazer & Berg, 1997; Kim & Franklin, 2009).

Hsu et al. (2017) have a study that provides SFBT training to participants and its results analyzed correspondingly. In total 14 volunteers who are experts in psychological counseling are participated, those people complete SFBT training which lasts 3 days (24 hours) via their mobile phones. Participants are expected to be at least 23 years old, got bachelor's degree and also expect participants to get general and professional education which lasts 12-months on the subjects of psychiatry, psychology, physiology, common law concepts, personal development, self-education, empathy education, and basic counseling skills education. 16 hours of this 24 is centered on the introduction of the therapy, and 8 hours are concentrated on crisis conditions. The results of the study show that participants who got this training are also influenced and developed positively in their life skills, counseling self-sufficiencies and competencies (Hsu et al., 2017). As a result of the study indicates, participants properly understand the principles and skills of brief therapy. SFBT sees as easy to learn and practice, provide getting instant feedback from clients and it increases the sufficiency and continuity of the psychological counseling process (Mostert, Johnson & Mostert, 1997; Murphy & Duncan, 1997). This training program significantly enriches to targets the formulation of clients' easily and (including to option that prevents deformation of the existing conditions) in consideration of various action options, it lends assistance efforts on their decision making (Hsu, 2014).

At the scope of accreditation, International Solution Focused Brief Therapy Association at the US, SFBT practitioner certificate is given at the end of 50 hours of theoretical training, 100 hours supervision accompanied clinical practice and examination. To apply this certificate program, as long as having rudiments and education on psychological counseling, generally, they prefer ones who have their master's degree on; psychological counseling, social services, family therapy, psychology or psychiatry areas and ones who can make SFBT practice with guided supervision (Bavelas et al., 2013). Education in theoretical lessons should prefer the learning content which includes (a) history and philosophy, (b) fundamental principles, (c) session plan and format, (d) video examples of experts, (e) format, (f) example videos of sessions, (g) roleplaying, (h) video feedback practice and (i) video feedback education (Bavelas et al., 2013). A guide is published by the International Solution Focused Brief Therapy Association, which contains information on how to use this therapy method. (Bavelas et al., 2013). At this guide, clients are especially asked for structuring preferred future vision. Also, to make this vision a piece of their daily lives, clients are asked for the benefit from their past successes, strengths, and sources.

There is no supervisory board for examining certificate programs in Turkey. In general, SFBT trainings are given by faculty members who have a doctoral degree or expert therapists. These trainings given by institutions or universities; the institutions issue participation certificates and the universities issue applied training certificates. There is not any explanation about international validity in those certificates. SFBT is given as a course in undergraduate and post-graduate programs at some universities in Turkey, moreover, many training programs take a very short time. Investigation of the training programs in Turkey shows that training, in general, lasts for 2 days and 16 hours. There is not any study about whether the objectives determined by the International Solution Focused Brief Therapy Association are evaluated or not, during the preparation of training programs. Only psychological counselors, psychologists, four-year licensed graduates and senior year students of the social services department are allowed to participate in SFBT training. There is no data available on whether one inspects this subject.

Purpose and Significance of Study

If you investigate the literature, even if there are numerous studies about using SFBT during the consultation procedure, there are few studies about the SFBT training results of participants who become experts in the field. In those studies, rather than psychological counselors, they focus on individuals who work in different segments. For instance, those studies focus on individuals who work in different areas; like social services (Smith, 2011), mental health (Ferraz & Wellman, 2009), health (Smith & Macduff, 2011), and their experiences at the end of supervised SFBT training. Accordingly, contrary to other studies, the purpose of this study is an investigation of key issues that reported from psychological counselors' and their candidates' personal experiences in SFBT training and give them a chance to explain their opinions about the application of this therapy method. Also, it aims to explain the strengths and weaknesses of training while taking its contributions to participants' career into consideration. Also, this study provides descriptive information about both the Solution Focused Brief Therapy training and short-term training and makes this information useful thus it may become a pioneer for future studies in the field. (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz & Demirel, 2017). In this context, this study searches for answers to the questions below;

a) What are the opinions of psychological counselors and their candidates about the method of Solution Focused Brief Therapy?

b) What are the opinions of psychological counselors and their candidates about points they consider as most significant ones at Solution Focused Brief Therapy training?

c) By using the Miracle Question Technique, what are the thoughts of psychological counselors and their candidates about their purpose for participating in the Solution Focused Brief Therapy training?

d) What are the comments of psychological counselors and their candidates on activities which should take more place in Solution Focused Brief Therapy training?

e) What are the opinions of psychological counselors and their candidates on which one/ones of techniques or skills they will plan to apply after Solution Focused Brief Therapy training?

f) What are the next plans of psychological counselors and their candidates after Solution Focused Brief Therapy training?

g) What are the opinions of psychological counselors and their candidates about the evaluation of Solution Focused Brief Therapy training?

Method

Model of Study

In this study, the opinions of psychological counselors who participate in Solution Focused Brief Therapy (SFBT) practice has been investigated. For this reason, we use open-ended assessment form which used by Dr. Stephen Larger who provides training for SFBT around the world including Turkey. (Larger, 2017). The aim of using open-ended questions is finding out the perspectives, expectations, suggestions and satisfaction ratios of participants. The case study method is used for the qualitative research design. Case studies are a study method that creatures defined and specified depending on time and space (Büyüköztürk et al., 2017). Also, in the case of studies, one can evaluate a single circumstance and develop explanations about it (Büyüköztürk et al., 2017; Gall, Borg and Gall, 1996). Data can be acquired by interview, document, questionnaire result and archival records in case studies (Christensen, Johnson, Turner & Christensen, 2011). In this study, we prefer to collect the data with open-ended questionnaire questions.

Participants

By the purpose of the study, in a suitable time for a case study (during SFBT training), the study group is determined by individuals who got psychological counseling experience and comply with participating SFBT training criteria (Creswell, 2013). The sample group consisted of 76 psychological counselors who participate in SFBT training which occurred on different dates and lasts 16 hours in two days. The opinions of participants are received at the end of the mentioned training. 50 individuals form 76 is completed this study voluntarily. 16 of the participants are newly graduated from the psychological counseling and guidance department and look for a job.

For the rest of the participants; 16 of them work in primary and secondary education institutions, 6 of them work in special education centers, and 5 of them work in private schools. 7 of the participants are unemployed and waiting for a teaching appointment examination (KPSS). 37 of the participants were females and 13 were males.

Data Collection and Analysis

Data of this study collected from the answers of training evaluation questions asked SFBT training participants in Northwest Brief Therapy Training Center (NBTTC, 2017). Data are collected via the internet and according to data confidentiality and content analysis method is used. Content analysis is turning answers of participants to scientifically understandable themes and commenting on them (Yıldırım & Şimşek, 2005). There are eight questions; one is Likert type and seven open-ended in assessment instruments. With Likert type questions, overall evaluation of training and rest of seven questions for investigation of the opinions of participants about training. Learning content and evaluation of SFBT training is made by, like SFBT philosophy, rather than destructive criticisms, constructive criticisms. For this reason, questions in the NBTTC evaluation form are in that format. (NBTTC, 2017). The results are viewed online, and themes are generated from a content analysis of answers given to those questions.

Results

1. 76 individuals participated in SFBT training, 50 (66%) of participants completed the questionnaire. When we asked participants for evaluation of training according to its increasing in their professional know-how out of 10 points, 42 percent of participants give seven points and above and eight percent of them give points between four and six.

2. At the end of the study, participants indicate as the most important parts of training as practicing (n=24), learning the SFBT technique (n=12), learning the philosophy of SFBT (n=8) and apprehending the questions of SFBT (n=6; Table 1).

Table 1. Participants' answers of the question *"What was the most significant part of training?"*

Samples of Answer Citations from Participants	Category of Answers	N
"Practicing in every stage makes me successful." (K12), *"It was supervision practices. I can see my deficiencies and I got feedback from my mistakes. It was a unique experience." (K3)*	Practicing	24
"I think in this training detailed teaching on method's techniques improves me." (K19)	Learning the SFBT Technique	12
"Apprehending its philosophy." (K1)	Learning Philosophy of SFBT	8
"It was questions." (K9)	Apprehending the Questions of SFBT	6

3. In this study, by the use of the NBTTC training evaluation question as one of the most important purpose questions of SFBT, which is the miracle question technique, we try to find out the participants' purpose of attending the training. The question asked as so "Imagine that a miracle has occurred. All of your training objectives suddenly come true when you enter this study group. What do you do differently when you work with your colleagues and clients? (NBTTC, 2017)". When the answers analyzed, participants determined their purpose to attend SFBT training as practicing (n=24), learning its philosophy, (n=20) and other causes (n=12; Table 2).

Table 2. Participants' Purpose to Attend the Training

Samples of Answer Citations from Participants	Category of Answers	N
"I had general information about solution focused therapy, I came for making practice." (K7)	Practicing	24
"My privileged aim is adopting its philosophy, because the techniques come later." (K19)	Understanding the Philosophy of SFBT	20
"To set timing better." (K10)	Other	12

4. Using the scaling question model which is one of SFBT practicing question models, we ask participants for answering these questions; "what do you need to learn for approximate to 10? What do you need to learn about more to reach out to level 10? Is there anything I can do for helping you to approximate level 10?" This question aims to learn the activities that participants want to take more time in training (for making training more effective). Participants answered as practicing (n=32), case studies (n=6) and other suggestions (n=12; example: long-term training; Table 3)

Table 3. Activities that participants want to take more time in training

Samples of Answer Citations from Participants	Category of Answers	N
" I think I understand well its fundamental philosophy but practicing can help me to approximate practice 10 points" (K7)	Practicing	32
"If we could extend over this training a longer period of time would be better for all of us." (K27)	Other	12
"There could be more case studies" (K20)	Case Study	6

5. At the end of the study, we ask participants that "Which one of what you learned in SFBT training do you want to continue to practice?" and their answers to that question are the SFBT techniques (n=32), the SFBT questions (n=12) and the others (n=6; Table 4).

Table 4. The Answers of Participants to the question "*Which one of what you learned in SFBT training do you want to continue to practice?"*

Samples of Answer Citations from Participants	Category of Answers	N
"I would practice counseling stages of sessions." (K10)	The SFBT Techniques	32
"I would use the miracle questions, exception questions and scaling questions in my practice (K22)	The SFBT Questions	12
"I will continue to emphasize positive sides of my clients." (K14)	Others	6

6. When we ask participants to what their next plans after SFBT training are, they answered as will get training about a different subject (n=14), will study on SFBT method (n=12), will be try practice (n=8) and will do other activities (n=16; Table 5).

Table 5. The Next Plans of Participants

Samples of Answer Citations from Participants	Category of Answers	N
"For teaching assignment, I will study KPSS examination." (K25)	Other Activities	16
"I would like to improve the skills I got through this training and adding more other trainings on this one." (K1)	Another Training	14
"I would like to read books about solution focused therapy." (K29)	Studying Method	12
"Practicing solution focused brief therapy as well as I can. Being one of the best practitioners in this field." (K16)	Practicing	8

7. When we ask participants to answer of question "What would your colleagues, clients, and supervisors realize what you are doing differently?" they replied as perfection in practicing (n=16), positive attitude in private life (n=12), different point of view in therapy practices (n=12), and positive attitude in professional life (n=10; Table 6).

Table 6. The Answers of the Participants to the Question "What would your colleagues, clients, and supervisors realize what you are doing differently?"

Samples of Answer Citations from Participants	Category of Answers	N
"They would realize, I practice the techniques differently and I become more competent." (K24)	Perfection in Practicing	16
"I would become more self-confident person." (K23)	Positive Attitude in Private Life	12
"They would realize my relationship with the client and rather than the problem, I concentrate on the solution." (K5)	Different Point of View in Therapy Practices	12
"They would realize that I satisfy more with my profession and I become happier." (K18)	Positive Attitude in Professional Life	10

8. We asked participants to share their opinions for overall evaluation that *"Is there anything else do you want to say about the training*?" and their answers were setting training for a longer period of time (n=20), positive opinions about keeping touch with trainer for further practices (supervision support; n=14), the benefits of the videos that used in training (n=11) and other recommendations (n=5; Table 7).

Table 7. The Answers of the Participants to the Question *"Is there anything else do you want to say about the training*?"

Samples of Answer Citations from Participants	Category of Answers	N
"If we could extend over this training a longer period of time, it would be better." (K25)	Training would Last Longer	20
Trainers say "if you need help, you can send me email" and this give confidence to us for the problems we can face during practicing. (K11)	Supervision Support	14
"I think videos we watched contributes much to training, maybe they can enrich more those kind of videos" (K1)	Videos Watched During Training	11
"I am leaving here with the knowledge that what we learn about SFBT in here is really different from the ones in theory books." (K30)	Other Recommendations	5

Summary of Results

In conclusion, when we look at the results according to participants' responds, the participants;

a) Participants report that SFBT training increased their academic knowledge.

b) Participants think that the key point of training is practicing and detailed teaching of techniques.

c) Participants indicate that they attend training for practicing and learning the philosophy of SFBT.

d) Participants want to take place more and outlasting practices in the training.

e) Participants indicate that they are disposed to apply SFBT techniques in their professional lives.

f) After this training, participants want to get different trainings which they can improve themselves.

g) Participants think that this training would make them more competent and it would affect positively to their private lives.

h) Participants indicate that they expect long-term training and need supervision.

Discussion

The purpose of this study is the evaluation of SFBT training by psychological counselors and their candidates. We think that this study comprises important results for both in psychological counseling field (SFBT and other approaches) and other intense short-term training programs in the educational field. When we look at a large part of the questionnaire results, the most remarkable result is "practicing" for almost all participants, so they use this expression at least once. Participants (a) purpose to attend the training is "practicing", (b) the reason they satisfy with training is indicated as finding a chance for "practicing", and (c) also they indicate that if there were more practicing chances it would be more beneficial. The biggest ask of participants at the results is applied training. By this, participants' need for supervision is also remarkable. Participants indicate that supervised practice is the point both participants satisfied with, and they also want a bigger part for it in the training content. For this reason, we can say that rather than applied training, a supervised training process makes participants more efficient and more satisfied with the training. In the study of Özyürek (2009), almost half of psychological counseling candidates (40%) indicate that their psychological counseling practices at schools do not inspect by faculty members of universities. Also, one of three participants indicates that they got feedback from a psychological counselor at the school. Correspondingly to this result, we can understand that the primary choice of participants is getting supervised training in the company with informative activities.

In this study, some participants think that their competence is increased through SFBT training. They highlight that they perceived more competent in their fields by their candidates and they can bring a new and different point of view to their therapy practices. Moreover, they indicate they realize they can have a more positive attitude towards their both private and professional lives. Similar to the findings of Hsu et al. (2017), we could say that this training enhances participants' positive attitudes about themselves and their self-sufficiency. Also, İkiz (2010) indicates that self-sufficiency and professional competency are important variables that affect the level of burnout. With the establishment of positive attitudes after SFBT training in participants' private and professional lives, we may suggest that this may decrease the symptoms of burnout syndrome and so affect participants positively.

At the end of the training, participants indicate that they will keep practicing SFBT techniques and questions. These results can be mean; (a) SFBT can be an alternative in addition to therapy methods for counseling, (b) it helps participants feel sufficient, (c) it helps to see SFBT practicable, and (d) they realize there can be need for SFBT method in institutions they work/may work in. Taking high ratings for training satisfaction into consideration, we can say that participants will use information from this training in their psychological counseling process.

Most of the participants are planning to attend other training, reading books and studying SFBT theory and questions for having deeper knowledge about SFBT and becoming more competent. We can say that SFBT training encourages participants to get continuing education. Continuing education is very important for increasing qualifications in the Turkish psychological counseling field (Arslan & Sommers-Flanagan, 2018). For that reason, despite it is not obligatory, participants' effort to increase their sufficiency is pleasing. Besides, participants indicate their satisfaction in questionnaire adding with by the promise of trainer specialist for supervision support in advance. The results reveal the need for supervision and consultation as part of continuing education.

Some of the participants suggest that if this training can be last for a long period, training would be more beneficial. In the standards of the International SFBT Association, SFBT training lasts 50 hours theoretical and 100 hours practice. However, long-termed training is not preferable for SFBT and other psychological counseling training in Turkey owing to financial and organizational difficulties. Nevertheless, results support that applied and long-termed training in the psychological counseling field (like cognitive behavioral therapy training, family therapy training) can be taken as an example by SFBT training.

In summary, SFBT starts to become a preferred therapy method especially at the schools in Turkey. Therefore, there are many SFBT training. The most important point worthy to notice in those training is providing a supervised practicing chance to participants as much as possible. It is also possible to say SFBT training has a positive impact on its participants. Finally, we can express here that providing training by standards (as abroad) is a significant need in Turkey.

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Investigation of Teacher Knowledge of Elementary Mathematics Teachers: Case of Probability

Mehmet Akif KILIÇ[a], Mesut ÖZTÜRK*[b], Betül KÜÇÜK-DEMİR[c]

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Abstract

This study was conducted in order to examine the content knowledge of mathematics teachers and to determine their views on probability issues. In the study, the case study model was used from the qualitative research designs. The participants of the study were six elementary mathematics teachers who is Turkey's north-east province who served. Teachers participating in the study were selected by quota sampling method. The criteria of the study were determined as teachers' masters and professional seniority. The data of the study were collected by semi-structured interview form. In the form of semi-structured interviews, teachers were asked questions of cognitive and affective questions related to the adequacy of probability information. Content analysis method was used in the data analysis. The results of the current study shows that the teachers considered the probability content knowledge is sufficient, but did not find the pedagogical content knowledge sufficient. Another result of the study is that some teachers do not know the concept of discrete event and independent event. Therefore, teachers have difficulty in distinguishing between discrete event and independent event concepts.

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Öz

Bu çalışma ortaokul matematik öğretmenlerinin olasılık konusundaki alan bilgilerini incelemek ve olasılık konularına yönelik görüşlerini belirlemek amacıyla yapılmıştır. Çalışmada nitel araştırma desenlerinden durum çalışması modeli kullanılmıştır. Çalışmaya Türkiye'nin kuzey doğusunda yer alan bir ilde görev yapan altı ortaokul matematik öğretmeni katılmıştır. Çalışmaya katılan öğretmenler ölçüt örnekleme yöntemiyle seçilmiştir. Çalışmada ölçüt olarak öğretmenlerin yüksek lisans yapma durumları ve mesleki kıdemleri temel alınmıştır. Çalışmanın verileri yarı yapılandırılmış görüşme formu ile toplanmıştır. Yarı yapılandırılmış görüşme formunda öğretmenlere olasılık bilgilerinin yeterliğine yönelik bilişsel ve duyuşsal alan soruları sorulmuştur. Çalışmada toplanan verileri içerik analizi uygulanmıştır. Yapılan analizler sonucunda öğretmenlerin olasılık konusunda alan bilgilerini yeterli gördükleri ancak pedagojik alan bilgilerini yeterli bulmadıkları belirlenmiştir. Çalışmada ulaşılan bir diğer sonuç ise bazı öğretmenlerin ayrık olay ve bağımsız olayı kavramsal olarak bilmedikleridir. Bu nedenle öğretmenler ayrık olay ve bağımsız olay kavramlarını ayırt etmede güçlük yaşamaktadır.

***Corresponding Author:** mesutozturk@live.com
[a] Teacher, Elementary School of Erdem Beyazıt, Bayburt/Turkey, http://orcid.org/ 0000-0003-0706-7032
[b] Asst. Prof., Bayburt University, Bayburt/Turkey, http://orcid.org/0000-0002-2163-3769
[c] Asst. Prof., Bayburt University, Bayburt/Turkey, http://orcid.org/0000-0002-6752-6803

Introduction

Probability is one of the important subjects of mathematics that we encounter in every aspect of our lives. Students are likely to become informally aware from the first years of primary school. However, this acquaintance occurs only in formal ways when students arrive at the 8th grade in secondary school. The encounter of the students probably brings along many difficulties and misconceptions. In order for the students to overcome these difficulties and not have misconceptions, their teachers should have good pedagogical and content knowledge about probability. Secondary school mathematics teachers take Statistics and Probability-I and Statistics and Probability-II courses on probability in undergraduate education. The updated curriculum also includes teaching the courses of Probability and Statistics, as well as the teaching of these courses separately (Probability, Statistics). What is expected from these courses is that teachers should be trained as mentors who not only know the possibility but also the possibility teaching. In other words, it aims to train teachers who know how to look at the subject of probability with two-lens glasses (student glasses and teacher glasses). Although the Probability and Statistics Teaching Lesson was added to the new curriculum, teachers who were currently employed did not take this course at the undergraduate level. Therefore, how these teachers look at probability subjects should be examined how they interpret the relationship between probability courses at the undergraduate level and probability subjects in secondary school. Because, it is their current teachers and the information of the teachers that will directly affect the students' learning of probability. Accordingly, it is considered that it is important for the practitioners to reveal the probability content information of the teachers. In this respect, the study aimed to examine how mathematics teachers associate probability information with content information and pedagogical information.

Content Knowledge of Teachers

The concept of content knowledge can be defined as the knowledge of the concepts, principles and definitions of teachers in their subject areas (Yanpar-Yelken et al., 2013). When the content knowledge of mathematics teachers is mentioned, it is understood that teachers' knowledge about the subjects in the mathematics lesson. To be more specific, can be expressed as to know the rules about mathematics, to understand why these rules are available, to know the reasons for the operations by the teachers (Ball, Thames, & Phelps, 2008). For example, in the teaching of probability subject in the secondary school curriculum, the reason why the probability values can take values between 0 and 1 is a statement corresponding to the content information of the mathematics teachers.

Good level of teachers' content knowledge is important for mathematics teaching. Because when teachers' content information is not sufficient, teachers can have problems in transferring the knowledge and skills they have to students, identifying places where students will have difficulty in learning information and eliminating possible misconceptions of students (Gökkurt, Şahin, & Soylu, 2012). On the contrary, it is likely that teachers with a good knowledge of the content will be able to learn the subjects better and know which operations they are doing and why. Because students imitate their teachers and try to make a solution themselves as they do their solutions (Öztürk, & Kaplan, 2019; Rosenholtz, 1985). Content knowledge alone is not enough for teaching mathematics. Teachers should also have good knowledge of pedagogy along with their content knowledge (Ball, Thames, & Phelps, 2008). Pedagogy knowledge is information that the teacher knows how to teach a subject. This type of knowledge is the knowledge of the teacher about the teaching methods and the curriculum (at which class level which subject they will teach) (Yanpar-Yelken et al., 2013). Building bridges between pedagogy knowledge and content knowledge increases the quality of the teaching process and provides better educated students.

Combining pedagogy knowledge and content knowledge is defined as pedagogical content knowledge (Baştürk & Dönmez, 2011; Yanpar-Yelken et al., 2013). Pedagogical content knowledge includes teachers' preference of appropriate teaching methods by having content knowledge and teaching knowledge (Staley, 2004). Stevens et al. (2009) defined pedagogical content knowledge as knowledge of a specific subject area, knowledge of the strategy techniques necessary to teach it, knowledge of the possible misconceptions of students, and knowledge of the curriculum.

Probability is one of the mathematical concepts that students and teachers have difficulty (Çelik & Güneş, 2007; Vysotskiy, 2018). Because students and teachers have difficulty in thinking probabilistic situations and mathematically approaching everyday situations related to probability (Memnun, 2008). However, the fundamental difficulty with regard to probability is related to the nature of the probability concept. Because the probability is different from the concepts that can be perceived intuitively, such as length, space, volume. Due to

the fact that reason probabilistic problems involve concepts of chance and change, being busy with probability is more difficult than dealing with numbers or shapes.

Students' thinking of possible situations is a more complicated structure than the transition from geometry to form or from arithmetic to algebra (Vysotskiy, 2018). There are many difficulties in the learning and teaching of probability in our country (Bulut, & Şahin, 2003; Gökkurt-Özdemir, 2017).

One of the reasons for these difficulties is the lack of content and pedagogical knowledge of teachers (Bulut, & Şahin, 2003). Researches revealed that teachers 'mathematical knowledge influences students' perspectives on mathematics. Therefore, it is important that teachers have good mathematics content knowledge. When teachers' knowledge of the content is sufficient and they support this knowledge with pedagogical knowledge, the quality of teaching is likely to increase (Stevens, 2009). When students' misconceptions about probability are taken into consideration, it is understood that simple and unified events, misconception, omission of the size of the sample cluster (Çelik, & Güneş, 2007) should be prioritized in terms of the independent event on the subject and the content knowledge on the discrete event. As a matter of fact, studies conducted in the literature emphasize the importance of discrete event and independent event concepts for the content knowledge of the teachers (Altun, 2015, p. 485; Gökkurt, Şahin, & Soylu, 2012; O'Connell, 1999).

Discrete Event and Independent Event

Let a random sample space be S and events from this sample space are A and B. If $A \cap B = \emptyset$, in other words, if $A, B \subset S$ events are not possible together, A and B events are called discrete events (Argün, Arıkan, Bulut, & Halıcıoğlu, 2014, p. 377; Demir, 2016, s). 34. Discrete events are also known as incompatible events (Demir, 2016, p. 34). For example, any instances that may occur when a non-loaded dice are discarded constitute the sample space (S = {1,2,3,4,5,6}). Let's take two events from this sample space. The first of these events is that "the numbers that come to the upper surface of the dice are smaller than 3", the second is defined as "the numbers that come to the upper surface of the dice are greater than 5" (A = {1, 2}, B = {6}). The intersections of these two events are empty and these two events can be defined as discrete events (Altun, 2015, p. 485).

The independent event is defined as if an event A does not affect the occurrence of a B event in any case or it is not affected by the event B then it is called an independent event (Demir, 2016, p. 64). Argün et al. (2014, p. 290) and Lipschutz and Lipson (2013, p. 92) emphasized that the two events should be in the identical (same) sample space in order to be an independent event. However, many studies in the literature do not use an expression of the necessity to have identical or identical sample spaces (Akdeniz, 2007, p. 77; Dekking, Kraaikamp, Lopuhaä, & Meester, 2005, p. 33; Demir, 2016, p. 64). In this study, it is searched that there should be identical sample spaces in the operational definition of the independent event. For example, when a non-loaded dice is thrown together with a fraudulent coin, all the situations that can occur are a sample space. T = Tura, Y = Let it be (S = {(1, T), (2, T), (3, T), (4, T), (5, T), (6, T), (1, Y), (2, Y), (3, Y), (4, Y), (5, Y), (6, Y)}). The number on the top of the dice is an odd number (S = {(1, T), (3, T), (5, T), (1, Y), (3, Y), (5, Y)}) and top events on the top of the coin (S = {(1, T), (2, T), (3, T), (4, T), (5, T), (6, T)}) they become independent events.

The above is described as an independent event with discrete event. As can be seen from the definitions, the discrete event and the independent event are actually very different concepts. However, these concepts are often confused with each other. In this context, the way to distinguish these two concepts is to look at the intersections of these events. If the interception of the two events are empty, the events are independent if it is different from the empty the events are independent (Lipschhutz, & Lipson, 2013, p. 92). Considering the above examples, there will be intersections of the events given in the discrete event example ($(A = \{1,2\}, B = \{6\}, A \cap B = \emptyset)$). In other words, the intersections of the sets are empty. In the case of an independent event, the odds of the number one and top of the coin (S = {(1, T), (3, T), (5, T)} are possible and are $A \cap B \neq \emptyset$.

Literature Review

When the literature is examined, it is seen that the studies on the subject of probability in mathematics education have increased in recent years. Some of the studies are aimed at examining the probability information and misconceptions of middle and high school students (Barragués, Guisasola, & Morais, 2006; Engel, 1971; Munisamy, & Doraisamy, 1998), while others are aimed at examining the content knowledge of prospective teachers. In the studies conducted to examine the probability information of high school students, it was determined that the students had difficulty in probability subjects and their knowledge levels were not sufficient (Memnun,

2008). In the studies conducted to determine students 'misconceptions, students' representation, negative and positive effect, simple and unified events, representation short path, result approach, misconception of sample size were reached (Akkoç, & Yeşildere-İmre, 2015, p. 19; Çelik, & Güneş, 2007). Akkoç and Yeşildere-İmre (2015, p. 25) stated that not only students but also teachers had misconceptions. Teachers' misconceptions (Klymchuk, & Kachapova, 2012), pedagogical information (Schoen, LaVenia, Chicken, Razzouk, Kisa, 2019; Shin, 2011) and content knowledge were also examined in the studies conducted to examine the content knowledge of teacher candidates (Gökkurt-Özdemir, 2017). However, it has been determined that the studies on the content knowledge of the current teachers are quite limited. Gökkurt-Özdemir (2017) in the study to examine the probability knowledge of teacher candidates, examined the probability content knowledge of teachers through descriptive analysis. The study focuses on the knowledge of teacher candidates on disparities between discrete and non-discrete events and independent events and dependent events. As a result of the study, it was determined that most of the teacher candidates did not have enough knowledge about the discrete event and the independent event and confused the discrete event and independent event. The researchers analyzed the data by using descriptive analysis method. Descriptive analysis may limit the findings that may arise as a result of using an existing theoretical framework. In addition, the study was conducted with teacher candidates and there is a need for studies with teachers. Although it is important to examine teacher candidates and students, it is even more important to examine the content knowledge of current (on-duty) teachers. Therefore, it is important to examine teachers' content knowledge on probability. This study was carried out to determine the content knowledge of middle school mathematics teachers about probability. For this purpose, the following sub-problems were sought:

1. What is the opinion of middle school mathematics teachers about the adequacy of pedagogical content knowledge in probability?
2. What is the subject content knowledge of middle school mathematics teachers about the discrete event?
3. What is the subject content knowledge of middle school mathematics teachers about the independent event?

What kind of abstractions do middle school mathematics teachers make between separate and independent events?

Method

Research Design

In the study, the case study model of qualitative research designs was used. The case study is used in cases where one or more situations are examined in detail (Yıldırım, & Şimşek, 2013). In this study, a case study model is preferred because it is aimed to examine the teachers' knowledge on probability of middle school mathematics teachers in detail. Yıldırım and Şimşek (2013) stated that the case study is also important in terms of revealing the process. In this study, it is thought that it would be more appropriate to use this model as it will examine the awareness of teachers about discrete event and independent event concepts.

Participants

Participants of this study are the 6 middle school mathematics teachers who work in the cities located at the Northeast of the Turkey. All of the participants were selected from teachers who volunteered to participate in the study. Quota sampling method, which is one of the purposeful sampling methods, was used in the selection of the participants. The advantage of quota sampling is that it is more representative of the population than other purposeful sampling method (McMillan, & Schumacher, 2014, p. 153). The criteria of the study were based on the post-graduate status of teachers and their work seniority. In addition, at least two participants (1 female and 1 male) were included in the study. Two of the teachers participated in the study are studying their master degree. Yaşar (male) and Yasemin (female) code names were used for these teachers. Two of the teachers participated in the study have 10 years of experience. Kayra (male) and Kadriye (female) code names were used in these teachers. The other two teachers who participated in the study were chosen as new (0-2 years experience) teachers in the profession. Tarkan (male) and Tülay (female) code names were used for these teachers. The participants were informed about the study and it was stated that their names would be known only by the researcher, not to be shared anywhere, and the data obtained will be used only for scientific purpose.

Data Collection Tools

Semi-structured interview form was used as data collection tool. The reason for using the semi-structured interview form is to reveal the participants' content knowledge on the subject of probability. The researchers aimed to reveal the participants' content knowledge in detail by using probe questions in line with the answers from the participants. After the semi-structured interview form was prepared by the researchers, the expert opinion was obtained and finalized. In the preparation process of the semi-structured interview form, four questions were examined and six probes related to these questions were prepared. Then the prepared form was presented to two faculty members in the department of mathematics education and their opinions were taken. The experts stated that the questions were appropriate. However, he suggested that some corrections be made for the questions at the end and that one more question should be added to the questions. The corrected form was applied to a mathematics teacher working in middle school and to determine whether there are parts that are not understood in the questions. As a result of the application, it was determined that the questions were clear and understandable and there was no need for correction. The questions in the semi-structured interview form are as follows: *"Do you think that the education you received about the probability of your undergraduate education is sufficient?", "Can you describe the discrete event?", "Can you describe the independent event?", "Are the concepts of discrete and independent events identical or different?"* These questions include the following sample probe questions: *"If they are same, can you explain? If they are different, can you explain what the differences are? Can you show an example of the differences between these concepts?"*

Data Analysis

In the study, content analysis method was used from qualitative data analysis methods. For this purpose, interview data were analyzed and coded by the first researcher. Encodings were checked by the second researcher and the value of consistency between the researchers was examined. The inter-coding consistency was examined using the formula [(number of views / total views) X100] and the inter-encoder consistency value was calculated as 78%. This calculated value indicates that inter-encoder compatibility is sufficient (Miles, & Huberman, 2015).

Validity and Reliability

In this study, internal and external validity studies were conducted. For the external validity of the study, the working group is explained in detail and in the statement of the participant views, the line numbers in the transcript and the number of the transcripts were also given. For the internal validity of the study, participants were asked probe questions and give their supportive examples.

In this study, internal and external reliability processes were performed. In order to ensure the external reliability of the study, direct transfers were made from the views of the participants. For internal reliability, the research model, the working group, the data collection tools and the analysis of the collected data are prepared to be consistent. The compatibility between the coding of the researchers was investigated. In addition, opinions were taken from the same occupational group with common cohesion.

Findings

Findings Regarding the Critical Thinking Tendency

Five of the teachers who participated in the study stated that the probability course they had taken in the undergraduate education was sufficient. One of the participant teachers, Yaşar talked about "[00.14] *the basic concepts of probability at the University's probability course. We have seen examples of daily life in probability* (Line, 6-7)." It is understood that he thinks that the knowledge he has received in probability course at the university is sufficient. Similarly, teacher Tarkan said that "[00.10*] I think the probability course we have taken is sufficient. We even got a probability lesson at the advanced level. Our point of view widened in probability class* (Line, 5-6)". It was also determined that the content knowledge courses they took from the teachers' statements were very detailed (comprehensive). Teacher Kadriye stated that "[00.31] *The information that we learned at the university is very high level according to what we teach in secondary school* (Line, 9)" she had found the probability lesson in undergraduate education sufficient.

One of the teachers who participated in the study stated that a significant part of the probability subject was removed from the secondary school curriculum. Yaşar teacher mentioned that "[00.30] *In the middle school,*

probability is a little bit simpler and more basic (Line, 10-11).” Kadriye Teacher who expressed similar views said that:

> “*In other words, the information we learned at university was indeed very high. In fact, the high school level was like the subjects we studied, but in secondary school, we've just shown how to write a sample space because they've reduced topics recently. We explain these situations, that is, the possibility that we learn in the university and the possibility that we aim to teach in schools is not very much related to each other*.” (Line 9-13)

These two statements show that teachers think that the curriculum has been simplified and that some subjects are removed from the program.

Some of the teachers who participated in the study think that the content knowledge they have learned at the undergraduate level and the probability information they aim to teach in secondary school are on the same basis. One of these participants, Tülay expressed his thoughts as follows:

> “[00.57*] I would say that there is a simple level, but when we think about it in a comprehensive way, we are inevitably going into some more details at the university. But in middle school, we explain it in a way that students can understand. But I can tell that, I think some of the subjects in the probabilities we took in the university are irrelevant. However, the basic logic is the same. It must already be built on the same logic. In this sense, I do not think that there is a big difference between the probability of university and the probability of middle school.”* (Line, 13-17)

It is understood from the teacher's statements that they think they have received a comprehensive probability education at the undergraduate level. On the other hand, because the probability subject in the middle school curriculum is given at a simple level, it is evident that the probability at the university and the probability subjects in the secondary school are only the same at the basic level.

It was determined that some of the teachers who participated in the study thought that their pedagogical knowledge was not sufficient despite the fact that the content knowledge was sufficient. Tarkan’s “[01.00] *The probability course at the university is an advanced course based on probability theories, not on probability teaching. So we didn't learn the possibility. We have learned what probability is used in daily life and where it is used* (Line, 14-16)” words have shown that the theoretical part of the probability course has been extensively described in the university. In addition, they do not take the course of teaching in the probability course. It was determined that one of the teachers who participated in the study thought that there was a gap between the teacher's knowledge of the content and their knowledge of teaching. The teacher Kayra with this thought supports this as;

> “*There are some differences between the probability course we took in the university and the probability lesson that we teach. As in the other courses, we have seen a more comprehensive course in the probability course than in the subjects we teach the students in middle school. Therefore, I think the probability courses we have taken in undergraduate education are sufficient*.” (Line, 20-23).

The distribution and frequency values of the teachers according to the codes obtained in the evaluation category for the pedagogical content knowledge are shown in Table 1.

Table 1. The distribution of the codes obtained according to the participants by the teachers for the evaluation of the pedagogical content knowledge

	Yaşar	**Yasemin**	**Kayra**	**Kadriye**	**Tarkan**	**Tülay**	**f**

Thinks that education he/she took is sufficient	X	X	X	X	X	5
Removed from the curriculum or simplified the curriculum	X		X			2
Probability subjects that are aimed to be taught in Middle School and probability subjects learned at university are the same.	X				X	2
His/her pedagogical knowledge is not enough			X	X		2
There is gap between content knowledge and teaching knowledge		X				1

When Table 1 is examined, it is determined that five of the teachers think that education is sufficient. This code is also the most repetitive code of this category. Following this, the most frequently repeated codes were removed from the curriculum or the curriculum was simplified, the pedagogical knowledge was not sufficient and the probability topics that were taught in middle school and the probability subjects learned at the university were the same basic codes (n = 2). The least repetitive code is the code between the field information and the teaching information.

Evaluations of Teachers about the Discrete Event Information on Probability

Four of the teachers who participated in the study explained the discrete event as events affecting each other. Tarkan teacher explained his idea as "[01.39] *... Discrete event requires two different events. The situation of two separate events, which do not affect each other, can be defined as a discrete event. That's how I can interpret this as far as I can remember* (Line, 22-24)". Similarly, Tülay teacher said that;

> "[01.28] *The discrete event is completely separate from each other. For example, in an event where the tossing a coin, the other event is to throwing a dice. These two events are discrete events. So the two are completely separate from each other. Separate cases, separate results.*" (Line 19-21)

Some of the teachers who participated in the study described the discrete event as events with a single sample space or universe. Yaşar, from these teachers, said that "[00.45] *The discrete event is that you have a single space in your operations. For example, if you throw a dice, there is only one space, or if you toss a coin, there is only one space* (Line, 13-14)". Yasemin, who gave a similar opinion from the participants said that;

> "[02.19] *Let me tell you something better than the example. The discrete event is also the same as the universal set. Let me give you an example from the same event. When the dice are thrown in the discrete event, it is impossible to come both 2 and 4 at the same time. The sample space is the same in the discrete event but the two events are not happening at the same time*." (Line, 26-29)

Unlike Yasemin and Yaşar, participants from Kadriye described the discrete event as events in different sample spaces. The teacher's statements are: "[01.03] *The discrete event, I think, is the case of events in different spaces. So if we're talking about two events that aren't in the same space, I think these are discrete events* (Line, 15-17)". It was understood that the teacher thought that the discrete event was in different sample spaces. Some of the teachers who participated in the study described the discrete event as events without common outcomes. Kayra teacher described the discrete event as "[01.55] *Discrete event is two events without common outputs. When we throw a dice the result of odd number and even number is the discrete event with an odd number* (Line, 28-29)".

The last code reached from the teachers' statements about the discrete event is not possible at the same time. The teacher who identified this code, Yasemin;

> "[01.43] *... I remember the discrete event as an event that is not possible at the same time. So I threw the dice, for example, 2 and 3 at the same time on the top of the dice to come at the same time was impossible or discrete as far as I remember*." (Line, 22-24)

The distribution of the codes of the teachers related to the discrete event according to the participants is presented in Table 2.

Table 2. The distribution of the obtained codes according to the participants for the evaluation of the discrete event information on probability

	Yaşar	**Yasemin**	**Kayra**	**Kadriye**	**Tarkan**	**Tülay**	**f**
Events that do not affect each other			X	X	X	X	4
Events without common outputs			X			X	2
Having a single sample space or having the same universe	X	X					2
Having different sample spaces				X			1
Events that are not possible at the same time		X					1

When Table 2 is examined, it is determined that four of the teachers' opinions about the discrete event are "not affecting each other". This code is also the most repetitive code of this category. After this, the most common repetitive codes are events with no common outputs and a single sample space or having the same universe (n = 2). The least repetitive codes are the different sample spaces and the codes that are not possible at the same time (n = 1).

Evaluation of Teachers' about Independent Event Information

The result of one of the codes obtained in the standalone event category is the code that does not affect the other. Teachers from participants mentioned her thoughts about independent event as;

Tülay: "[01:58] *Independent events are two situations that do not affect each other. For example, to throw two different dice at the same time. One outcome doesn't affect the other, or if it comes 2 in one event it doesn't mean that it won't come again in the second event*." (Line, 23-25)

Kayra: "[02.05] *If the outcome of an event does not affect another event, these two events are independent of each other. When dice is thrown and a coin is tossed. The result of the two is independent of each other. Does not affect each other* (Line, 31-32)".

Kadriye: "[01.25] *We can say that independent events occur at the same time, the possibility of events that do not affect each other. For example, a dice-throwing experiment and a coin-tossing experiment are independent of each other. So the results here do not affect each other. I think so* (Line, 19-21)".

Tarkan:"[2.27] *In an independent case, for example, I pick the ball back from a bag, and I pick the ball again. The first situation does not affect the second situation. This is called an independent event*. (Line, 32-34)".

Yaşar Teacher, who approaches the independent event differently from the other participants "[01.00] *In an independent event you need to do more than one thing at the same time. So it's like throwing a dice at the same time as picking a ball or tossing a coin and throwing a dice* (Line, 16-17)". It is understood from the statement of the teacher that the independent event explains the occurrence of more than one event at the same time.

Some of the teachers who participated in the study described the independent event as events with different sample space. Participant teachers Yasemin said that "[02.19*] In the case of independent events, the spaces are different. For example, a dice is thrown and a coin is tossed. The dice and the coin have their own sample space. These two are independent events…*" (Line, 29-31)

Table 3 presents the distribution of the codes of the teachers as a result of the content knowledge on the independent event.

Table 3. The distribution of the obtained codes according to the participants for the evaluation of the independent event information on probability

	Yaşar	**Yasemin**	**Kayra**	**Kadriye**	**Tarkan**	**Tülay**	**f**

The result of one does not affect the other			X	X	X	X	4
Different sample space		X					1
Multiple events occurring at the same time	X						1

Table 3 pointed out that four of the teachers' opinions on the independent case is "do not affect the other". This code is also the most repetitive code of this category. The least repetitive codes are "different sample space" and the "occurrence of multiple events at the same time" (n = 1).

Teachers' Evaluation about Probability Concept

It was determined that some of the teachers who participated in the study had negative thoughts about probability. Kadriye Teacher who was determined that she has negative automatic thought:

"[03.15] *I'm having a hard time with probability subject. I just want to say that. Especially in the 10th class this topic is being studied. To be honest I'm having difficulties when it comes to high school level questions. I don't know about university education. I don't think it's about university education. In general, we may not have been taught very well in this regard. So I think that this is the level of problem until I come to university, so maybe we cannot think of multifaceted. I don't think it's right to just relate it to the university*." (Line, 40-45)

It was determined that one of the teachers who participated in the study had difficulty in distinguishing between discrete and independent events. Yasemin Teacher who mentioned this opinion said that:

"[04.11] *Probability is a subject that I have been struggling with throughout my life. Because of that I can't get too close to it. I'm not very interested with it. To me, the probability is an extreme abstract concept. The subject of probability should be reduced a little, and in the 8s, 6s, 5s, it has to be put into the curriculum, but how is it like in the 8s? The students in 5, 6 and 7th grade don't have it. All of a sudden, at 8th grade, what's independent event? What's descrete event? They're dealing with such abstract possibilitiy subject. I think it should be given to children in the 5th grade, but in the 5th grade there should be try and fail, material and play. It should be considered more concrete. This subject is a very important; I think it can be studied at the first level in middle school. For example 2-3 hours of attainment time, then 4th, 5th grade. And also, sometimes they are removing from the curriculum sometimes put it back. I mean, I don't think the possibility should be removed from the program. Statistics should not be removed. But it is not very appropriate to be given only in the 8th grade. This is my opinion. Children do not understand it when they come to 8th grade. I do not think that teachers, including me, have much control over the probability subject*." (Line, 47-60)

Table 4 shows the distribution of the codes of the teachers as a result of their evaluations about the probability concept according to the participants.

Table 4. The distribution of the obtained codes according to the participants for the evaluation of the probability concept in terms of probability

	Yaşar	**Yasemin**	**Kayra**	**Kadriye**	**Tarkan**	**Tülay**	**f**
Have negative automatic thoughts about probability		X		X		X	3

Have difficulty to distinguish between discrete and independent events			X	1
Probability is extreme abstract concept	X			1
States that he does not think critically multifaceted.		X		1

When Table 4 is examined, it is determined that three of the teachers have negative automatic thoughts about probability. This code is also the most repetitive code of this category. The least repetitive codes are "have difficulty to distinguish discrete and independent phenomena", "the probability is excessive abstract concept", and "states that he does not think critically multifaceted" (n = 1).

Discussion and Conclusion

In this study, which was conducted in order to examine the content knowledge of middle school mathematics teachers about probability, it was determined that the teachers' probability content knowledge was good but their pedagogical knowledge was not sufficient. In addition, it was found that most of the participant teachers had difficulty in distinguishing discrete event and independent event and could not conceptually understand discrete event and independent event. Furthermore, it was found that teachers who had participated in the study had negative thoughts about probability. When the opinions of the teachers about the evaluation of probability information are examined, it is understood that most of the teachers found the education they received sufficient. On the other hand, they pointed out that there was a constant change in the curriculum and, along with these changes, the probability issues were greatly reduced in the curriculum. Although it was criticized by the teachers in the elimination of advanced topics in the curriculum, studies conducted during the years when the probability issues were heavily involved in the curriculum indicated that it was necessary to simplify the curriculum and to include firstly conceptual understanding activities (Munisamy, & Doraisamy, 1998). Another issue that teachers emphasize is the probability subjects that are aimed to be taught in middle school and the probability subjects learned in the university are on the same basis. The mathematics content courses that the teachers have learned at the university are expressed as content knowledge and their knowledge about the middle school mathematics courses that the teachers will teach is explained to us as pedagogical content knowledge. Baki's (2018, p.3) "the teacher should have at least one upper level of the curriculum that he / she has to teach" expression points out the knowledge of mathematics that the teachers have learned in the university and the mathematics knowledge they aim to teach in secondary school are the same. Some of the teachers stated that their pedagogical knowledge is not sufficient. Lim and Guerra (2013) examined the pedagogical content knowledge of pre-service teachers in terms of numerical calculation, probability and statistics, geometry and measurement, and algebraic expressions. In a study conducted by Danişman and Tanışlı (2017), he determined that teacher candidates think that they do not find themselves pedagogically sufficient in probability teaching and they think that they need improvement.

In this context, it can be said that teachers' thoughts about not being sufficient on pedagogical knowledge is supports literature. The teachers who participated in the study stated that there is a gap between their content knowledge and pedagogical knowledge. In other words, teachers stated that there is a disconnection between field information and teaching information. De Vaul (2017) stated that mathematics teachers take content knowledge courses in undergraduate programs however; there may be deficiencies in teaching information due to insufficient pedagogical content knowledge. Studies in the literature have emphasized that the bridging of pedagogical knowledge and the content knowledge of teachers is important for teaching (Baştürk, & Dönmez, 2011; Yanpar-Yelken et al., 2013). It can be said that the finding obtained in this context supports the literature.

When the knowledge of the mathematics teachers about the discrete event was evaluated, it was determined that their teachers had some misinformation about the discrete event. Most of the teachers who have false information about the discrete event are defined as events that do not affect the discrete event. This definition is not sufficient and it is more accurate to identify with the independent event. In other words, teachers explain the discrete event as events that do not affect each other. Demir (2016, p. 64) stated the independent events as events that do not affect each other. One participant stated that discrete events are occurring in different sample spaces. This statement of the teacher shows that he has a false knowledge. Because discrete events must be made in the same sample space according to the definition (Argün et al., 2016, p. 377; Demir, 2016, p. 34). Some of the teachers who used the correct expression about the discrete event described the discrete event as events without common output. Altun (2015, p. 485), in his example, pointed out that there would be no common output of discrete events.

It was determined that the participants who used similar expressions defined the discrete event as events that could not be realized at the same time. Some participants who use the correct expressions of the discrete event have stated that for a discrete event, events must be in a single instance space or in the same universe. Argün et al. (2014, p. 377) and Demir (2016, p. 34) stated that discrete events are on the same sample space.

Most of the teachers participating in the study used the correct expression about the independent event. These teachers described the independent events as the events that did not affect the other. This expression coincides with the definitions in the literature (Demir, 2016, p. 64; Lipschhutz and Lipson, 2013, p. 92). One of the teachers who participated in the study was not focused on the key concept in the definition but gave the correct answer. Although the participant who describes the occurrence of more than one event at the same time as an independent event does not make any statement about the outcomes of the events, the statement he uses is correct. Altun (2015, p. 485) benefited from this statement when explaining the independent events. A teacher who responded incorrectly from the teachers who participated in the study stated that independent events took place in different sample spaces. Argün et al. (2014, p. 290) and Lipschutz and Lipson (2013, p. 92) emphasizes that independent events should be on identical spaces. In this context, it can be said that the expression used by the teacher is inaccurate.

Considering the students' evaluations on the concept of probability, it was determined that half of the teachers participating in the study had negative thoughts about probability. Although there is no clear indication that teachers have negative thoughts about probability in the literature, it is stated that teachers have experienced reservations, fears or concerns when approaching the subject of probability (Danişman, & Tanışlı, 2017). It was determined that the teachers who participated in the study had difficulty in distinguishing discrete and independent events. Gökkurt-Özdemir (2017), in his study, found that mathematics teacher candidates have difficulty in distinguishing between discrete event and independent incident. In this study, it was found that teachers could not fully understand the concept of discrete event and the concept of independent phenomenon in the findings obtained for the concepts of discrete event and independent event. Difficulty of distinguishing between discrete event and independent concepts can be related to this reason. In this context, it can be said that the findings of the study support the literature and the study. Another assessment of teachers about the concept of probability is related to the excessive abstractness of the concept of probability. A teacher indicated in his probability class that he did not think critically. Vysotsky (2018) emphasized that the subject of probability is different and more complex than algebra and geometry. The researcher stated that the possibility included the problems of chance and change to make it abstract. In this context, it can be said that the findings obtained support the literature. The findings of the study indicated that the teachers did not emphasize the basic difference of the discrete event and the independent event (the fact that the two events were empty and no intersections).

This study, which aims to examine the probability content knowledge of middle school mathematics teachers, has certain limitations. The first limitation was the number of participation teachers in the study which is six. This limitation relates to the model of the study. A case study model was used in the study, and the participants of the study were limited and detailed interviews were conducted because the case study included in-depth data collection with a small number of participants. The results of the study showed that teachers' content knowledge and pedagogical knowledge is not sufficient. For this reason, future researchers may design experimental research to increase teachers' content knowledge and pedagogical knowledge. Another finding reached in the study is that teachers have negative automatic thoughts about probability subject. Future researchers can carry out mixed-method research that will reveal teachers' negative auto-thoughts about probability. In addition, this study was carried out only on probability, and future researchers may also examine the field information of teachers or prospective teachers in the field of statistical learning.

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The Effects of Academic Self-Concept and Organizational Factors on Academic Achievement

Ömer Faruk CANTEKİN*[a]

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Abstract

University students' achievement is influenced by a number of factors. Academic self-concept and organizational factors are among the significant ones. This study aims to investigate the effects of academic self-concept and organizational factors on university students' achievement and to discover whether this varies according to such variables as gender, grade, place of accommodation, educational status of the parents, and preference. The sample of the study consisted of the randomly selected 450 university students attending private and state universities in provincial Ankara. The data were collected using Matovu Academic Self-Concept Scale and Organizational Factors Scale. As a result of the study, it was found that gender, the grade, the place of accommodation, administrative services and practices, and physical setting and equipment positively affected student achievement. Further studies are needed to investigate the combined effects of the variables, including academic self-concept, thought to have an effect on student achievement at university.

Akademik Benlik Kavramı ve Örgütsel Faktörlerin Akademik Başarı Üzerindeki Etkisi

Makale Bilgisi

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Öz

Üniversite düzeyinde öğrenci başarısı bir dizi değişkenden etkilenmektedir. Akademik benlik kavramı ve örgütsel faktörler bu değişkenlerden önemli olanları arasında yer alır. Bu çalışmanın amacı, akademik benlik kavramının ve örgütsel faktörlerin üniversite öğrencilerinin akademik başarıları üzerindeki etkisini ve bu durumun cinsiyet, yıl, kalınan yer, anne-baba eğitim durumu, tercih değişkenlerine göre farklılık gösterip göstermediğini incelemektir. Araştırmanın örneklemini Ankara ili merkez ilçelerde bulunan devlet üniversitelerinde okuyan öğrencilerden rastgele olarak seçilmiş 460 öğrenci oluşturmaktadır. Veriler Matovu Akademik Benlik Kavramı Ölçeği (MABKÖ) ve Üniversite Öğrencilerinin Akademik Başarılarını Etkileyen Örgütsel Faktörler Ölçeği (ÖBEÖFÖ) aracılığıyla toplanmıştır. Sonuç olarak, cinsiyet, üniversite yılı ve kalınan yer, akademik benlik kavramı ve Yönetsel Hizmet ve Uygulamalar ve Fiziksel Ortam ve Donanım faktörlerinin öğrencilerin akademik başarısını olumlu olarak etkilediği bulunmuştur. Akademik benlik kavramı başta olmak üzere, akademik başarıyı etkilediği düşünülen farklı öğrenci özelliklerinin birlikte değerlendirildiği çalışmalara ihtiyaç vardır.

***Corresponding Author:** cantekin@gazi.edu.tr
[a] Asst. Prof., Gazi University, Faculty of Health Sciences, Department of Social Work, Ankara / Turkey
https://orcid.org/0000-0001-5096-3233

Introduction

University students' academic achievement is important as it is a step to a decent profession. Earning a university or college degree has economic, social, psychological and cultural effects on students, their close social ties, and the society as a whole (De Koning et al., 2013; Mayhew et al., 2016). On the other hand, educational investments and expenses, the need for qualified academic staff are listed as the social challenges related to low academic achievement (OECD, 2008). Increasing the level of academic achievement and students getting graduated without needing extra terms are important for a country's economy and educational policies.

One of the building blocks of personality, self-concept refers to one's opinions as to who he is, what meaning his life has, what he is able to do, and how he adapts to the world (Öner, 1987). A perusal of literature brings about different definitions of self-concept. For instance, Rosenberg (1986) defines self-concept as the sum of one's opinions and feelings with reference to themselves as an object. Self-concept is not innate; rather, it is formed through time in the social and physical environments. School, peer groups, and parents contribute significantly to boosting children's self-concept and self-esteem in the early and middle childhood (Frisby & Tucker, 1993). Defined as one's perceptions, feelings, and attitudes towards themselves, self-concept is multidimensional (Marshall, 1989; Wall,1986). Some of these dimensions are bodily features, social self, cognitive self, and academic self.

Self-concept consists of one's general evaluations and perceptions as to themselves and ASC is part of the general self-concept (Marsh, 1987). ASC is described as the totality of one's knowledge and perceptions about themselves in the cases of academic success (Wigfeld & Karpathian, 1991). It is also defined as the judgement a student has formed about a specific academic effort, considering how capable he is in comparison with the other students (Arseven, 1986). ASC consists of a student's perceptions about himself in different disciplines (e.g., math, science etc.) or general academic realm (Marsh et al., 2008). It involves not only students' feelings about themselves

There are numerous definitions of academic self-concept in the literature (Arseven, 1986; Wigfeld & Karpathian, 1991; Guay et al., 2003; Traütwein et al., 2006), but the common points can be summarized as 1) academic self-concept is one's subjective evaluation about themselves, 2) it involves social comparison , 3) it has both cognitive and affective content, 4) it is not limited to only one academic area, 5) it expresses personal opinions and feelings as to one's academic abilities.

As one of the concepts on which the oldest and most comprehensive educational research have been conducted, ASC (Marsh et al. 2012) has been found to be related with a series of outcomes and variables including academic effort (Traütwein et al. 2006), academic achievement (Skinner et al. 1990; Guay et al. 2003; Valentine and Dubois, 2005; Marsh and Craven, 2006; Awad, 2007), academic interest and long term academic goals (Marsh et al. 2005, 2007; Pinxten et al. 2010), and positive ASC has been defined to facilitate reaching educational goals (Seaton et al. 2009). Positive ASC is stated to be significant in school life and education and to affect learning outcomes (Wolff et al. 2018: 58). Besides, it is pointed out that students with high success level have high academic self-concept, those with high academic self-concept have high levels of learning, and the effect of academic self-concept on success is stronger than the effect of success on academic self-concept (Dean, 1977; Lau and Chan, 2001; Newfield and McElyae, 1983). On the other hand, low ASC can affect decisions regarding education and career and may lead to failure (Davis, 1966; Marsh et al. 2008). In addition, there are studies indicating that academic self-concept may differ according to such demographic variables as gender, age (Wigfield et al. 2001), and the grade (Liu and Wang, 2005; Jacops et al. 2002).

It is believed that student success is not only affected by internal factors of personal traits, ASC, academic self-sufficiency or subjective wellbeing but also by external factors, such as social support and organizational factors (Véronneau and Dishion, 2011; Rice et al. 2013; Memduhoğlu & Tarhan, 2013; Ekinci & Gökler, 2017; Wang et al. 2019). Organizational factors can be investigated under four dimensions: 1) professional competency and practices of instructors, 2) administrative services and applications, 3) communication, 4) physical environment and equipment (Memduhoğlu & Tanhan, 2013: 115).

The aim of this study is to describe the effects of academic self-concept and organizational factors on university students' achievement. Also, whether this varies according to such variables as gender, grade, place of accommodation, educational status of the parents, and preference was investigated.

Method

This section covers research design, population and sample, data collection tools and data analysis.

Research Design

The study is based on relational survey method. Relational survey method aims to determine the existence and/or the degree of covariance between two or more variables (Karasar, 2003).

In this study, the effects of academic self-concept and organizational factors on students' achievement were examined. Besides, how level of achievement differs according to demographic variables was investigated. In the study, student success was considered as the dependent variable while academic self-concept, organizational factors and demographic features were considered as independent variables.

Population and Sample

The population of the study consists of randomly selected 450 university students attending private and state universities located in the central districts of Ankara.

Data Collection Tools

The data were collected through a form. The first section of the form includes demographic information (current general point average, gender, grade, place of accommodation, educational status of the parents, and preference). The second and third sections include Matovu Academic Self-Concept Scale (MASCS) and "Scale of Organizational Factors Affecting Student Academic Achievement (SOFASAA), respectively.

MASCS. In the determination of students' academic self-concept, the data were collected with MABKÖ. Matovu Academic Self-Concept Scale, developed by Liu and Wang (2005) and later adapted to university students by Matovu (2014), was adapted to Turkish by Cantekin and Gökler (2019) to be used for the samplings of university students in Turkey. The scale comprises 20 items that assess academic self-concept of university students. MASCS has a two-factor structure consisting of Academic Confidence and Academic Effort and provides two separate total scores for each factor. For the dimensions, Cronbach Alpha internal consistency coefficients were obtained as 0.960 and 0.964, respectively. Cronbach Alpha internal consistency coefficient for the entire scale was calculated as 0.930. MASCS is a 7-point Likert-type scale (strongly disagree, disagree, disagree somewhat, neither agree nor disagree, agree somewhat, agree, strongly agree).

SOFASAA. In the determination of organizational factors affecting student success, "Scale of Organizational Factors Affecting Student Academic Achievement" developed by Memduhoğlu and Tanhan (2013) was employed. The scale consists of 22 items assessing the organizational factors affecting university students' academic achievement and is a 5-point Likert-type scale (totally disagree, slightly agree, moderately agree, strongly agree, totally agree). Each item is in affirmative form. The scale includes four different factors which are "professional competency and practices of instructors", "administrative services and applications", "communication", and "physical environment and equipment". Alpha coefficients of SOFASAA were found as 0.903 for the first factor, 0.900 for the second, 0.815 for the third, and 0.761 for the fourth, and total alpha reliability coefficient was determined as 0.926. Thus, the scale is valid and reliable and can assess organizational factors affecting student success in educational organizations.

Data Collection

The data were collected through the form applied to university students on the university campuses in the academic year 2017-2018.

Data Analysis

In the study, factors affecting student success were tried to be determined. Normality hypothesis was examined with Kolmogorov-Smirnov and Shapiro Wilk tests before the analyses, and data were observed to come from a normally distributed population. Therefore, parametric statistical methods were employed in comparisons. As parametric methods were employed in statistical analyses, mean and standard deviation values were shown in the tables. In the comparison of two independent variables, t-test was used, and one-way variance analysis (ANOVA) used in the comparison of more than two independent variables. In variance analysis, Tukey test, as one of the multiple comparison tests, was utilized when null hypothesis was rejected. In the investigation of procedural

relationships, regression analysis was used. The analyses were carried out with IBM SPSS v22 Package Program and upper limit for significance was accepted as 0.05.

Findings

As seen in Table 1, gender, grade, and place of accommodation have a statistically significant effect on academic achievement of students. Considering the average values, male students can be said to be more successful than female students. When the result of the multiple comparison test is analysed, students at the 2nd grade are more successful than others and those staying at dormitories have higher level of academic achievement than that of others. Further, as can be seen in Table 1, educational status of the parents is a non-effective variable on students' academic achievement.

Table 1. Comparison of academic achievement according to demographic variables

Variable	Level	n	%	Mean[§]	St. deviation	t / F
Gender	Female	183	39.8	2,56	,52	-4.72**
	Male	277	60.2	2,80	,53	
Grade	1	62	13.5	2,68[a]	,56	6.17**
	2	79	17.2	2,91[b]	,47	
	3	113	24.6	2,68[a]	,54	
	4	93	20.2	2,78[a]	,52	
	5	113	24.6	2,62[a]	,36	
Place of Accommodation	Family	199	43.3	2,64[a]	,56	3.50*
	Dormitory	133	28.9	2,82[a]	,51	
	Flat shared with friends	33	7.2	2,59[a]	,69	
	Other	95	20.7	2,70[a]	,46	
Educational Level of Mother	1	163	35.4	2,71	,55	1.54
	2	95	20.7	2,75	,56	
	3	124	27.0	2,62	,49	
	4	78	17.0	2,78	,56	
Educational Level of Father	1	78	17.0	2,71	,50	0.35
	2	89	19.3	2,69	,54	
	3	143	31.1	2,74	,56	
	4	150	32.6	2,68	,54	

* *p<0.05;* ** *p<0.01;* § *upper indices show different means.*

Table 2. Regression analysis for determining the variables affecting academic achievement

Variable	Coefficient	St. Error	t
Fixed	1,377	,177	7.792***
Academic Confidence	,232	,052	4.505***
Academic Effort	,125	,050	2.491**
Professional Competencies of Instructors	,044	,039	1.143
Administrative Services and Practices	,114	,046	2,462**
Communication	-,053	,038	-1.396
Physical Setting and Equipment	-,074	,032	-2,294**

Table 2 shows Academic Confidence, Academic Effort, Administrative Services and Practices, and Physical Setting and Equipment factors have a significant effect on students' academic achievement. While one point increase in Academic Confidence factor increases academic achievement with an average of 0.232 point, one point increase in Academic Effort increases academic achievement with an average of 0.125 point. One point increase in Administrative Services and Practices leads to an average of 0.114 point increase in students' academic achievement. Physical Setting and Equipment factor has a negative effect on student success.

Discussion and Conclusion

In this study, the relationship between ASC and academic achievement was investigated and the increase in the dimensions of ASC (academic confidence and academic effort) were observed to increase academic achievement. Secondly, as the organizational factors, "Professional Competencies of Instructors" and "Communication" factors were seen to have no effect on students' academic achievement; however, "Administrative Services and Practices" and "Physical Setting and Equipment" factors had an effect on students' academic achievement. In addition, the study took into account the demographic variables predicting academic achievement which include gender, grade, place of accommodation, and educational status of the parents. Results indicated that gender, grade and place of accommodation positively affect students' academic achievement while educational status of the parents did not affect students' academic achievement.

Parallel to the main finding of this study, there are a number of studies indicating that academic effort, as one of the dimensions of ASC, has a positive effect on students' academic achievement (Dika, 2012; Gibbison et al. 2011; Jansen & Suhre, 2010; Nunez, 2009; Reynolds & Weigand, 2010; Torenbeek et al., 2010; Zhou et al., 2015; Mihaela, 2015). Similarly, there are other studies stating the positive effect of academic confidence on students' academic achievement (Fenning and May, 2013; Krumrei-Mancuso et al. 2013). Thus, in line with the international research, in this study, ASC has been proven to have a positive effect on academic achievement in the sampling of Turkish students. In this regard, ASC can be considered as a universally shared common ground independently of culture. In future studies, this issue should be tested with different cultures.

It is thought-provoking that professional competencies of instructors and communication factors, as the organizational factors, did not have an effect on students' academic achievement. This may indicate that students benefit more from other sources rather than instructors while reaching learning outcomes. This finding may evoke a student-centred learning at the first glance; however, it also shows that the function of instructors in reaching outcomes have declined (Cantekin, 2015). Moreover, it is stated that successful students do not only have high academic performance but also are content with the school setting where they receive education (OECD, 2017). This suggests that external factors may also affect academic achievement. Hence, in his study, this was detected in the factors of administrative services and practices and physical setting and equipment. Administrative services and practices factor include such dimensions as providing students with social and cultural activities, offering consultancy service, and including students in the decision making process. When related literature is examined, students' participation in social and cultural activities apart from educational activities (van der Zanden, et al. 2018), providing students with course equipment and documents (Shi, 2019), and offering psychological counselling and guidance (Shaterloo & Mohammadyari, 2011) are stated to have a positive effect on students' academic achievement. Therefore, an improvement in administrative services and practices is seen to increase student success. However, an improvement in physical setting and equipment factor was seen to decrease students' academic achievement in this study. When the related literature is analysed, different results are found. To illustrate, in studies conducted in different countries, while physical opportunities and sources were found to have a positive effect on student success (Lee et al. 2005; Huang, 2010), investments made in the physical opportunities of the school were seen to cause no improvement in students' success (Martorell et al. 2016: 28). As a result, the finding regarding that an improvement in the sub-dimension of physical environment decreased student success can be explained with the environmental features of the schools where participating students of this research study at and the forms of students' perception of these features.

Considering the demographic variables, in terms of related literature on gender, there are studies concluding that female students were more successful than male students, as opposed to the finding of the current study (Steinmayr & Spinath, 2008; Gibb et al. 2008; Matthews et al. 2009; Voyer & Voyer, 2014). This suggests that the relationship between gender and academic achievement should not be directly handled with gender, but together with other variables. In other words, it is possible to say that there are mediating variables that explain the relationship between gender and academic achievement.

When related literature on the duration of education is examined, no research comparatively focusing on the relationship between the grade and academic achievement has been found. However, in the current study, students on the 2nd grade were observed to be more successful than other students. More research regarding this issue needs to be conducted in future studies.

In studies related to accommodation, in line with the findings of this study, students residing in dormitories had higher academic achievement than those staying at other forms of accommodation (Kaya et al. 2005;

Koçbeker, 2007; Arlı, 2013). Therefore, staying at the dormitory can be said to have a positive effect on student success.

In this study, educational levels of parents were seen to have no effect on students' academic achievement. There are various studies conducted on this issue. While some studies concluded that students whose parents' educational level was high were observed to have high academic achievement (Bowman, 2014; De Wit et al. 2012; Nunez, 2009; Shaw et al. 2012; Yazedjian, Toews, & Navarro, 2009), other studies did not find such a relationship (Friedman & Mandel, 2011; Dika, 2012; Soria et al. 2013; Zhou et al. 2015).

To conclude, further studies are needed to jointly investigate different features of students, which are believed to affect academic achievement. Besides, academic self-concept should be taken into account in these studies. By doing so, features of students can be addressed within a holistic approach.

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An Examination of the Evidences Used by the Secondary School Students in the Process of Socio-Scientific Argumentation: Global Climate Change Sample

Ali Yiğit Kutluca*[a], Pınar Seda Çetin[b], Melike Akbaş[c]

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Abstract

The aim of study was to determine the functions of the evidence used by the secondary school students during the whole group and small group socio-scientific argumentation, and to determine the differences with respect to grade level. In this single case study, a total of 70 secondary school students studying at a public school in the Black Sea region were administered an open-ended knowledge test consisting of three open-ended questions to determine their level of conceptual knowledge of global climate change. Then, the students were included in small and whole group argumentation through two different socio-scientific scenarios in the context of global climate change. The whole and small group argumentations among the students of each class level were audio- recorded. The evidences students used during small and whole group argumentation were analyzed with the analytical evidence assessment tool that includes different categories of evidence. Analysis of the data revealed the eighth grade students who were better in terms of knowledge were also leading the total evidence use. Another important conclusion is that students tend to use evidence to refute predominantly counter claims and to support their own claims.

Ortaokul Öğrencilerinin Sosyobilimsel Argümantasyon Sürecinde Kullandıkları Kanıtların İncelenmesi: Küresel İklim Değişikliği Örneği

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Öz

Araştırmanın amacı; ortaokul öğrencilerinin sosyobilimsel argümantasyon sürecinde kullandıkları kanıtların fonksiyonunun sınıf düzeyi ve bilgi düzeylerine göre nasıl değiştiğini incelemektir. Çalışmada ilk olarak, Karadeniz bölgesindeki bir devlet okulunda öğrenim gören toplamda 70 ortaokul öğrencisine küresel iklim değişikliği hakkındaki kavramsal bilgi düzeylerini belirlemek için açık uçlu üç sorudan oluşan bilgi testi uygulanmıştır. Ardından öğrenciler, küresel iklim değişikliği bağlamındaki iki farklı sosyobilimsel senaryo aracılığıyla büyük ve küçük grup tartışmalarına dâhil edilmişlerdir. Her sınıf düzeyindeki öğrencilerin kendi aralarında yaptıkları büyük ve küçük grup tartışmaları, ses kayıt cihazları ile kayda alınmıştır. Öğrencilerin büyük ve küçük grup tartışmaları sırasında kullandıkları kanıtlar, farklı kanıt kategorilerini içeren analitik bir kanıt değerlendirme aracı ile analiz edilmiştir. Analizler; bilgi düzeyi açısından daha iyi durumda olan sekizinci sınıf öğrencilerinin toplam kanıt kullanımında da önde oldukları sonucunu ortaya çıkarmıştır. Öğrencilerin ağırlıklı olarak karşı iddiaları çürütme ve kendi iddialarını destekleme amaçlı kanıt kullanma eğiliminde oldukları da elde edilen önemli sonuçlar arasındadır.

***Corresponding Author:** alikutluca@aydin.edu.tr
[a] Assist. Prof. Dr., Istanbul Aydin University, Istanbul/Turkey, http://orcid.org/0000-0002-1341-3432
[b] Assoc. Prof. Dr, Bolu Abant Izzet Baysal Unıversity, Bolu/Turkey, https://orcid.org/0000-0003-4299-0893
[c] PhD student, Bolu Abant Izzet Baysal Unıversity, Bolu/Turkey, http://orcid.org/0000-0002-1029-655X

Introduction

One of the main objectives of contemporary science education is to educate students as science literate individuals (MNE, 2013; NRC, 2013; ACARA, 2014). The majority of the science education researchers (e.g., Sandoval, 2005; McNeill, 2011) emphasized that students should be a part of the scientific practices which are essentially based on questioning, reasoning, and using evidence. Therefore, it is important to include the argumentation as a process in science classes so that students can gain some potential benefits such as learning science subjects, participating scientific discourse, evaluating their peers' views on science, and supporting their decisions on a socio-scientific issue. Beyond all these, students who participated argumentation activities will also have the opportunity to understand the epistemology of scientific knowledge and evaluation on the basis of information structures, based on evidence from different perspectives (Driver, Newton, & Osborne, 2000). Accordingly, argumentation, with the most general expression is an essential epistemic practice that allows students to take part in science through the use of evidence in order to accept or reject the scientific theory, data and claims (Simon, Erduran, & Osborne, 2006; Bricker & Bell, 2008). However, the researchers studying in the field of argumentation (e.g., Zeidler & Sadler, 2008; Sadler, 2009) asserted that the scientific context is not enough alone to make students explore scientific concepts, to understand the relationship between science and their own life and to create interest and motivation for science. This situation reveals the importance of socio scientific context, which involves process, and products of science and controversial issues intersecting science and society (Sadler, 2004). To establish a link between scientific knowledge and data will not be enough for the students involving socio-scientific argumentation process they also need to be considered to the cultural, ethical, social and economic aspects of the problem and to critically suggest the knowledge claims and evidences. (Nielsen, 2012). This will allow the primary and secondary school students to see interdisciplinary interactions more clearly and to make more qualified reasoning. For this reason, it has been considered that there is a need for research to determine the function of the evidence that primary and secondary students use while evaluating a socio-scientific context and how they are influenced by the grade level and level of knowledge.

Socioscientific Argumentation and Evidence Used

One of the most fundamental points that researchers studying on science education, argumentation and socio-scientific issues come to a consensus is that students' involvement in argumentations that arise in daily contexts about socio scientific issues that have an impact on their own lives will develop their understanding of science (Zeidler, Sadler, Applebaum, & Callahan, 2009; Dawson & Venville, 2010). In parallel with this claim, it is seen that there have been many studies in the literature aimed to evaluate the socio scientific argumentation produced by high school or university students in terms of independent variables such as nature of science (Kutluca & Aydın, 2017), content knowledge (Cetin, Doğan, & Kutluca, 2014), context (Dawson & Venville, 2010) and cultural interactions (Sadler & Donnelly, 2006). The idea that individuals involved in the socio-scientific argumentation process with basic epistemological features should use evidence as the main component to assess and construct the knowledge claims (Nielsen, 2013) may be the basis of the rationality of evidence-based research. However, since the evidence used in the socio-scientific argumentation process has less certainty and greater change in nature than those used in the scientific context, it will be necessary to create more specific arguments on these issues and to be more dependent on the nature of the argumentation. Therefore, socio-scientific argumentation will enable students to have a conscious understanding of the science and world in which they live, to internalize science both epistemologically and socially, and to provide evidence-based decisions about the socio-scientific issues that they faced (Dawson, 2015). In the literature, when the rational basis of the research is examined; it is revealed that there is a limitation in terms of quantity, the studies are mostly conducted with the participation of high school or university students and there is no research to determine the effect of grade level on evidence. For example, McNeill (2011), who examined the explanation, arguments and evidence presented by fifth grade students to different contexts, found that participants' evidence used changed during the argumentation process and had reached the findings that shows improvement about how they could use their knowledge structures in the right place and time. Glassner, Weinstack and Neuman (2005) who were aimed to specify the objectives of the evidence use in the argumentation process stated that 9th grade students had difficulty in using evidence-based justifications. Iordanou and Constantinou (2014) who investigate the function and metacognitive awareness of the pre-service teachers' while they were presenting an arguments about the global climate change, determined that participants were more aware of the function of highly qualified evidence involved in the socio-scientific argumentation process, and that they attempted to put more emphasis on the evidence used. Similarly, it is examined how 11th grade students use evidence in argumentation in another study by Iordanou and Constantinou (2015). The

researchers, who included participants in the evidence-driven argumentation process, suggested that students increased the evidence use and used more accurate evidence. Albe (2008), who examines what kind of evidence they use in the process of evaluating students 'knowledge claims on smartphones, and how they interpret these contradictory evidences, concluded that the most important factor affecting the students' decision-making is the quality of the evidence use. Emery, Harlow, Whitmer and Gianes (2017) who investigated 53 female students' comments on some conflicting arguments about environment and science and how the type of evidence they used affects their decision making; noticed that there were no change on their attitude after reading the most of students' opposite information presented as evidence. In another study by Yang (2005) how 10th-grade students evaluate evidence and expert opinions on a socio-scientific issue has been investigated. The researcher concluded that most of the students focused on numerical data and trust expert opinions as a definite source of information while they were doing reasoning. Levinson (2006) who investigates the quality of evidence presented by teachers to make the socio-scientific argumentation process more effective has reached the conclusion that students who are faced with clearer evidence create more quality arguments. In the study conducted by Roberts and Gott (2010) to investigate how 65 pre-service teachers reached evidences during socio- scientific argumentation process, it is concluded that participants reached more complex evidence and formed more quality arguments after 15 weeks of socio-scientific argumentation process. By the researchers, this result interpreted as the potential of using evidence for individuals involved in socio-scientific argumentation has been increased. In summary, the claim that the use of knowledge-oriented evidence with a qualified epistemological basis brings with it a better quality socio-scientific argumentation process was confirmed by many theoretical and experimental studies. However, the fact that there is no study to base the idea on whether this is valid for primary and secondary school students brings about an important research need. Therefore, the purpose of this research is to examine how the function of the evidence used by the sixth, seventh and eighth grade students in the socio-scientific argumentation process changes according to their class and therefore their level of knowledge. Accordingly, the research questions sought in this study are as follows:

1. What is the conceptual knowledge of secondary school students about global climate change?
2. How the evidence used by secondary school students in whole group argumentation differs according to grade level?
3. How the evidence used by secondary school students in small group argumentation differs according to grade level?

Method

Research Design

This study was conducted through a case study design. A case study representing a qualitative and constructive paradigm, that a specific research strategy that allows identification of the reality behind any phenomenon (Meyer, 2015). Besides, case study is not only an investigation of a single perspective, but it also is possible to explore with various perspectives that allow them to be revealed and understood (Baxter & Jack, 2008). According to Yin (2003) the main focus of a case study is to seek an answer for ''how and why'' questions. Therefore, the case investigated in this study is how and for what purpose secondary school students presents their evidences that used in the socio scientific argumentation process. As the case at hand in this study is limited to examining the functions of the evidence presented by secondary school students, the research design can be thought as a single case study. To describe this single situation in more detail and to identify the underlying reality through various data sources, such as detailed socio-scientific argumentation processes in the form of small groups and whole group argumentations (through voice recordings), observation notes and conceptual comprehension tests on global climate change has been used.

Participants

The study group consisted of 70 secondary school students in the sixth, seventh and eighth grades of a secondary school in the Black Sea region in the 2018-2019 academic year. The characteristics of the participants are presented in Table 1.

Table 1. Participant Features

		f
Gender	Female	35
	Male	35
Grade Level	6th grade	20
	7th grade	24
	8th grade	26
TOTAL	70	

When table 1 is examined it can be seen that the study group consisted of 35 female and 35 male secondary students so totally 70 secondary students. However, it is noteworthy that 20 of the participants were in the 6th grade, 24 were in the 7th grade and 26 were in the 8th grade. Students from each grade level included in the study were divided into five small groups on a random basis to conduct small group argumentations.

Data Collection Tools

Two different data collection tools as global climate change knowledge test and socio-scientific argumentation scenario were used in the study. Detailed information on data collection tools is given below.

Global Climate Change Knowledge Test: This test was developed by the researchers to determine the conceptual understanding of the participants about the global climate change before the socio-scientific argumentation process. At the beginning of the study we hypothesize that grade level effects students' level of knowledge on global climate change which in turn play a significant role in function of evidences they use. The test consists of three open-ended questions related to global warming and climate change at the level of comprehension of the Bloom taxonomy. The lowest score that students can obtain from the test is determined as "0"and the highest score determined as ''100''. Expert opinion from two different faculty members in the field of science education was taken in order to ensure the internal validity of the questions in the test (Creswell, 2014). The researchers then made a pilot study with randomly selected six students from all grade levels to determine whether the questions were clear and understandable, expressed the same thing to participants and served the purpose of the study. The researchers, who sent the questions and students' answers in the pilot study back to the experts to check the form, completed the test and made it ready for implementation.

Socio- Scientific Argumentation Scenarios: Two different scenarios that covering similar goals were used to integrate students into the global socio-scientific argumentation process. The reason for using small and whole group argumentations with two different scenarios is to give students more opportunity to express their ideas. The first scenario 'Emerging Technology and Global Climate Change' was used for whole group argumentation while the scenario called 'Ecology or Technology?' was used for the small group argumentations. The context of the scenarios prepared by paying attention to the appropriateness of the curriculum and the relevance of the subjects to daily life. Expert opinion was taken from two different faculty members who were experts in their field in order to verify whether it is suitable in terms of argumentation and language. Necessary corrections have been made on the scenarios with respect to feedback taken from the expert and the scenarios have been finalized.

Data Collection

The data collection process of the study lasted 3 weeks. During the first week, all students were asked to conduct the Global Climate Change Knowledge Test, while the second week, a whole group and the third week, a small group argumentation were conducted. During the whole and small group argumentations students were asked questions such as *"what are the reasons you need to think about this in this way?*", "*Do you have any evidence that supports this idea?*" in order to make the process effective and contribute to the depth of the argumentation. Whole and small group argumentations recorded with the help of voice recorders lasted an average of 35-40 minutes. The weekly flow is given in Figure 1.

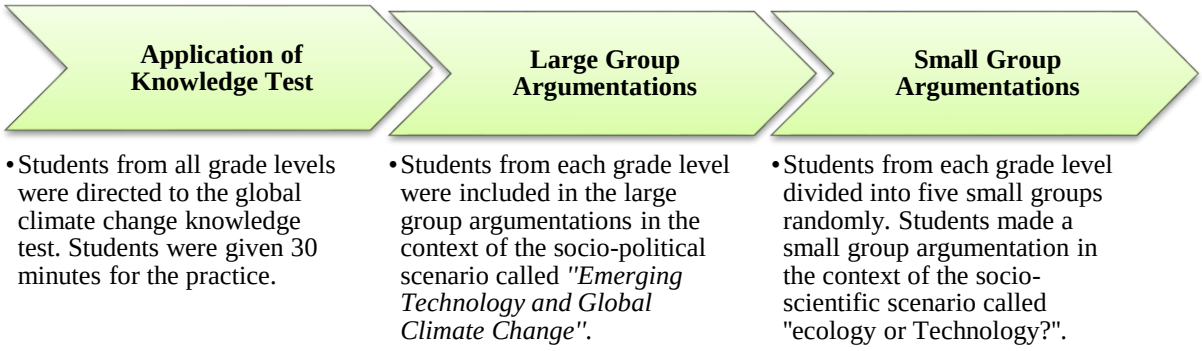

Figure 1. Data Collection Process

Data Analysis

Before the socio-scientific argumentation process the test responses of students from each grade level scored by two different experts in order to determine the conceptual knowledge of the subject matter. 95% consistency was achieved between the scoring made by different experts at the same time. The function of the evidence and forms of utilization in the arguments presented by the students during the whole group and small group argumentations was analyzed with the help of the analytical evaluation tool developed by Kuhn and Moore (2015). The tool to help to determine the function of evidence presented in the process of argumentation consists of four different categories. Coding categories and the explanations related to them are presented in Table 2.

Table 2. Evidence Coding Categories According to Functions

Category	Evidence function	Example
E_1	To undermine others claims	Participant A: I decided it should be used because the technology is developing. Participant B: But in different parts of the world when the balance deteriorates, floods, storms and hoses can occur.
E_2	To support his/her own claim,	Because of climate change and global warming, the weather is sometimes cold and sometimes hot that's why agricultural products are decreasing and a lot of trees, many animals and people can be damaged.
E_3	To intentionally accepting the evidence of the other side,	Participant: Teacher, I think fossil fuels should be used, but this use should not be overrated, I mean it should be used valuable because we cannot effort the energy needs if it is not used.
E_4	To intentionally support other party with other evidences	Participant (renewable energy source in favor): Yes, it has advantages, if we use it consciously, the damage is reduced. For example, if the bulbs are more economical, then fossil fuels will be used less and losses in the world will be reduced. Technology will be even more important to us. They're bringing the end of the world in return of money.

The whole group and small group socio-scientific argumentation that recorded by voice recorder was transcribed. Because of the three different grade levels (6-7-8) and two different argumentation processes (whole and small), the analysis were performed on six different forms. After transcribing voice recordings, the dialogue between participants is divided into sections of opinion, which is defined as a claim that can be given with any possible reason during whole and small group argumentations. The analysis performed by the researchers on the relevant sections were compared by using the fit percentage formula proposed by Miles and Huberman (1994). The formula for determining the number of consensus and disagreement and calculating the reliability is as follows:

$$\text{Compliance Percentage} = \frac{\text{Consensus}}{\text{Consensus} + \text{Disagreement}} \times 100$$

Inter coder reliability rates was found as 84% (small group), and 89% (whole group) for the sixth-grade, 92% (small group), and 90% (whole group) for the seventh-grade, and 94% (small and whole group)for the eighth grade. The percentages obtained confirm that the coding is reliable (Miles and Huberman, 1994). The frequency values of the coding categories are presented in tables that allows comparison of whole group and small group argumentations in every grade level from the analyzes. Excerpts from the arguments created by participants in whole group and small group argumentation processes were named independent from the research in order to ensure the confidentiality of the identity information. (*Representative naming; WGG_6E_1: whole group sixth grade evidence 1*).

Findings

The aim of this study was to determine the functions of the evidence used by the sixth, seventh and eighth grade students during the whole group and small group socio-scientific argumentation, and to determine the differences with respect to grade level. The findings of the data analysis are presented in detail below; firstly, the findings of the students' answers to the knowledge test are presented. Afterwards, tables are presented which show the frequency and categories of evidence use in each group of grade level in socio-scientific argumentation.

Comparison of Conceptual Knowledge Levels According to Grade Level

Table 3 presents the findings obtained from the conceptual knowledge test scores of the students to determine their conceptual understanding of global climate change.

Table 3. Conceptual Knowledge Levels by Grade Level

	6th grade	**7th grade**	**8th grade**	**Total**
Participants	20	24	26	70
Mean Score	42,38	45,00	65,41	51,59

The results given in Table 3 show that secondary school students have low conceptual understanding of global warming and climate change. In other respects, it was found that the conceptual knowledge of the sixth and seventh grade students was very close to each other, and that the eighth-grade students had a higher conceptual understanding than the others.

Comparison of the Evidences Used In Whole Group Argumentations

Evidence from each grade level during the whole group argumentations of the participant through the socio-scientific scenario called ‘’Emerging Technology and Global Climate Change’’ analyzed with the help of the related analytical evaluation tool and presented comparatively in Table 4.

Table 4. Whole Group Argumentations by Grade Levels

Evidence Type	**6th grade (f)**	**7th grade (f)**	**8th grade (f)**	**Total Usage**
E_1	13	13	29	55
E_2	29	28	18	75
E_3	1	2	4	7
E_4	3	3	3	9
TOTAL	**46**	**46**	**54**	**146**

As it is seen in Table 4 where the evidence used during the big group argumentations according to class levels is compared in terms of certain categories of evidence, it is seen that the sixth and seventh grades have the same frequency in terms of total evidence use and that the eighth grade students are in the forefront in terms of the use of evidence.. It is also among the important findings that the evidence used by students from all class levels in the whole group argumentations mainly aims to support the claims. A similar finding was found when the class was compared specific to evidence categories with different characteristics. In terms of the E_1 category, which represents the evidence that students use in whole group argumentations to weaken the claims of others; the use

of E_1 in the eighth-grade argumentations was more than the sum of the other two classes (Table 4). Examples of each class level for the use of E_1 can be presented as follows.

> **WGG_6E_1:** Teacher, everybody says not to use but when you ask ‘’why?’’ everyone says because of cars, technology but they also use it. For example, nature is harmed when women squeeze deodorant. For example, deodorants, gases coming from refrigerators and many other things cause global warming.
> **WGG_7E_1:** Teacher, you know that they say that fossil fuels must be used, but people always use it in a bad way to harm animals and nature.
> **WGG_8E_1:** I object to my friend's claim. He/she says that factories produce more mass production, but there are wastes of factories, they harm the environment and cause the extinction of living things in water. He/she could not explain the effects of the climate.

In category (E_2), most common examples of the evidence used in the whole group argumentations in socio-scientific context are as follows:

> **WGG_6E_2:** I think that fossil fuels should not be used because it crates balance deterioration in nature.
> **WGG_7E_2:** Teacher I want to say something, Because of climate change and global warming, the weather is sometimes cold and sometimes hot that is why agricultural products are decreasing and a lot of trees, many animals and people can be damaged.
> **WGG_8E_2:** It is not something positive for me. Enough is as good as a feast so surplus of technology is also harmful with the development of technology, the need for energy will increase and the use of fossil fuels will increase. Global climate change will also increase.

The eighth-grade students were less likely to apply to this category of evidence than students of other grades are another interesting finding about the E2 category. The first of the rarest categories of evidence in whole group argumentations in socio-scientific context; The E3 category is to intentionally reason against own side with evidence. Here, participants tend to present thinking and arguments like the other side in order to convince the other party. Exemplary quotations from participant arguments are presented below.

> **WGG_6E_3:** Yes, it has negative impacts on climate. For examples people become sick because of poisonous gasses. It can even lead to death but we have to use it. Nothing happens without using it.
> **WGG_7E_3:** OK. Fossil fuels should be used, but this use should not be exaggerated, so something must be used valuable because if it is not used, we cannot meet the energy needs.
> **WGG_8E_3:** Fossil fuels have an impact on climate change. Because it can disrupt the balance of nature, hose, storm can cause. However, the benefits still prevail.

Exemplary excerpts from each grade level for category E_4 where equal use is available at all grade levels representing the evidence used to deliberately support counterparty's evidence with other stronger evidence are presented below.

> **WGG_6E_4:** My teacher ok we use it but we have to use it without using anything else. It has a negative impact on the climate, yes. For instance, he is sick people from poisonous gas and can lead to death in this case.
> **WGG_7E_4:** Firstly, fossil fuels are harmful, but we can prevent this, but it is also wrong to say that we should not use coal (fossil fuel) because if it were not for him, we would have a huge energy source. So the technology in the world will never move forward. I do not know if my idea will work, but, for example, they can use technology to compress many fossil fuels and make super energy fuel. Thus, both more energy and less gas such as carbon dioxide are emitted.
> **WGG_8E_4:** There are benefits yes, if we use it consciously reduce the damage. For example, if the bulbs were more economical then fossil fuels would be used less and the damages in the world would be reduced. Technology will be even more important to us. For the money, they bring the end of the world.

Comparison of the Evidences Used In Small Group Argumentations

Evidence from each class level during the whole group argumentations of the participants through the socio-scientific scenario called ‘’Emerging Technology and Global Climate Change’’ analyzed with the help of the related analytical evaluation tool and presented comparatively in Table 5.

Table 5. Small Group Argumentations by Grade Levels

Evidence Type	6th grade (f)	7th grade (f)	8th grade (f)	Total Usage
E_1	26	25	62	113
E_2	63	62	71	196
E_3	4	5	9	18
E_4	2	3	8	13
TOTAL	**95**	**95**	**150**	**340**

The findings in Table 5 show that the use of total evidence in small group argumentations is considerably greater than in whole group argumentations. When the related finding is examined in terms of class levels; It was found that the sixth and seventh grades had the same frequency values in terms of total evidence use, and the eighth grade students were far ahead in terms of the use of evidence. In addition, it is also important that the evidence used by students from all class levels in small group argumentations is mainly aimed at supporting the claims (E_2). It is also an important finding that evidence used by the students from all class levels is for more predominantly to support their own claims (E_2). Examples of each class level for the use can be presented as follows.

> **SGG_6E_2:** I think that fossil fuels have an impact on climate change. For example, it is written that the temperature increases in sea water due to global warming caused damage in the Pacific Ocean.
> **SGG_7E_2:** I think the use of fossil fuels is beneficial because if we didn't have fossil fuels, we wouldn't get warm, for example, those who burn natural gas would use it to warm up.
> **SGG_8E_2:** For example, renewable energy is being produced, but just for now, for example, the coal of course will end. When it finishes, factories will suddenly stop, everything will be expensive and then the famine and the economic crisis will begin.

Another important finding related to the category of evidence is that students from different grade levels use the frequency values close to each other. A similar finding was found when class comparisons were made in terms of categories of evidence with different characteristics. In terms of the E1 category, which represents the evidence that students use in small group argumentations to weaken the claims of other party; The use of E1 in the eighth-grade argumentations was more than the sum of the other two classes (Table 4). Exemplary uses are provided below.

> **SGG_6E_1:** But whenever we use fossil fuel, a gas called greenhouse gas emerges and it reflects the harmful lights of the sun, causes the seas to become warmer and the corals in the sea become destroyed and climate change.
> **SGG_7E_1:** But on the other hand, these fossil fuels disrupt the atmosphere of the world, With the deterioration of the world's balance, the animals in the nature, in forests and their homes can be destroyed because of natural disasters caused by global warming. İt is also has influences on the poles. The glaciers are melting, the bears die because of the glacier's melts.
> **SGG_8E_1:** But if there were no fossil fuel, there won't be coal. When we couldn't use coal, our house wouldn't warm up. Electricity could not be generated in thermal power plants, there would be no fuel in jets, planes, cars.

In small group argumentations in socio-scientific context, the first of the rare categories of evidence, as encountered in the same whole group argumentations; The E3 category is used to intentionally accept the evidence of the other party. It can be stated that the eighth-grade students are better than the students in other classes in this category of evidence. Exemplary quotations from participant arguments are presented below.

> **SGG_6E_3:** It has been recognized that fossil fuels have some harmful effects for humans and the environment, but I am still in the middle of the two.
> **SGG_7E_3:** Okay, yes, we really need to use technology, but people use fossil fuels really, really too much, and we see that global warming is increasing every day.
> **SGG_8E_3:** I also think that fossil fuels are beneficial, but in some respects it can be harmful. Because if the percolators are not attached to the chimney, toxic smoke damages the atmosphere. I think fossil fuels are also useful in some cases.

Findings in the E_4 evidence category, which emerged in small group argumentations, revealed that eighth grade students used this evidence category more than the students in other classes. Examples from each grade level for the category E_4 where equal use at all grade levels are presented below that are Evidence that is used to support the other party's evidence intentionally with other stronger evidence.

> **SGG_6E_4:** Yes, fossil fuel causes an increase in the greenhouse gasses in atmosphere. But the reason for preferring fossil fuel is that it is accessible and gives more energy.
> **SGG_7E_4:** We should use fossil fuels, but we should not use too much, you should also pay much attention. We shouldn't waste electricity either, because our fuel can be exhausted day by day, so everything is limited. For example, Oil is used for transportation and natural gas is also needed in the winter to warm up
> **SGG_8E_4:** I think fossil fuels are useful, but in some ways it can also be harmful. When technology develops, it can cure and heal diseases, but this time it kills with other damages. Let us to die in this way if technology wouldn't heal us completely. Do not let our World to be destroyed.

Conclusion and Discussion

This study focuses on the function of the evidence used in whole group and small group argumentations and how this function changes according to the grade level. For this purpose, firstly; the sixth, seventh and eighth grade students' conceptual knowledge levels about global climate change were tested. Then, the evidence they used during whole and small group argumentations through two different socio-scientific scenarios was analyzed by using an analytical evidence assessment tool. The first remarkable results reached in the light of the analysis is that the conceptual knowledge of the students included in the study on global climate change is quite low. However, it is also observed that eighth grade students are better in terms of their level of knowledge than the students in other grade levels. This result is consistent with the findings of similar studies in terms of the context of global climate change-information level in the literature (e.g. Karpudewan, Roth, & Abdullah, 2015). For example; Ulutaş (2013) found that secondary school students knowledge about global warming and climate change is quite low and the knowledge of the eighth-grade students differ significantly in the other grade levels. In addition, this result also reveals that the students involved in the socio-scientific argumentation in the context of global warming and climate change did not have sufficient knowledge before the implementation. This raises a possible rationality to test whether the level of knowledge of students on any subject context affects the quality of the arguments they generate, whether or not they apply to the evidence they use (Von Aufschnaiter, Erduran, Osborne, & Simon, 2008; Clark & Samspon, 2008). Analyzes conducted to determine the possible relationship between the level of conceptual knowledge and evidence function show that eighth grade students are better off in terms of evidence use than other students. The results of the sixth and seventh grade students' knowledge levels and the evidence they used during whole and small group argumentations were very similar. This result also confirms that students' level of knowledge affects the evidence they use as well as their argumentation. Another point that draws attention in the results of the research is that the total evidence used during small group argumentations is much higher than in whole group argumentations (e.g. Driver et al. 2000; Sadler, Chambers, & Zeidler, 2004; Sampson & Clark, 2011). This detail shows that the participants formed more arguments in small group argumentations and were able to express themselves better. Sampson and Clark (2009) suggests that learning outcomes can be seen more clearly because they have the advantage of evaluating the different cognitive levels of the students involved in small group argumentations using the same pool of knowledge, and this claim has consistency with research results.

The results obtained in this research, were also evaluated in the category of evidence in the analytical tool where students evaluate the evidence they use in whole and small socio-scientific argumentation processes. Accordingly, it is concluded that the students mainly tend to use evidence to weaken others claims (E_1) and to support their own claims (E_2). This result has consistency with the results of the research conducted by Iordanou and Constantinou (2014). The researchers suggested that the participant students generally used evidence to undermine others' claims or to support their own claims, and their metacognitive awareness in epistemological terms was quite low, and students should participate more frequently in argumentation processes to correct this situation. Similarly, it is concluded that the evidence used by secondary school students is often aimed at protecting their positions and their cognitive awareness is quite low in this study (Iordanou, 2010). The fact that students tend to use evidence rebuttal-oriented (E_1) and justification-oriented (E_2) in both whole and small socioscientific

argumentation processes was also reflected in the criterion components of the analytical assessment tools developed to evaluate the quality of student argumentation. For example, the primary determinant of argumentation quality according to the argumentation assessment scale developed by Erduran, Simon and Osborne (2004), is rebuttals, while the secondary determinant component is the justifications presented by the students. In according to another analytical assesment tool developed by Sadler and Fowler (2006), the number and nature of the justifications presented by the students are considered as the primary determinant of the quality of argumentation. Therefore, the fact that the students use predominantly justification-oriented and rebuttal-oriented evidence is a direction that confirms the criteria for analytical tools developed to determine the quality of argumentation.

Suggestions

As a result of the argumentation of the results obtained in this research on the basis of the relevant literature some suggestions may be given to increase the quality of science education and to contribute to the literature. The first of these is that it is aimed to increase the activities that will encourage the evidence used in socio-scientific argumentation processes of secondary school students in particular. If students participate in argumentation processes more frequently within science education, the opportunities will be provided for their meta-level awareness development. In addition, it may be necessary to include researches to examine the pedagogical competences of teachers and teacher candidates in order to include students in socio-scientific argumentation processes and to encourage the evidence used in different functions. In this way, both the role of teachers on the students' use of evidence will be determined and the opportunity to see and develop their pedagogical competences will be created. Finally, as the results of this study, it may be necessary to increase direct activities to increase the conceptual understanding of secondary school students with low levels of knowledge in the context of global climate change. In this way, students will be able to use valid evidence.

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Digital Player Typologies in Gamification and Game-Based Learning Approaches: A Meta-Synthesis

Sezan SEZGİN*[a]

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Abstract

Educational practices based on individual differences have become more significant as a result of technological advances. Learners today, demand learning processes which contain visual stimuli, ease of use, fast thinking and movement and playful activities. The two of such learning approaches are gamification and game-based learning. This research is a concept-centric meta-synthesis study examining player types as an individual difference in playful learning environments. In this research, the studies which analysed the typology of players, are examined in terms of methods used, game environments and contextual aspects Content analysis revealed the common points and 9 different thematic components in relation to general player typology were identified. According to study, it is concluded that, player typologies can be used as an individual difference criterion in the game-based educational processes. It is also recognized that player typologies identified by different researchers may not be eligible for all settings and practices. Given that game-based approaches are highly affected from cultural context, cultural characteristics of community of learners should be taken into consideration if these approaches to be employed in learning environments.

Oyunlaştırma ve Oyun Tabanlı Öğrenme Yaklaşımlarında Dijital Oyuncu Tipolojileri: Bir Meta-Sentez

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Öz

Teknolojik ilerlemelerin etkisiyle eğitim sistemlerinde bireysel farklılıklara göre eğitim uygulamaları önemli hale gelmektedir. Öğrenenler çevrelerini saran teknoloji yapılarıyla büyümekte, bunun sonucunda görsellik, kullanım kolaylığı, oyunsallık, hızlı düşünme ve hareket etme becerilerine dayalı öğrenme süreçleri talep etmektedir. Bu taleplere uygun öğrenme yaklaşımlarından ikisi oyunlaştırma ve oyun tabanlı öğrenmedir. Bu çalışma, oyun odaklı yaklaşımlarda, bir bireysel farklılık olarak, oyuncu tiplerini inceleyen kavram odaklı bir meta-sentez çalışmasıdır. Oyuncu tipolojilerini inceleyen çalışmalar, kullandıkları yöntem, oyun ortamları ve içeriksel bakış açıları bağlamlarında incelenmiştir. İçerik analizi sonucunda oyuncu tipolojilerine ait 9 farklı tematik bileşene ulaşılmıştır. Çalışma sonucunda, oyun temelli eğitsel süreçlerde oyuncu tipolojilerinin öğrenmede yeni bir bireysel farklılık ölçütü olarak kullanılabileceğine ulaşılmıştır. Bununla beraber, diğer araştırmacıların belirlediği oyuncu tipolojilerinin, her ortam ve uygulama için uygun olmayabileceği düşüncesi öne çıkmıştır. Çalışma sonunda, kültürel bağlamlardan yüksek oranda etkilenebilen oyun merkezli yaklaşımların, öğrenme ortamlarında kullanılabilmesi için öğrenme topluluğuna ilişkin kültürel özelliklerin de dikkate alınması gerektiği sonucuna ulaşılmıştır.

***Corresponding Author:** sezansezgin@mehmetakif.edu.tr
[a] Dr., Mehmet Akif Ersoy University, Burdur/Turkey, https://orcid.org/0000-0002-0878-591X

Introduction

Human lives has become more and more digitalized which may differentiate learning experiences. Internet of things (IoT) age and forthcoming post-humanist period have made information sources substantially increased. In addition, the range of external stimulus that individuals come across have also increased. As a result of extreme numbers of stimulus and information sources, it is required that individually tailored learning content should be covered in the process of learning and teaching. Therefore, in these processes individual differences have become significant. With the introduction of "one size does not fit for everyone" concept, educational settings have been designed based on individual differences (i.e., age, gender, learning styles, cognitive styles, etc.). With the advent of the IoT, it may be natural that novice educational approaches are searched for, based on the changing individual or massive learning environments. In the new learning settings, requirements, in order to avoid negative experience in relation to learners' relevance, attention, and continuity became gradually difficult and new strategies are adopted to encourage learner engagement and motivation in the learning and teaching processes (Sezgin, Bozkurt, Yılmaz, & van der Linden, 2018).

New generations of learners live in a setting where internet and web technologies are very dominant. These learners are commonly described as "G generation, Net generation, millennium children or alpha generation". These learners' mental development and learning tendency are largely based on visuality, ease of use, quick thinking and acting skills. However, one of the most important characteristics of these individuals is that they are very close to the game environments (Annetta, Folta, & Klesath, 2010). These individuals may adopt different learning approaches for their own learning processes in line with their learning characteristics (Moller & Huett, 2012). Game-based approaches cover the diversified elements of games (Sezgin & Yuzer, 2017) and provide learners appropriate learning experiences in line with their characteristics and tendency. Gamification and other game-based strategies could integrated to educational processes to deal with major learning problems, including motivation, engagement and sustainability. Furthermore, these approaches also employ the power of "play" which is one of the basic learning instincts of humans (Huizinga, 1955) for instructional purposes. In this context, gamification and game-based learning approaches are frequently used in learning environments. Gamification is generally defined as the use of gameful thinking, sensation and visual experience (aesthetics) and other game components (game mechanics & dynamics) in a non-game situation to support individuals' motivation, engagement and learning (Kapp, 2012), thus creating gameful experiences (Koivisto & Hamari, 2014) for learning environments. On the other hand, in game-based learning-teaching, learning and teaching practices are carried out through a game (Kirriemuir & McFarlane, 2004). The positive educational effects of gamification and game based learning approaches are indicated in various researches in the related literature. In these researches, positive effects of dependent learning variables as learning performance (Wang, Hsu, Yeh, Lin & Lai, 2016), motivation, engagement (Buckley & Doyle, 2016; Hamari, 2017), or learning satisfaction (Fleischmann & Ariel, 2016) are defined. Nevertheless, there are also some negative effects of gamification and game based learning approaches screened in the literature (Hanus & Fox, 2015).

This study focuses on the differences in the play behaviour of learners (players) involved in the process, especially for approaches centered on gameful thinking, and thus on the player types as an effective individual difference for learning environments. The aim of the study is to review studies on player typologies to "to provide a new perspective by placing it in a viewpoint and to allow for new comprehensive research on the subject" (McMillan & Schumacher, 1984; cited in Balcı, 2011) as well as "to provide a background information for future studies"(Erkuş, 2011).

Player Types

Although playing games is one of the basic instincts of people, each individual has its own way to play games which produces different player characteristics together individual differences. This causes players to differentiate with a player-type distinction associated with personality. Although there is limited information about the role of player types on learning in different player typology studies, it is a known fact that people have various expectations and react differently towards different game-like features (Monterrat, Desmarais, Lavoué & George, 2015). Individualised learning is an important phenemenon in todays' world of education but most of the game centered learning / teaching programs are structuring the game environment under a "one size fits all" approach. Player typologies aim to classify the skills and characteristics of individuals that affect their gaming experiences (Cowley, Charles, Black, & Hickey, 2013). Gaming experiences mean also learning experiences when it is taken

into account in educational settings. In this section, different types of players are given based on the definition of the term by different researchers.

Bartle (1996)

One the earliest player typologies was developed by Bartle (1996). In this classification players are grouped into four categories, namely achievers, explorers, socialisers and killers. During the game process the ultimate aim of *achievers* is to get scores as fast as possible or to pass the levels to achieve their goal to be successful. These players use the discovery action, other players and enemies within the game as a step for success in the game. *Explorers* try to understand how processes in the game world work and spend time searching for places or features that might not have been recognized in the game world. These players aim to collect points for unlocking different places, objects or features in the game or to kill their enemies in the game so that they do not have difficulty in the parts to be examined. Explorers live the entertainment element in the game by discovering the game world, game features, the mechanics and dynamics of the game and the flow of the script. These players have longer playing times than other player types. *Socializers* are intended to interact with other individuals in the game as players. Interaction among players is the major source of fun for them. Such interactions include chat, jokes, fun and experience exchange. In addition, observation of other players and their progress may be a source of rewards in some games. These players may prefer those games with multi-players and with a social network integration. *Killers* aim to kill other players and enemies in a fast and violent way as the game progress. These actions in the game's own virtual world are a source of pleasure for players. These players can use in-game socialization to learn the tactics and movements of other players. In-game discovery and progress is made to successfully deal with new rivals and enemies. Bartle's first classification about gamer types is shown in Figure 1.

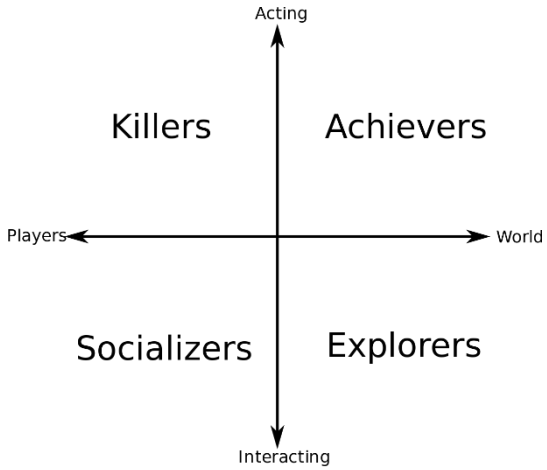

Figure 1. Bartle's First Classification of Gamers

Bartle analysed the players in the context of Multi-User Dungeons (MUD) which are a kind of text-based multi-player virtual world games. MUD are player to player games which are based on role-playing, interactive fiction and conversation. The data of the study were collected between 1989 and 1990 through interviews with experienced players and discussion forums. The participants were asked to answer the following question: "what do people want from games?" through this question the data were collected about what they like and dislike about game situations. Bartle's taxonomy of players is limited to Multi-User Dungeons. MUDs were later replaced with virtual worlds (i.e., second life, open sim, etc.). As a result of such changes Bartle's taxonomy was revised and a third dimension was added. In Bartle's new taxonomy (2003), there are eight different player types as shown in Figure 2.

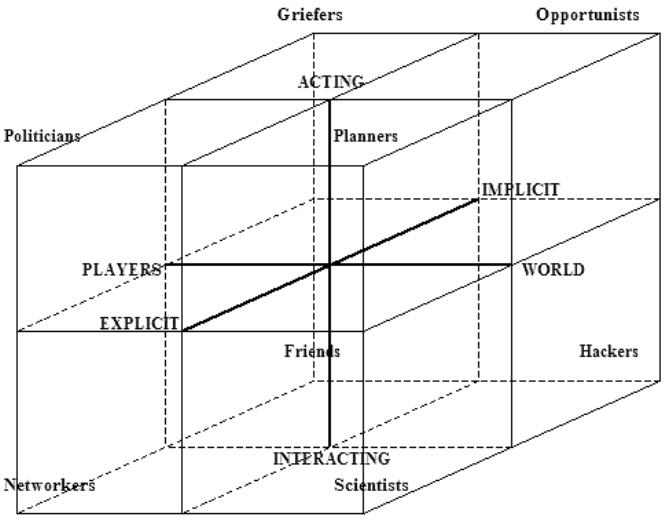

Figure 2. Bartle's Second Classification of Gamers

Park Associate (2006)

Parks Associates which is a firm in the field of marketing, analysed 2002 US online players who were 13 years-old or older. According to research online players were defined as players who play digital games at least one hour per a day. In the analysis period, the monthly median of game durations were found as a beginning. It was found that this duration was nearly 20 hours. With the help of this measure participants were fallen into two tiers according to play duration. Player typology was developed based on 17 attitude items. The answers given by the participants were investigated through the clustering analysis. The analysis of the data produced six different player types (Figure 3) in two separate tiers.

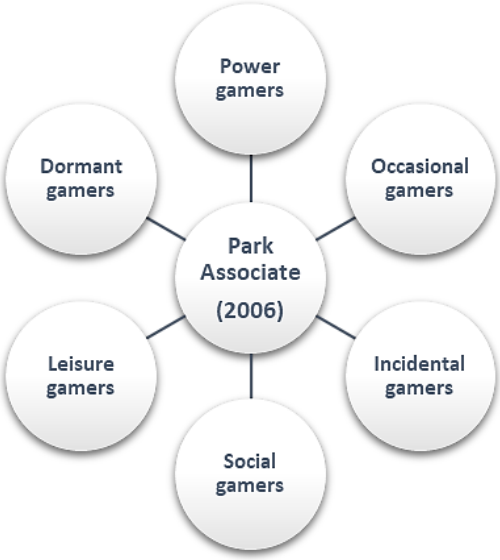

Figure 3. Park Associate (2006) Player Types

Power gamers are players who live online games and breathe through the game climate. *Occasional gamers* mostly prefer puzzles and board games and they do not spend so much money and effort to play games. *Incidental gamers* often play games when they get bored and during incidental times. *Social gamers* use games as a way of communicating with other people. *Leisure gamers* considers games a serious hobbies. It was found that they may

spend 58 hours of leisure time for games. *Dormant gamers* cannot find the enough opportunity to play games even if they are willing to play because of reasons like family, work or school. The number of such players increases among older players (Klopfer, Osterwell, & Salen, 2009; Hanlon, 2006).

Schuurman, De Moor, De Marez, and Van Looy (2008)

Schuurman et. al. (2008) also developed a categorization of players. The study based the categorization on the different motivations of players during a video game. The data of the study were collected through an online survey on a sample of 2985 Flemish players. The analysis produced four different player types based on eleven motivations. The player types are given as follows: Overall convinced gamers, convinced competitive gamer, escapist gamers and passtime gamers. Of them *overall convinced gamers* had higher mean scores in eight motivation types out of eleven pre-determined motivation types. Although they did not have a certain motivation to play games, it seems that playing games was part of their identity (Schuurman et. al., 2008). *Convinced competitive gamers* are reported to have motivation related to competition rather than discovery or socialization-related motivations. The mean scores of the *escapist gamers* are reported to be not high for various motivations to play games. Those motivations which such players had relatively higher mean scores included freedom, acting as if they were another people and new world. *Passtime gamers* had no a certain motivation to play games, but they played games just to spend their time. They may or may not describe themselves as players.

The data of the study Schuurman et. al. (2008) were collected through an online survey questionnaire. It was posted at various game websites and forums. However, the players were specifically invited to join the study. As a result 2895 survey questionnaires were completed by Flemish players. The study aimed to access those people who described themselves as "gamers". The number of casual gamers in the study is relatively low. In the data collection tool eleven basic game motivation were included. The responses were given on a five-point likert type scale. The survey questionnaire also included items regarding game behaviours, game context and socio-demographical characteristics. The motivation types included in the survey questionnaire were selected based on a review of literature. The questionnaire was used in a pilot study with a sample which included experienced players. The data were analysed using the K-means clustering and the analysis produced four different and significant clusters.

Fullerton (2008)

In the study by Fullerton (2008), namely "A Playcentric Approach to Creating Innovative Games", several gamer types were suggested based on the satisfaction of the participants from their point of view. This classification as mentioned by the author is not a very detailed taxonomy of players and therefore, cannot cover the digital games which are dominant in the current period. In addition, Fullerton's classification (2008) is not based on experimental data. The types of players in this classification are given as follows: *Competitors* attempt to be the best irrespective of the game played. They may have perfectionist personality traits. *Explorers* have a high level of curiosity about the game world. Explorers may have adventurous personalities in general. The limits of the game world are physically and mentally tested by these players. *Collectors* aim to collect all items, including awards, points or information in the game scenario. These players are sensitive about the topics of arrangements and organization. *Achievers* aim to reach different levels of success and to pass all possible steps in the game. *Jokers* do not take the game and playing the game seriously. For them the significant point is not success, but fun. Their play behaviour may make serious gamers angry. However, their presence in the play setting may make it much more social. *Artists* may have some dominant characteristics of design and creativity. Unlike other types of players they aim to produce a different outcome and solution or to develop a different strategy. *Directors* attempt to guide the flow of games and to have a word in the game process. They may act as a play maker, process initiator and a guide for other players. *Storytellers* create a world based on fantasy or imagination in the game process or in the playful environment. They live in the world they formed and tell the characteristics of this world to other players. *Performers* aim to present their game-related skills, information and characteristics to other players.

Götzenbrucker and Köhl (2009)

Götzenbrucker and Köhl (2009) examined the game experiences that can be differentiated according to changing living conditions of online players in ther study. Their study lasted for more than 10 years and the participants were fifteen online players. The study allowed for the players to share their game-related experiences and dealt with the analysis of the effects of their life styles, habits and media on their game behaviour. In the study

a total of fifteen individual interviews was carried out on a sample of the players who participated in their earlier study. The age of the participants was between 30 and 52 whose educational level was higher than their country (Austria) mean. Most of the participants were working in the fields related to technology. The authors employed some of the data collection tools that were also used in their earlier study. However, in the second study they added in-depth qualitative interviews to obtain much more complete perspectives on the attitudes of players. These qualitative data were analysed using the grounded theory. The results of the analysis showed eight fields to be analysed as follows in Table 1:

Table 1. Götzenbrucker and Köhl's (2009) Domains of Inquiry

Gamers' behaviour, game preferences	Private/professional consequences
Motivation	Game quitting scenarios
Gamers' personal career	Friendships
Positive/negative gaming experiences	Social networks

In the taxonomy developed by Götzenbrucker and Köhl (2009) there are several types of players as follows: *Communicative role-players* like to play a role by covering their own characteristics in different scenarios. Communication and the development of the network of friends are the main achievement for these players. These players believe that the communicative links that they established with others will have reflections in real life. *Anarchists* consider themselves as different from other player types, and are usually in an action against other players. These players love the risk, insecure situations, adventure and evil behaviours (cheating, killing, playing, etc.). *Steady gamers* are regular players who make games part of their lives. These players can experience things that are considered unimaginable in their real life through games. They extensively employ media and have curiosity about new technological devices. These players integrate games into their lives using different adaptation techniques in regard to the changes in different stages or milestones of their lives. Steady gamers are much more achievement-oriented than the first two types of gamers. *Designers* deal with mechanics of games, game settings and technical background of games. They aim to create their own game world and also, attempt to redesign the games. Designers who like to fight against different components and try new things in the game world consider the game as "a creative design site". The findings of the study indicated that there are correlations between game behaviours, motivation to play and life styles. Significant defining moments of the players are found to be important parameters. More specifically, it was found that significant events such as new employment or having a baby decrease the duration of playing game time. This finding suggests that in classifying the types of players it is very significant to take into account these significant events in players' life.

Drachen, Canossa, and Yannakakis (2009)

Drachen et al. (2009) carried out a study on a sample of players who completed or were still playing an adventure game, Tomb Raider: Underworld. The data used to determine player types were collected through the game metrics registration system called EIDOS Metrics Suite. The participants were 1365 gamers. They were classified based on different variables (the frequency of losing a game, duration to complete the game, etc.). The data analysis produced four types of players as follows: *Veterans* are experienced gamers who complete the game fast and less lose it. *Solvers* mostly use their time in the game to solve puzzles covered in the game. *Pacifists* are usually killed by in-game enemies (as a result of falling, etc.), but they can still complete the game quickly. *Runners* refer to those players who try to complete the game as soon as possible.

Nacke, Bateman, and Mandryk (2011)

Nacke et al. (2011) developed BrainHex model which is based on neurobiological findings considering the levelling of player satisfaction. However, in the model neurobiological techniques are not employed. Instead, only theoretical information from the previous studies is used as basis. The BrainHex model provides references from the DGD1 (Demographic Game Design Model) and DGD2 models developed by the authors previously. The DGD1 and DGD2 models were created by adapting the psychometric Myers-Briggs personality test to the player characteristics. Although these models are significant in presenting very important perspectives on the types of players, they have a shortcoming in that the Myers-Briggs test was not specifically developed to measure neither games not gamers.

The BrainHex model includes seven different gamer categories as archetypes. Each category is not considered as a psychometric type with definite boundaries, but as a classification category related to various experiences of gamers. These categories may include more than one psychometric characteristics. The data of the study were collected through an online survey questionnaire which was distributed from the BrainHex website. The number of the participants who completed this questionnaire was 50.423. A php code was developed to contribute to identify the participants' game preferences on the website. The first section of the questionnaire included demographical information (i.e., age, gender, geographical regions, etc). In addition, it covered the statements based on the Myers-Briggs-Type personality test. In the second section there were statements about the player archetypes. More specifically, there were three statements for each type (for instance, in relation to the archetype of seeker one of three statements was as follows: these players just walk around to enjoy the script). The responses of the participants were evaluated on a five-point Likert type scale. In the third section for each BrainHex archetype there were seven specific statements. The participants were asked to evaluate these items using the scores ranging 1 to 7. The PHP code immediately calculate the scores for the responses of the participants and indicate the related BrainHex archetype. Most of the participants took part in the study were male (88,6 %). The survey questionnaire was written in English, and the participants were from North America (49,8%), West Europe and UK (27.9%), East Europe and Russia (8,2%) and South and Central America (4,3%). The classification of players is made up of seven types as follows:

- ***Seeker:*** It has been observed that such players are motivated by the mechanisms of interest related to sensory information and memory sections in the brain. They are curious about game world and enjoy browsing exciting features. It is known that finding the parts which can be interpreted later causes endomorphin secretion and hence, creates a feeling of satisfaction.
- ***Survivors:*** Such players improve their performance through fear and tension. This situation is achieved by the effect of dopamine on the effect of epinephrine neurotransmitter in the case of excitement caused by tension (Nacke et al., 2011). They prefer those games containing fear and tension.
- ***Daredevils:*** They look for excitement taking risks and enjoy stabbing actions. The interests of these players are platform games with dizziness or sudden changes of direction at high speeds.
- ***Masterminds:*** They satisfy with the games which require a certain solution strategy. They enjoy master minds which require the decision-making for the most productive solution and puzzles.
- ***Conquerors:*** They aim to tackle distressed situations, complete very difficult tasks, and beat other players while achieving success. They like to endeavour to achieve victory. Easy achievement does not satisfy them. They are open to challenges and may channel their anger to achievement. Both epinephrine (adrenaline) and norepinephrine secretions as well as testosterone may shape their game behaviour.
- ***Socialisers:*** For such players other people are the source of excitement and satisfaction. They like to talk with others, help them and make observations together and the sense of trust is a very significant variable for them. The use of the social center of oxytocin, which is important in establishing a trust-based relationship, is at the forefront of these players.
- ***Achievers:*** These players are target-oriented individuals. They are motivated with the aim of long-term success. The other characteristic of them is to complete tasks to achieve the goal. Their major characteristics is to complete tasks in order to achieve their goals. Conquerors are struggle-oriented and tend to win through struggle, while achievers satisfy with the completion of the game. Another goal of them is to have a success-oriented game process.

Xu, Poole, Miller, Eiriksdottir, Kestranek, Catrambone, and Mynatt (2012)

Xu et. al. (2012) used the American Horsepower Challenge (AHPC) which is a multi-player health-related game as game setting. This game includes a competition structure involving the recording and evaluation of physical activities at or outside of the school and students from different schools may participate in such activities. The participants of the study were 1743 students. The data were collected using focus group interviews. A total of 18 focus groups was formed, and each group consisted of 4-10 students. In addition, interviews were conducted with samples of 17 teachers and of 56 students. The field notes of the researchers were obtained by the logs obtained from the step counters attached to the students' shoes. An inductive iterative process is used in the analysis

of qualitative data. In the process of data analysis, the data were examined in terms of motivation (what the player thinks about the game), behaviour (what the player does during the game) and effect (what the social impact of the player on the rest of the player group).

As a result of the analysis they developed five different types of players. Of them *achievers* have regular goals throughout the gaming process that are focused on improving their individual progress and personal performance. *Active buddies* like to create small groups of close friends and to make fun physical activities with their group members. *Social experience seekers* like to socialize and make changes to their external representations in the game environment (for instance, they frequently change the elements and avatars in the games) and to talk about them. *Team players* are motivated to belong to a group, group achievement, group rankings and improve the performance of the group members. *Freeloaders* have a great deal of interest at the beginning of the game process, but over time their interest is rapidly reduced. Although they are not very active in the game process, they do not leave it. Instead, they are in the pursuit of things they think that they can benefit from (i.e., free t-shirts, etc.). The other player types do not like freeloaders in that for them freeloaders have negative effects on team work.

Ferro, Walz, and Greuter (2013)

Ferro et al. (2013) examined the relationship between personality types, game elements / mechanics and player types used in previous studies. Based on these analyses they developed five player types. This classification is a theoretical model based on the findings of the previous studies. Their player categories are as follows:

- ***Dominant players:*** Dominant players like to be visible in game environments. They mostly achieve it through sociability, assertiveness and aggressiveness. They are reported to be reliable and egoist and to have self-directed acts.
- ***Objectivist players:*** These players are less selfish than dominant players. However, they still think themselves during the game process. Their actions are based on their own knowledge and skills while achieving their goals such as rewards, bonuses etc.
- ***Humanists:*** They have social acts and commit themselves to various game-related tasks to develop social commitment. These players care about the needs of others as much as their own needs. They do not attempt to develop individual solutions. Instead, they tend to solve the problems with other players.
- ***Inquisitives:*** Such players like to make research and to discover new things. Instead of being explained what to do about a variety of tasks, they prefer to find the solution and to understand the tasks by discovery. More natural game environments are more interesting for this player type.
- ***Creatives:*** Such players like to develop and experience new things. They prefer guidance instead of direct instruction.

Tondello, Wehbe, Diamond, Busch, Marczewski, and Nacke (2016) - Marczewski (2015)

Marczewski developed the Gamification User Types Hexad framework which include motivation research, player types and applied design experience. The first framework which was based on observation and experience was later translated into a consistent measurement tool. At the stage of development of the scale, a workshop was held with a group of six experts, and then, the framework was introduced to these experts. Experience-based Hexad Framework covers a distinct item pool for each player category. The experts verified the validity of the items created and provided the appearance validity. In addition, the experts listed the defining features of user categories and the suitability of each category in relation to specific game mechanics. At the second level the items about player categories were again examined, and those items which were misleading, extremely general, extremely context-dependent and unnecessary excluded from the item pool. The final ranking scale was consisted of 74 items. Then the experts were asked to answer the items in the form using a 6-point Likert type scale. The aim was to analyse the prediction power of the items in regard to player types. The results of the analysis produced a form with 30 items. The analysis was carried out in three components: scale reliability, correlation of personality traits with scale items and correlation of game design elements and scale items. The determination of personality traits was carried out using the Big Five test (five factor model). In the correlation analyses the Kendall's τ was employed. At the later stages the potential of the measurement tool as a model to be used in gamified systems was investigated. The correlations between 32 design elements that are frequently used in game environments and

player categories were analysed. The results showed that there is a positive correlation between these 32 design elements and player categories. The player classification by Marczewski which was empirically tested is as follows:

- ***Socialisers:*** Such players are motivated with the relational connections among players. They want to develop social connections and interactions with other players.
- ***Free spirits:*** They tend to exhibit an autonomous endeavour. They want to produce something in line with their desire and to discover.
- ***Achievers:*** Achievers attempt to be masters of the game. Their major characteristics include learning new things and improving themselves to have better qualities.
- ***Philanthropists:*** These players focus on the goal and meaning of the game. They want to help others and to make positive contributions to others' life without expecting anything.
- ***Players:*** The motivation for them is rewards. These players do everything to win prizes from a game or a gameful setting. They play the games for the sake of rewards.
- ***Disruptors:*** These players are individuals who live and adopt a strong sense of change. They try to create changes by disrupting the game system or influencing other players.

Vahlo, Kaakinen, Holm, and Koponen (2017)

Vahlo et al. (2017) examined the digital game preferences by identifying game dynamics of 700 digital games, and also players' desire to play games with specific types of dynamics. The authors define their study as "a complementary approach for motivations to play and player behavior studies". The participants of the study were 1717 adult participants. The data was collected using a web-based survey which includes the game dynamics preference questionnaire with 33 items. As a result of the study, 5 game dynamics preference categories and 7 player types.

- ***The Mercenary:*** These players are most favored with sneaking, shooting enemies, killing, and executing battle tactics. Also other highly favored in game for this type of players are; acting as the main character, developing its skills and abilities, and exploring the gameworld.
- ***The Companion:*** These players reported relatively high preference scores for befriending with in-game characters, creating an avatar, developing its skills and abilities, and developing a city or village. They revealed a strong dislike for killing, waging war, shooting enemies, and exploding
- ***The Commander:*** These respondents were highly attracted to strategizing, building, and developing a city or a base, defending their own territory, and managing cities and their citizens. They disliked the dynamics of Care but also stealing and breaking the law, hiding and running for your life, and staying in rhythm
- ***The Adventurer:*** They showed very high preferences in creating a character, developing its skills and abilities, acting as the protagonist, exploring the gameworld and uncovering its secrets, and befriending amongst in-game characters. They did not prefer racing and competing in sports, matching tiles, playing instruments and dancing, or taking care of pets
- ***The Patterner:*** They showed the highest preference score for matching tiles or other elements together as well as a moderate preference for jumping between platforms and collecting rare items but disliked many other game dynamics, especially killing, stealing, destroying, and waging war
- ***The Daredevil:*** They favored racing more than other player types, and also moderately exploding, sneaking, and shooting. They did not show strong dislike for any of the 33 game dynamics.
- ***The Explorer:*** The player type revealed the highest preference of all the player types for collecting rare items and treasures. They enjoyed also exploring the gameworld, developing a character's skills and abilities, and matching tiles together, but disapproved stealing, exploding, and running for your life more than any other player clusterses were revealed.

Method

This research is a concept-centric meta-synthesis study examining player classifications as an individual difference in playful learning environments. In this research, the studies which analysed the typology of players are examined chronologically in terms of methods used, game environment and contextual aspects. Meta-synthesis is a research approach that brings together the results of different studies which analyse a similar subject (Walsh & Downe, 2005). Although some of the studies reviewed in the research used completely quantitative methods, the player classifications in their findings analysed in terms of their content. In the study, in order to find the related studies the following key terms were used: "player types", "player typologies", "player classification", "gamer types", "gamer typologies", "gamer classification". The studies reviewed in this study were found and listed via Google Scholar. Before conducting the search, other databases such as SCOPUS and Web of Science were checked. However, Google Scholar provided the most extensive results. In the screening process, a total of 141 studies were identified. After removing duplicates, filtering studies that were irrelevant to the purposes of this study and a set of inclusion criteria were implemented, 14 publications identified for the double review.

Inclusion Criteria

In finding out the studies for synthesis, the snowball sample technique was employed in that references used in the studies were also benefited. In the selection of the studies to be reviewed only two criteria were used to provide scope extend. These criteria are as follows: "being published in a scientific journal, book or research report" and "providing a specific taxonomy of players". No date range was set for the data screening process of this study for not to narrow down the scope of research. Among the studies included, 8 of them were scientific journal articles, 2 of them were book chapters and 1 of them was a research report. As a limitation of this study research report and book chapters may be seen as a validity/reliability threat for this current study. Nevertheless, the research report was published by an internationally recognized market research and consulting company with serious scientific methodology (https://www.parksassociates.com/page/company), and book chapter were published by well known international scientific book publishers. Table 2 shows the references found.

Table 2. Studies Included into Research Synthesis According to Literature Review

Name of the Study	Authors	Date
Hearts, clubs, diamonds, spades: Players who suit MUDs	Bartle	1996
Park Associate's Marketing Survey about Online Gamers	Park Associate	2006
Fanboys, Competers, Escapists and Time-killers: a Typology based on Gamers' Motivations for Playing Video	Schuurman et al.	2008
A Playcentric Approach to Creating Innovative Games	Fullerton	2008
Ten years later. Towards the careers of long-term gamers in Austria	Götzenbrucker and Köhl	2009
Player Modeling using Self-Organization in Tomb Raider:Underworld	Drachen et al.	2009
BrainHex: Preliminary Results from a Neurobiological Gamer Typology Survey	Nacke et al.	2011
This is Not a One-Horse Race: Understanding Player Types in Multiplayer Pervasive Health Games for Youth	Xu et al.	2012
Towards personalised, gamified systems: an investigation into game design, personality and player typologies	Ferro et al.	2013
Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Design	Tondello et al.-Marczewski	2016-2015
Digital Game Dynamics Preferences and Player Types	Vahlo et al.	2017

The study by Yee (2006) is frequently referenced in the studies about player classifications and games. In his study Yee (2006) analysed the motivations of players in online games. The study concluded that there are three groups of motivation which include ten different motivations for online players. However, it did not attempt to classify players. Instead, it analysed the motivations of players which can be used in these classifications. Therefore, it was not included in the current study. In addition, the study by Whang and Chang (2004) players were classified only in terms of social behaviours, namely single-oriented, community-oriented and off-real world players. Given that it took into consideration only one dimension, it was also excluded from the current study. In

addition to ten different player classifications given, Bartle's (1996) revision of the original classification can also be added. However, the revised player typology of Bartle is not based on empirical findings and it was not published in a scientific article. Therefore, it is also excluded from the study.

Data Analysis

The analysis consisted of two steps: 1) initial reading of all 14 articles, without predefined criteria, to get an impression of the authors' presentations of the stated typological approach and of the choices the authors made regarding research design; and (b) a careful and thoughtful reading of a selected group of articles using a guide developed for this second step of the analysis.

In the second part of analysis included studies according to pre-defined criteria were analysed comparatively based on the following points: 1) participant groups and origins of the paper 2) game settings/environments, 3) methodologies (sample characteristics, data collection tools, variables used in the categorization of players, data analysis methods employed). The content analysis was carried out using the NVivo 12 program. The player types collected were examined in terms of their content definitions. The content analysis was carried out by both the author and a field expert on game-based learning/gamification twice with a thirty-day interval. The intrarater and interrater reliability were calculated due to provide thematic consistency. The intrarater reliability was found to be .852, whereas the interrater reliability was found to be .819. Although the quantification of content analysis does not seem to be very meaningful for qualitative research in general, this may be regarded as important in the studies which aim at creating proposal models on specific issues. The Cohen Kappa (Cohen, 1960; as cited in Stemler, 2001) was employed, and the values ranging between 0.81 and 1.00 indicate a perfect consistency (Landis & Koch, 1977). The labels of the themes were identified together with four field specialists.

Findings and Discussion

In this study, the studies conducted by different researchers about player typologies were examined in terms of participants, game environments, methods and findings. In some of these studies, psychometric tests related to personality types were used in the process of developing player typologies (Ferro et al., 2013; Marczewski, 2015; Nacke et al., 2011). In the other studies the dominant way to develop player typologies is the use of researcher experiences, player experiences and various game motivations as the basis for these typologies. Also, in the study of Vahlo et al. (2017), a player classification was made based on the interaction between player and game dynamics. The study by Parks Associates (2006) is in fact a market research to describe their current customer profiles. Classifications developed by Fullerton (2008) and by Ferro et al. (2013) are mostly based on researcher experiences or the previous classifications. There is also no empirical evidence used in these studies. Therefore, it is safe to argue that although these classifications provide significant information for the researchers in the field of games, they are not scientifically well accepted classifications of players. Player types formed by different researchers are shown in Table 3.

Table 3. Player Types Formed by Different Researchers

Bartle (1996)	**Park Associate (2006**)	**Schuurman et al. (2008)**	**Fullerton (2008)**
Achievers	Power gamers	Fanboys	Competitor
Socializers	Social gamers	Competers	Explorer
Explorers	Leisure gamers	The Escapist	Collector
Killers	Dormant gamers	Time Killers	Achiever
	Incidental gamers		Joker
	Occasional gamers		Artist
			Director
			Storyteller
			Performer
Götzenbrucker and Köhl (2009)	**Drachen et al. (2009)**	**Nacke et al. (2011)**	**Xu et al. (2012**)
Communicative role-players	Veterans	Seeker	Achievers
Anarchists	Solvers	Survivor	Active buddies
Steady gamers	Pacifists	Daredevil	Social experience
Designers	Runners	Mastermind	seekers
		Conqueror	Team players
		Socialiser	Freeloaders
		Achiever	
Ferro et al. (2013)	**Tondello et al. (2016) - Marczewski (2015)**	**Vahlo et al. (2017)**	
Dominants	Socialisers	Mercenary	
Objectivists	Free spirits	Companion	
Humanist	Achievers	Commander	
Inquisitives	Philanthropists	Adventurer,	
Creatives	Players	Patterner	
	Disruptors	Daredevil	
		Explorer	

One of the notable primary findings of this research is that some of the typologies were developed cumulatively. It causes us to think that different player typologies have common characteristics, but may involve context-specific diversified characteristics (Figure 4).

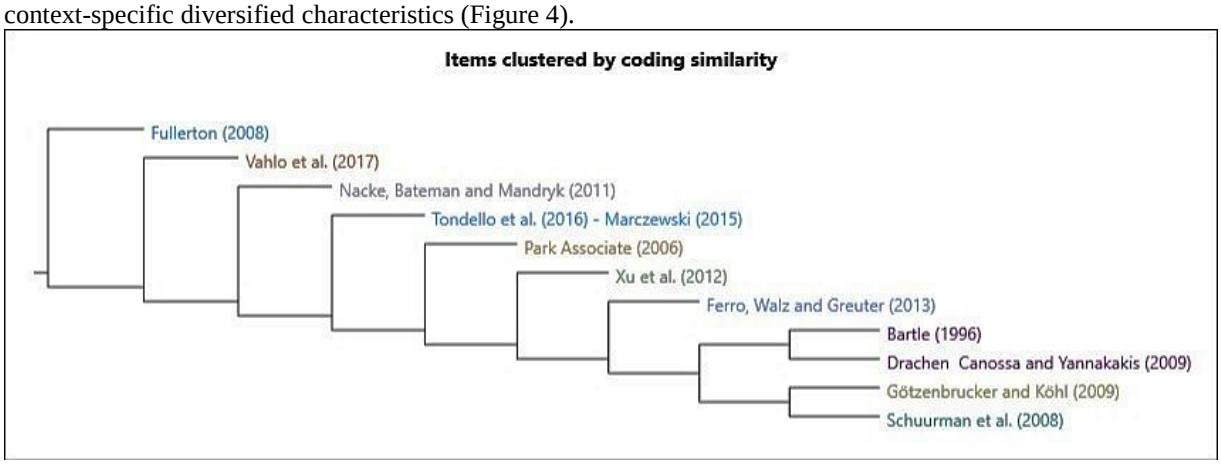

Figure 4. General coding similarity in content analysis

If individuals are to be classified according to any of their behaviour, the context in which this behaviour occur should be taken into consideration. In player typology studies which attempt to classify players based on their specific game behaviours, examining the game environment with priority will be informative for both researchers and designers in terms of the scope and generalization of the results. One of the earliest player classification was developed by Bartle (1996). This classification is frequently used in the studies on games and game-based learning. However, Bartles' classification were specifically developed for MUDs. Therefore, it can be argued that this model cannot be used and generalized to every type of games or gamification approaches. However, Bartle (2003) revised his taxonomy given that the original version of the taxonomy was based on a static game setting. The player typology developed by Schuurman et. al. (2008) was based on video games without focusing on a specific type of such games. The classification by Götzenbrucker and Köhl (2009) was developed on a sample of online players who participated in the MMORPGs (Massively multiplayer online role-playing games). The MMORPGs are in fact a developed version of the MUDs employed in the taxonomy of Bartle (1996). In the study by Drachen et. al. (2009) "Tomb Raider: Underworld" which is an adventure game was employed. The study carried out by Xu et. al. (2012) employed the "American Horsepower Challenge" which is a multi-player online health-related game. In the other play typologies the player characteristics are not based on a specific experience of a game.

When gamer typology studies included in the current study were reviewed, it was seen that survey studies were dominant among them. Also samples of the studies were generally formed with high number of participants. Two studies were non-empirical and one study was carried out to develop a scale (e.g. Tondello et al., 2016). In some studies the data were collected using in-depth interviews. For instance, the participants of the study carried out by Götzenbrucker and Köhl (2009) were fifteen adults. It is observed that the player typologies were not developed taking into account a specific range of participant ages. However, the participants are mostly young adults and adults in the studies reviewed. There is no sufficient information about the gender of the participants. The studies were carried out in different countries. Given that games are highly affected from cultural settings, it is reasonable to expect that such studies were implemented in various countries. Participants, age ranges and regional contexts of the studies reviewed are shown in Table 4.

Table 4. Participants in Gamer Classification Studies

Research	Number of Participants	Age range	Country
Bartle (1996)	30	N/A	UK
Park Associate (2006)	2002	-	US
Schuurman et al. (2008)	2985	N/A	Belgium
Fullerton (2008)	N/A	N/A	N/A
Götzenbrucker and Köhl (2009)	15	15-23	Austria
Drachen et al. (2009)	1365	N/A	N/A
Nacke et al. (2011)	50423	N/A	Mostly North America
Xu et al. (2012)	1743	middle school children	US
Ferro et al. (2013)	N/A	N/A	Australia
Tondello et al. (2016) - Marczewski (2015)	133	graduate/undergraduate level	Canada
Vahlo et al. (2017)	1717	adults	Finland-Denmark

The studies reviewed were analysed in terms of data collection tools, the variables employed in developing the player typology and data analysis techniques. Of 6 quantitative studies the data of 5 studies were collected through online surveys. The other quantitative study used a game metrics logging system which keeps the numerical game data. 4 studies were descriptive while one of them was a correlational study which attempted to develop a scale. The other study was an inferential research. There were also three studies which employed a qualitative method. The data of these studies were collected through interviews, focus group interviews, online discussions and field notes. In terms of the fundamental variables that were used to develop player typologies it is found that such

variables included game experience, game habits, motivation to play games, satisfaction from playing games, specific reactions to game components, interest towards games, personality types, acts about personal reporting and effects. It can be argued that other than these variables motivation, experience during the game and attitudes towards games can be used to develop new player typologies.

Methodological components of reviewed studies are shown in Table 5. In terms of data analysis methods, it was seen that the most frequent used methods are found to be clustering analysis and content analysis. In the studies which employed relational analyses, the types of players were developed comparing them with psychometric personality types.

Table 5. Methodological Components

Research	Data Gathering Tool	Classification Variable	Analysis
Bartle (1996)	Open-ended online discussions	Game experience	Content analysis
Park Associate (2006)	Online survey	Playing habits, attitudes	Cluster analysis
Schuurman et al. (2008)	Online survey	Basic game motivations	Cluster analysis
Fullerton (2008)	N/A	Pleasures of play from the point of view of the player	N/A
Götzenbrucker and Köhl (2009)	in-depth interviews	Gamers' attitudes	Content analysis related to the concept of grounded theory with 8 domains of inquiry
Drachen et al. (2009)	a game metrics logging system	Playing characteristics across different gameplay features	Cluster analysis
Nacke et al. (2011)	Online survey	Theoretical motivations, interest in digital games, Myers-Briggs Psychometric Types	Inferential analysis – Factor analysis (for DGD1)
Xu et al. (2012)	focus groups, individual interviews, field notes	self-reported data (motivation, behavior, influence)	Content analysis
Ferro et al. (2013)	Review of the literature	player typologies, personality types and related game elements	Theoretical analysis
Tondello et al. (2016) – Marczewski (2015)	Online survey	Motivation, Big Five Psychometric Types	Factor analysis, Correlation analysis
Vahlo et al. (2017)	Online survey	Game dynamics	Cluster analysis

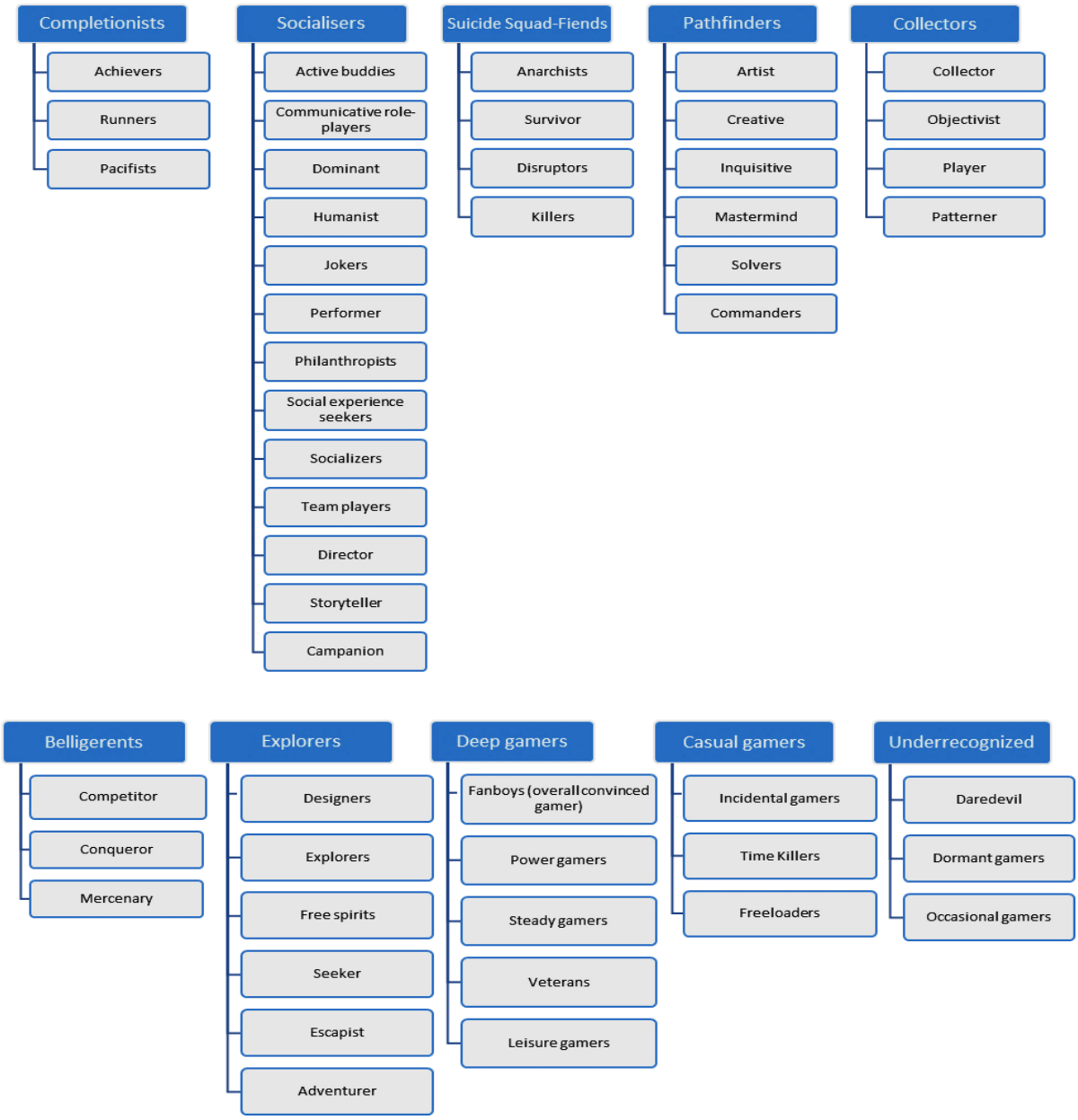

Figure 5. Themes Revelaled from Content Analysis of Player Typologies Research.

Conclusion

In this study, 9 common themes emerged from the meta-synthesis of previous player typologies research: *Completionists, Socialisers, Suicide Squad-Fiends, Pathfinders, Collectors, Belligerents, Explorers, Deep-gamers and Casual gamers.* The study by Hamari and Tuunanen (2014) which also reviewed the player types dealt with 12 such categories. Based on this review they suggested five different dimensions: Achievement, Exploration, Sociability, Domination, and Immersion. Of the studies reviewed by Hamari and Tuunanen (2014) only two studies were also included in this study. This difference was due to the inclusion criteria employed. In the current research only those studies which contained specific player typology are reviewed. In this current study 9 different themes with code categories were developed. These themes can also be evaluated as generic digital player types.

The number of studies which investigate player types are quite limited in the literature, however there are several studies that uses player types as an individual difference (dos Santos, Bittencourt, & Vassileva, 2018; Gelder, & Kovenock, 2017; Gil, Cantador, & Marczewski, 2015; Kuo & Chen, 2019; Park & Kim, 2017). The common deficiency of these studies is ignoring the contextual and cultural suitability of generic player typologies and using clear-cut player types in their research processes. Any significant trend was observed during the literature review. Testing former player typologies in gamified environments, evaluating different performance indicators or investigating effects of different player types on motivation and engegament variables.

The themes revealed in this research are also generic player types based on the synthesis of the research findings. These codes suggest that player types refer to differences that are dependent on more than one variable. It seems that in developing player typologies instead of clear-cut categories, archetype categories which may include various attributes at the same time should be identified and the dominant tendency should be made clear.

The player typologies covered in the study are mostly based on digital game settings and definitions. On the other hand, in developing such typologies the game setting is very significant. Therefore, these player typologies were developed based on the game setting or context. For instance, if a player typology was developed without considering social dimension it means that that typology was developed based on other variables (i.e., game speed, motivation for the game, attitudes, etc.). In order to develop a player typology that may be mutually agreed the players should be offered many opportunites irrespective of context/setting/the type of play. On the other hand, the variety of codes that make up the themes and theme codes indicates the fact that there are important variables such as personality trait, perception, attitude, motivation that all direct the behavior of the player types. Player typologies as an ingredient of individual differences can be useful for designers of learning-teaching settings, researchers and teachers to be much more informed about learning characteristics and to better guide learning processes. For player typologies to be effective in learning environments as an ingredient of individual differences, one needs to explain how certain games feed interests of particular play styles. On the other hand, these player models can be expected to provide descriptive and predictive power to game designers (Stewart, 2011).

The core context that can be reasoned based on the findings of this current study is the usage of individual differences in teaching-learning processes. Gamification and the other game based learning processes are the powerful approaches which can provide solutions for problematic issues in learning/teaching as motivation (Buckley & Doyle, 2016), engegament (Looyestyn, Kernot, Boshoff, Ryan, Edney, & Maher, 2017), problem solving (de la Peña Esteban, Torralbo, Casas, & García, 2019), or critical thinking (Kingsley & Grabner-Hagen, 2015). These game centered approaches get their educational strength from one of the basic instincts of humankind, "playing". In this respect using gamification or other game centered approaches can be resulted with effective and permanent learning. But at this point, it is important to comprehend that every individual has its own attributes and every individual may react differently in different game based approaches. In line with these estimations, the findings of this current study reveal that gamer typologies can be formed based on different variables however these formations may also be influenced by methodologies used or the characteristics of the participants especially culture as well. This study introduces the necessity of investigating gamer types as an individual difference, suitable with cultural context, and with a proper scientific approach. Creating a national gamer typology with a proper scientific approach will be an important move and supporter for using gamer types in individualised learning scenarios by teachers, teacher mentors or educational researchers. According to this perspective, this current research may provide clues about adapting the instructional content to learning processes.

It has been found out that some of the studies employed only quantitative methods while the others only qualitative methods. However, in some studies the player typologies were developed using the data from the scales which did not cover the measurement or observation of game experience in real game settings. It is one of the weak points about the content and reliability of player typologies developed up to now. Particularly it is significant to collect data through quantitative data through clustering analysis of the in-depth interviews to develop player typologies which are used as an ingredient of individual differences in the technology-based education settings. In addition, the key factor in the study was the selection of the studies which involved the observation of the players in multi-player game situations to produce player typologies. It is found that the research processes in the studies reviewed were not tested using the complementary factors and verification methods. Although there is no common point in the studies reviewed in terms of game types, as stated earlier those studies which focused on multi-player game settings were selected which makes it possible to generalize the findings of the study on player types (Hamari & Tuunanen, 2014). The study also analysed the age range of the participants in the studies reviewed. The

participants of the studies which produced a classification of digital game players were mostly young adults or adults. The reactions of the individuals from different age groups to similar game elements may be analysed in future studies.

The findings of the study suggest that if educational processes which are based on games are to take into account individual differences the player types should first be identifies and the educational process should be designed based on this classification. Player typologies have cognitive, social, behavioural and psychological dimensions. In this context individual behaviors can be observed by establishing a relational structure related to player typologies, by creating new player typologies suitable for different platforms or educational processes and appropriate process or platform. The variety of player types allows for the observation of the behavior of these player types in various social networks. Therefore, in the semi-experimental studies the player characterics should be analysed through face-to-face interviews or in online settings.

Playing games is one of the basic instincts that is closely related to learning and is also one of the significant cultural facts. Therefore, changes in culture and language that involve the game can also change the tendencies and motivations related to the game. In other words, although the player classification developed in a specific culture is meaningful in similar cultures, it does not provide a useful explanation in different cultures. Hence culture-specific player typologies are needed to provide scientific explanation for individual differences in educational settings.

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Development and Validation of the Cloud Technologies Usage in Education Scale

Agâh Tugrul Korucu *[a], Aydin Karakoca[b]

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Abstract

In this research, it is aimed to develop a scale for the use of cloud technologies in education. The sample group of the study consists of 415 preservice teachers who are studying at universities in Konya. For the validity and reliability analyses of the scale, the sample group consisting of 415 units was randomly allocated (n_1 =208 and n_2=207) sub-samples, the first sample was used for explanatory factor analysis and the second sample was used for confirmatory factor analysis. As a result of the explanatory factor analysis of the data obtained from the first group, 6-item scale consists of motivation and interaction sub-dimensions. Interaction dimension of total variability alone explains 35.89% and motivation dimension explains 33.56%. Factor loads for the sub-dimensions ranged between 0.74 and 0.83. The internal consistency coefficient was 0.83 for Cronbach alpha, 0.77 for motivation subscale and 0.79 for interaction subscale. For the second sample, it was found that the model formed by the two-factor structure of the scale was appropriate according to the fit indices obtained from the confirmatory factor analysis results. As a result, Cloud Technologies Usage scale was found to be a valid and reliable measurement tool.

Eğitimde Bulut Teknolojileri Kullanımı Ölçeğinin Geliştirilmesi ve Geçerliliği

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Araştırma makalesi

Öz

Bu araştırmada, bulut teknolojilerinin eğitimde kullanımı için bir ölçek geliştirilmesi amaçlanmıştır. Araştırmanın örneklem grubunu Konya üniversitelerinde okuyan 415 öğretmen adayı oluşturmaktadır. Ölçeğin geçerlik ve güvenirlik analizleri için, 415 birimden oluşan örneklem grubu rastgele iki gruba ayrılmıştır (n_1=208 ve n_2=207). ilk örneklem grubu açıklayıcı, ikinci örnek grubu da doğrulayıcı faktör analizi için kullanılmıştır. Açıklayıcı faktör analizi sonucunda 6 maddelik ölçeğin iki alt boyutlu (motivasyon ve etkileşim) yapıda olduğu bulunmuştur. Alt boyutlardan etkileşim alt boyutu toplam değişkenliğin %35.89'unu, motivasyon alt boyutu ise %33.56'sını açıklamaktadır. Alt boyutlar için faktör yükleri 0.74 ile 0.83 arasında değişmektedir. İç tutarlılık katsayısı Cronbach alpha ölçeğin tamamı için 0.83, motivasyon alt boyutu için 0.77 ve etkileşim alt boyutu için 0.79 bulunmuştur. İkinci örneklem verileri kullanılarak doğrulayıcı faktör analizi sonuçlarından elde edilen uyum göstergelerine göre iki faktörlü modelin uygun olduğu bulunmuştur. Sonuç olarak, Bulut Teknolojileri Kullanımı ölçeğinin geçerli ve güvenilir bir ölçüm aracı olduğu gösterilmiştir.

***Corresponding Author:** agah.korucu@gmail.com
[a] Assoc. Prof.. Dr., Necmettin Erbakan University, Konya/Turkey, https://orcid.org/0000-0002-8334-1526
[b] Assist. Prof. Dr., Necmettin Erbakan University, Konya/Turkey, https://orcid.org/0000-0001-6503-3872

Introduction

In the present century, the development and spread of information and communication technologies have been effective in all areas of life and caused changes occurring globally and on a large scale. These technologies, which were previously physically large, but could process less information, have become small enough to be carried in the pocket today, but have the power to carry out many operations at the same time, and become functional and convenient. Nowadays, thanks to these technologies, the demand for accessing information in an easy and rapid way has increased in case of need, on the move, in short anytime anywhere from different platforms and different operating systems. In today's world where information and technology have a great impact, all users, individually or institutionally, are looking for ways to access, transfer, share and process data independently of time and space, quickly and easily (Sarıtaş, & Üner, 2013; Sırakaya, & Sırakaya, 2013). In this process of change and in meeting the demands, the concept of internet has played an important role, and with the concept of internet, global competition among countries has gained rapid momentum. In order to keep pace with this rapid change and global competition, countries must accept the active and effective use of these technologies in every stage and every area of our lives such as political, social, economic, health, must be open to innovations and interactions in the digitalizing world, and must plan to make maximum use of all the opportunities of internet. Since the competitiveness of a country depends on its innovation and knowledge (Öztopcu, 2018).

Education plays an important role in the change and development of societies. The education sector plays a vital role in the development of any country in terms of building an information-based society (Nayar, & Kumar, 2018). The main purpose of education is to educate individuals by considering the needs of the society and to give information to individuals, as well as to gain the ability to produce, understand, interpret and use it in all individual and social activities. In this sense, education should have a content that will determine the social, political and economic development levels besides its main objectives (Aydın, 2003; Öztopcu, 2018). In today's world, when the needs of the society are taken into consideration, it is necessary to educate individuals who can adapt to the information society, who can use information technologies and internet actively and effectively, and to increase the use of technology in education for these individuals. In other words, education services should shift from traditional to online form while keeping up with the evolution of technology (Pardeshi, 2014). In the process of transitioning to this online environment, valuable personal or public information and data such as photos, documents, music or any other file previously stored in more traditional ways (printing, local or external hard drives, DVD, Flash memory), have been conveyed and stored in electronic and internet environments with the digitalizing world (Ion et al., 2011; Okutucu, 2012). Social networking software and "Web 2.0" environments support constructivist learning environments with multiple features such as creating collaborative opportunities, enhancing interaction and providing multimedia elements to meet all these relocation, maintenance and storage and other 21st century demands (Beldarrain, 2006; Hamutoğlu, 2018; O'Reilly, 2005; Schneckenberg, 2014) and demands in educational system are tried to be met with "cloud technologies" which enable Web 2.0 technologies to be completed, offer common workspaces, and which are adopted as a class in time. "Web 2.0 technologies" and "cloud technologies" which are expressed as two main trends of the development of internet, continue to develop rapidly day by day (Marinos, & Briscoe 2009; Bower, Hedberg, & Kuswara, 2009; Johnson et al., 2010).

Cloud technologies are used not only in the field of education but also over a wide range of applications in public fields such as industry, marketing, telecommunication, tourism, healthcare, insurance, transportation, banking, shopping, hospital and library as well as in personal services, even cloud technologies are considered as the fifth facility following water, electricity, gas and telephone services (Monroy et al., 2013). In addition to the usage of cloud technologies in all these areas, cloud technologies offer; free web mail services (such as Gmail, Hotmail and Yahoo), many content services such as videos, movies, series (YouTube, Netflix etc.), music services (Spotify), as well as text, photos, video social media sites (Facebook, Instagram, Twitter, Pinterest, etc.), blogs and wikis that serve to share a wide range of content such as sharing and collecting these shared content in an area. Considering the fact that there are students in the consumers of these cloud-based technologies, that today's students do not recognize a world without internet (Pardeshi, 2014) and that cloud technologies bring flexible and economic access everywhere, the usage of cloud technologies by educational institutions in managing their resources effectively is considered as a good solution.

When the cloud concept is examined, it is seen that it is used as a metaphor, this metaphor is used to define the location of data and applications in some sources, while the cloud concept is used as an image covering the internet, computer networks, user devices, data centers, Web services, infrastructure and services (Sultan, 2010; Rayport, & Heyword, 2009; Kim, 2009; Sevli, 2011; Molen, 2010; Stevenson & Hedberg, 2011; Tadwalkar, 2013). Although there is no valid definition of cloud technologies, the National Institute of Standards and Technology (NIST) defines them as "a model that can easily and quickly be published and provide network access with minimum management effort or service provider with respect to requests for a shareable and configurable computing resource (e.g. networks, servers, storage, applications and services)". Similarly to this definition, Foster et al. (2008), have identified cloud computing as a virtualized, dynamically scalable, managed computing power, a large-scale distributed computing paradigm driven by the economies of scale, communicated over internet to the demands of external customers (Foster et al., 2008). If a new definition is to be made in line with these definitions and other definitions; cloud technologies is an internet-based platform where the content is stored in different physical environments by service providers' servers and where the content is offered to the users according to the demands of the users, which covers many virtualized services and infrastructure platforms including computers, networks, storage, development platforms and applications, and which offers online access through any device such as computers, laptops, smartphones or tablets. To summarize, it is an internet-based distributed computer paradigm that covers many services within cloud technologies and allows users to access these services only through an internet network.

The advantages of cloud technologies in many areas play an important role. As a matter of fact, the advantages of cloud environments have been effective in increasing its usage and its preference in education. Shin (2015) attributes cloud technologies to gain popularity in the educational sector, potentially offering unprecedented levels of efficiency, flexibility, and value. On the other hand, Nayar and Kumar (2018) state that for educational sector, cloud technologies are revolutionary in achieving competitive demands with lower cost, higher agility and less risk. When the literature is reviewed, it is seen that there are many advantages of cloud technologies. The first of these advantages is that users can archive and back up any type of document without the burden of local data storage, and can access, use, and make changes from any device, anytime and anywhere, even when they leave the training environment (Burda, & Teuteberg, 2016; Shin, 2015; Sarıtaş, & Üner, 2013). This allows avoidance of data loss in the event of a malfunction, and makes it easy to copy and transfer data to a new device (Elamir et al., 2013; Sarıtaş, & Üner, 2013). Features of cloud technologies such as their working in independent platforms, offering of high access opportunities with virtual computers which work more rapidly than physical servers, usage of flexible structure which doesn't require memory and disk changes and their dynamic structure will greatly reduce expensive investment costs in infrastructure, installation in hardware and software, update and renewal transactions and will enable focusing on the main purposes of education by saving time and labour force (Al-Zoube, 2009; Wei, 2014; Sarıtaş, & Üner, 2013; Tosun, & Özdoğan, 2013; Mell, & Grance, 2011). In addition to these features, the following can be listed as other advantages that cloud technologies offer; providing advanced performance, instant updates, automatic maintenance and repair, enabling compatibility between different platforms such as different operating systems, different file formats, enabling collaborative group work and collaboration with remote access, enabling high-level data security in the possibility of viruses etc., having as much or unlimited data storage capacity as needed, not requiring to carry goods, offering backup systems, placing importance to privacy, possessing dynamic infrastructure and multi-dimensional features such as mobility, efficiency, accessibility, flexibility, scalability and continuity (Arpaci, 2016; Kalafat, 2015; Miller, 1989; Sırakaya, & Sırakaya, 2013; Okutucu, 2012; Pardeshi, 2014; Prince, 2011). While all these advantageous features of cloud technologies allow students to be exposed to learning environments for a longer period of time, provide a rich interactive learning environment, provide students with access to the most up-to-date internet facilities and keep them up-to-date, the following advantages are also recorded as a result of performed researches; provision of collaborative learning experiences, support to active learning and individual learning processes, support to oriented teaching and learning theories and their effect to the development of numerous skills such as communication, lateral thinking and problem solving (Bouyer, & Arasteh, 2014; Gonzalez-Martínez et al., 2015; Schneckenberg, 2014; Shin, 2015; Sultan, 2010; Thorsteinsson et al., 2010; Wu, & Huang, 2011).

When considered the advantages of cloud technologies in education, digitalizing world and the investments made by important companies such as Microsoft, IBM, Google and Amazon (Nayar, & Kumar, 2018), it can be said that the importance of cloud technologies will increase day by day. The fact that universities play an

important role in global competition and in the development of information societies by covering a wide audience and being a leader in technology development and adoption worldwide (Sabi et al., 2016), day-by-day increasing importance given to information and reasons such as the need to support learning environments with these new technologies by eliminating time and space limitations increase the importance of researching the use of cloud technologies in education. In line with this importance, this study aims to develop a validity and reliability scale to measure the use of cloud technology in university students.

Method

Measurement Development

From the 21-item pool based on the studies (e.g. Al-Zoube M. 2009; Bouyer, & Arasteh, 2014; Pardeshi, 2014; Prince, 2011; Sultan, 2010; Wei, 2014; Wu, 2011) 5 faculty members experts in the subject were evaluated each item as "necessary", "unnecessary" and "may be". As result of the evaluations of the experts, The Cloud Technologies Usage in Education Scale (CTES) consisting six items was created. All items in CTES were measured on 5-point likert type graded between "1=Strongly disagree" and "5=Strongly agree".

Sampling Group

Population of this study is composed of preservice teachers who are studying at universities in Konya in the spring term of 2018-2019. The sampling group was randomly selected from the population, 500 questionnaires were applied to preservice teachers and 415 validated units (83%) of sample were obtained after missing items included questionnaires excluded. When the demographic characteristics of the participants were examined (see Table 1), it was seen that 42% were women, 93% were use internet at least three hours per week and 98% were found themselves sufficient to use mobile devices. The frequency distribution of the demographic questions of the sampling group is given in Table 1.

Data Collection

After CTES questionnaire form designed for online survey format and survey link sent to e-mail adresses of 500 preservice teachers. It was stated on the CTES online survey form that the participants were free to participate in the survey on a voluntary basis.

Data Analysis

Questionnaires without missing observations returned from participants are coded into IBM SPSS Statistics v21 programme for further analysis. Totaly 415 (83%) questionnaries were considered for analysis. This sample was divided into two sub-groups randomly. First group (n_1=208) used for exploratory factor analysis (EFA) and second group (n_2=207) used for confirmatory factor analysis (CFA). Principal component analysis (PCA) method for factor extraction by varimax factor rotation were selected for applying EFA with SPSS. Factor loadings for one factor was at least 0.60 and no cross loading above 0.30 were kept in the model. Reliability analysis for whole scale and subfactors are examined. Tukey's test of additivity was performed for whole scale and sub factors. Lisrel 8.71 was used for perform the CFA, using the second sub-group of the cases, to confirm the PCA factor model. The goodness of fit indexes, including chi-square, (χ^2/degree of freedom $\leq$ 2), root mean square error of approximation (RMSEA<0.8), root mean square residual (RMR), standardized root mean square residual (SRMR<0.08), goodness of fit index (GFI$\geq$0.95), adjusted goodness of fit index (AGFI$\geq$0.95), normed fit index (NFI$\geq$0.95), non-normed fit index (NNFI $\geq$0.90) and incremental fit index (IFI$\geq$0.95) were used to evaluate the validity of the model (Schreiber et al., 2006). Item analysis, reliability analysis, correlation analysis and descriptive analysis was also performed.

Table 1. Frequency distribution of demographic items.

	EFA	CFA	Total
Gender			
Female	105	68	173
Male	103	139	242
Grade			
1	48	52	100
2	59	42	101
3	61	61	102
4	40	52	92
Internet usage time per week			
0-3 hours	15	16	31
3-6 hours	30	42	72
6-9 hours	56	58	114
9 hours and above	107	91	198
To what extent do you find yourself competent in mobile device use?			
Very Sufficient	40	35	75
Moderate	52	56	108
Enough	112	111	223
Insufficient	4	5	9
How long have you used your mobile device?			
0-2 years	20	12	32
2-4 years	45	27	72
4 years and above	143	168	311

Findings

Item Analysis

Item analysis was performed to keep the relevant items on the scale and to determine the items that disrupt integrity of the six-item CTES. Internal consistency coefficient Cronbach alfa of the CTES found 0.83. There was no item that can cause an increase in this coefficient if removed from the scale. Inter-item correlations are found between 0.33-0.59 and item-total correlations found between 0.47-0.68 (see Table 4). Since all inter-item and item-total correlations were above 0.30, six items were kept on the scale. When the variance amounts (common variance) that each item shares with other variables are examined, factor loadings vary between 0.63 and 0.77 and since all values are above 0.5, all items are included in the analysis (see Table 2).

Exploratory Factor Analysis (EFA)

The first sample group data ($n_1 = 208$) of the scale built at the end of the assessments conducted by experts was used for EFA. Kaiser-Mayer-Olkin (KMO) test was used to determine whether the sample size of the data was sufficient for EFA and Barttlet's test was performed to determine the suitability of the data for EFA. From the first sample data, KMO was 0.789, and Barttlett's test of sphericity was $X^2=433$ with significance level $p=0.00<0.01$. These results indicated that the sample size was sufficient, data were consisting of correlated items and appropriate for the EFA. Principal component analysis was chosen as a factor extraction method in order to determine the factors that explained the highest variability. By using the Varimax method, the rotated factors can be interpreted more easily. As a result of PCA, it was found that the data had a 2-factor structure based on the number of eigenvalues greater than 1.The two-factor model consisting of 6 items that explained 69.45% of total variance. For EFA, it was found sufficient to have a total explanation rate of 40-60% variance in social sciences, but a high explanation rate of 69.45% was achieved in this study. Of the two-factor structure, the first factor explained 35.89% of the total variability and the second factor explained 33.57%. The factor loadings of items ranged from 0.74 to 0.82 in the motivation subdimension, from 0.78 to 0.83 in the interaction subdimension.

Table 2. PCA results for CTES.

Item	Motivation	Interaction
M1	0.74	
M2	0.80	
M3	0.82	
I1		0.83
I2		0.83
I3		0.78
Eigenvalue	2.15	2.01
Explained variance	35.89%	33.57%
Total explained variance	69.46%	

Confirmatory Factor Analysis (CFA)

The data obtained from the second sample group consisting of n_2=207 units were used to determine the suitability of the two-factor structure of the scale. CFA using maximum likelihood estimate was conducted with Lisrel 8.71 to evaluate correlated two factor structure of the CTES (Jöreskog, & Sörbom, 1993). The path diagram and standardized estimates of the model are given in Figure 1.

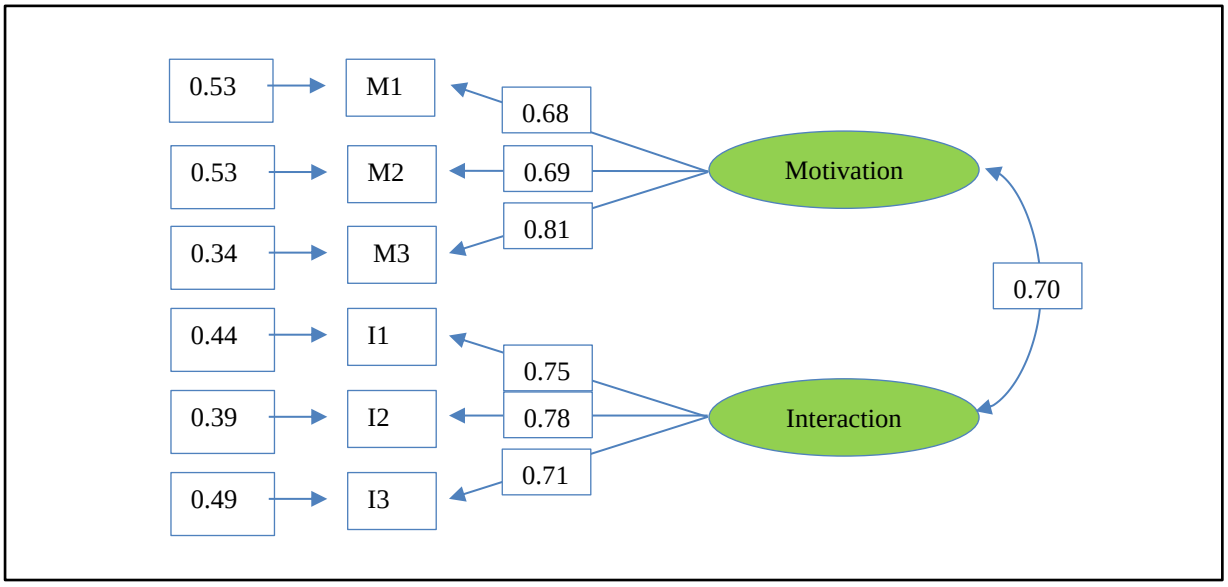

Figure 1. CFA model and estimates for CTES.

The standardized loadings represent the correlation between each observed variable and the corresponding factor. According to standardized loadings of correlated two-factor model given in Figure 1, correlations between motivation and M1, M2 and M3 are found .68, .69 and .81 respectively. Correlations between Interaction and I1, I2 and I2 are 0.75, 0.78 and 0.71 respectively. All the correlations given between factors and items are found statistically significiant. Correlations between factors and Items were all high enough above near 0.70. Correlation coefficient between motivation and interaction were 0.70 and found statisticially significiant. As a result of Figure 1 dimensions underlie the motivation and interaction values of CTES are found correlated.

Frequently used goodness of fit indices for confirmatory model was given in Table 3. Acceptable values of good fit and perfect fit of the statistics are also given (Schreiber et al., 2006). The CFA results for two-factor model were, $\chi^2 = 7.24$, df=8, p=0.51>0.05, χ^2/df =0.93, RMSEA=0, SRMR=0.02, GFI=0.99, AGFI=0.97,

NFI=0.99, NNFI=1 and IFI=1 and all results indicated the perfect fit. According to all goodness of fit statistics given in Table 3 showed that the model was appropriate and the two-factor structure as a model based on EFA was confirmed.

Table 3. Goodness of fit statistics for CTES and reference values.

Fit statistics	Good Fit	Perfect Fit	CTES	Evaluation
Chi-square(χ^2/df)	≤ 3	≤ 2	0.93	Perfect Fit
Root mean square error of approximation(RMSEA)	<0.08	<0.05	0	Perfect Fit
Standardized root mean square residual (SRMR)	<0.05	<0.08	0.02	Perfect Fit
Goodness of fit index (GFI)	≥0.90	≥0.95	0.99	Perfect Fit
Adjusted goodnes of fit index (AGFI)	≥0.90	≥0.95	0.97	Perfect Fit
Normed fit index (NFI)	≥0.90	≥0.95	0.99	Perfect Fit
Non-normed fit index (NNFI)	≥0.90	≥0.95	1	Perfect Fit
Incremental fit index (IFI)	≥0.90	≥0.95	1	Perfect Fit

Reliability Analysis

The reliability analysis of the scale was performed with the Cronbach alpha coefficient, which evaluates the internal consistency of the scale items. The Cronbach alpha value indicates whether items form a whole to explain the similar structure. The larger the Cronbach's alpha value, the more consistent the items are in determining the same property. Cronbach's alpha values of 0.70 and above are acceptable (Bland, & Altman, 1997).

Descriptive statistics related to the whole scale and its sub-dimensions are given in Table 4. The cronbach's alpha value for the whole scale was calculated as 0.83. The Cronbach's alpha coefficient for the motivation subscale was 0.77 and the Cronbach's alpha coefficient for the interaction subscale was 0.79. Thus, the 6-item scale was found to have a high reliability.

Tukey's additivity test was used to determine whether item scores for the whole scale and its subdimension items were summable. It was found that there was no multiplicative interaction among the items on the scale, where all items in each sub-dimensions of the six-item scale scores can were summable. All p values for Tukey's test found significiant (p=0.09, p=0.21 and p=0.10 > 0.05).

Table 4. Reliability and descriptive statistics of CTES.

		$\bar{x}$	s.e.	Item-total correlation	Tukey's Additivity Test F	P
Motivation ($\alpha = 0.77$)						
	M1	3.73	0.06	0.59		
	M2	3.86	0.06	0.47	2.89	0.09
	M3	3.75	0.06	0.61		
Interaction($\alpha = 0.79$)						
	I1	3.58	0.07	0.68	1.59	0.21
	I2	3.48	0.07	0.61		
	I3	3.40	0.07	0.52		
Overall($\alpha = 0.83$)		3.63	.031		2.76	0.10

Correlation Analysis

The correlations analysis results showed that there is a significiant correlation among motivation, interaction sub-dimensions and total scale scores of CTES. Pearson correlation coefficients for motivation and interaction score was 0.56 (p=0.00), motivation-total was 0.87 (p=0.00) and interaction- total was 0.89 (p=0.00). Correlation analysis showed that there was a moderate positive linear relationship between motivation and interaction scores.

Discussion

In the information and communication technologies era, the increase in the rate of information production increases the importance of access to and sharing of information. An important feature of the developments in science and technology is their easy access to information. As in many areas, it is very important to reach and share information in education. In this study, a valid, easily applicable and reliable scale has been developed that can handle the use of cloud technologies with all respects, which are popular in sharing information, in the field of education.

The data obtained from the scale consisting of 6 items applied to preservice teachers studying at Konya universities analyzed with PCA and the scale consisted of two sub-dimensions which were motivation and interaction. The scale consists of 5-point likert-type items.

Firstly, item analysis was conducted to determine whether there are any items that disrupt the integrity of the six-item scale. As a result of item analysis, it was seen that the factor loadings of the six-item scale ranged between 0.63 and 0.77, and that the Cronbach internal consistency coefficient of the scale was found to be α=0.83. In addition, correlations between items were found to be between 0.33-0.59 and item-total correlations were between 0.47-0.68. All findings indicate that all items of the scale can be included in the analysis. Because factor loadings of 0.50 or above and reliability coefficient α = 0.70 or higher are taken as proof that the scale is reliable (Büyüköztürk, 2011; Gorsuch, 1983).

Then, in order to determine whether the data were suitable for factor analysis, explanatory factor analysis was performed with the data obtained from the first sample group (n_1 = 208). Kaiser-Meyer-Olkin (KMO) test and Bartlett's test were used in these analyzes. KMO value was found to be 0.79 and Bartlett's test value was $\chi^2 = 43$; p=0.00<0.01. According to these values, it can be said that the data are suitable for factor analysis. KMO values, between 0.60-0.69 are moderate, between 0.70-0.79 are good, 0.80-0.88 are very good, and between 0.90-1 are indicates perfect fit for factor analysis (Akgül, 2005; Büyüköztürk, 2002; Büyüköztürk, 2011; Field, 2000; Russell, 2002; Tavşancıl, 2014; Yaşlıoğlu, 2017). Similarly, Hamutoğlu (2017) found the KMO value to be 0.89 in his study of adapting the Technology Acceptance Model scale to Turkish language on the basis of cloud information technologies and reported that the suitability of the study to factor analysis was very good. In Bartlett's test, p = 0.00 indicates that the correlation matrix is not equal to the identy matrix, that the data set is composed of related variables and that the data set is suitable for factor analysis (Büyüköztürk, 2005; Tabachnick, & Fidell, 2007; Karasar, 2004). Hamutoğlu (2017) determined the Barlett's test results (χ^2 = 9575.38, p= .00) in the scale adaptation study and found that the scale data were suitable for factor analysis. In this sense, the test results in both studies were similar in terms of suitability for factor analysis.

Factor loadings and eigenvalues of the items are another feature that is examined in factor analysis. These values are taken as an important basic criterion in determining the validity of the scale and its separation into factors. (Gorsuch, 1983; O'Rourke et al., 2013). As a result of the PCA and Varimax rotation method, it was seen that the factor loadings of the items in the scale varied between 0.74 and 0.83. As a general opinion in the literature, it is accepted that item factor loadings are at least 0.30 levels (Büyüköztürk, 2011). However, some sources suggest that these values should be at least 0.32 or at least 0.40-0.45 (Seçer, 2013; Tabachnick, & Fidell, 2013). According to both, the factor loadings of the items of this scale can be considered quite well. Because Büyüköztürk (2011) stated that the factor loadings that above 0.50 were quite well. In addition, high factor loadings are seen as an indicator that the variable may be under this factor (Büyüköztürk, 2011). In this sense, when the eigenvalues of the factors in the scale are examined, it is possible to say that the items in the scale are grouped under two factors. When the eigenvalues for the factors are examined, it is seen that the first factor called motivation has 2.15 and the second factor called interaction has 2.01 eigenvalues. In factor analysis, factors with an eigenvalue greater than or equal to 1 are considered significant (Büyüköztürk, 2002; Elderoğlu, 2017). In this sense, both factors on the use of cloud technologies scale are significant. When the variance values explained by these factors in the scale were examined, it was seen that the first factor explained 35.89% of the total variance and the second factor explained 33.57% of the total variance. It was also observed that these factors explained 69.46% of the total variance. This shows that the scale's ability to measure is so high. (Büyüköztürk, 2002). Because the higher the variance described, the better the scale measures. When the total variance is higher than 40% according to some sources and more than 50% according to some sources, when

considered as an adequate criterion for the use of the scale (Elderoglu, 2017; Kline, 1994; Büyüköztürk, 2011; O'Rourke et al., 2013) it is possible to say that the CTES meets these criteria.

The scale was applied to the sample group with the two-factor structure obtained by PCA model was analyzed with CFA. The CFA results were evaluated with different fit indices. According to these results $\chi^2 = 7.24$, df=8 with p=0.51>0.05. Failure to reject the null hypothesis indicates the model fit is good (Jöreskog, 1969). χ^2/df statistics was 0.93. It can be said that chi-square / sd value is less than or equal to 2 is acceptable fit for educational sciences and it gives meaningless results for fitting observed data to model (Schreiber et al., 2006; Barrett, 2007; Çelik, & Yılmaz, 2016; Ventura, 2011). When the other goodness of fit values are analyzed, it is seen that RMSEA = 0, SRMR = 0.02, GFI = 0.99, AGFI = 0.97, NFI = 0.99, NNFI = 1 and IFI = 1. RMSEA is less than 0.05, SRMR is less than 0.08, GFI is greater than 0.90 and also AGFI, NFI, NNFI and IFI values greater than 0.90 indicate that all values have excellent goodness of fit. (Dursun, & Aydın, 2011; Rigdon, 1996; Kline, 2005; Shevlin, & Miles, 1998).

In the analyzes conducted for the reliability of the scale, the Cronbach's alpha coefficient for the motivation factor was 0.77 and the Cronbach's alpha coefficient for the interaction factor was 0.79, while the Cronbach's alpha coefficient for the overall scale was 0.83. A psychological test of 0.70 or higher Cronbach alfa appears to be sufficient, and a value above 0.80 is considered to be good. (Alpar, 1998; Büyüköztürk, 2005; Gorsuch, 1983; Horn, 1965; Seçer, 2013). In this sense, the reliability value of the scale was found to be 0.83, which proves that the scale can perform good and reliable measurements.

Finally, when the relationships between the sub-dimensions of the scale and the whole were examined, it was found that there were statistically significant relationships among all scores. Pearson correlation coefficients for motivation and interaction score was 0.56 (p=0.00<0.05), motivation-total was 0.87 (p=0.00<0.05) and interaction- total was 0.89 (p=0.00<0.05). Correlation analysis showed that there was a moderate positive linear relationship between motivation and interaction scores. Also motivation and interaction showed positive, strong linear relation with total score.

Thus, CTES has been shown to be a valid and reliable tool with the ability to measure information on the use of cloud technologies in the field of education.

Conclusion

In this study developed a two-factor scale to examine cloud technology usage of preservice teachers studying at Konya universities. Construct validity and reliability of CTES, indicated that the CTES was valid for investigating the cloud technologies usage of preservice teachers in education. This study contributes to the measurement and evaluation of the effects of the usage of cloud technologies in education together with its sub-dimensions in detail.

In addition, it is thought that the factors in this scale measuring motivation and interaction sub-dimensions will affect the success in education. Because in the literature, it is seen that there are many studies that use of Web 2.0 technologies in education are effective in motivation and interaction. Batıbay (2019) stated that these new digital teaching tools have an effect on motivation and achievement, and that these environments increase the motivation score. In addition to these statements, there are statements that each of the Web 2.0 tools has its own characteristics in terms of motivation and communication, and that the use of these tools has beneficial results on motivation, communication and social interaction and improves the education processes (Nandhini, 2016; Norton, & Hathaway, 2008; Özer, & Özer, 2017; Tiryaki, & Erzurum, 2011).

As the sample group of this study consisted of only preservice teachers in Konya, we should state that the results obtained are only valid for prospective teachers throughout Konya, and we need to be careful because of the limitation of the study in order to make generalizations for the whole country.

- In the future, more general results can be obtained by working with a more comprehensive sample across the country.
- In addition, we recommend such studies as the comparison of the results obtained by applying this scale for different provinces and at different educational levels in schools or in different sectors will contribute to the development of the overall of CTES.

- In this study, the structural validity and reliability of the scale was examined at a specific time point. In future studies, different reliability methods and different validity tests such as test-retest reliability methods can be used.

Appendix

Appendix 1. Cloud Technologies Usage in Education Scale (CTES)

Below are statements to determine the different impacts of cloud technologies usage on education. Participants were asked to indicate the agreement level of the expressions that related to the use of cloud technologies. All items are measured on 5-point likert scale (1=Strongly disagree, 2=Disagree, 3=Undecided, 4=Agree and 5=Strongly agree".

Motivation
1 Using cloud services increases my professional knowledge
2 I find it useful to use cloud systems in education
3 I intend to use cloud services in my future career
Interaction
1 Using cloud services contributes to collaborative learning of students
2 Using cloud services allows discussion about the course
3 Using cloud services increases interaction with my teacher

Please contact us for the scale: agah.korucu@gmail.com

Ekler

EK 1: Eğitimde Bulut Teknolojileri Kullanımı Ölçeği (BUTEK)

Aşağıda, bulut teknolojileri kullanımının eğitim üzerindeki farklı etkilerini belirleyen ifadeler yer almaktadır. Katılımcılardan bulut teknolojilerinin kullanımıyla ilgili ifadelere katılma düzeylerini belirtmeleri istenmektedir. Tüm maddeler 5 puanlı likert ölçeğinde ölçülmektedir (1=Kesinlikle katılmıyorum, 2=Katılmıyorum, 3=Kararsızım, 4=Katılıyorum ve 5=Kesinlikle katılıyorum).

Motivasyon
1 Bulut hizmetlerini kullanmak mesleki alanımla ilgili bilgimi artırıyor
2 Bulut hizmetlerini eğitim-öğretimde kullanmayı faydalı buluyorum
3 Gelecekteki kariyerimde bulut hizmetlerini kullanmayı düşünüyorum
Etkileşim
1 Bulut hizmetlerini kullanmak öğrencilerin işbirlikçi öğrenmelerine katkı sağlar
2 Bulut hizmetlerini kullanmak dersle ilgili tartışma yapmayı kolaylaştırır
3 Bulut hizmetlerini kullanmak öğretmenimle etkileşimimi artırır

Ölçek için lütfen iletişime geçiniz: agah.korucu@gmail.com

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Adapting the Virtual World Risk Perception Scale to Secondary School Level

Veysel Bilal Arslankara*[a], Ertuğrul Usta[b]

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Abstract

In this study, Virtual World Risk Perception Scale which was developed to determine the virtual risk perception levels of high school students was adapted to the secondary school level. The scale is a five-point Likert type and consists of 23 items divided into five sub-dimensions. The study group consisted of 261 students in 7th and 8th grade in a secondary school in Sakarya. The validity and reliability of the scale were tested and confirmatory factor analysis, internal consistency coefficients and stability analyzes were examined. In the light of the analyzes, it was concluded that the scale is a valid and reliable measurement tool that can measure the virtual risk perceptions of secondary school students. Cronbach Alpha, Guttmann Split Half and Sperman Brown values were calculated for the reliability of the whole scale and sub-dimensions. As a result, Dünya virtual corruption ", "virtual deterioration ", "virtual opportunity ", "virtual opportunity" and "virtual awareness", the five sub-factors and 23 items, which were judged to be valid and reliable as a result of the analysis, the Virtual World Risk Perception Scale (VWRPS) is expected to be a scale that is open to development, usable and fills the gap in the relevant literature.

Sanal Dünya Risk Algısı Ölçeğinin Ortaokul Düzeyine Uyarlanması

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Öz

Bu çalışmada daha önce lise öğrencilerinin sanal risk algı (virtual risk perception) düzeylerinin belirlenmesi amacıyla geliştirilen Sanal Dünya Risk Algısı Ölçeği ortaokul düzeyine uyarlanmıştır. Ölçek beş dereceli likert tipi olup beş alt boyuta ayrılmış 23 maddeden oluşmaktadır. Araştırmanın çalışma grubunu Sakarya ilinde bulunan bir ortaokulda 7. ve 8. Sınıfta öğrenim gören toplam 261 öğrenci oluşturmaktadır. Ölçeğin geçerlik ve güvenirliği test edilmiş, doğrulayıcı faktör analizi, iç tutarlılık katsayıları ve kararlılık analizleri incelenmiştir. Yapılan analizler ışığında ölçeğin ortaokul öğrencilerinin sanal risk algılarını ölçebilen geçerli ve güvenilir bir ölçme aracı olduğu sonucuna varılmıştır. Ölçeğin tamamı ve alt boyutların güvenirlikleri için Cronbach Alpha, Guttmann Split Half ve Sperman Brown değerleri hesaplanmıştır. Neticede "sanal yozlaşma", "sanal yıpranma", "sanal olanak", "sanal fırsat" ve "sanal farkındalık" isimleri ile beş alt faktör ve 23 maddeden oluşan ve yapılan analizler neticesinde geçerli ve güvenilir olduğuna karar verilen Sanal Dünya Risk Algısı Ölçeği (SDRAÖ)'nin, geliştirilmeye açık, kullanılabilir düzeyde ve ilgili alanyazında boşluğu dolduran bir ölçek olması beklenmektedir.

***Corresponding Author:** vbilalarslankara@gmail.com
[a] Information Technology Teacher - Mebbis System Manager, Akyazi District Directorate of National Education, Sakarya/Turkey, http://orcid.org/0000-0002-9062-9210
[b] Prof. Dr., Necmettin Erbakan University, Computer Education and Instructional Technology, Konya/Turkey, http://orcid.org/0000-0001-6112-9965

Introduction

In today's world, where digital is encompassing all areas (Hilbert & Lopez, 2011; Dentzel, 2013), even if there are regions and people who do not have internet access, people living in society, including Silent Belt individuals, are included in a system of government (state). The number of transactions carried out without the help of internet is low. Because there are always a series of needs that concern every individual in life. Therefore, the Internet and every new technology it brings are counted among the needs for everyone. Abraham Maslow organized the basic needs of human beings in the order of priority in the Human Needs Theory which has an important place in the theories of motivation and structured it as a pyramid. Accordingly, the lowest level of the pyramid moves from the most important and indispensable needs for human survival to the need for self-realization at the top level, in order of removal. According to the theory, human needs are unlimited and after one need is met, another need arises. In the process of needs, the individual is not completely satisfied with this process. Other needs that have not yet been fulfilled in this process are a great source of motivation for the individual and motivate the individual to achieve it. However, once the targeted need has been met, the motivation of the individual towards this need moves away from the determining effect on the related behaviors (Maslow, 1943). The profound cultural changes experienced in consumer societies have changed the essence, terms and conceptual view of the desires of human beings for their natural needs. The existential aspects of the pyramid are gradually becoming obsolete and it is obvious that today's needs should be reclassified because some of the values that people care about have lost their importance compared to the past.

According to Maslow, the first two stages of the pyramid are the most important stages of all the needs. Other needs do not matter to an individual who has not yet met his physiological needs. Because a person who is hungry or thirsty will firstly meet this need and then turn to other needs. The need for security is based on basic security requirements such as protection and housing. Accordingly, the person will reduce their fear and anxiety and then turn to other needs. Third step; it is on the basis of belonging and love, and the needs of loving, being loved and belonging are expressed as social needs. In the fourth step, the need for success, appreciation and respect of the individual is mentioned. In the fifth step, self-realization is realized by realizing the capacity of the individual (Cao et al., 2013).

There is a world where 56% (4.38 billion) of the population approaching 8 billion are internet users, 45% (3.48 billion) are social media users and 42% (3.25 billion) are mobile technology users. Although social media has been taking place in human life for a short time, people share many things that they once regarded as intimate with their spouses and friends, as well as millions of people they do not recognize, and this sharing increases the time spent on the internet with the addiction follow-up. Because people use social networks to meet many basic needs such as finding a job, making new friends, shopping or improving themselves; this makes social media different and important (Evans 2008; Lietsala & Sirkkunan 2008; Onat & Alikılıç 2008; Anklam 2009; Komito & Bates 2009; Lee & Cho 2011). At this point, the question are social networks essential? It has raised the question of whether virtual environments and social media are among the main problems of people. This is because many technology-addicted people address the needs of social networks even before the lower physiological needs. Maslow's hierarchy of needs is based on the principle that it is meaningless to meet higher needs without meeting lower needs. In this context, it is emphasized that the need hierarchy should be updated by placing today's needs such as wi-fi, battery status, internet and social networks which expresses not to be away from technology on the ground floor of Maslow's hierarchy of needs; It is the subject of scientific research that social needs are tried to be met through social networks (Statista, 2016). In this context, Ruttledge (2011) proposes a restructured version of Maslow's theory that regulates the need for connectivity in a hierarchical structure. According to him, the need to belong is not a third stage need, but a basic need and all needs depend on the interconnection of people. The following scheme proposes a more realistic multipath model through social connections to meet psychological needs.

Figure 1. A reconstructed version of Rutledge, which discusses the importance of connectivity in Maslow's model.

The world is evolving towards the days when these rapid technological developments will change the way people live and the structure of societies. While societies are facing these changes, how the pyramid of needs will be affected should not be ignored. Social networks have become virtual environments where people become addicted to receiving more likes or retweets by someone. Therefore, the number of examples that are frequently encountered in social media and which often becomes meaningless to people becomes a phenomenon increases with each passing day. As a result, such dependent individuals become unable to move to the next step by being stuck in the step of belonging, respect and reputation, and their development towards higher level needs and behaviors are also hindered by themselves. In this context, the prohibition of social media (Fletcher, 2019) should not be seen as an option, but the steps to be taken to reduce these deprivating effects to personal gain should also be considered as major and attractive challenges (Friedman, 2014). It is known that individuals of all ages are active users of social media, this use involves both benefit and harm together and in this context, it is known that the use of social media by young people, especially middle school and high school students, is more vulnerable to these risks. The main reason for this is that each new generation has more effective features than the previous generation, especially in the context of learning and analysis. It is seen that Alpha generation individuals are more active in establishing technology usage and social connections over the network than middle school students who are included in generation z, especially considering the fact that Alpha generation individuals will be secondary school students after a few years. In fact, this is supported by the fact that many of the Alpha individuals are active social media users and even phenomena, especially with family support. Therefore, they are intertwined with virtual risks at any moment.

According to age-related usage statistics, it is seen that individuals' access to virtual environments is constantly increasing as an indispensable daily life activity for individuals from the age of very young according to age-related usage statistics (We are Social, 2017; We are Social, 2018) We are Social, 2019). The situation in our country is in parallel with the situation in the world. TÜİK Household 2012, 2015, 2018 reports indicate this situation (TÜİK, 2018; TÜİK, 2019). The immense integration of virtual environments into people's daily lives has a huge impact on primary school, middle school and high school students, including preschoolers; they may leave them open, ineffective or vulnerable to a number of virtual risks whose impact is known or unpredictable. Because the internet, social media, virtual environments and so on. all network structures are tools that accommodate both benefit and harm according to their location and usage. Therefore, this aspect of virtual environments should be evaluated within the scope of risk. Because risk, advantage and disadvantage, threat and opportunity, is a concept that includes danger and opportunity (Arslankara & Usta, 2018). Risk is defined as the

likelihood of a hazard or opportunity to occur. In this respect, risk consists of two dimensions. The first is "danger" and the second is "opportunity" (Giddens, 2000).

Virtual risk is the result of research that the most affected age groups are younger and younger individuals (Dooley, et al. 2009; Walrave, 2011). There are many different reasons for this. Among these, the most explanatory aspect of the age factor is that these young and young individuals are present-day Z and Alpha generations and therefore carry all the characteristics of these generations. Because individuals born in the period from 2000 to 2010 Z generation; Individuals born after 2010 are considered as Alpha generation (Tarhan, 2019; Kleinschmit, 2019). Each new generation is classified according to certain characteristics compared to the previous generation. Accordingly, the Z-belt and the Alpha-belt are individually more entrepreneurial than I-centered. Easier and more comfortable, more hasty and impatient, self-focused generation. They are highly prone to technology. Because the Z and Alpha generation are also digital natives. Therefore, they are more prone to virtual risks than their predecessor, Y, X, Baby Bloomer or Silent generation. In addition, children born in 2010, the pioneers of the Alpha generation, will be educated as secondary school individuals in two years after 2021 according to the education system of our country. The majority of the parents of the Alpha generation are parents who are subject to Generation Y. The fact that these parents are digitally indigenous, similar in many ways to the Z and Alpha generations, and the sharp separation from their predecessor X, Baby Bloomer and Silent generation in the context of child rearing, many Alpha individuals are extremely familiar with the technology and have a clear command of these technologies. made them easier. Therefore, it is stated by the families and teachers that the vast majority of these individuals are not family-controlled, such as the Z generation, whose parent is the X generation, whose parents are active social media users and many more are social media phenomena or Youtubers. Therefore, it is not possible for Z and Alpha generation individuals to avoid virtual risks. Because all these digital and virtual environments are among the most basic needs especially for individuals who are born in technology. This situation motivates individuals against these needs. The individual is strongly motivated against the need that is lacking in himself. For example, the thirst motive of a very thirsty person will be much stronger than the thirst motive of the normal thirsty individual.

Psychological, social and emotional needs such as belonging, acceptance, love and respect, which people adopt as values, exceed the limits of privacy in terms of social media, desire to be followed and liked by shares, desire to approve their actions etc. In this context, it is of utmost importance to meet these needs, which individuals value as vital activities. The reason for this situation is due to the fact that every unfulfilled need can cause frustration, increase boredom and stress, and lead to many psychological diseases with various social problems and create pathological societies (Maslow, 1943). For example, people who cannot live without sharing anything on social media have been diagnosed with Histrinoionic Personality Disorder. This social media disease is often seen in people who keep attention, are approved by social media users and share everything they do on social media. The term medicine used in psychiatry corresponds to the concept of somatization disorder. Somatization disorder is the way people describe their inner conflicts in different ways. The individual always wants everyone to praise himself, to find him beautiful or handsome, to like and to approve of his actions. To achieve this, they make everything exaggerated and always seek innovation and excitement (Özen et al. 2010). Another social media disease is Fomo. Fomo can be briefly described as the fear of abduction in virtual environments. The Fomo (Fear of Missing Out) disease, which has entered the literature especially with the Z generation, is due to the fact that individuals have missed the developments in virtual environments or that the tablet, phone and computer have the fear of running out of charge. In such individuals, social media is again brought to a basic need and food and sleep are sacrificed, but never tried to stay away from social media. These people wonder what people do in virtual environments, but when they meet with family members or friends, they do not leave mobile devices aside and communicate with people face-to-face and verbal (Franchina et al. 2018). WhatsAppitis (Keyboard Disease), RSI (Repetitive Strain Injury), Hikikomori Phenomenon, Ego Surfing, Blog Spoofing, Youtube Narcissism, Myspace Imitating, Google Stalking, Cyberhondric, Photolurking, Comedialism, Cracked, Cheesepherd, Chrysograph, Disease, Jomo Disease and Selfitis diseases have entered the literature as technology, internet and social media diseases (Guerrero, 2014; Tekayak & Akpınar, 2017; Castro & Torres, 2018; Olcay, 2018).

Therefore, it is of great importance that the social media and internet usage of these individuals living together with virtual risks - although increasingly difficult - is controlled and monitored by their parents. In this context, the second biggest responsibility falls to the educational institutions. The primary responsibility of educational institutions is to meet the basic educational needs of individuals (basic life and social skills, universal and social

values education, etc.). Although individuals of this age are more open to development in terms of acquiring and applying many skills and behaviors than their predecessors, they are exposed to many mistakes and mistakes due to their developmental periods. However, in this regard, families and individuals in the Z and Alpha critical thinking, analytical thinking, computer thinking skills and relationship skills, which are sub-dimensions of social emotional learning, such as early acquisition of skills that will keep their virtual risk perceptions; these skills will be made possible by the education that will be started first in the family and then the correct and beneficial use of technology which will be gained in primary and then secondary schools. In the pre-school and primary school years, unplugged coding activities based on Information Technologies and Software course actively support these thinking skills; in the following years, starting with the right curriculum and support at an early age, whether in online or classroom education, supported by different software languages supported by coding and robotics disciplines; what should be done in family or education environments is not to be banned by the prohibition of multi-directional virtual devices or devices such as social media or telephone. needs to be provided with. For this purpose, first of all, the family and then the administrators and teachers in the understanding of school management and discipline have great responsibilities. It is obvious that awareness and perception levels of families against virtual risks are very important and parents' awareness raising activities against social media consumption (Arslankara & Usta, 2019) are obvious.

In the light of all these contexts, the main problem of the research is that individuals of the Z and Alpha generations are intertwined with such virtual risks and do not have sufficient knowledge and awareness.

Therefore, the aim of the study was to adapt the Virtual World Risk Perception scale, which was previously developed to determine the perceptions of high-school students' virtual risk, to the secondary school level. The basic question that is sought in order to achieve this goal is as follows:

1- Is the Virtual World Risk Perception Scale a valid and reliable scale that can be used at secondary level?

Method

In order to examine the validity and reliability of the Virtual World Risk Perception Scale in the study, it was collected and analyzed from the individuals in the study group defined as the target group of the study.

Study Group

The study group of the study consists of 7th and 8th grade students in secondary schools in Sakarya. A total of 261 students participated in the study. The distribution of students according to gender and class is summarized in Table 1.

Table 1. Distribution of Working Group by Gender and Departments

Grade	Female	Male	Total
7	77	74	151
8	69	41	110
Total	146	115	**261**

Measuring tool

The data of this study were collected by using the Virtual World Risk Perception Scale, which was developed by Arslankara & Usta (2018) and originally named "Development of Virtual World Risk Perception Scale" (VWRPS). The original scale was based on data obtained from 390 high school students (176 girls, 214 boys) from different high schools in Ağrı (Vocational High School, Technical High School, Anatolian High School, İmam Hatip High School). In this study, the validity and reliability of the scale developed at secondary school level was examined. In the adaptation study, the scale was applied to 261 secondary school students. In order to evaluate the psychometric properties of the scale, Cronbach's alpha (α) values were calculated for each factor and confirmatory factor analyzes were performed.

The scale developed by Arslankara & Usta (2018) and applied on high school students consists of 26 items and five factors. As a result of the exploratory factor analysis, the factor structure of the scale, which was determined to consist of 5 factors, was validated by confirmatory factor analysis. As a result of the CFA, it was concluded that the values of the scale model were in agreement with the data. Factors included in the scale, number of items and internal consistency coefficients are summarized in Table 2.

Table 2. Number of items and internal consistency coefficients by factors

Factors	Number or Items	Cronbach's Alpha	Sperman Brown	Guttmann Split Half
F1 - Virtual corruption	7	.63	.66	.65
F2 - Virtual wear	6	.80	.76	.75
F3 - Virtual facility	4	.68	.67	.67
F4 - Virtual opportunity	5	.69	.57	56
F5 - Virtual awareness	4	.63	.64	.64
Total	26	.82	.72	.86

Scale Adaptation Phase

The most important phase of the scale adaptation studies is considered as the translation phase according to the general acceptance (Hambleton & Patsula, 1999; Karakoç & Dönmez, 2014). However, since the language of the original scale is Turkish, no translation stage is required. The target group of the original scale is high school (secondary school) students. Therefore, the suitability of the language used in the scale for secondary school students was reviewed by the researchers. A Turkish Language and Literature and a Turkish teacher checked the language level; three students from each grade level were asked to read the scale items one by one and it was concluded that the students could understand all the expressions in the scale clearly and clearly. Therefore, after the draft scale form was prepared, the scale was applied to 261 secondary and 7th grade students in order to test the factor structure, construct validity and reliability and item discrimination of the scores. According to the obtained data, the factor structure that is valid for this form of the scale is discussed.

The data obtained from the scale applied to the study group were subjected to statistical analysis and processed into SPSS and AMOS software for validity and reliability analysis. The validity of the scale's original factor structure indicated in Table 2 was found to be valid at secondary school level with the confirmatory factor analysis. The basic parameter values obtained by confirmatory factor analysis showed that the scale's factor structure provided general criteria for model-data fit at secondary school level. Therefore, there was no need for exploratory factor analysis. Cronbach Alpha, Sperman Brown and Guttmann Split Half analyzes were performed on the data to calculate the reliability of the scale.

Data Analysis

In confirmatory factor analyzes, model-data fit is tested and hypotheses established to examine the relationship between variables are tested (Kline, 1994; Tabachnick & Fidell, 2001). Factor structure of the Virtual World Risk Perception Scale was examined and tested by confirmatory factor analysis. As a result of the analysis, a large number of fit indexes are used to evaluate the validity of the model. The most frequently used fit indexes are Chi-Square Compatibility Test, Goodness Fit Index (GFI), Corrected Goodness Fit Index (AGFI), Square Root of Mean Errors (RMR or RMS) and Mean Square Root of Approximate Errors (RMSEA) (Gülbahar & Büyüköztürk, 2008).

Acceptable criteria for these values calculated by confirmatory factor analysis are stated as follows: Norm2 / sd ratio which is expressed as normed chi-square is less than 3 is accepted as an indicator of perfect harmony (Şimşek 2007; Yılmaz & Çelik, 2009). The fact that the $\chi 2$ / sd ratio is less than 5 is accepted as an indicator of the goodness of the tested model with real data (MacCallum et al., 1996; Sümer, 2000). In addition, GFI and AGFI values of model data fit indexes are expected to be above 0.90, and RMS or standardized RMS and RMSEA values

are expected to be less than 0.05 (Anderson & Gerbing, 1984; Simsek, 2007). Item total correlations were examined for item discrimination powers. Cronbach Alpha, Sperman Brown and Guttmann Split Half values were calculated for factor structure and subscales.

Each item was scaled as non-reflective (1), low reflective (2), medium reflective (3), highly reflective (4), completely reflective (5). 23 of the items were positive and 3 were negative. The lowest score that can be obtained from the scale is 23 while the highest score is 115. High scores indicate that the risk perception level in the virtual world is high. Items 4, 5 and 8 are reverse (negative-negative) coded. Other items other than these three items are positive statements (Annex-1).

Findings

The construct validity, item-total correlations and internal consistency coefficients were calculated within the framework of the validity and reliability analyzes of the Virtual World Risk Perception Scale and the findings are given below.

Validity Findings

The regression values produced for each item as a result of confirmatory factor analysis are presented in Table 3.

Table 3. Standardized regression loads of the scale

Number of Items	Load rating	**Number of Items**	Load rating
Nm7	.71	***Nm26***	***.50***
Nm2	.66	**Nm20**	.67
Nm6	***.50***	**Nm19**	.68
Nm3	.51	**Nm18**	.57
Nm8	.71	**Nm9**	.62
Nm1	.55	**Nm10**	.64
Nm5	.55	**Nm4**	,51
Nm24	***,43***	**Nm22**	.68
Nm25	.66	**Nm23**	.71
Nm21	.70	**Nm17**	.70
Nm13	.65	**Nm11**	.51
Nm15	.60	**Nm14**	.56
Nm16	.59	**Nm12**	.53

Standardized estimated regression loads should be measured around 0.70 load values. However, the three items in the original scale (Nm6, Nm24, Nm26) were considered to be excluded from the scale as the standardized regression values were low. Some of the other substances are also slightly low, up to 0.70. However, as explained below, it was decided that only low-load items other than these three items do not need to be removed from the scale, as the well-being values of the scale were within acceptable limits. Thus, it is thought that the scope validity of the measuring tool will be maintained.

The results of the confirmatory factor analysis using the maximum probability technique without limitation showed goodness of fit values; Chi Square / Freedom Degree (CMIN / DF) = 2.047, X2 = 561.643, p <.000, RMSEA = .063, S-RMR = .092, GFI = .90, AGFI = .87, CFI = .90, NFI = .84 and IFI = .89. According to these values, it can be said that all good values are acceptable values (Munro, 2005; Schreiber et al. 2006). Therefore, this model indicates that the factors are validated by the data. Factorial model and factor-item relationship values of the scale are given in Figure 2.

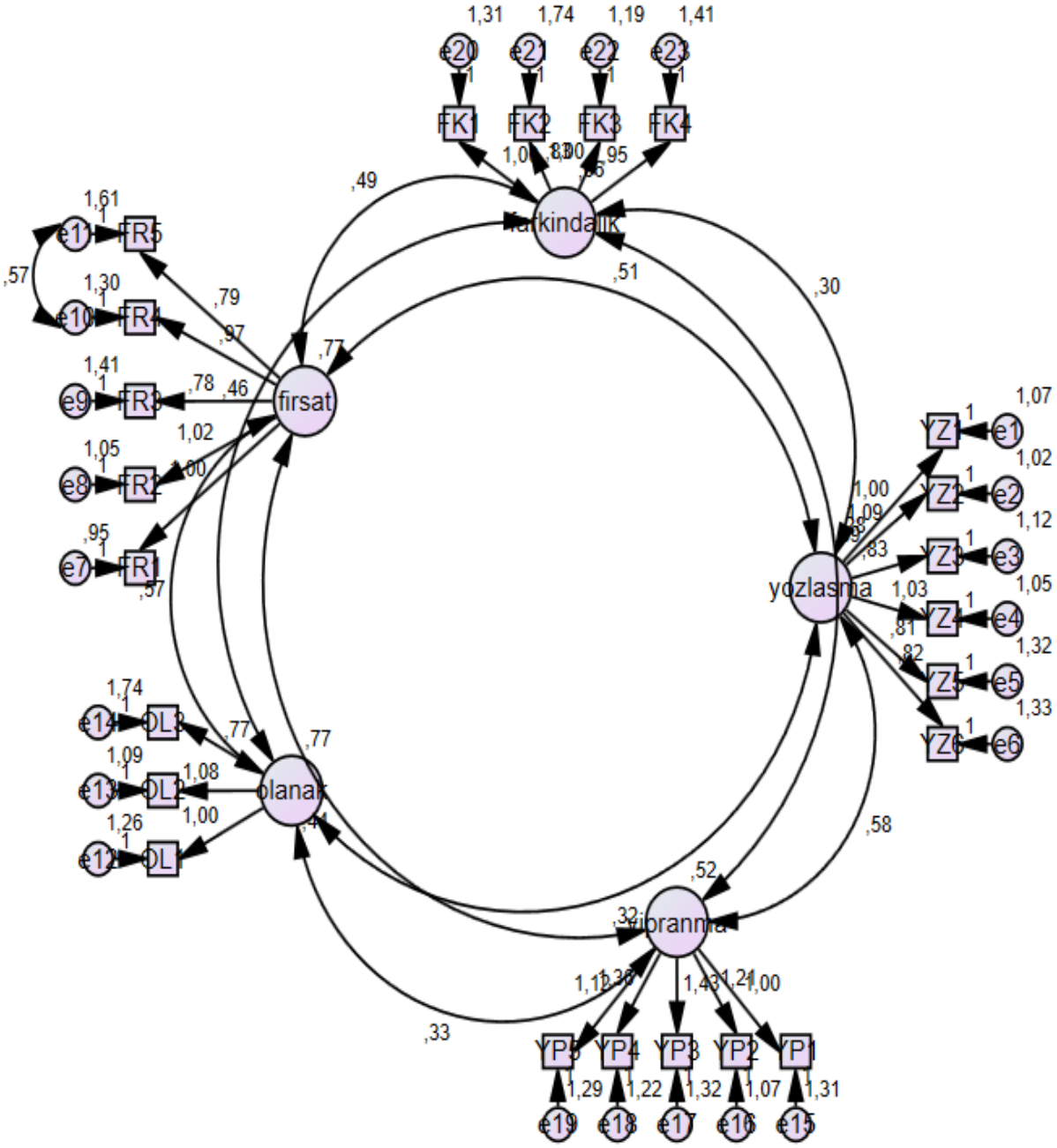

Figure 2. Diagram of confirmatory factor analysis of the scale

Findings Regarding Reliability Level

Reliability analysis of the scale according to factors and as a whole; Cronbach Alpha reliability coefficient was calculated by using Sperman-Brown and Guttmann Split-Half. The reliability analysis values of each factor and overall scale are given in Table 4:

Table 4. Reliability analysis results related to the overall scale (secondary school level)

Factors	Number of Items	Cronbach's Alpha	Sperman Brown	Guttmann Split Half
F1 - Virtual corruption	6	.65	.69	.68
F2 - Virtual wear	5	.87	.77	.73
F3 - Virtual facility	3	.83	.73	.67
F4 - Virtual opportunity	5	.76	.63	.67
F5 - Virtual awareness	4	.71	.73	.71
Total	23	.85	.75	.83

In Table 4, the Cronbach's alpha reliability coefficient of the scale, which was adapted to 23 items and maintained as a result of five-factor structure, was measured as 0.851. It was determined that the values related to the factors were between 0.653 and 0.874. The lowest Cronbach's Alpha value is the Virtual Corruption factor. Normally, this value is expected to be 0.70 and above (Büyüköztürk, 2007). However, it is possible to say that the internal consistency of the scale is acceptable due to the fact that the total reliability score is sufficient, in other words, the scale can make reliable measurements.

Discussion and Conclusion

When the variables predicting the perception of virtual risk are considered, it is known that problematic internet use is a significant predictor for each audience. Therefore, it is thought that individuals who are aware of the threats and dangers of information and communication technologies and who have been exposed to cyber bullying have a high level of sensitivity to virtual risks. It is of great importance that present-day adolescents, who are referred to as the Z-generation, are knowledgeable and cautious about the threats and dangers they will create as well as the advantages of technology. Parents are also expected to be aware of the risks associated with virtual bullying, which is directly related to the threat dimension of virtual risk. Therefore, considering the students who spend most of their day in schools, it is seen that it is very important to acquire the necessary knowledge and ethics on the basis of the project feet regarding the technology integrations that are tried to be done in educational environments (Ayas & Horzum, 2012).

In many studies, it is seen that males exhibit more risky behaviors in virtual environments while using information technology tools compared to women, but behave more cautiously and perceptively. It is seen that the proportion of male students is higher in problematic internet use (Çelik & Odacı, 2012, Zorbaz & Tuzgöl Dost, 2014). Therefore, it can be stated that gender is an important factor on virtual risk perception. On the basis of this, it can be said that more men have easy access to information technology tools depending on our social culture and that the internet cafe culture is mostly addressed to men.

In this study, "Virtual Risk Perception Scale" was adapted to the secondary school level in order to determine students' virtual risk perception levels. The scale is a five-point Likert type and can be grouped under five factors. Factors included in the factors; "Completely reflecting", "Very reflecting", "Moderately reflecting", "Less reflecting" and "Not reflecting at all" were scaled to reveal the level of students' perception of the scale items. It was applied to 261 students in 7th and 8th grade.

Confirmatory factor analysis was performed to confirm the factor structures of the scale. At this stage, the regression loads of the items were measured and it was decided to exclude the three items with very low values from the original scale. Therefore, the original version of the scale was reduced to 23 items. According to the findings obtained from the confirmatory factor analysis, the observed values of the scale model showed acceptable agreement, in other words, this model was confirmed by the data. In order to ensure the content validity and appearance validity, the necessary arrangements were made by taking the field experts' opinions before the implementation stage and the scope, appearance and language validity were ensured.

Cronbach Alpha, Guttmann Split Half and Sperman Brown reliability coefficients were analyzed for internal consistency of the Virtual World Risk Perception Scale. Cronbach Alpha, Guttmann Split Half and Sperman Brown reliability coefficients for the whole scale were measured as .85, .75 and .83 and it was concluded that the reliability levels were quite good.

This study was adapted by studying middle school students. The scale can be used to measure the risk perception levels of secondary school students in relation to the virtual world with its combined structure and 5 sub-dimensions. In addition, the sub-factor scores of students' "virtual corruption", "virtual wear", "virtual opportunity", "virtual opportunity" and "virtual awareness" dimensions can be measured in terms of virtual risk perception. It is important to carry out new researches by considering the different target audiences and dimensions of the original scale to measure the virtual risk perceptions of different target audiences and to see the similarities and differences between these target audiences.

According to the results of the study, it is recommended that educational sciences, psychology and technology researchers, education administrators and teachers should use the scale in all kinds of studies that will be conducted on the risks related to students' virtual environments.

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A Comparison of Implicit and Explicit Teaching in Terms of Grammar and Writing Skills of Intermediate Learners

Lokman ALTUN*[a], Rabia DİNÇER[b]

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Abstract

Teaching grammar has always been a very popular issue in the field of language studies. Explicit and implicit teachings are the main methods that are being applied for years in this field. This paper mainly aims to compare these two methods in terms of grammar success. Integrating this grammar knowledge to writing skills appropriately is another aim of this study. 40 intermediate university students whose ages are between 18-22 participated in this study. With pre and posttest and pre and post writings, quantitative method was applied in this paper. T-tests, ANCOVA and descriptive statistics were identified with the aid of SPSS. Writing scores of both groups also were evaluated by two raters and the number of grammar mistakes was calculated. As a result of this study, significant difference between pre and posttest was found. In addition, the explicit group's grammar and writing points were really better than the implicit group and the former group made fewer mistakes in their writings. This paper points out the significance of the explicit teaching method and gives the advice to administer and teachers about integrating these types of methods into language courses and curriculums.

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Öz

Dilbilgisi öğretimi dil çalışmalarında sürekli popüler bir konu olmuştur. Doğrudan ve dolaylı öğretim yöntemleri ana akım olarak yıllardır bu alanda kullanılıyor. Bu çalışmanın amacı bu iki akımı öğrencilerin dilbilgisi başarıları açısından karşılaştırmaktır. Diğer bir amacı ise dilbilgisini yazma becerisine entegrasyonunu sağlamaktır. 18-22 yaş arasında 40 orta seviye üniversite öğrencisi bu çalışmaya katılmıştır. Ön test, son test, ön yazı testi ve son yazı testi ile nicel bir yöntem uygulanmıştır. SPSS programı aracılığı ile T-test, ANCOVA ve betimsel istatistikleri gösteren analiz yöntemleri uygulandı. İki grubun yazı test puanları ve dilbilgisi hata sayıları iki değerlendirici tarafından belirlendi. Bu çalışmanın sonucu olarak, ön test ve son test arasında anlamsal bir farklılık bulundu. Doğrudan öğrenme yöntemi ile öğrenen öğrencilerin dilbilgisi ve yazı puanları dolaylı öğrenmeyle öğrenen öğrencilere göre daha yüksekti ve yazı sınavlarında daha az hata yaptıkları da bulundu. Bu çalışma doğrudan öğrenme metodunun önemini ortaya koyar. Yetkililere ve öğretmenlere de bu tarz metotların derslerde ve müfredatlarda yer alması gerektiğini gösterir.

***Corresponding Author:** lkmnaltn58@gmail.com

[a] Instructor Lokman Altun, National Defense University, İstanbul, https://orcid.org/0000-0002-0671-5889

[b]Instructor Rabia Dinçer, National Defense University, İstanbul, https://orcid.org/0000-0001-8414-0331

Introduction

Grammar has always been one of the key factors in languages. Each language has unique grammar rules and structures. Grammar can be thought of as a system which organizes words and typical things in a sentence (Brown, 2002). As the importance of grammar is so clear for everyone, the ways of teaching grammar have always been discussed by researchers. Sheen (2002) said that finding the most useful teaching grammar method is a big concern for most of the linguists because Akakura (2009) says that each grammar structure cannot be acquired with the same method. Therefore, different techniques and methods have been conducted to be able to identify the best method for grammar teaching until now. Plenty of theories have been suggested to see how second language (L2) can be acquired, how to carry out different approaches, and how to evaluate the learning process (Andrews, 2007). Among different methods, explicit and implicit grammar teaching has come into prominence but choosing which method is more effective while teaching grammar is a controversial topic for researchers. Hammerly (1975) points out that the usage of implicit and explicit approach in terms of grammar teaching is one of the most stimulating and questionable topics. It has also consistently been discussed to find out the more effective method for teaching grammar since in the 19th century (Richards & Rodgers, 1986). Although these two approaches are disputable, grammar teaching methods generally are based on these two approaches. These approaches are mostly used in our classrooms. Naturally, the approach which teacher use in their classrooms is changing according to the topic and different approaches also cause different ideas in teachers' lesson plans. As a result of this difference, different teaching methods result in the end (Deng & Lin, 2016). However, they have generally good effect on students' grammar knowledge. These approaches influence not only students' grammar knowledge but also their grammar structure usage in their writings. When they acquire the structure implicitly or explicitly, they have a tendency to use the structures in their writings and these two approaches have also directly impact on grammar usage so it is inevitable to see the effect of these two methods on writings while they are producing the grammar topics.

Explicit grammar teaching is one of the oldest topics in language teaching. In spite of being old, it has been maintaining its importance for years. Explicit grammar teaching is built on a foundation. Krashen (1982) explains this approach's main aim by saying that educators should explain the topic clearly and learners should find practice chance until the rule is fully understood. Explicit teaching is in reliance on this idea. Nunan (1991) explains a little bit deeper by declaring that explicit teaching method can happen only when students learn the rules deliberately and teachers should give specific information. Ellis (2001) thinks that in implicit teaching, focusing the form in communicative activities is prioritized rather than comprehending the meaning and predetermined structures are taught actively and the rules firstly are given to students. Examples are also done with the class together. He also claims that the rules should be presented and then examples should be provided. Akakura (2012) also supports other researchers by pointing out that rules should be given directly in explicit teaching and the important thing is rules in the input. If a teacher teaches a form with explicit teaching method, he/she needs to pay attention to some procedures. Erlam(2003) summarizes these procedures very well. He says that the rule firstly should be showed deductively to students at the beginning of lessons. Explicit grammar teaching is mostly based on these explanations. Based on different researches, teaching grammar explicitly has lots of advantages for students development not just grammar but also different aspects of language. Nassaji and Fotos (2004) explain one of the effects by saying that students will probably remember the form of that grammar structure for a longer time if the students do enough communicative activities with that grammar structures. The accuracy of students will be also certainly affected by explicit grammar teaching. Bhatia (1997) and Widodo (2006) also believe that teaching explicitly acts on students' meaningful communication skills. In order to acquire a grammar structure explicitly, there are some important steps. Nazari (2013) identifies these steps by expressing that students should know three steps in explicit teaching. Encounter, process, and use are three steps of explicit teaching so that this grammar structure will be a part of their interlanguage.

Implicit teaching has also been searched a lot by the researchers for years as it is one of the most preferred teaching methods for grammar teaching. Krashen (1981) explains this teaching method by declaring that conscious learning is just one way to learn a language for the learners so, there is no need to acquire a language consciously. This explanation reveals the significance of acquiring a language implicitly. How teachers should implement this method in their classrooms is another issue for the researchers. Ranalli (2001) points out that this teaching method is related to consciousness-raising theory so, teachers in the classes should just focus attention on significant parts of target form because the learners should be expert instantly in terms of the target form. Andrews (2007, p. 3) also explains the steps of implicit teaching by expressing that lots of sentences from authentic texts are brought to

classes and just structure are shown as input. The aim is to focus on the meaning of the task. Students should deduce the rules from examples without consciousness. The teacher also aims at teaching the rules with texts. In this step, feedback can be necessary to clarify the forms of the rule but input can just be enough to push students to understand the forms alone. The implicit teaching method is also affecting students' skills positively. Dekeyser (1995) explains how implicit teaching has an influence on students' skills by stating that metalinguistic awareness of students will work out since students don't generally attend to a specific rule. Not only explicit knowledge but also implicit knowledge is required to enhance the talent of fluent and confident communication because speaking without waiting is a very clear proof of implicit language knowledge (Ellis, 2008). Sik (2015) also draws attention to another benefit of implicit knowledge by reciting that students habit formation process can increase thanks to implicit learning because students do activities until they use that structure automatically. Implicit teaching also requires some special tasks. Hinkel and Fotos (2002) explain one of these types of tasks by saying that lots of communicative tasks are in the center of implicit teaching for success and much more these types of tasks should be encouraged outside of the class by the teachers. To develop students' implicit knowledge, students need communicative activities to find enough opportunity to be able to participate in communication activities (Ellis, 2005).

As both teaching methods have a relationship with each other, comparing them has got attention very much. While some of the researchers try to make a distinction between them, some of them attempt to find out the effectiveness of one of them on another. Ellis(1994) makes a very general distinction by saying that implicit teaching is natural and provides to use the language automatically and fluently but explicit teaching is verbal and it is about knowing something deliberately. Since both of them are different methodologies, presenting them in the classes also change a lot. At the end of the lesson, the teacher introduces the grammar rule (Seliger, 1975) and students try to figure out the rule (Robinson, 1996; Rosa & O'Neill, 1999) but the teacher never explains the rules directly (Shaffer, 1989). Explicit instruction is shown to students firstly in the lessons by the teachers while implicit instruction can be presented differently (Erlam, 2003, p. 250). Explicit instruction should get attention to the rule immediately whereas teacher gives the task, not the rule and learners pay attention to the task instead of the rule in implicit teaching (Hulstijn, 2005; Norris & Ortega, 2000). The other discussion topic is favorableness. The researchers don't have the same idea about this topic. Herron and Tomasello (1992) think that implicit teaching has more advantage but Robinson (1996, p. 35) and Seliger (1975, p 22) support explicit teaching. There are also some researchers who think that there is no distinction between them like Rosa and O'Neill (1999, p. 525) and Shaffer (1989). Both methods are also affecting each other in some ways. DeKeyser (2003) picks up on this issue by claiming that implicit teaching depends on explicit teaching though implicit teaching can be the result of explicit teaching which is known earlier if explicit teaching is practiced a lot deliberately. Explicit teaching can also be considered as focus on forms and explicit teaching is named as focus on form (Ellis, 2001; Long, 1988, 1991). Burgess and Etherington (2002) explain what these definitions are by stating that focus on forms emphasize the structure rather than meaning but focus on form highlights the grammatical structure within the communicative context.

When the researchers investigated this topic deeply, he realized that there weren't many studies in this field. However, a few researchers tried to find out the effect of implicit and explicit teaching types on complex grammar structures. Andrews (2007) studied on this topic and found that explicit is better than implicit in terms of complex structures. For simple structures, there was no big difference.

Macaro and Masterman (2006) just focused on explicit grammar instruction. They tried to find out the effectiveness of explicit teaching on grammar and writing. For five months, two groups, control and experimental, were compared at three points. As a result of this study, explicit grammar teaching affected some aspects of grammar. It didn't help to increase accuracy.

Andringa, de Glopper, Hacquebord (2011) investigated the effect of implicit and explicit on free writing. With 81 students, two grammar topics were practiced with implicit and explicit knowledge. It resulted that both types of structures were effective in free writing but explicit was better when two of them were compared.

Akakura (2012) conducted his study by using technology. He aimed to find the effectiveness of explicit instruction on implicit and explicit L2 knowledge. Article tasks were given by technological tools. These tasks

were elicited imitation, oral production, grammaticality, and metalinguistic knowledge. Treatment lasted for six weeks. Pre and post-test were used. As a result, it was seen that explicit has a great effect on implicit knowledge and on ungrammatical items on measures of explicit knowledge.

Nazari (2013) focused on productive and receptive skills. With 30 adult learners, the present perfect tense was taught. The result was the same and explicit was better than implicit in terms of receptive and productive skills.

Khodabandeh(2016) contrasted four different task types. Explicit, implicit, task-based and without instruction approach were compared to learn students' writing classified ads abilities. 72 senior students participated. Pre and post-test were used. Descriptive and inferential statistics showed that explicit and task-based groups were better than implicit and self-study.

After investigating the old studies, it was seen that implicit and explicit teaching methods have been studied a lot in the field of English as a Foreign Language (EFL) but checking the usage of particular grammar topic in students' writings is not common. Besides, there are few studies which are based on intermediate students' grammar in their writings in Turkish EFL context that's why this study wanted to fill these gaps. These research questions are aimed at answering:

1. Is there any difference between the effect of implicit and explicit grammar teaching on students' pre and posttest grammar scores?
2. Is there any difference between the effect of implicit and explicit grammar teaching on students' pre and posttest writing scores?
3. Is there any difference between the effect of implicit and explicit grammar teaching on students' grammar mistakes in their writings?

Method

The purpose of this study is to discover the effectiveness of implicit and explicit teaching methods on students' grammar knowledge. The target of this paper is also to see the effects of implicit and explicit grammar teaching methods on students' grammar usage in their writings. Quantitative method is preferred to conduct this study. Quantitative method is the most suitable method for the aim of this study because this study aims to see the development of students empirically in terms of grammar and writing.

Participants

40 Turkish intermediate students took part in this study. 40 students were preferred because there were just 60 intermediate students at school. Among 60 students, by using simple random sample, 40 students were chosen randomly. The ages of students were between 18-20 years and they were first and third-grade students who were studying engineering at a state university. These students were chosen based upon their English levels. Before term, a proficiency test was conducted by the school and proficiency levels of the learners were identified. English is a compulsory lesson and it was 4 hours weekly for each class. The level of students was intermediate, and it was determined based on SpeakOut proficiency test. It was published by Pearson and the school used this test to learn students' proficiency levels before education period.

Instruments

The quantitative study was chosen by the researcher to see the effects of both approaches more clearly as qualitative data gave the researcher more reliable results and it provided the researcher to see the definite effect of the grammar teaching approaches on students' grammar and writing. Firstly, students' grammar knowledge was tested through pre and posttest. The researchers wanted to learn the effect of implicit and explicit teaching on students' grammar knowledge and to see the difference between the two groups empirically. The Pre and Post-tests were SpeakOut Proficiency Tests by Pearson Publishing because the learners used SpeakOut book series in their lesson throughout the term. These tests were also prepared by experts at this field and all questions were related to the lessons. Secondly, pre and post writing were conducted to evaluate their writing scores and to identify students' correct usage of that specific grammar topic in their writings. The scores were calculated based on B1 Scoring Criteria presented by Cambridge English. The scale was based on B1 Level because the participants were intermediate.

Procedure

The procedure lasted for 6 weeks. The participants were divided two different groups. The first group (n=20) learned the predetermined grammar topics explicit whereas the second group (n=20) learned the topics implicitly. Topics were chosen according to the book's content. Five grammar topics such as Real Conditionals, Present Perfect Tense, Articles, Quantifiers, and Hypothetical conditions and Reported Speech which were in the content of the book were taught explicitly to the first group and implicitly to the second group. These topics were chosen because these topics were suitable for the intermediate students. In order to verify this information, the researcher again checked the levels of these topics by taking into account of CEFR and GSE level. The same skill-based main course book was used in both groups throughout the second term. Four lessons per week were divided for English lessons and each lesson was 45 minutes. For each group, one lesson hour was divided to teach predetermined grammar topics.

For the first group, each topic was introduced explicitly. The teacher directly writes the rules to the board and practices on the book and online practices such as Kahoot, Quizizz were done with the teacher.

For the second group, topics were introduced implicitly. The participants tried to notice the rules of the predetermined topic thanks to inputs. Inputs were reading texts, listening audios and videos. The teacher encouraged the students to understand the rules and helped them interiorize the rules. After being noticed, same activities done with the first group were used by the teacher.

Data Collection

First of all, pretest including these five grammar topics was conducted to both groups and pre writings were collected from students via Edmodo. There were multiple choice and fill in the blanks questions. In addition, students' ideas were gathered at the beginning of the term. Students wrote their ideas on Edmodo which is a Web 2.0 tool. The teacher wanted them to write at least 150 words. The aim was to encourage students to express their ideas freely and to be able to evaluate their writings equally.

Lastly, the students were tested again consisting of multiple choice and correcting mistakes questions. The students also wrote their post writings to Edmodo as a comment. This time, the word limitation was 180 words at least.

Data Analysis

SPSS 25 was employed to analyze data. To check the 2- tailed significance value, analysis of covariance (ANCOVA) was used by the researchers. After being found the significant value, T-test provided to compare pre and posttest results of both groups and to be able to evaluate whether there is any significant difference between pretest and posttest scores.

For writing evaluation, pre and post writings were checked by two raters at the same time and the scores of both groups were evaluated according to The Assessment Scale. Four different items helped the raters to calculate the points (see Appendix A). The researchers compared the mean scores of pre and post writings an account of SPSS again by using descriptive statistics. Descriptive statistics helped the researcher to calculate the students' writing mean scores. To see the number of mistakes of writings, just post writings were evaluated by two raters because predetermined grammar topics were used just in post writings. Two raters just focused on predetermined topics while checking the mistakes and other mistakes were dismissed in order to see completely the effect of implicit and explicit grammar teaching methods. Thanks to SPSS, the researchers compared the number of post writing grammar mistakes.

Findings

So as to check if there is any significant difference between the first and the second group pretest scores, significance value was calculated (See table 1).

Table 1. Significance Value of Pretest Scores

	Levene's Test for Equality of Variances	t-test for Equality of Means

		F	Sig.	t	Sig.(2-tailed)
Pretest	Equal variances assumed	1,704	,200	2,652	,012
	Equal variances not assumed			2,652	,012

When the table was analyzed, it was seen that there was no significant difference between groups (z=0, 12 > 0, 05). It was also understood that the groups were homogenous.

To learn whether there is any significant difference between the groups, the significant value of posttest scores was checked (see Table 2).

Table 2. Significance Value of Posttest Scores

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	Sig.(2-tailed)
Posttest	Equal variances assumed	,534	,469	3,636	,001
	Equal variances not assumed			3,636	,001

According to the table, after implicit and explicit teaching approaches were applied, a significant difference between groups (z=0, 01< 0, 05) can be seen. It can be said that these types of teaching styles served the purpose.

To be able to find out the more successful approach, pretest and posttest scores of both groups were compared and it was shown below (see Table 3).

Table 3. Descriptive Statistics of the grammar mean scores of both groups

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Posttest	Explicit Teaching	20	24,30	4,462	,998
	Implicit Teaching	20	18,90	4,919	1,100
Pretest	Explicit Teaching	20	21,30	6,199	1,386
	Implicit Teaching	20	16,90	4,077	,912

When the scores were checked carefully, it was easily realized that both groups increased their scores slightly but the score of explicit teaching is greater (m= 24, 30) than the score of implicit teaching group (m= 18, 90). Pretest score of the explicit group also increased nearly 3 points while the other group increased just 2 points.

In order to answer the second research question (RQ2), the scores of pre and post writing were compared. Pre and post writing scores are tabled below (see Table 4).

Table 4. Descriptive Statistics of the writing mean scores of both groups

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Pre_writing	Explicit Group	20	12,75	3,823	,855
	Implicit group	20	12,30	3,147	,704
Post_Writing	Explicit Group	20	16,75	2,552	,571
	Implicit group	20	13,45	3,316	,742

The mean scores of post writings demonstrate that explicit group (m=16, 75) did better than the other group (m=13, 45). The explicit group gained approximately 4 points whereas the other group raised just approximately 1,5 points in the post writings.

To be able to clarify the RQ3, mistakes of pre and post writings were compared and it was shown as a table (See Table 5).

Table 5. Descriptive Statistics of the mistakes of both groups

	Treatment	N	Mean	Std. Deviation	Std. Error Mean
Post mistakes	Explicit Group	20	8,10	3,878	,867
	Implicit group	20	9,45	4,359	,975

When the table was examined, the group who learned the grammar topics explicitly made fewer mistakes than the group who learned the grammar topics implicitly. It can be understood that explicit teaching was more effective than the other group.

Discussion and Conclusion

When the results were considered, it was easily understood that two methods were effective separately for the participants. They helped students to increase their grammar and writing points. However, the effect of both methods was really different from each other when they were compared. Results showed that there was a significant difference between pre and post-test scores contrary to the study of Andrews (2007), Nazari (2013). Furthermore, Erlam (2003) also found no significant difference between the two groups. Reaching the significant different value can be the reason of students' interest in grammar lessons. As the participants generally took grammar lessons serious, they probably were attentive to tests.

When the grammar scores of both groups were examined, it was again seen the success of the explicit group. Although the implicit group also increased their points, the explicit group was really better than the other group. These results were in accordance with the studies of Andringa, de Glopper, Hacquebord (2011), Akakura (2012), Nazari (2013), Khodabandeh(2016). There can be lots of different explanations why the explicit group came to the forefront. Time can be thought as the most significant issue while discussing the success of the explicit group. Six weeks couldn't be enough time to teach grammar implicitly. Treatment process probably provided to learn explicitly more effectively because acquiring grammar knowledge explicitly don't need a very long time but internalizing the implicit grammar knowledge requires much more treatment process. Another reason can be considered as the habits of students. The participants were adults and especially adult Turkish students generally are accustomed to explicit grammar teaching type. They have been educated through educational methods and techniques including explicit teaching methods. This habit can lead the explicit group to have higher motivation towards English classes. They probably understood the predetermined topics better than the other group. The test itself can be another reason why the explicit group was better because questions within the test require to remember the rules firstly and then to produce that sentence or that rule. These types of questions provided the participants to concentrate on just the form, not the meaning.

When the writing scores and mistakes were examined, the achievement of the explicit group was seen so apparently. Especially, the number of mistakes was less among the explicit group students and this result again shows the effectiveness of explicit teaching method. These results were in line with Scott (1989), Lightbown (1998), Macaro and Masterman (2006). Seeing the instructions and rules clearly on the board and integrating the explicit knowledge to the writing process probably affected the participants positively. These results point out the significance of the explicit type of teaching because writing again needs to remember the rule and using that rule in a sentence correctly. As the explicit group is familiar with explicit type, they organized their ideas easily and put their ideas on paper. All of these reasons also caused to increase the points of writings because the scoring criteria were based on using language properly. Time factor again can be another cause to be able to infer why the explicit group scores were better and mistakes of them were less. For the effective implicit teaching method, a longer treatment period is needed because students make very much effort to be able to clarify that structure and use it in the daily life situation. These results also were the same with the studies of Scott (1989, 1990) and Lynch (2005). Khodabandeh (2016) also found that explicit group is superior to the implicit group in terms of producing and using sentences in their writings in a right way.

As a conclusion, significant difference was found between the scores of pre and posttest. This score reveals the efficiency of the treatment process. After testing the grammar knowledge of the participants, the pre and post writings were compared. The successful grammar results of the explicit group students reflected credit on their writing scores and grammar mistakes. With the help of a rubric for writings and two raters, writing scores were calculated and the success of the explicit group students came in sight again. This success affected them to use grammar topics which were taught during the treatment process truly and mistakes of the explicit group were clearly less than the other groups. Though the implicit group also raised their points and made a few mistakes, the

explicit group really outperformed. These increased points and the number of a few mistakes were surely the evidence of the achievement of the explicit teaching method. It was seen that students have more tendency to explicit teaching method and this tendency triggered the positive result of the explicit group.

This paper has very good and effective suggestions for teachers and administers. Considering the students' scores, integrating and using the explicit teaching in the classes are inevitable for the language teachers. Implicit teaching should not be ignored and must be practiced along with explicit teaching methods. Teachers should also adapt their teaching methods according to the appropriateness of the topic. For educators, making enough practice is also a crucial part of the teaching process, too. For the administration, being aware of the existence of these types of methods is too important and they should modify the curriculum regarding these types of methods. The administration stuff also should have enough knowledge about these methods and they should educate candidate of the language teachers and in-service teachers.

As limitations of this study, six weeks were not so adequate to compare entirely the difference between these methods in terms of success. The treatment duration should be extended. For the writing part, the number of writing activities should be increased. The teachers should utilize more creative writing activities that provide students to use predetermined topics in their writings freely. The number of the participants also should be increased to analyze deeper and the further researchers should get the idea of students about these types of methods so, mixed method study should be applied.

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Self-efficacy Perceptions Scale for Reading Comprehension of 4th Grade Students in Primary School: Validity and Reliability Study

Sultan Selen KULA*[a], Yusuf BUDAK[b]

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Abstract

The aim of this study is to develop a data collection tool to determine the self-efficacy perceptions of 4th grade students in reading comprehension. The study group consisted of 525 primary school fourth grade students randomly selected. The study was designed in the survey model. The process for the development of appropriate measuring tool has been systematically monitored. For the scope validity of the scale, the relevant theorotical field was screened and expert opinions were consulted. Exploratory and confirmatory factor analysis were performed to determine the construct validity of the scale. In one-dimensional structure, Cronbach-Alpha internal consistency coefficient of the scale consisting of triple likert type and 29 items was determined as .918. According to these findings, it can be said that the scale measures the self-efficacy perceptions of the 4th grade students in reading comprehension, validly and reliably.

İlkokul 4. Sınıf Öğrencilerinin Okuduğunu Anlamaya İlişkin Öz Yeterlik Algıları Ölçeği: Geçerlik ve Güvenirlik Çalışması

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Öz

Bu çalışmanın amacı, ilkokul 4. sınıf öğrencilerinin okuduğunu anlamaya ilişkin öz yeterlik algılarını belirlemek için bir veri toplama aracı geliştirmektir. Araştırmanın çalışma grubunu rastlantısal olarak seçilen 525 ilkokul dördüncü sınıf öğrencisi oluşturmaktadır. Araştırma tarama modelinde tasarlanmıştır. Ölçme aracının geliştirilmesi için uygun olan süreç sistematik olarak izlenmiştir. Ölçeğin kapsam geçerliği için ilgili alan yazın taranmış ve uzman görüşlerine başvurulmuştur. Ölçeğin yapı geçerliğinin belirlenmesi amacıyla açımlayıcı ve doğrulayıcı faktör analizi yapılmıştır. Tek boyutlu bir yapıda, üçlü likert tipi ve 29 maddeden oluşan ölçeğin Cronbach-Alfa iç tutarlılık katsayısı .918 olarak belirlenmiştir. Bu bulgular doğrultusunda ölçeğin, ilkokul 4. sınıf öğrencilerinin okuduğunu anlamaya ilişkin öz yeterlik algılarını geçerli ve güvenilir şekilde ölçer nitelikte olduğu söylenebilir.

***Corresponding Author:** selenyazgunoglu@windowslive.com

[a] Assist. Prof. Dr., Ahi Evran University, Faculty of Education, Educational Sciences, Kirsehir, http://orcid.org/0000-0002-1614-3431

[b]Prof. Dr., Gazi University, Faculty of Education, Educational Sciences, Ankara, http://orcid.org/ 0000-0001-9625-204X

Introduction

One of the important concepts that Bandura presents with Social Learning Theory is self-efficacy. Self-efficacy is the belief in one's own capacity to bring the level of learning and behavior to the required levels. It is emphasized that the creation and strengthening of self-efficacy perceptions affects the change of some behaviors (Bandura, 1977). Self-efficacy is the judgment that individuals have reached about their ability to achieve a job (Zimmerman 1995). Self-efficacy perception is effective for individuals to decide to do a job, to struggle with efforts and persistence (Schunk,1981). Different sources that affect individual self-efficacy can be mentioned. According to Bandura (1977), self-efficacy of individuals is nourished from 4 basic sources of information. These; direct experiences, indirect experiences, verbal persuasion and physiological conditions. The most influential factor among these sources is the direct experience of the individual. It is known that students' self-efficacy perceptions of any subject are influenced by their sense of achievement (Senemoğlu, 2009). For the student, the answer to the question "Can I succeed" reveals her/his self-efficacy perception (Viau, 2015). In this case, in the teaching-learning process, the students' feeling themselves successful about the subject, can strengthen the self-efficacy perception. Indirect experiences, which are the second source of self-efficacy belief, are the evaluations of peers based on the judgments formed by observing the behaviors and results of those peers. In this process, the individual compares her/his own performance and the performances of the people who exhibit similar features. At the end of this comparison, self-efficacy beliefs may develop either positively or negatively depending on whether or not the individual have the same results as the observed person. Verbal persuasion, which is another source affecting self-efficacy beliefs, is the suggestions and encouragement of individuals about possible successes or failures of a job. Verbal persuasion can affect the self-efficacy beliefs positively or negatively. Physiological conditions are the effects of individuals' expectations of success or failure on self-efficacy belief.

Bandura (1977), in the theory of behavioral change, argues that self-efficacy perception plays an active role in changing the behavior of the individual. The degree of self-sufficiency in a subject affects the level of determination and persistence. Many behaviors are primarily shaped in the person's way of thinking. Therefore, the students' beliefs about their own competences, the academic activities they decided to do willingly, their ability to regulate their learning, motivation levels and academic achievements affect the self-efficacy perception. People's self-efficacy beliefs are effective in trying and structuring their future prospects. Prospective ideas support the desire to work of people with high self-efficacy, provide positive guidance to them, and lead them to produce success scenarios. People who doubt their competences in one respect, portray failure scenarios in their eyes and focus on many things that go wrong. It is very difficult to succeed while struggling with self-doubt. In addition, when the perceived self-efficacy is higher, the person tends to struggle for higher targets and stands firmly in pursuit of the goals (Bandura, 1993).

In addition, self-efficacy perception enables students to persist and not give up even if they have failed situations (Lodewyk ve Winne, 2005; Maddux, 2002; Pajares, 2003 as cited in Bruning, Schraw and Norby, 2014). Children with a strong sense of competence about the subject given to them are expected to make great efforts to achieve the task. On the contrary, children who perceive themselves as inadequate tend to avoid given duty, reluctance, and give up quickly when they encounter difficulties (Schunk, 2011).

Self-efficacy beliefs affect people's sense of self-motivation, their way of thinking and their behavior. The self-efficacy belief ensures the occurrence of these states depending on four important processes. These processes are: cognitive, motivational, affective and selective processes (Bandura,1993,1994). The concept of self-efficacy, which is such an effective concept in all the processes students experience academically, is also seen as very important in the processes related to reading comprehension. It is possible to say that the students who have the ability to comprehend and interpret any text they read have their self-efficacy perceptions strengthened and developed.

Self-Efficacy Perception for Reading Comprehension

Comprehension means understanding what something means, what it points to. According to this, it is possible to synthesize new information with old information in the process of understanding which is a mental activity (TDK, 2005). Reading is a comprehension process. In other words, the main purpose of reading is to understand what is read and to make sense of it in the mind. The main function of reading is to perceive, to remember, to associate with previous information and thus to produce new information or in other words, new meanings. In this context, reading plays an important role in academic learning and enriching life. Accordingly, the process of

reading comprehension; contains a number of complex processes such as finding meaning, thinking on meaning, researching causes, extracting results and evaluating (Balcı, 2013). Since the cognitive structure of the reader, past experiences and pre-learning factors play an active role in the reading process, reading comprehension is a process that includes individual differences in this aspect. The constructivist approach explains the learning process in two dimensions: developmental and interactional. Developmental approach considers the process of reading as a process from preschool to advanced reading in advanced classes. On the other hand, interactive approach explains that reading takes place with variables such as text and environment interacting with the reader (Güneş, 2009). Therefore, it is possible to say that there are different approaches in making sense of reading comprehension process. On the basis of these approaches, it can be stated that both individual-related characteristics and reading-related environmental characteristics play a role in the process of reading comprehension. It can be stated that the developmental characteristics, cognitive structure, experiences, affective characteristics of the individual, comprehensibility of the reading material, suitability to the individual, reader-friendliness and the characteristics of the reading environment influence the comprehension.

When the literature is examined, it is seen that there are studies on scale development related to many affective factors influencing reading. It is known that individuals' attitudes towards reading affect their reading speed, reading motivation and their success in comprehension (Yıldız, 2013). In this respect, many different scale development studies have been conducted regarding reading attitudes in Turkey. There are reading attitude scales developed for primary school students (Başaran and Ateş, 2009; Güngör-Kılıç, 2004; Özbay and Uyar, 2009; Sallabaş, 2008; Ünal, 2006; Ürün-Karahan, 2018) secondary school students (Akkaya and Özdemir, 2013)) and pre-service teachers (Doğan and Çermik, 2016). In addition, there are many reading attitude scales adapted from abroad (Baştuğ and Keskin, 2013; Çakıroğlu and Palancı, 2015; Dedeoğlu and Ulusoy, 2013). As a result of increasing digitalization in daily life, reading and technology-related attitude studies have also been included in the literature (Güneş & Susar-Kırmızı, 2014). One of the other affective factors that affect individuals' reading and comprehension processes is reading motivation. It is known that there are scale development studies related to reading motivation in Turkey (Aydemir and Öztürk, 2013; Durmuş, 2014; Katrancı, 2015; Yıldız, 2010; Yıldız, Yıldırım, Ateş, and Çetinkaya, 2013) and abroad (Chapman and Tunmer, 1995; Gambrell, Palmer, Codling and Mazzoni, 1996; Wigfield and Guthrie, 1995). Similarly, reading anxiety scales were included in the literature (Melanlıoğlu, 2014; Çeliktürk & Yamaç, 2015). Another factor that is known to have an effect on reading comprehension is metacognitive awareness (Jacobs and Paris, 1987; Mokhtari and Reichard, 2002; Zhang and Wu, 2009). It was found that metacognitive reading skills also affect self-efficacy perceptions (Kuruyer and Özsoy, 2016). There are developed scales in our country in this field (Çakıroğlu and Ataman, 2008; Gelen, 2003; Karatay, 2009). When the affective characteristics affecting reading and comprehension are considered, it is noteworthy that predominantly, scales for determining attitudes were developed. Research shows that people with poor reading skills have turned into people with insufficient thinking skills who cannot use writing and thinking strategies well (Alfassi, 2004). From this point of view, the fact that having individuals with advanced reading comprehension skills in a society prepares the basis for that society to have a healthy thinking structure. Because individuals with advanced reading skills are individuals with a high level of thinking and understanding. At the same time, reading and comprehension skills directly affect the student's ability to develop her/his personality, to establish healthy relations with the society she/he lives in, and to be successful in life and in school (MEB, 2009). Reading skills are generally an important determinant of academic achievement (Bloom, 2012). Reading comprehension, which is an important factor for development in all academic processes, is affected by the self-efficacy perception of the individual in this area. In this context, there are different self-efficacy scales in the literature. There are many different studies on scale development regarding children's perception of reading self-efficacy (Henk and Melnick, 1995; Keskin and Atmaca, 2014; Ülper, Yaylı and Karakaya, 2013), reading self-efficacy in a foreign language (Ghonsooly and Elahi, 2010; Mills, Pajares and Herron, 2006) on screen reading self-efficacy as a result of digitalization (Gömleksiz, Kan and Fidan, 2013), critical reading skill self-efficacy (Karabay, 2013; Karadeniz, 2014; Küçükoğlu, 2008); and parents' story reading self-efficacy (Kotaman, 2009). However, these scales focus on the concept of reading. In determining self-efficacy perceptions of reading comprehension, "Reading Comprehension Self-Efficacy Perception Scale" was developed by Epçaçan and Demirel (2011). However, the fact that this scale was arranged in a 5-point Likert type produced the opinion that it would not be appropriate for the level of the earlier age group students. Because it is thought that individuals of early age may have difficulty in filling five-point Likert scales (Köklü, 1995). Therefore, it is important to measure the level of self-efficacy perception of individuals. Thus, it can be ensured that the students who have insufficient

self-efficacy for reading comprehension can be determined and necessary precautions can be taken. Therefore, it is thought that the development of Self-efficacy Perception Scale for Read Comprehension, which is an important criterion for success, will contribute to the literature as well as contributing to the development of sufficient and successful individuals in reading comprehension.

Method

It is a scale development research designed in a survey model. The survey model is based on the description of an existing situation (Karasar, 2009). In this study, the psychometric feature that will be described according to the survey model is self-efficacy for reading comprehension. This study consists of the validity and reliability studies of the data collection tool developed to determine the self-efficacy perceptions of 4th grade students for reading comprehension.

Study Group

The sample of the study consisted of 525 primary school fourth grade students. The data obtained from 518 public school students were included in the analysis as data from 7 students were invalid and left out. In the scale development studies, it was reported that an average of about 300 samples were suitable for factor analysis (Comrey and Lee, 1992). In this context, it is seen that the data set obtained from 518 people is suitable for exploratory factor analysis.

Data Collection Tool

Data were obtained from 518 students for validity and reliability studies of Self-Efficacy Perception Scale for Reading Comprehension (SPSRC). While writing the items in the data collection tool, first of all, a theoretical framework was created by scanning the literature. In line with this theoretical framework, the general structure of the scale was determined by using the book section on the development of self-efficacy scales of Bandura (2005) and a pool of 32 items was formed. In order to determine the scope validity, expert opinion was consulted (Karasar, 2009). In order to ensure the validity of the scale, a test form was created in accordance with the opinions of the classroom teachers, psychological counseling and guidance, education programs and teaching field experts.

Based on the view that the use of triple likert-type scales will be appropriate for small-age participants (Köklü, 1995), the scale items were organized as follows; "Doesn't fit me", "Fits me a little", "Fits me completely". (Appendix 1).

The responses of the students to the scale were graded from 1 to 3 and transferred to the SPSS program. It was checked by KMO (Kasier - Meyer - Olkin) and Bartlett Sphericity Tests whether the responses to items were suitable for factor analysis (Kalaycı, 2010). In order to determine the factor structures of the SPSRC, the principal component analysis and varimax rotation component analysis were used. The factor structure of the scale was determined by Exploratory Factor Analysis (EFA). Then, the factor load values of each item in the scale were calculated. For the whole scale, reliability was determined by Cronbach-alpha internal consistency coefficient. Confirmatory factor analysis was conducted to confirm the single factor structure of the scale using Lisrel program. Cronbach-alpha internal consistency coefficient and Guttman Split-Half correlation were calculated for the whole scale and reliability was determined.

Findings

The Kaiser-Meyer-Olkin (KMO) value and Barlett test results were analyzed in order to test the suitability for the exploratory factor analysis (EFA) of the data set obtained from the SPSRC. These results are given in Table 1.

Table 1. KMO and Bartlett Sample Proficiency Test Results

Kaiser-Meyer-Olkin Sample Proficiency Measurement		.945
Bartlett Test Results	Approximate Chi-Square (x^2)	4524.156
	Degree of freedom (df)	435
	Significance level (Sig.)	.000

The KMO value in Table 1 is a ratio that measures the size of the correlation coefficients and the size of the partial correlation coefficients and measures the suitability of the data set for factor analysis. This ratio should be over 0.5. The values of 0.90 and above are interpreted as "excellent" for factor analysis (Kalaycı, 2010). The KMO ratio of SPSRC was 0.945, indicating that the number of samples for the data was excellent for factor analysis. Bartlett sphericity test results test the suitability of the data set for factor analysis by measuring whether there is a high correlation between the variables. When the results are examined, it is seen that the data set is suitable for factor analysis in the Bartlett test results ($p=0,000$, $p<0.05$) as well.

The principal component analysis was used for exploratory factor analysis to determine the construct validity of the scale. In order to determine how many factors the scale consists of, eigenvalue statistics of the items were determined and it was found that there were six factors in scale with eigenvalue statistics greater than 1. The number of factors related to SPSRC is given in Table 2 below.

Table 2. SPSRC Number of Factors Associated with Eigenvalue Statistics

Factor	Eigenvalues			Varimax Rotation - Total of Factor Loads Squares		
	Total	Explained Variance %	Cumulative Variance %	Total	Explained Variance %	Cumulative Variance %
1	9,109	30,363	30,363	3,083	10,278	10,278
2	1.360	4,532	34,895	2,580	8,602	18,879
3	1,165	3,882	38,777	2,492	8,308	27,187
4	1,097	3,658	42,435	2,335	7,785	34,972
5	1,017	3,390	45,835	2,224	7,414	42,386
6	1,002	3,339	49,164	2,033	6,778	49,164

When the total variances explained in Table 2 are examined, it is observed that there are 6 factors greater than 1 eigenvalue on the 30-item scale, but in the line chart of factor analysis which is another way in determining the number of factors that will be subject to rotation it is seen that the slope begins to disappear from factor 1 (Figure 1).

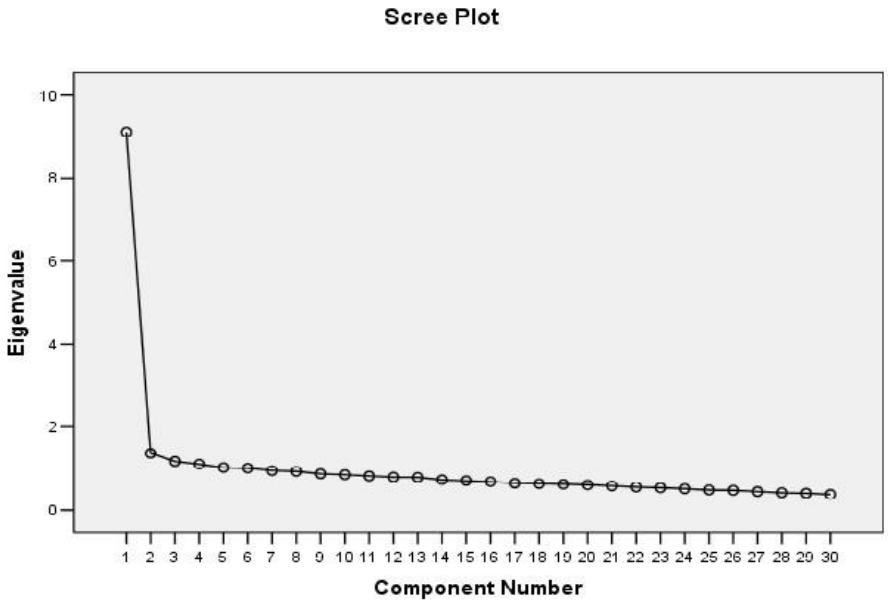

Figure 1. Line Chart of Factor Analysis for Eigenvalues

As seen in Figure 1, in line chart of factor analysis the slope starts to disappear from factor 1. Based on this graph, the scale was determined as one-dimensional.

In order for the scale to be one-dimensional; the ratio of the variance explained by the factor is at least 30% of the total variance and the eigenvalue of the first factor is greater than 3-3.5 times the eigenvalue of the second factor (Çokluk, Şekercioğlu and Büyüköztürk, 2012). In this case, when the SPSRC is examined; As a result of factor analysis, the ratio of variance explained by the first factor is over 30% of the total variance (the variance explained by the first factor was 30.36%, the variance explained by the second factor was 4.53% and the total variance was 34.89%) and provides the first condition. The eigenvalue of the first factor was found to be 9.109 and the eigenvalue of the second factor was 1.360. Thus, the second condition proving that the scale is a single factor is provided. Therefore, these results show that the scale has a single factor structure.

Factor load values for each item in the scale are given in Table 3 below.

Table 3. Factor Loads Related to SPSRC

Item No	Factor Load	Item No	Factor Load
13	.618	12	.535
14	.617	4	.533
17	.613	7	.530
25	.609	1	.529
29	.602	15	.528
22	.595	16	.527
21	.590	8	.518
27	.590	3	.517
26	.587	24	.513
19	.587	23	.512

9	.581	10	.511
20	.575	28	.505
2	.575	11	.502
18	.558	30	.456
5	.538	6	.414

When Table 3 is examined, it is seen that the factor load values of all items are above .30. For the number of data of 350 and above, the factor loads should be .30 and above (Kalaycı, 2010). Accordingly, it can be stated that the substances in the scale are suitable for use. It was decided to revise the item 24 from the scale as a result of the opinions obtained from the experts.

Confirmatory factor analysis (CFA) was performed with the data obtained from 350 students by using Lisrel 8.80 program to test the validity of the single factor structure of the scale. As a result of the CFA, it was seen that the factor loads (λ) of the items varied between .39- .60 (Figure 2). Standardized values of .30 and above indicate that they have an acceptable effect size (Kline, 2010). The t values of each item vary between 8.75 and 14.48. The fact that the calculated t-values are above 1.96 shows that the items in the scale represent the relevant dimensions in a meaningful way (Şimşek, 2007).

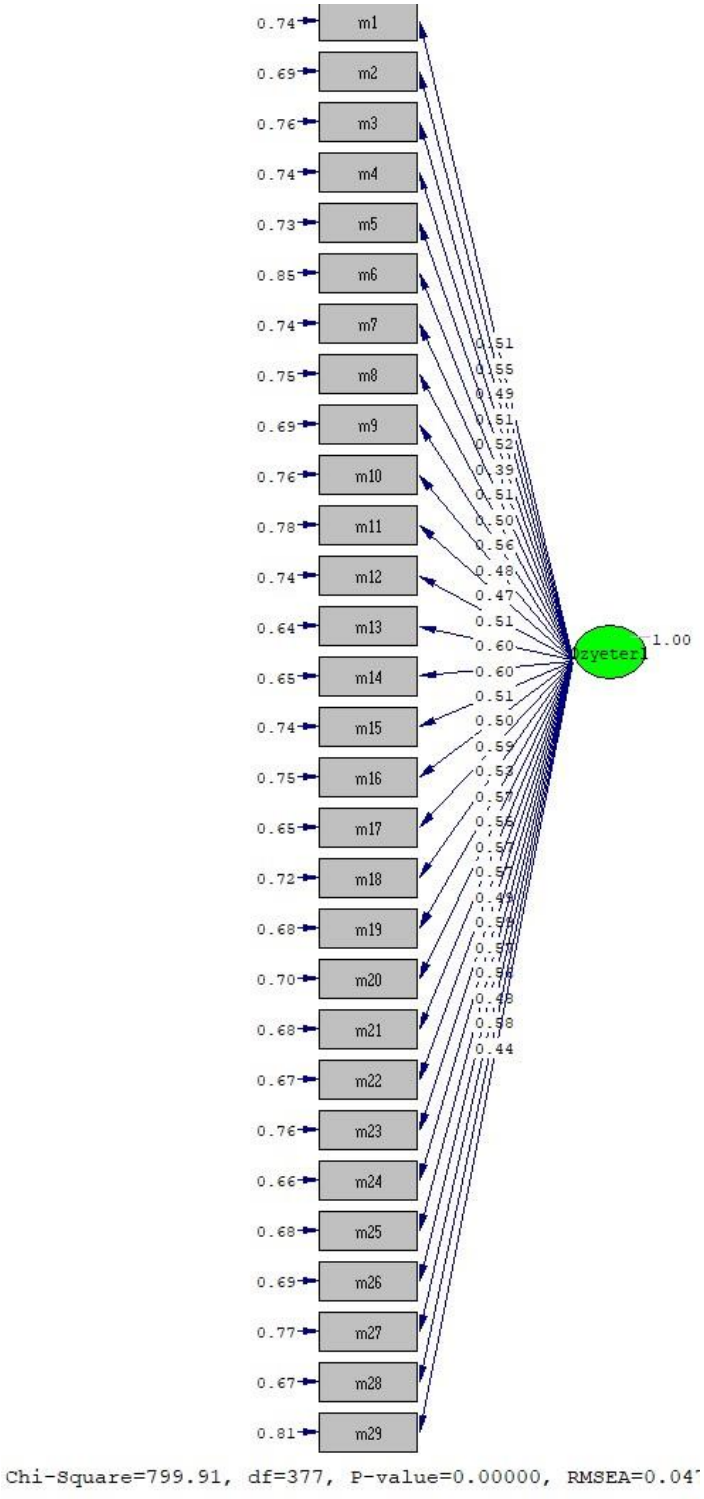

Figure 2. Standardized Values of Items

When the fit indices obtained from CFA were examined, it was concluded that p value was significant (p <.05). Therefore, the ratio χ^2/sd (799.91/377) was calculated to be 2,12. χ^2/df ≤3 is considered acceptable (Kline, 2010). Information on other fit indices is given in Table 5.

Table 4. Fit Indices for the Scale

Model	χ^2	χ^2/sd	NFI	NNFI	IFI	RFI	CFI	RMSEA
Single Factor Structure	799.91	2.12	.95	.97	.98	.95	.98	.04
Criteria		<3	≥0,90	≥0,90	≥0,90	≥0,90	≥0,95	≤0,08

When the fit indices of the scale were examined, it was concluded that the fit indices such as RMSEA, CFI, RFI, IFI, NNFI, NFI were in accordance with the criteria that the model in the literature was acceptable (Çokluk, Şekercioğlu & Büyüköztürk, 2014). In this case, the single factor structure of the SPSRC consisting of 29 items was confirmed as a model. The Cronbach-Alpha internal consistency coefficient of the scale, which consists of 29 items, was determined as .918. If the Cronbach-Alpha internal consistency coefficient is 0,80≤α<1,00, the scale is a highly reliable scale (Kayış, 2010). Guttman Split-Half correlation method was also used to determine the reliability of the scale. Guttman Split-Half method is determined by calculating the correlation value between the two parts of the scale after dividing the form into two identical parts and applying the two parts to the participants simultaneously (Carmines and Zeller, 1982). In this calculation, the correlation between forms gives the reliability value of the scale. This correlation value of the scale was calculated as .828. According to reliability calculations, SPSRC is a high reliability scale.

Discussion and Conclusion

This study was carried out to develop the self-efficacy perceptions scale of 4th grade students for reading comprehension. There are 29 items in the SPSRC. Scale items are arranged in triple likert type; "Doesn't fit me", "Fits me a little", "Fits me Completely".

In the process of development of the scale, self-efficacy scale development studies in the literature were examined (Ekici, 2012; Epçaçan and Demirel, 2011; Karabay, 2013; Küçükoğlu, 2008; Ülper, Yaylı and Karakaya, 2013). Factor structures of these scales were reviewed and a common theoretical structure which could be adopted in determining the dimensions was sought. The scale aimed to determine the reading self-efficacy perception of elementary school 4th, 5th and 6th grade students (Henk and Melnick, 1995) consists of three dimensions; Observational Comparison, Social Feedback, Physiological States while the elementary school children's self-efficacy scale developed by Ülper, Yaylı and Karakaya (2013) consists of one dimension. In the scale developed for reading self-efficacy in a foreign language (Ghonsooly and Elahi, 2010), there are four dimensions: Students' Reading Efficacy, Students' Reading Disabilities, Practice and Skills, Enjoying Group Work. The scale developed to determine the pre-service teachers' critical reading self-efficacy perceptions (Karabay, 2013) consists of three dimensions: Evaluation, Research-Examination and Visual. Another critical reading self-efficacy scale (Karadeniz, 2014) consists of five dimensions: Questioning, Analysis, Evaluation, Finding Similarities and Differences, Making Inferences. The scale developed to determine the screen reading self-efficacy levels of pre-service teachers (Gömleksiz, Kan and Fidan, 2013) consists of three dimensions: Comprehension, Difficulty and Benefit. Reading comprehension self-efficacy scale (Epçaçan & Demirel, 2011) consists of three dimensions: Written and Visual Comprehension, Self-Regulation in Reading, and High Self-Confidence Related to Reading.
In this respect, it is seen that there is no fixed factor structure related to self-efficacy concept and it is concluded that there are scales in different factor structures according to the subject being studied and the characteristics of the sample. In this study, studying on self-efficacy perception for reading comprehension and studying with the 4th grade students are thought to be the factors in the emergence of the single factor structure of the scale.

As a result of this study, it was concluded that the SPSRC was able to measure the self-efficacy perceptions of the 4th grade students in reading comprehensive validly and reliably. This scale can be used to determine which variables affect the self-efficacy perceptions of primary school 4th grade students for reading comprehension. In this context, validity and reliability studies of the SPSRC can be tested in different working groups.

The developed SPSRC can be used by both teachers and researchers in this field to determine the self-efficacy perceptions of 4th grade students for reading comprehension.

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Appendix 1. Okuduğunu Anlamaya İlişkin Öz Yeterlik Algısı Ölçeği

Maddeler	Bana Hiç Uymuyor	Bana Biraz Uyuyor	Bana Tamamen Uyuyor
1. Okuduğum metinde yer alan kelimelerin anlamını açıklayabilirim.			
2. Okuduğum metinde yer alan cümlelerin anlamını açıklayabilirim.			
3. Okuduğum metinde yer alan paragrafların anlamını açıklayabilirim.			
4. Okuduğum metnin ana fikrini belirleyebilirim.			
5. Okuduğum metnin konusunu belirleyebilirim.			
6. Okuduğum metinde yer alan bir deyimin ne anlama geldiğini açıklayabilirim.			
7. Okuduğum metinde yer alan bir fikri eleştirebilirim.			
8. Okuduğum metinde yer alan bir düşünceyi kendi cümlelerimle yeniden ifade edebilirim.			
9. Okuduğum bir metni özetleyebilirim.			
10. Okuduğum bir metinle ilgili çıkarımlar yapabilirim.			
11. Başlığını okuduğum bir metnin içeriğini tahmin edebilirim.			
12. Görsellerine baktığım bir metnin içeriğini tahmin edebilirim.			
13. Okuduğum metinde neden-sonuç ilişkileri kurabilirim.			
14. Okuduğum metnin anlamını açıklayabilirim.			
15. Okuduğum metinde geçen durumlarla ilgili karşılaştırmalar yapabilirim.			
16. Okuduğum metinde yer alan düşünceleri yorumlayabilirim.			
17. Okumakta olduğum metnin sonucunu tahmin edebilirim.			
18. Okuduğum metinde yer alan olayların benzer yönlerini belirleyebilirim.			
19. Okuduğum metinde yer alan olayların farklı yönlerini belirleyebilirim.			
20. Okuduğum metinde geçen karakterlerin duygularını açıklayabilirim.			
21. Okuduğum metinde geçen olayları gözümde canlandırabilirim.			
22. Okuduğum metinde geçen karakterleri gözümde canlandırabilirim.			
23. Okuduğum metinde geçen yerleri (mekânları) gözümde canlandırabilirim.			
24. Okuduğum metinde geçen olayları olumlu ve olumsuz yönleriyle değerlendirebilirim.			
25. Okuduğum metinle ilgili kendi düşüncelerimi ifade edebilirim.			
26. Okuduğum metinle ilgili kendi duygularımı ifade edebilirim.			
27. Okuduğum metinde karşılaştığım yeni kelimelerin anlamlarını tahmin edebilirim.			
28. Okuduğum metinle ilgili sorulan soruları yanıtlayabilirim.			
29. Okuduğum metnin anlam akışını bozan ifadeleri belirleyebilirim.			

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Educational Data Mining and Learning Analytics: Past, Present and Future

Muhittin ŞAHİN*[a], Halil YURDUGÜL[b]

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Abstract

Educational data mining and learning analytics have recently emerged as two important fields aimed at rendering e-learning environments more effective. Aim of this study seeks first to reveal the differences between these two fields and then to discuss the future of these concepts by evaluating how they changed throughout history. Educational data mining refers to uncovering the patterns hidden in the big data whilst learning analytics is the use of these patterns to optimize e-learning environments. One of the purpos
,es of the study is to add to the literature on the future trends regarding these concepts. The studies on the future of learning analytics are categorized in five main headings: personalization of learning processes, learning design, learning experience design, dashboard design and the Industry 4.0 applications. In the very near future, it seems that studies will be performed on EDM and the Industry 4.0 one of its application areas, "(Internet of Things-IoT)" and EDM has the potential to substantially help researchers in discovering the patterns in the interaction data in the Learning Management Systems and in designing more effective learning environments.

Eğitsel Veri Madenciliği ve Öğrenme Analitikleri: Dünü, Bugünü ve Geleceği

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Makale Türü:
Derleme makalesi

Öz

Eğitsel veri madenciliği ve öğrenme analitikleri son zamanlarda e-öğrenme ortamlarının daha etkili hale getirilmesi amacıyla kullanılan iki önemli alan olarak karşımıza çıkmaktadır. Bu araştırmanın amacı, öncelikle her iki çalışma alanı arasındaki farklılıkları ortaya koymak ve diğer taraftan bu kavramlara ilişkin değişimleri tarihsel gelişimleri içerisinde değerlendirmektir. Eğitsel veri madenciliği büyük veri içerisindeki örüntülerin keşfedilmesini ifade etmekte iken, öğrenme analitikleri elde edilen bu örüntülerin e-öğrenme ortamlarının iyileştirilmesi için işe koşulmasıdır. Eğitsel veri madenciliği veri tabanında bilgi keşfi süreçleri ile ortaya koyulmaya başlamışken, öğrenme analitikleri ise özellikle 2011 yılında bu veri tabanlarından elde edilen örüntülerin işe koşulması olarak araştırmalardaki yerini almıştır. Araştırmanın amaçlarından bir tanesi ise bu kavramların gelecekteki yönelimlerine yönelik alan yazına katkı sağlamaktır. Öğrenme analitiklerinin geleceğine yönelik çalışmalar beş temel başlık altında ele alınmıştır. Bu çalışma başlıkları; öğrenme süreçlerinin kişiselleştirilmesi, öğrenme tasarımı, öğrenme yaşantıları tasarımı, öğrenme panelleri tasarımı ve Endüstri 4.0 uygulamaları şeklindedir. Çok yakın bir gelecekte EVM ve Endüstri 4.0 uygulama alanlarından birisi olan "Nesnelerin İnterneti (Internet of Things-IoT)" alanlarında çalışmaların yürütüleceği ve özellikle Öğrenim Yönetim Sistemlerinde (ÖYS) yer alan etkileşim verilerindeki örüntülerin keşfedilmesi ve daha etkili öğrenme ortamlarının tasarlanmasında araştırmacılara önemli bir güç katacağı düşünülmektedir.

***Corresponding Author:** muhittin.sahin@ege.edu.tr
[a] Research Assisstant Dr., Ege University, Izmir/TURKEY, https://orcid.org/0000-0002-9462-1953
[b]Prof. Dr., Hacettepe University, Ankara/TURKEY, https://orcid.org/0000-0001-7856-4664

Introduction

Educational data mining (EDM) and learning analytics (LA) proved to be two notable themes in the field of education/teaching technologies in the last 10 years. Before elaborating on these two themes, it is worth identifying the difference between the concepts of analysis and analytics. If data are considered as the observation values of the characteristics of concepts, it is possible to reach out information by processing these data. At the heart of these processes, there is an attempt of uncovering hidden patterns embedded in raw data, and this whole process or procedure is referred to as analysis. Further, the attempt of uncovering these patterns contributes to not only a) the existing theoretical knowledge in the relevant field, but also b) the decision-making processes in the related area. The use of the patterns obtained from analysis in the decision-making processes is particularly discussed in relation to the concept of analytics. Briefly stated, analysis refers to identifying the patterns in data sets whereas analytics refers to the use of these patterns. When considered as a process, pattern discovery process is mostly studied in the framework of data mining; the use of the information obtained from this process is called analytics. Both data mining and analytics incorporate distinctions specific to the fields. In this regard, data mining based on educational data is named as "educational data mining" and the use of the patterns based on educational/instructional data is called learning analytics. However, educational data mining and learning analytics feature similar steps as a process, which creates a conceptual confusion. On the other hand, these fields have historically evolved into two diverse concepts. These being said, this study seeks first to reveal the differences between these two fields and then to discuss the future of these concepts by evaluating how they changed throughout history.

Educational Data Mining

The standardization of the ASCII codes by ANSI in 1963 has been a particularly important milestone for many areas in regard to the development of information technologies. Since, when one thought of data, the first thing that came to mind had been numbers until the year 1963. Yet, the introduction of the ASCII characters made it possible to store text-based information in digital environments. Then, visual and auditory data began to be recorded on the disk surfaces. Given that a 'file' as a computer concept is composed of data and command sets stored on the disk surfaces, it becomes clearer what the diversity of data types refers to. The data unit of the floppy disks used in the past was kilobytes, while that of the hard disk drives developed later on was megabytes; with the help of rapidly developing technologies, this unit evolved into gigabyte-terabyte with disk directories and today petabytes are used to refer to data volumes thanks to cloud technologies. This can be seen as an indicator of the development of data in about 50-60 years.

As scales of the digital data (volume) increased, the process of uncovering the patterns hidden in the data became more systematic and this process is referred to as Knowledge Discovery in DataBase (KDD). This concept, which outlines data mining, has been used primarily in enterprises (where it is vital to make accurate and fast decisions). In this sense, data mining also refers to the process of revealing previously unknown useful information, trends and/or patterns from the bulky data stored in databases (Thuraisingham, 2014; Kantardzic, 2011; Yin, Kaku, Tang, and Zhu, 2011). This process consists of the following steps: a) defining problems or constructing hypotheses, b) targeting the data in the database, c) pre-processing the data (de-noising, conversion, scaling, dimension reduction, feature extraction, etc.), d) the use of data mining algorithms and, e) pattern/correlation recognition.. This process is shown in Figure 1.

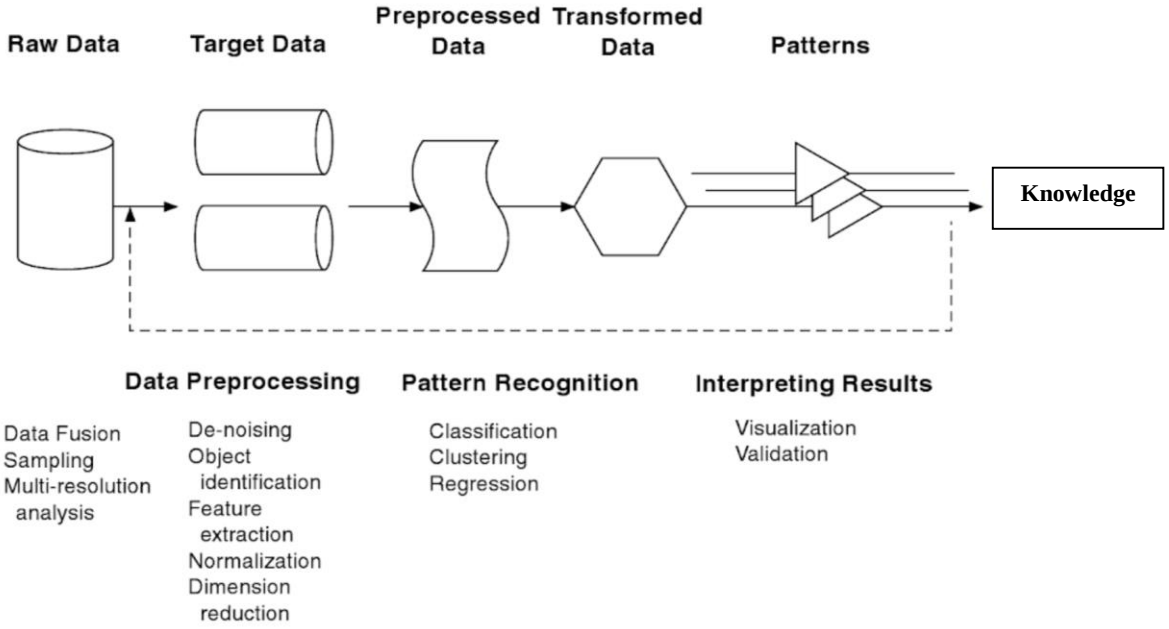

Figure 1. Schematic Process of Data Mining (Keyes, 2006)

Figure 1 presents the schematic process diagram for data mining. This process involves the stages of a) selecting the data hidden in the databases, b) pre-processing the selected data (processes related to noisy data and missing observations, data conversions, feature extraction and feature inclusion, dimension reduction, etc.), c) pattern recognition (classification, clustering, relationship mining, sequential analysis etc. algorithms) and d) the presentation of the findings and information obtained.

The information dimension, which is the stage after pattern recognition in the data set, is related to the use of the information obtained in the decision-making process and since the use of information implies intelligence, this process and its follow-up process is called business intelligence (Keyes, 2006).

In educational environments, learners leave a lot of unstructured traces (log data) behind in e-learning environments. Educational data mining allows for uncovering the meaningful and implicit patterns from these unstructured data of the learners. Educational data mining refers to the development of various methods to reveal the significant and implicit patterns from the data that are present in educational environments in structured and/or unstructured way and the use of the methods developed accordingly (Baker and Siemens, 2014). Several methods such as estimation, structure discovery, relationship mining can be employed in the use of these implicit patterns. The method/s to be employed may vary according to the purpose of the study. Prediction models include classification and regression; structure discovery includes clustering and factor analysis while relationship mining incorporates association rule and sequential pattern mining (Baker and Inventado, 2014).

Past and Present of EDM

Many resources on the history of data mining have identified the beginning of data mining with the history of the algorithms used in data mining. For example, there are some studies that point to the Bayes theory in the 1700s or regression analysis in the 1800s (Berry and Linoff, 2004). These studies also highlight neural networks, clustering, genetic algorithms (the 1950s), decision trees (the 1960s), and support-vector machines (the 1990s) (Wu et al. 2008).

The first application of data mining in education is the study by Sanjeev and Zytkow (1995) that seeks to make institutional decisions in a university database. Further, there are workshops and conferences in the literature on the field of EDM. The first conference on EDM was the "International Conference on Artificial Intelligence in Education" in 1982 and the first workshop was the "Workshop on Applying Machine Learning to ITS

Design/Construction" in Canada (Romero and Ventura, 2013). Figure 2 presents the historical development of the field of EDM.

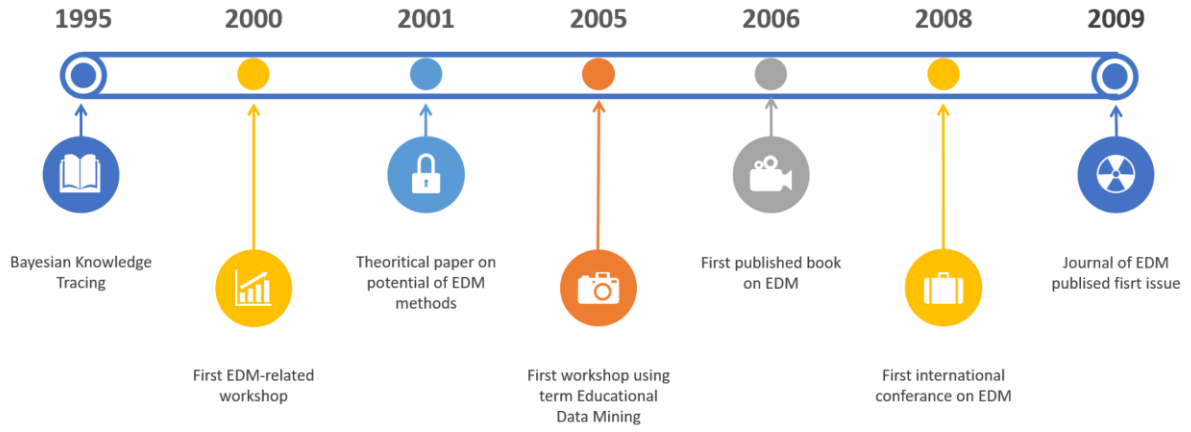

Figure 2. Historical Development of Educational Data Mining (Baker and Inventado, 2014)

As seen in Figure 2, 1995 and the 2000s witnessed the development of the first algorithms and the organization of the first workshops. Hence, publications were made based on the emerging knowledge and the EDM magazine was commenced. The year 2011 featured the first concrete examples of the applications of EDM algorithms in online learning environments with the use of learning analytics.

The studies on EDM are as follows in chronological order:

- The years between 1995-2005 focused on relationship mining,
- Prediction methods were popular from 2005 to 2009,
- Various methods such as the Item Response Theory, the Bayesian Network and Markov Chain have been used in the framework of psychometric analysis and learner modeling since 2009 (Baker and Yacef, 2009).

Today, there are four basic domains when it comes to the key application areas of EDM. These domains are identified as follows by Baker (2010):

- Student Model: Modelling of students according to different personal characteristics including prior knowledge, attitude, motivation and meta-cognition strategies.
- Domain Model: Discovering or improving models of the knowledge structure of the domain.
- Pedagogical Support: Improving and testing the applications that may provide pedagogical support such as discovering which pedagogical support is most effective for which student.
- Investigating the key factors that affect learning in more depth in order to design better learning environments and providing empirical evidences.

Worth mentioning here is the relationship between educational data mining and learning analytics that include similar aspects but are aimed at shaping instructional design and processes, particularly in 2011-2012. Although the essence and boundaries of both concepts (educational data mining and learning analytics) were vague in these years, these concepts are today well-defined. Siemens and Baker's (2012) study titled "learning analytics and educational data mining: towards communication and collaboration" serves as a manifesto and calls for resolving this confusion, determining the boundaries of these fields and collaboration.

Future of EDM

EDM enables researchers to discover patterns by using various data including learner interaction data, self-report data and data warehouses. In addition to these data obtained in the virtual web, many data from the physical web obtained through sensors are now included in the big data. These sensor technologies are featured as an

application of the Industry 4.0. The use of these sensor technologies in education is a recent development. With the improvement of such applications, sensor technologies can transfer and store a lot of data about educational environments. And, EDM will allow for the identification of patterns from these data. In the very near future it seems that studies will be performed on EDM and the Industry 4.0 and one of its application areas, "(Internet of Things-IoT)."

EDM has the potential to substantially help researchers in discovering the patterns in the interaction data in the Learning Management Systems (LMS) and in designing more effective learning environments. It is further reported that EDM would provide opportunities for researchers and designers to develop personalized learning environments and suggestion systems (Huebner, 2013). Besides, it can be used in developing decision support systems to minimize instructional intervention (Bienkowski, Feng, and Means, 2012).

Today, EDM more focuses on "student model", which is a key component of learning systems, compared to learning analytics. Naturally, the most important study area of EDM is Intelligent Tutoring Systems (ITS) where there is no human tutor. On the other hand, LA usually plays a critical role in the design of LMS. Hence, studies on the integration of LMS and ITS to combine the forces of EDM and LA have increased in the recent times (Aleven et al. 2015; Aleven et al. 2016). Indeed, Aleven et al. (2015) titled their study "The Beginning of a Beautiful Friendship? Intelligent Tutoring Systems and MOOCs."

Promising subjects for the future of EDM include updating, optimizing and improving algorithms based on machine learning and expert systems in artificial intelligence applications in education.

Learning Analytics

The study (two sigma problem) by Bloom (1984) reported that one to one tutor support increases learners' learning outcomes by two standard deviations. Thus, with developing technology, various e-learning environments have been presented to learners to support and improve learners' learning processes. These environments are the environments in favor of autonomous learners, that is, the learners who take responsibility for their own learning and organize their own learning experiences. However, these e-learning environments fail to support learner autonomy (Simic, Gasevic, and Devedzic, 2004). Educational data mining and learning analytics offer some important opportunities to overcome the drawbacks of e-learning environments (Shabani, Zahra, and Eshaghian, 2014). This section presents information on learning analytics as the previous one is on educational data mining. Learning analytics is the measurement, collection, analysis and reporting of data about learning environments for the purposes of understanding and optimizing learners and the environments in which it occurs (Siemens and Gasevic, 2012). A key concern of learning analytics is the gathering and analyzation of data as well as the setting of appropriate interventions to improve the learners learning experience (Greller, Ebner, and Schön, 2014). Based on these definitions, it can be stated that educational data mining refers to discovering the implicit patterns hidden in the data on education environments whilst learning analytics refer to the use of these implicit patterns uncovered to improve learning environments. Learning analytics are involved in an iterative and a formative process. Figure 3 shows the processes related to learning analytics.

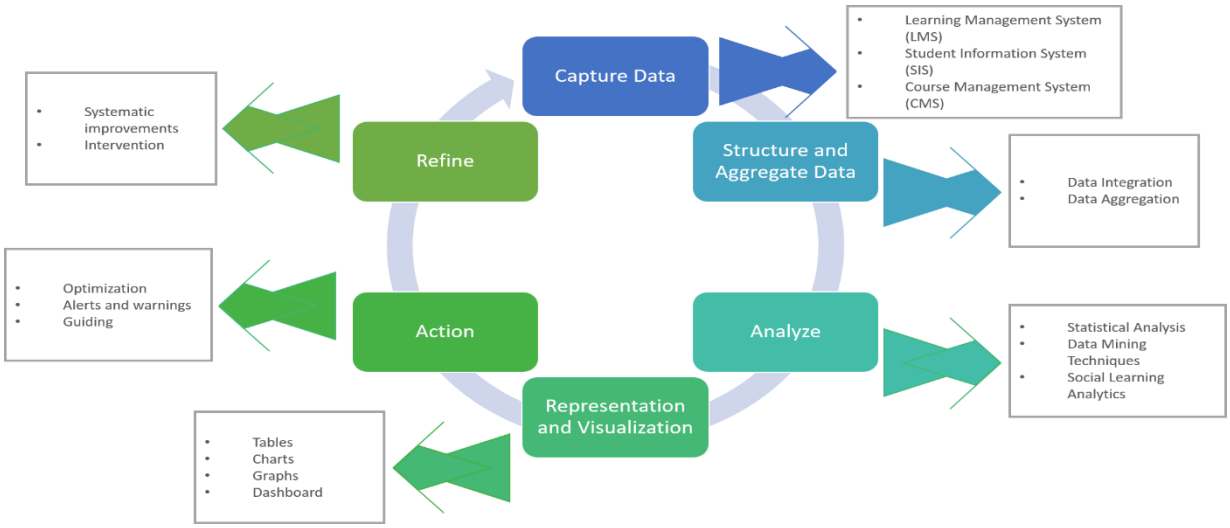

Figure 3. Learning Analytics Process (Lal, 2014)

As seen in Figure 3, learning analytics process has a cyclical structure, which starts with capturing data and ends with refining. The outputs of one study are the inputs of the next study in learning analytics studies. As for the data of learning analytics, the following sources can be used: Learning Management Systems (LMS), Student Information Systems (SIS), E-Learning Environments and recently developed Intelligent Tutoring Systems (ILMS). The next step after capturing data is structuring the data, that is, obtaining quality data, and making the data ready for analysis. Educational data mining processes and techniques are employed in this step. In the analysis step, different methods such as statistical analyses, data mining techniques, social learning analytics, etc. can be used. Following the recognition of implicit structures and patterns in the analysis step, information can be presented to learners, tutors, researchers and managers, namely stakeholders, by using tables, charts, graphics, word clouds and learning dashboards. The process of designing the system is followed by the action step where the developed environments are presented to stakeholders. The last step is refining, which involves systematic improvements. After this step, the outputs and data obtained from this study are used as the input and data of the next study, and the learning analytics process continues in an iterative and a formative way.

Some reference models have been introduced to ensure a better understanding of learning analytics and these models seek to answer some questions. One of those models is the reference model put forward by Chatti, Dyckhoff, Schroeder, and Thüs (2012), which is shown in Figure 4.

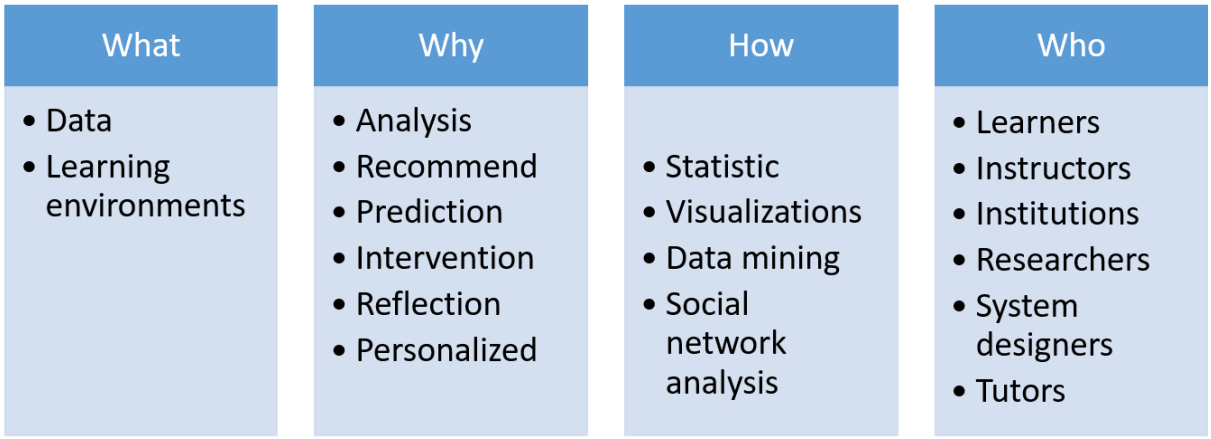

Figure 4. Learning Analytics Reference Model (Chatti, Dyckhoff, Schroeder, and Thüs, 2012)

Figure 4 shows that learning analytics basically seek to answer what, why, whom and how questions for the optimization of learning environments. Learning analytics utilize learning management systems, content management systems, student information systems, etc. as data sources. Based on these data, a lot of information and resources are offered to learners, tutors, managers, institutions, researchers and designers. Learning analytics enable a) learners to have adaptive feedbacks, recommendations and improve learning performance, b) educators to understand their students' learning processes and understand social, cognitive and behavioral aspects, c) researchers to evaluate learning effectiveness, d) administrators to assess the effectiveness of their institutional resources (Romero and Ventura, 2013). Based on purpose, these data can be used for analysis, prediction, intervention, mentoring, evaluation, adaptation, personalization, reflection, etc. In that regard, learning analytics can be utilized through different techniques such as statistics, data mining, social network analysis, visualization. It is worth noting that learning analytics use visualization as a technique. Some studies consider learning analytics merely as learning dashboards. Yet, learning analytics are a much broader concept. Learning dashboard is the application of the analytics used to interpret teacher and student findings, including the visual presentation of the data obtained through data mining (Pardo and Dawson, 2016). Learning dashboards are a visual element used for the presentation of learning analytics.

Past and Present of Learning Analytics

The studies on learning analytics can be grouped in three periods: a) the studies performed before 2011, b) the studies performed between 2011-2014 (the 2011 Learning Analytics Conference) and c) the studies performed after 2014 (Journal of Learning Analytics) (Peña-Ayala, Cárdenas-Robledo, and Sossa, 2017). Yet, learning analytics were presented in the time-to-adoption horizon of 4-5 years in the 2011 Horizon Report prepared by the New Media Consortium and in the 2011 Learning Analytics Conference, which attracted the attention of researchers. Further, in 2019, analytics technologies were considered in the horizon of one year or less. Learning analytics were first introduced in 2011 and is now a young field of research with increasing popularity. The following fields contribute to the development of this young field: a) citation analysis, b) social network analysis, c) user modelling, d) education/ cognitive modelling, e) tutors, f) knowledge discovery in databases, g) adaptive hypermedia and h) e-learning (Siemens, 2013).

In the initial studies, learning analytics were merely considered as a type of learning dashboards (Şahin, 2018). Yet, learning dashboards are one of the means to present the uncovered patterns. Learning analytics are far from being merely learning dashboards; it is a much broader concept. Learning analytics include interventions to the system or the individual. The interventions to the system are made through adaptive engines whilst those to the individual are made with intervention engines. There are a number of studies on adaptive engines, but the studies on intervention engines are limited. The study by Mckay et al. (2012) titled E^2Coach (Electronic and Expert Coach) may be considered as an example for these studies. Another study on this field is Arnold and Pistilli's (2012) study titled Course Signal. These two studies can be named as the first and pioneering studies where learning analytics are used in the context of intervention to learning environments and learning process. Other studies on intervention engines in the literature also include intelligent systems; indeed, Tlili et al. (2018) developed iMoodle and Şahin (2018) introduced the Intelligent Intervention System.

Learning dashboards served as a tool to provide only feedback interventions in the past. These interventions were structured based on the design elements of a visual message. However, today, it is possible to design not only feedbacks but also feed-forwards through learning dashboards. In this sense, the concept of intervention cannot be reduced to feedbacks. Since the concept of intervention incorporates both feedbacks and feed-forwards. It can be thus said that every feedback is a kind of intervention, but not every intervention is a feedback. Learning dashboards can be structured in different ways according to educational, supportive and motivational intervention types. Efforts are already underway to better design learning dashboards.

Future of Learning Analytics

In this study, the studies on the future of learning analytics are categorized in five main headings: a) personalization of learning processes, b) learning design, c) learning experience design, d) dashboard design and e) the Industry 4.0 applications. This section elaborates on these concepts.

It is important for the future of learning analytics that learners personalize their learning processes (Siemens, 2013). In using learning analytics to personalize learning environments and improve learning experiences, learning

analytics were not discussed in relation to their potential in daily teaching activities (Bakharia et al., 2016). One of the things that come to mind when one thinks of the personalization of learning processes is learning design. Learning design is a methodology used to design learning activities and interventions with the effective use of concepts and technologies (Conole, 2012), which focuses on the learner context and constructivist approach in learning activities (Mor and Craft, 2012). Since learning design deals with the ways to optimize learning environments or to design different interventions for learning environments. The concept of learning design was first articulated in the Larnaca Declaration in 2012. Afterwards, many researchers, particularly those in the Open University in London, studied this concept. There is a notable pedagogical gap between learning analytics and learning design in the studies on learning analytics (Bakharia et al., 2016). Many data are already stored in learning environments and can be processed by various methods. Yet, learning design helps researchers in determining which metrics in these data have an important role in media and instructional design. Therefore, it seems that the gap between learning analytics and pedagogical information can be addressed by combining learning design and learning analytics. To offer a solution for this problem and to represent it, some frameworks have been put forward by researchers. The advantage of developing a common framework should be seen in establishing understanding, validity, reliability and direct support by clear guidance of the types of analytics and tools essential for particular learning contexts (Mangaroska and Giannakos, 2018). A review of the literature reveals the Learning Analytics Design put forth by Ifenthaler (2017), the framework for temporal analytics, tool-specific analytics, cohort dynamics, comparative analytics and contingency developed by Bakharia et al. (2016) as well as the Analytics Layers for Learning Design (AL4LD) introduced by Hernández-Leo et al. (2019).

One of the advantages of learning analytics and learning design is that it is possible to determine which learning designs lead to higher achievement and better student engagement (Nguyen, Rienties, Toetenel, Ferguson, and Whitelock, 2017). More research on learning design and learning experiences can be performed to further improve learning analytics. Learning experiences design includes support and guidance to learners in their learning experiences rather than instructors and designers. Learning design is a methodology for enabling teachers and designers to make more informed decisions in how they go about designing learning activities and interventions, which makes effective use of appropriate resources and technologies (Conole, 2012). In this regard, it is expected that learning design guides teachers and designers about the types of interventions, content and learning activities that will be present in the system. Moreover, it can offer insights into which designs are favored more by learners. The design of learning experiences includes the processes related to learners rather than instructors and designers. Learners are provided with support and guidance throughout their learning experiences.

Moore (1989) reported three types of interaction in learning environments: learner-content, learner-learner and learner-instructor interactions. Yet, with technological developments, these types have improved and new types of interaction have been introduced. Learners in online learning environments can also interact with their assessment tasks (Özgür and Yurdugül, 2016). Today, the interaction with learning dashboards, which are one of the applications of learning analytics, is considered as a type of interaction too (Khan ve Pardo, 2016; Rei, Figueira ve Oliveira, 2017). As learners can be provided with information, such as daily individual performance, comparison of individual performance with group performance, and estimated success, through these learning dashboards. The knowledge of which performance indicator/s reviewed by the learner for a longer time and of what kind of interaction pattern the learner is involved in after their review, offers some important insights for researchers and designers. This allows for the improvement of designs based on the revealed patterns.

One of the promising fields for the future of learning analytics is the Industry 4.0 applications. Particularly Internet of Things (IoT) and Internet of Educational Things (IoET), which is an extension of IoT in learning environments, are expected to play a critical role in the studies on learning analytics. Since sensor technologies are today widely used in almost every area and the data obtained from these sensors are gathered in data warehouses to yield significant patterns. These patterns are shared with the stakeholders. The purpose of learning analytics is to optimize learning environments; so, in this way, not only the interaction data (log data) in learning environments but also the data obtained from sensors in the future can be utilized to optimize these environments.

Discussion and Conclusion

This study is concerned with the concepts of educational data mining and learning analytics, which has considerably expanded as a study field especially after 2011 and were included in several Horizon Reports. Accordingly, it first describes the concepts of educational data mining and learning analytics and offers a historical

overview of the concepts. It is notable that there has been an ongoing conceptual confusion regarding educational data mining and learning analytics. Yet, these concepts are based on two different areas. EDM is rooted in educational software and student modelling; in contrast, LA origins are related to the semantic web, "intelligent curriculum", outcome prediction and systemic interventions (Romero and Ventura, 2013). This study also aims to reveal the differences between these concepts. It presents the historical development of educational data mining, its stages, algorithms or methods, as well as its past, present and future. It further includes the processes of learning analytics and the questions it seeks to answer. The previous and current studies on learning analytics as well as subjects that may be promising for further studies are covered in this study to guide and lead the way for researchers. This study will potentially help researchers in studying educational data mining and learning analytics by enabling them a) to understand these concepts and their differences, b) to have an understanding of the processes related to them, c) to gain insight into the previous studies and d) to develop a perspective towards future studies in the field.

Although it is reported that EDM and LA follow a common goal, which is to optimize learning and to increase performance, they are occasionally mistaken for each other. They consist of components similar both in terms of process and origins. Thus, these concepts were intertwined until 2011; yet today, they are differentiated from each other by clear boundaries.

Their similarities and differences should be discussed in two levels: a) process and b) application. To clarify the link between these two concepts in terms of process, it is useful to mention an analogy based on the concepts of analysis and analytics: "Is it analysis or analytics?" Whilst analysis seeks to reveal the links and patterns hidden in data, analytics is about the presentation and communication of the information obtained from the patterns for effective decision-making. In this analogy, the concept of analysis refers to EDM whereas the concept of analytics refers to LA.

As for application, EDM mostly deals with automated systems based on the student model (where human intervention is minimal) while LA is about system designs where an instructor is present. To elaborate further on this point, the above-mentioned definitions involve an effective decision-making based on the patterns in the data and it is critical who makes the decision. If it is the machine who will make the decision based on the information obtained from the patterns (automated processes), this learning practice can be considered as an application of EDM. On the contrary, if it is a human, e.g. the instructor or learner, this can be considered as an application of LA.

Thus, the Intelligent Tutoring Systems are based on EDM and particularly on the user model. However, the pre-configured applications such as Learning Management Systems focus on LA more. This distinction can be also made with the presence or absence of a human tutor. A learner needs two different interventions/support in a learning process in the context of out-of-school teaching technologies. These are respectively supports required by the learner in learning and problem-solving steps. The supports in learning process are rather educational, supportive and motivational interventions. Those in problem-solving steps benefit from tutoring systems. These systems focus more on the intensive user model, the dynamic Bayesian networks, the Hidden Markov models and an extension of these models, namely the "Bayesian Knowledge Tracing" models; and, these approaches have been substantially studied in relation to EDM.

Today, there are ongoing efforts to reunite these two fields, which were separated from each other by clear lines in 2011. The greatest motivation behind these efforts is to make the new generation Learning Management Systems (LMS) intelligent and to combine MOOCs with Intelligent Tutoring Systems in a single system, since it is believed that video analytics, text analytics and learning dashboards in MOOCs fail to support the learner's learning experience. Barenes et al. (2016) emphasized that Massive Open Online Courses (MOOC) systems like EdX, Coursera, Canvas and UdaCity are limitedly supported by learning analytics and that it is necessary to improve these systems and combine them with ITSs to support the learner in problem-solving steps, and further to integrate the data of both systems. This emphasis is also to co-use LA and EDM in application.

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Keeping Online Diary as an Integrated Activity for Developing Writing Skill in EFL Classes through Penzu

Erkan Yüce*[a]

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Abstract

The present study focused on one of the Web 2.0 tools, Penzu. Penzu is a kind of online diary through which users can easily take notes and keep them on the Web. The study discussed the applicability of Penzu in foreign language classes as an integrated activity to develop language learners' writing skills. In this respect, a sample Penzu page was prepared and introduced to foreign language teaching instructors at a state university in Turkey. The study followed a qualitative inquiry. Face-to-face interviews were conducted with the participants, and the data were collected through semi-structured interview questions. After analyzing the data, the results were reported descriptively. The results primarily indicated that the language instructors were in favor of implementing Penzu as an integrated activity in foreign language teaching classes to enhance students' writing skills. The study also reported several strengths and weaknesses which may promote or hinder the implementation of Penzu in language education contexts. All in all, this study attempted to enrich traditional foreign language teaching classes by implementation of Penzu as an integrated activity for writing skill, and to pave the way for further studies that foster application of Web 2.0 tools in language education contexts.

YDİ Sınıflarında Penzu Yoluyla Yazma Becerisini Geliştirmek İçin Bütünleşik Bir Etkinlik Olarak Çevrimiçi Günlük Tutma

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Öz

Bu çalışma, Web 2.0 araçlarından biri olan Penzu üzerinde durmuştur. Penzu, kullanıcıların kolayca not alabilecekleri ve onları Web 'de tutabilecekleri bir tür çevrimiçi günlüktür. Çalışma Penzu'nun yabancı dil sınıflarında dil öğrenenlerin yazma becerilerini geliştirmek için bütünleşik bir etkinlik olarak uygulanabilirliğini tartışmıştır. Bu bağlamda, örnek bir Penzu sayfası hazırlanmış ve Türkiye'deki bir devlet üniversitesinde yabancı dil okutmanlarına tanıtılmıştır. Çalışma nitel bir araştırma izlemiştir. Katılımcılar ile yüz yüze görüşmeler yapılmış ve veriler yarı yapılandırılmış görüşme soruları aracılığıyla toplanmıştır. Verileri analiz ettikten sonra, sonuçlar tanımlayıcı olarak bildirilmiştir. Sonuçlar, öncelikle dil okutmanlarının, öğrencilerin yazma becerilerini geliştirmek için Penzu'yu yabancı dil öğretimi derslerinde bütünleşik bir etkinlik olarak uygulama taraftarı olduklarını göstermiştir. Çalışma ayrıca, Penzu'nun dil eğitimi ortamlarında uygulanmasını teşvik edebilecek veya engelleyebilecek bazı güçlü ve zayıf yönleri de bildirmiştir. Sonuç olarak, bu çalışma, Penzu'nun yazma becerisi için bütünleşik bir etkinlik olarak uygulanmasıyla geleneksel yabancı dil öğretimi sınıflarını zenginleştirmeye ve Web 2.0 araçlarının dil eğitimi ortamlarında uygulanmasını teşvik eden yeni çalışmaların önünü açmaya çalışmıştır.

***Corresponding Author:** erkanyuce@nevsehir.edu.tr
[a] Dr., Nevşehir Hacı Bektaş Veli University, Nevşehir, Turkey, http://orcid.org/0000-0003-2716-5668

Introduction

Writing as a process can become motivationally challenging especially for non-native language learners as it necessitates special attention and immediate feedback on the text when compared to speaking, though being able to write at a desired level may bring rewards from different domains of life (Brunning, 2000; Olshtain, 2001). Olshtain (2001) stated that writing as a skill in communicative language teaching takes a special attention as it enables to send messages in different ways at various contexts, and writing must be supported in language learning as a communicative activity.

The Web technologies gained an indispensable part not only in daily life but also in education contexts by offering learners a variety of learning opportunities and professionals can benefit from their advantages by employing Web 2.0 tools in education contexts (Arslan, 2018; Dizon & Thanyawatpokin, 2018; Hurlburt, 2008; Li, Bado, Smith, & Moore, 2013). Web 2.0 tools can be very valuable especially in foreign/second language writing classes. Instructors can benefit from free online tools in a variety of ways from designing integrated activities for students to giving feedback in an online environment. From simple texts to complex texts, writing requires several points that must be followed such as coherence, cohesion, punctuation, grammatical accuracy, etc. in order to convey the intended messages to interlocutors. As this point, Web 2.0 technology can provide engaging tools, which can present interesting activities and foster learner autonomy, in order to practice language skills by replacing real classroom contexts with online environments (Pop, 2010).

This study focuses on the application of one of these Web 2.0 tools, Penzu, as an integrated activity in EFL writing classes. Penzu is an online diary which can also be used as an online journal. It can be used either online or as an application by downloading to phones or tablets. You can use Penzu and customize your page at any time during the day (Murray, 2017). The current study investigated the applicability of Penzu in foreign language classes as an integrated tool to develop language learners' writing skills. It can be regarded as an important one as previous studies did not focus on instructors' views on the applicability of Web 2.0 tools with specific reference to Penzu as an integrated activity in developing students' writing skills. The findings of this study can fill this gap, and contribute to classroom applications in language education contexts. Therefore, the research question of this study is:

- What are the perceptions of EFL instructors concerning online diary (Penzu) applications in developing writing skill in EFL classes?

Literature Review

Popularity of blogs or online diaries has increased recently among the Internet users, mostly among teenagers, by affecting their writing behaviors, and combining teaching practices with blogs or online diaries in educational contexts has become the subject of many studies for different purposes (Bloch, 2004; Coşkun & Marlowe, 2015; Featro & DiGregorio, 2016; Meechai, 2010; Morgan, 2012; Mynard, 2007; Noytim, 2010; Vurdien, 2013). The studies which are directly related to the current study were provided in this section.

Several studies reported findings related to the implementation of Web 2.0 tools in terms of writing skill. For example, Blackmore-Squires (2010) investigated the impact of blog use in improving writing skill in second language learning. Questionnaires, interviews and the comments made by students on the blog were employed to gather data from the students. The results revealed that the students were in favor of the blog use, and the blog helped them to enhance their writing. Similarly, Noytim (2010) explored the potentials of Weblog practices on English language learning through the views of students at a university context in Thailand. Questionnaires and student blogs were used to gather data. The results reported that the participants viewed blogs as effective tools contributing their writing and reading skills in English. McGrail and Davis (2011) questioned the impacts of blogging on students writing development. Blogging posts of fifth grade students at elementary level were collected as primary data and were analyzed through content analysis. The results indicated that the students took ownership of their writings after blogging. Additionally, Alshumaimeri (2011) figured out the implementation of wikies in developing students' foreign language writing performance in Saudi Arabia. The results revealed that the target group performed better than the other group in terms of accuracy and quality in writing. Furthermore, Dizon and Thanyawatpokin (2018) tried to compare the implementation of Facebook and blogs on writing skill with regard to syntactic complexity, lexical variety and fluency at a Japanese EFL context. The results showed that blogging was more influential in promoting of EFL writing and the students had more favorable attitudes

towards blogging in EFL writing than the students in Facebook group. Lastly, Alsmari (2019) searched for the use of Edmodo, one of Web 2.0 tools, as an integrated tool in Saudi students' EFL writing skills. The results indicated that Edmodo was very effective in developing their writing skills.

There are also studies regarding the implementation of Web 2.0 tools in developing other language skills and application of these tools in language education contexts. For example, Sun and Yang (2015) integrated Web 2.0 tools into EFL speaking classes, and reported that this process helped students to enhance their speaking skills in English. Aşıksoy (2018) tried to reveal the attitudes of ELT students towards Web 2.0 tools in improving their language skills. The results indicated that most of the students had insights on Web 2.0 tools in EFL learning. Also, the students expressed that Web 2.0 tools support them in developing their foreign language skills, especially listening skill. Furthermore, Mynard (2007) explored the blog keeping habits of Japanese female college students. They kept blogs in order to reflect on their language learning during their stay in the UK for learning English. The results suggested the application of blogs in language education contexts. Ulrich and Karvonen (2011) investigated the integration of Web 2.0 tools into formal online learning settings. The results highlighted several areas for professional development, design in instruction and institutional changes. Balbay and Erkan (2018) investigated both the perceptions of ELT instructors regarding the Web 2.0 technology use in academic English classes at university context and the effects of using Web 2.0 tools in teaching. The results indicated important changes in the instructors' perceptions towards Web 2.0 tools use in classes. Cho and Casteneda (2019) searched for whether a grammar-focused mobile application causes motivational and affective engagement in Spanish courses. The results revealed that the mobile application helped students in facilitating their engagement.

Method

Research Design

This study was carried out in the spring term of 2018-2019 academic year. The study tried to explore the views of foreign language instructors on the applicability of Penzu in foreign language classes as an integrated tool to develop language learners' writing skills. Accordingly, a sample Penzu page was prepared and introduced to the participants. The study followed qualitative inquiry and collected data through face-to-face interviews. Semi-structured interview questions were directed to the participants to collect the data. The researcher wrote the expressions of participants during the interviews. Descriptive analysis was applied to the data. The results were categorized and presented through tables and quotations from the participants.

Study Group

The study was conducted at School of Foreign Languages of a public university in Turkey. The participants were instructors of foreign languages, and they were chosen purposefully and conveniently in line with the purpose of study (Bernard, 2000; Patton, 2002). Only volunteer instructors were included in the study. There were nine participants in total. Most of them (n=8) were EFL instructors and only one of them was instructor of French (n=1). Their experiences in teaching foreign language ranged from three years to twenty-five years. There were three instructors who graduated from an English Language and Literature (ELL) department, four instructors who graduated from an English Language Teaching (ELT) department, and one instructor who graduated from a French Language Teaching department (FLT), and one instructor who graduated from an English Linguistics (EL) department.

Data Collection Tool

An interview form involving four semi-structured interview questions was developed by the researcher. The questions addressed at investigating the views of participants on the applicability of Penzu in foreign language classes as an integrated tool to develop language learners' writing skills. The questions focused on applicability of Penzu as an online diary in developing foreign language learners' writing skills, applicability of Penzu as an integrated activity in foreign language writing classes, strengths and weaknesses of Penzu. The semi-structured interview questions of this study were: 'Can Penzu as an online diary help foreign language learners to develop their writing skills?', 'Can we use Penzu as an integrated activity in foreign language classes to develop learners'

writing skills?', 'What are the strengths of Penzu as an online diary?' and 'What are the weaknesses of Penzu as an online diary?'.

Data Collection

Firstly, the researcher introduced Penzu to the participants, and they were required to engage in the features of Penzu. After they had gained insight about Penzu, they were interviewed by the researcher on face-to-face basis. The interviews took nearly half an hour. The researcher noted the expressions of participants during the interviews. The researcher labelled each participant with an alphabetical letter from "A" to "H" to ensure the confidentiality of their identities.

Data Analysis

After the interviews, the data were analyzed by the researcher and an expert in the area. Descriptive analysis was applied to the data. The themes were defined in line with the interview questions, and direct quotations from the participants were given to reflect the participants' views in a clear and striking way (Yıldırım and Şimşek, 2016).

Trustworthiness

Member checking, intercoder agreement, peer review and external audits strategies were followed by the researcher in order to ensure the trustworthiness of the processes (Creswell & Miller, 2000; Creswell, 2007; Patton, 2002). First, the interview transcriptions were shared with the participants to prevent any misunderstanding. Next, the interview transcriptions were shared with other experts to seek agreement on the data set. Then, processes followed by the researcher were discussed with a peer who had experience on the subject. Last, a reviewer provided comments on the processes which were followed during the study.

Findings

Whether Penzu as an online diary can help foreign language learners to develop their writing skills was investigated in the first interview question. The following table (Table 1) shows the results of descriptive analysis for this interview question:

Table 1. Penzu as an Online Diary

Theme	Category	Participants	n	Total
Writing Skill	Positive Views	A, C, D, E, F, G, H	8	9
	Negative Views	B	1	

According to Table 1, most of the participants (n=8) think that Penzu as an online diary can help foreign language learners to develop their writing skills, while only one of the participants (n=1) expressed negative view regarding Penzu. Sample quotations from the participants for this interview question are as follows:

A: "Exactly. Writing online and having the possibility of correcting mistakes help a foreign language learner to develop writing skill."

B: "If a person likes writing, even just one piece of paper is enough. So, this website can only be helpful for such kind of learners. For others, I don't think it will be useful."

C: "I searched the site. I think it might help. This site provides a positive contribution to improving students' writing skills."

D: "I suppose that it would help in certain aspects. In my views, getting the students do it regularly could be the main issue with this part."

E: "I think it can only help foreign language learner develop their fluency in writing. Their accuracy in terms of grammar, vocabulary or punctuation will not develop because of lack of assessment or feedback. It can also help them in developing their creativities."

F: "Yes, it can."

G: “Penzu can improve learners’ creative writing skills.”

H: “I believe in the usefulness of this online diary to improve greatly pupils’ writing skills.”

Whether we can use Penzu as an integrated activity in foreign language classes to develop students’ writing skills was investigated in the second interview question. Table 2 shows the results of descriptive analysis for this interview question:

Table 2. Penzu as an Integrated Activity

Theme	Category	Participants	n	Total
Integrated Activity	Positive Views	A, B, C, D, F, G, H	8	9
	Negative Views	E	1	

Table 2 shows that most of the participants (n=8) had positive views regarding that we can use Penzu as an integrated activity in foreign language classes to develop students’ writing, while only one of them (n=1) had negative views. Quotations from the participants for this interview question are as follows:

A: “Of course, we can.”

B: “Using technology may affect some students positively.”

C: “Yes we can use it, because students are already using the internet constantly.”

D: “Yes, it seems possible. The question is how to get students do it use it regularly.”

E: “Since it is the online form of an ordinary journal, there is nothing special about it other than appealing to students who like technology. However, they print out the material and take it to the classroom for feedback or assessment, it will serve the purpose. Again, students who keep an ordinary journal can also bring their writings to class.”

F: “Yes, we can.”

G: “It can be given as daily/weekly homework.”

H: “Written assignments could be inflicted over Penzu, where teacher evaluation can be performed and realized online by teachers having assigned related posts.”

The participants’ views on the strengths of Penzu as an online diary was investigated in the third interview question. Categories obtained for this interview question are as follows:

Table 3. Strengths of Penzu

Theme	Category	Participants	n
Strengths	Appealing for New Generation	A, B,C, E, F, D	8
	Being Free of Charge	B, G	2
	Availability	B, C, E, F, H	5

According to Table 3, the strengths of Penzu as an online diary was categorized under 3 main categories and these are ‘appealing for new generation’, ‘being free of charge’ and ‘availability’. Quotations from the participants for this interview question are as follows:

A: “Students have difficulty in writing on a paper. But if they can write as they text, it will be much easier.”

B: “Unfortunately, I could not see any.”

C: "In my opinion, the most advantageous part of the site in question is that it is always online, available and not too boring for students."

E: "It appeals to new generation who do not like paper and pencil. It is customizable. Students can decorate their online journal according to their own delight. They can change color, font or add photos easily. Penzu has a mobile app so it is available wherever students go. They won't lose their writings because the program or the app stores them online."

F: "You can use it both on the Web and mobile. Students may prefer writing online to writing on a paper. It is easy to share journals via e-mail."

G: "It is free of charge. Students can use it as a personal diary."

H: "Internet connection could once be a problem, but now that is so irrelevant. I can't think of any problems caused by Penzu-based homework or assignments."

The participants' views on the weaknesses of Penzu as an online diary was investigated in the fourth interview question. Table 4 presents categories obtained for this interview question as:

Table 4. Weaknesses of Penzu

Theme	Category	Participants	n
Weaknesses	Giving Feedback	B, E	2
	Penzu Pro	E, F	2

According to Table 4, 'giving feedback' and 'Penzu Pro' were two categories that two participants expressed similar views on the weaknesses of Penzu as an online diary. The other participants expressed different views on the weaknesses of Penzu as an online diary. Quotations from the participants for this interview question are as:

A: "There is nothing to do if the student is not willing to write. So, at this point Penzu should encourage students to write."

B: "What I found missing in this platform is a virtual classroom, where participants can see each other's' work. Yet, I don't mean public in general instead the real classmates. Moreover, almost everything is charged with a fee via Penzu Pro. Another annoying thing about this website is that it sends "how is your day" message every day."

C: "As an online diary, I can't say that it has many weaknesses, but I think the diaries that the students write are too difficult to control."

E: "Students cannot get feedback from their teachers or peers. Some premium features of the program need paying. Some old school may worry about privacy."

F: "It is more of a personal thing rather than being a classroom material. There is not a teacher student module. Therefore, it is impossible to give feedback on Penzu."

G: "It lacks progress monitoring tools. Guided writings cannot be designed as homework. There are no daily/weekly topics."

Discussion and Conclusion

The current study primarily indicated that the EFL instructors were in favor of implementing Penzu as an integrated tool in foreign language teaching classes to enhance students' writing skills. Findings obtained from this study supports the previous research studies indicated in the literature. For example, Coşkun and Marlowe (2015) both introduced Web 2.0 tools of Animoto and Fotobabble for ELT contexts, and tried to reveal EFL instructors' attitudes towards their implementation in ELT. They reported that the participants had positive views on their application in language teaching. Anglin (2017) stated that the teachers had positive views on Web 2.0 tools as these tools support students in terms of learning, building community and presenting instruction in different ways. Similarly, Güler and Özkan (2018) investigated prospective EFL teachers' opinions on the

usages of Web 2.0 tools with specific reference to podcasts and to what extent they benefit from podcasts in their education contexts. The results demonstrated that the participants are in favor of using podcasts in their practices. Likewise, Park (2013) provided college instructors with guidance on Web 2.0 tools to increase learner engagement in tasks, and suggested practical ways for using various Web 2.0 tools in order to foster engagement in reading tasks at classroom contexts.

However, one of the participants (E) stated that instructors who are digital immigrants may worry about their application educational contexts in relation the weaknesses of Penzu as an online diary. This finding also supports previous studies. For example, Morgan (2012) stated that explicit teaching is required in order to benefit from these tools' potentials in a maximum way. Moreover, Konstantinidis, Theodosiadou and Pappos (2013) provided a source of Web 2.0 tools for education contexts in order to motivate teachers to use these tools in their classes. The teachers with low technology skills showed positive attitudes towards them.

In conclusion, this study showed that foreign language instructors at a public university in Turkey were in favor of implementing Penzu as an online diary in foreign language classes as an integrated activity to enhance foreign language learners' writing skills though it involves several weaknesses.

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The Relationship between Sustainable Leadership and Perceived School Effectiveness: The Mediating Role of Work Effort

Şenay SEZGİN NARTGÜN[a], İbrahim LİMON[b], Ümit DİLEKÇİ[c]*

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Abstract

This study investigates the mediator role of teachers' work effort in the relationship between sustainable leadership and perceived school effectiveness. It employs the relational survey model. The data was obtained from a study group of 411 teachers. Three different measures were used in the study: *"Sustainable Leadership Scale"*, *"Perceived School Effectiveness Scale"* and *"Work Effort Scale"*. The findings showed that principals' sustainable leadership scores were above moderate level except for social sustainability. On the other hand, teachers perceived their school as effective and their work effort above moderate level. It was also found that there were significant positive high and moderate level correlations among variables. Sustainable leadership predicted both perceived school effectiveness and work effort. Finally, it was determined that work effort did not have a mediator role in the relationship between sustainable leadership and perceived school effectiveness.

Sürdürülebilir Liderlik ve Algılanan Okul Etkililiği Arasındaki İlişki: İş Gayretinin Aracı Rolü

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Öz

Araştırma, öğretmenlerin iş gayretinin sürdürülebilir liderlik ve algılanan okul etkililiği arasındaki ilişkide aracı rolünü incelemektedir. İlişkisel tarama modelini esas alan araştırmada veriler 411 öğretmenden oluşan bir çalışma grubundan elde edilmiştir. Veri toplamak amacıyla *"Sürdürülebilir Liderlik Ölçeği"*, *"Algılanan Okul Etkililiği Ölçeği"* ve *"İş Gayreti Ölçeği"* kullanılmıştır. Elde edilen bulgular, öğretmen algılarına göre okul müdürlerinin sürdürülebilir liderlik davranışlarının sosyal sürdürülebilirlik boyutu haricinde ortalama üzerinde bir düzeyde olduğunu göstermektedir. Benzer biçimde algılanan okul etkililiği ve öğretmen iş gayreti de ortalama düzeyin üzerindedir. Araştırmada ele alınan değişkenler arasında istatistiksel olarak anlamlı, pozitif yönlü, yüksek ve orta düzeyde ilişkiler olduğu görülmüştür. Sürdürülebilir liderliğin hem algılanan okul etkililiğini hem de öğretmen iş gayretini anlamlı bir biçimde yordadığı; ancak iş gayretinin sürdürülebilir liderlik ile algılanan okul etkililiği arasında aracı rolünün bulunmadığı tespit edilmiştir.

***Corresponding Author:** dilekciumit@gmail.com
[a]Prof. Dr, Bolu Abant Izzet Baysal University, Bolu/Turkey, http://orcid.org/0000-0002-5404-1655
[b]Dr., Ministry of National Education, Sakarya/Turkey, http://orcid.org/0000-0002-5830-7561
[c]Asst. Prof., Batman University, Batman/Turkey, http://orcid.org/0000-0002-6205-1247

Introduction

Sustainable development is unavoidable for contemporary organizations and it is emphasized as a responsibility of leaders (Šimanskienė & Župerkienė, 2014). Sustainability can be conceptualized as the long-lasting or institutionalization of an innovation or practice (Balcı, 2016). In the literature sustainability is addressed in terms of financial, social, ethics, politics etc. (Šimanskienė & Župerkienė, 2014). *"Sustainable leadership"* is thought to enliven with proper leadership behaviors, and it has come into question as a result of using the term sustainability with leadership. Defined as the ability of maintaining organizational values in a more persuasive and efficient manner, sustainable leadership relies on the rationale that organizational durability does not appertain to a leader and leadership pass from a leader to another one (Çetin & Çayak, 2018). Having capital importance not only for present-day society but also for existence and durability of next generations, sustainable leadership does not depend on the ability and determination of a single leader, but it requires a continuous and cumulative effort and concern. For this reason, it can be said that the practice of sustainable leadership is not simple and harbors several principles (Šimanskienė & Župerkienė, 2014; Yangil, 2016). These principles can be listed as follows (Hargreaves & Fink, 2003);

- *Sustainable leadership creates and preserves sustaining learning,*
- *Sustainable leadership secures success over time,*
- *Sustainable leadership sustains the leadership of others,*
- *Sustainable leadership addresses issues of social justice,*
- *Sustainable leadership develops rather than depletes human and material resources,*
- *Sustainable leadership develops environmental diversity and capacity,*
- *Sustainable leadership undertakes activist engagement with the environment.*

Leaders must be sustainable economically, socially, administratively and culturally in order to render their organizations sustainable within the principles mentioned above (Çetin & Çayak, 2018). In line with this requirement, we address sustainable leadership in terms of managerial, economic, cultural and social sustainability. *Managerial sustainability* can be characterized as creating a cooperative organizational climate through positive relations and managing organizational change successfully by providing necessary support for employees in the process (Çayak, 2018). *Economic sustainability* incorporates securing stability for a sufficient and consistent economic development, the ability of investment and innovativeness (Čiegis, Ramanauskienė & Martinkus, 2009). On the other hand, *cultural sustainability* aims to preserve cultural heritage and transfer it next generation successfully, and to encourage cultural diversity (Singh & Keitsch, 2016). Finally, *social sustainability* is the ability to create more space for innovation and pursuing equity for present and future generations by focusing on their access to social sources equally (Lago, Aklini Kocak, Crnkovic & Penzenstadler, 2015; Rashidfarokhi, Yrjänä, Wallenius, Toivonen, Ekroos & Viitanen, 2018). Recently, there is a growing interest in literature for sustainable leadership in terms of educational organizations (Ahmed, 2016; Burns, 2016; Cohen, DeFrancia & Martinez, 2016; Çayak, 2018; Hargreaves, 2007; Iliško & Badyanova, 2014; Kantabutra & Saratun, 2013; Lambert, 2012; Yollu, 2017).

It is possible to see the same interest in work effort which is a term commonly associated with performance and motivation (Kuvaas & Dysvik, 2009). Defined as the elevation of intention to behavior (Özdemir, 2013a) and taken seriously in organizational activities, effort is the origin of the term *"work effort"*. Work effort is defined as the volitional behaviors of the employee (Behling & Starke, 1973) and is interchangeably used with active job performance (Tummers & Den Dulk, 2013). It includes all the volitional employee behavior contributing to the organization (Argon & Limon, 2017). McAllister (1995; cited in Tummers & Den Dulk, 2013) found that higher level of work effort meant higher level of performance. For this reason, it is of great importance for organizations (Rapp, 2000). In this sense, it can be said that work effort is a substantial issue in terms of organizational efficiency and productivity and deserves the interest it has attracted recently (Brockner, Grover, Reed & DeWitt, 1992; Bryne, Stoner, Thompson & Hochwarter, 2005; Gardner, Dunham, Cummings & Pierce, 1989; Kuvaas & Dysvik, 2009; Yeo & Neal, 2004). Thanks to its measurable nature, work effort can help to reveal some important outcomes of educational organizations as well (Argon & Limon, 2017; De Cooman, De Gieter, Pepermans, Jegers & Van Acker, 2009; Green, 2004; Rapp, 2000; Yeo & Neal, 2004).

Effectiveness of schools has been of considerable interest amongst researchers and is dealt with from different perspectives (Alanoğlu & Demirtaş, 2016; Ayık & Ada, 2009; Cerit & Yıldırım, 2017; Karabatak, Alanoğlu & Şengür, 2018; Memduhoğlu & Karataş, 2017; Özdemir & Sezgin, 2002; Ramberg, Låftman, Fransson & Modin, 2019; Sivri & Şahin, 2019; Şenel & Buluç, 2016; Turhan, Şener & Gündüzalp, 2017; Uğurlu & Abdurrezzak, 2016; Yıldırım, 2015; Yıldırım & Ada, 2018; Yıldırım, Akan & Yalçın, 2017). The term effectiveness is defined as the extent to which an organization realizes its objectives (Barnard, 1938; cited in Balcı, 2014) and used as *"effective school"* in educational literature (Sivri & Şahin, 2019). Effective school can be defined as the most suitable school environment for students' cognitive, affective, psychomotor, social and esthetical development (Özdemir, 2013b). When the theoretical background of the term is examined, it is observed that the studies on effective school mostly concentrate on whether the qualities of the schools have a significant effect on student achievement or not (Turhan, Şener & Gündüzalp, 2017). Ron Edmonds (1977; cited in Purkey & Smith, 1983), one of the pioneer researchers of school effectiveness, lists the components of effective schools as *(i) a firm administrative leadership* (*ii) high academic expectations from students (iii) a well-arranged atmosphere of learning (iv) a focus on fundamental skills (v) a frequent monitoring of student development.* Özdemir (2013b) adds that an effective school is a melting pot for students, teachers and environment. Effective schools also predicate the happiness and development of all shareholders on. Other qualities of effective schools are having clear objectives and rich academic programs, principals' showing instructional leadership, efficient use of school resources, an efficient guiding system. According to Purkey & Smith (1983), when we speak of school effectiveness, management skills, instructional leadership, employee retention and development, participation and support of parents, extended learning environment, publicity of academic achievements are important (Purkey & Smith, 1983). However, in this study, school effectiveness is dealt with in terms of productivity, adaptation and flexibility (Yıldırım & Ada, 2018).

School principals' sustainable leadership abilities, teachers' work effort and effectiveness have a substantial effect on educational organizations. Sustainability in leadership mainly aims to create a solid organizational infrastructure for the prospective managers and the system that will transfer this infrastructure from generation to generation. It also brings competitive advantage to the organizations which in turn help develop methods continuously improving organizational performance (McCann & Holt, 2010; Yollu, 2017). On the other hand, the importance of work effort which stands in between somewhere motivation and performance has come forward (De Cooman et al., 2009). School effectiveness, which can be regarded as the initiative of searching for ways of achieving the objectives of the school, improving student achievement and reaching organizational excellence has become a crucial prerequisite for sustaining success of educational organizations (Sivri & Şahin, 2019). However, as far as we could reach in scope of this study, the relationships among these three variables are not dealt with in literature.

Aim of the study

This study aims to determine school principals' sustainable leadership levels and school effectiveness based on teachers perceptions, self-reported work effort level of teachers and to put forward the relationships among those variables. It also tests the mediator role of teachers' work effort in the relationship between sustainable leadership and perceived school effectiveness. A mediation model was formed based on the literature (Avery & Bergsteiner, 2011; Lee, 2017; Morris, 2009; Pandey, 2018; Suriyankietkaew & Avery, 2016). The mediation model is illustrated in Figure 1 below.

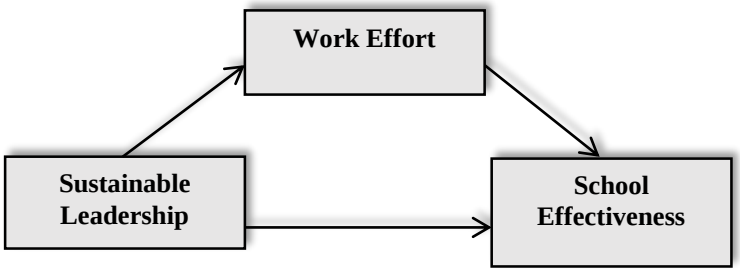

Figure 1. Research model

Method

Research Design

This study employed relational survey method. In relational survey method, the researcher can investigate both correlations among variables and the effect of an independent or more than one independent variable on a dependent or more than one dependent variables (Mertens, 2010). The current study investigated the relationship among three variables (sustainable leadership as independent variable, teacher work effort mediator variable and perceived school effectiveness dependent variable).

Study Group

In this study, the researchers do not aim to generalize the findings to a population, so it was conducted on a study group. Data were collected from 411 teachers working at different grade levels. Of the participants 230 were female (56%) and 181 were male (44%); 69 were primary school teachers (16,8%), 217 were elementary school teachers (52,8%) and remaining 104 were high school teachers (25,3%). Additionally, 309 of the participants (75,2%) had undergraduate degrees and 102 of them (24,8%) had graduate degree. Finally, 68 of the participants (16,5%) had a tenure of 0-5 years; 83 of them (20,2%) had 6-10 years; 97 of them (23,6%) had 11-15 years; 89 of them (21,7%) had 16-20 years and 74 of them (18%) had a tenure of 21 years and above.

Data Collection Tools

Data were collected through three different scales. The data collection tools are introduced below.

Sustainable Leadership Scale

It was developed by Çayak & Çetin (2018) to measure principals' sustainable leadership level. The scale can be used in all grade levels. It is a five-point Likert type scale and does not have a reverse-coded item. The items are responded on a scale ranging from *"Strongly disagree (1)"* to *"Totally agree (5)".* The scale has four dimensions. The first one is administrative sustainability (17 items); the second one is economic sustainability (10 items); the third one is cultural sustainability (5 items) and the fourth dimension is social sustainability (4 items). There are totally 36 items in the scale. The scale measures the sustainable leadership level of principals based on the teachers' perceptions. A sample item is from the scale is *"My principal informs the teachers about his practices"*. Maximum score that can be obtained from the scale is 180 and minimum score is 36. Cronbach's Alpha coefficients of the dimensions and scale was found to be respectively (α=,975 (Çayak & Çetin, 2018). The construct validity of the scale was tested through explanatory and confirmatory factor analysis. Fit indices were reported as follows (x^2/df =3,55; TLI=,91; CFI=,92; RMSEA=,064).

To test the validity of the scale, confirmatory factor analysis (CFA) was conducted in the scope of the current study. The findings showed that fit indices of the scale was very close to the cut off values in the literature (x^2=1492,670; df=583; x^2/df=2,560; p=,000; CFI=,932; GFI=,830; AGFI=,805; NNFI=,927; NFI=,894; IFI=,932; RMR=,042; SRMR=,038; RMSEA=,062). Cronbach's Alpha coefficients of the dimensions and scale was found to be respectively (α=,968). Based on these findings, it can be concluded that reliability and validity criteria were satisfied.

Work Effort Scale

It is a scale measuring the employees' work effort level based on self-report and developed by Kuvaas & Dysvik (2009). It is a five-point Likert type scale and does not have a reverse-coded item. The scale is unidimensional and has five items. The items are responded on a scale ranging from *"Strongly disagree (1)"* to *"Strongly agree (5)"*. Maximum score that can be obtained from the scale is 25 and minimum score is 5. A sample item is *"I often expend extra effort in carrying out my job"*. It was adapted to Turkish culture by Özdemir (2013a) and found to be valid and reliable in Turkish cultural context. The researcher validated the construct of the scale through explanatory factor analysis and it was observed that the explained variance was 74%. On the other hand, Cronbach's Alpha coefficient was found ,870 and factor loading of the items ranged from ,68 to ,82.

In this study the construct validity of the scale was tested through CFA and it showed that fit indices were within the cut off values in the literature (x^2=11,931; df=4; x^2/df=2,983; p=,018; CFI=,989; GFI=,988; AGFI=,956;

NNFI=,972; NFI=,894; IFI=,983; RMR=,009; SRMR=,028; RMSEA=,073). A Cronbach's Alpha coefficient of the scale was found to be ,831. Based on these findings, it can be concluded that reliability and validity criteria were satisfied.

Perceived School Effectiveness

The scale was originally developed by Mott (1972) and used to measure the organizational effectiveness of the hospitals. Later on, the scale was modified in different studies to be used in educational organizations. The Mott scale was adapted and used in schools first by Miskel, Fevurly & Stewart (1979) and then by Hoy and his colleagues (Hoy & Ferguson, 1985; Hoy, Tarter, & Kottkamp, 1991). It is a six-point Likert type scale and there is no reverse-coded item. The scale is unidimensional and there are 8 items totally. It aims to measure the effectiveness of the schools based on the teachers' perceptions. The items are responded on a scale ranging from *"Strongly disagree (1)"* to *"Totally agree (6)"*. Maximum score that can be obtained from the scale is 48 and minimum score is 8. A sample item is *"The quality of the products and service provided by this school is high"*. It was adapted to Turkish culture by Yıldırım & Ada (2018) and found to be valid and reliable in Turkish cultural context. The researchers reported the test-retest reliability coefficient of the scale as ,84 and Cronbach's Alpha coefficient as ,86. The construct validity was checked through explanatory and confirmatory factor analysis. CFA was conducted on two different study groups and fit indices were as follows (First study group: x^2/df=3,06; AGFI=,95; GFI=,97; NFI=,98; CFI=,99; RMR=,045; SRMR=,029; RMSEA=,063; second study group: x^2/df=2,16; AGFI=,87; GFI=,93; NFI=,96; CFI=,98; RMR=,034; SRMR=,043; RMSEA=,092).

In this study the construct validity of the scale was tested through CFA and it showed that fit indices were within the cut off values in the literature (x^2=52,010; df=17; x^2/df=3,059; p=,000; CFI=,981; GFI=,966; AGFI=,928; NNFI=,970; NFI=,973; IFI=,982; RMR=,037; SRMR=,025; RMSEA=,075). The scale had a Cronbach's Alpha coefficient of ,916. Based on these findings it can be said that reliability and validity criteria were satisfied.

Data Analysis

Before the analysis of the data, the data set was scanned to determine whether there were missing values or not and no missing values were detected. Univariate normality was checked through skewness and kurtosis values. The values are presented in Table 1 below.

Table 1. Skewness and Kurtosis Statistics

Scale / Dimension	*N*	Skewness	Std. Error	Kurtosis	Std. Error
Administrative Sustainability	411	-,794		,333	
Economic Sustainability	411	-,939		1,235	
Cultural Sustainability	411	-,858		,649	
Social Sustainability	411	-,186	,120	-,440	,240
Sustainable Leadership	411	-,715		,348	
Perceived School Effectiveness	411	-,920		,611	
Work Effort	411	-,617		,518	

As can be seen in Table 1, skewness and kurtosis values range between -1,96 and +1,96. Based on these findings it can be said that data set satisfied the assumption of univariate normality (Field, 2009).

Secondly, to detect the multivariate outliers Malahonobis distances were calculated (Çokluk, Şekercioğlu & Büyüköztürk, 2018). In this phase, data of 411 participants were excluded and subsequent analysis were carried out with data of 370 participants. To see whether there was a multicollinearity problem or not between sustainable leadership and teacher work effort as predictive variables, tolerance and VIF values were checked. These values are presented in Table 2 below.

Table 2. Skewness and Kurtosis Statistics

	Coefficients			Collinearity Statistics	
Scale / Dimension	**Beta**	***t***	**Sig.**	**Tolerance**	**VIF**
Work Effort	,121	2,482	,014	,711	1,407
Sustainable Leadership	,547	11,256	,000		

Dependent Variable: Perceived School Effectiveness

In Table 2, tolerance and VIF values are presented. The tolerance value is ,711 and VIF is 1.407. These findings and spearman correlation coefficient between these two variables (r=,538; p<,001) indicate that there is no multicollinearity problem (Field, 2009; Mertler & Vannatta, 2005). Finally, the multivariate normality was examined through scatter plot matrix. It was observed that all the correlations of the variables were in the shape of ellipse in the matrix. Based on this observation, it can be said that the data set satisfied multivariate normality assumption (Çokluk et al. 2018).

While fit indices of the scales were interpreted based on (Browne & Cudek, 1993; Hu & Bentler, 1999; Schermelleh-Engel, Helfried, Moosbrugger & Müller, 2003; Sümer, 2000; Worthington & Whittaker, 2006), Cronabch's Alpha was interpreted based on (Büyüköztürk, 2011; Singh, 2007) relations among variables based on (Russo, 2003).

Findings

Firstly, the correlations among variables and means are presented. The findings are shown in Table 3 below.

Table 3. Means and Correlations Among Variables

Scale / Dimension	$\bar{x}$	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Administrative Sustainability	3,78	1						
2. Economic Sustainability	4,08	,819**	1					
3. Cultural Sustainability	3,88	,683**	,711**	1				
4. Social Sustainability	3,32	,667**	,555**	,531**	1			
5. Sustainable Leadership	3,83	,966**	,902**	,797**	,745**	1		
6. Perceived School Effectiveness	4,42	,585**	,538**	,499**	,489**	,612**	1	
7. Work Effort	4,27	,515**	,516**	,382**	,414**	,538**	,415**	1

***p<.001*

As can be seen in Table 3, sustainable leadership level of principals based on teachers' perceptions is *"I agree"* for administrative, economic, cultural and overall scale ($\bar{x}$=3,78; $\bar{x}$=4,08; $\bar{x}$=3,88 respectively). On the other hand, in social sustainability it is at *"Undecided"* level ($\bar{x}$=3,32). Based on these findings, except for social sustainability, principals display sustainable leadership behaviors at a satisfactory level. As for perceived school effectiveness, it is at *"Partially agree"* level ($\bar{x}$=4,42). Lastly, teachers' work effort is at *"Strongly agree"* level ($\bar{x}$=4,27). On the other hand, there are positive relationships between sustainable leadership and perceived school effectiveness (r=,612; p<,001); sustainable leadership and teachers' work effort (r=,538; p<,001) and perceived school effectiveness and teachers' work effort (r=,415; p<,001). It should also be noted that the relations between the variables are medium and high in strength.

To test the mediator role of teachers' work effort in the relationship between sustainable leadership and perceived school effectiveness, the steps suggested by Baron & Kenny (1986) were followed. First of all, independent variable (sustainable leadership) should have a statistically significant effect on mediator variable (work effort). Secondly, mediator variable should have a statistically significant effect on dependent variable (perceived school effectiveness). Finally, when these two controlled, previously significant effects of independent variable on dependent variable should turn into insignificant (full mediation) or drop (partial mediation). To test the aforementioned assumptions, the mediation test was conducted in four steps.

Step 1

In this step, the effect of independent variable was checked on dependent variable. The structural model is presented in Figure 2 below.

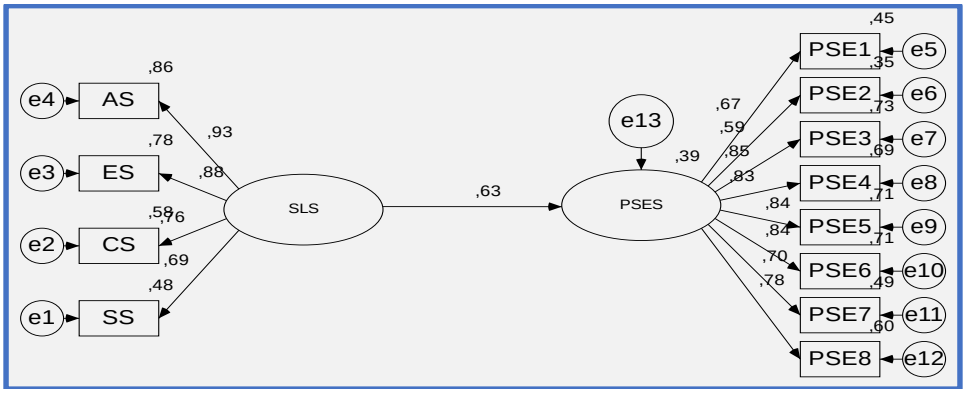

Figure 2. Effect of sustainable leadership on perceived school effectiveness

Table 4. Effect of Sustainable Leadership on Perceived School Effectiveness

Structural Path	*β*	S. E	C.R	*p*	Result
PSE<---SL	,626	,095	9,227	,000	Significant

As seen in Table 4, sustainable leadership has a statistically significant effect on perceived school effectiveness (*β*=.626; *p*<.001). In other words, sustainable leadership accounts nearly 63% of variance in perceived school effectiveness. This finding indicates that the first assumption of the mediation is satisfied. In the next step, the effect of independent variable on mediator variable was checked.

Step 2

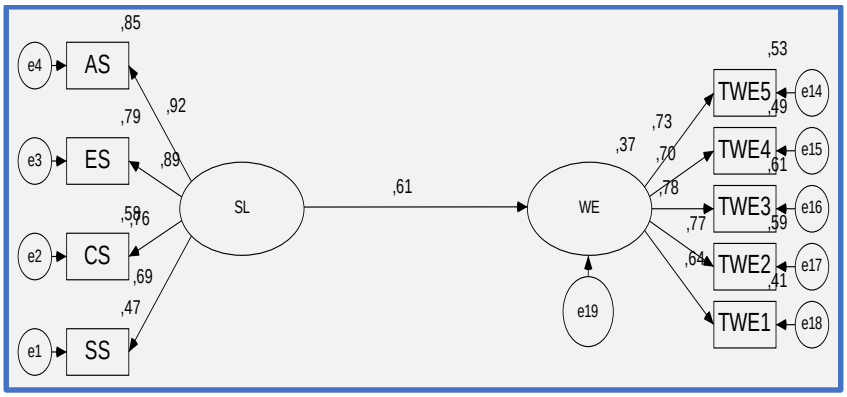

Figure 3. Effect of sustainable leadership on work effort

Table 5. Effect of Sustainable Leadership on Work Effort

Structural Path	*β*	S. E	C.R	*p*	Result
WE<---SL	,607	,046	9,010	,000	Significant

As can be seen in Table 5, sustainable leadership has a statistically significant effect on work effort (*β*=.607; *p*<.001). In other words, sustainable leadership accounts for nearly 61% of variance in work effort. Based on this

finding, it can be said that the second assumption of the mediation is satisfied. In the last step, all the variables were entered into the model simultaneously and the other assumptions were checked.

Step 3

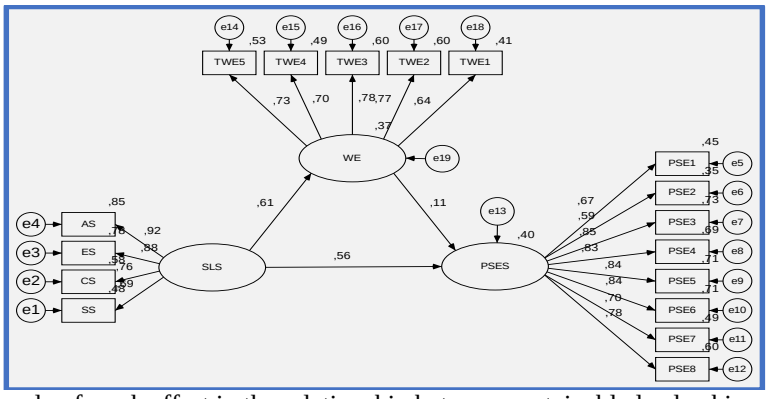

Figure 4. Mediator role of work effort in the relationship between sustainable leadership and perceived school effectiveness

Table 6. Relationship Among Variables

Structural Path	*β*	S. E	C.R	*p*	Result
WE<---SL	,607	,045	9,057	,000	Significant
PSE<---WE	,113	,132	1,773	,076	Insignificant
PSE<---SL	,557	,106	7,374	,000	Significant

In the last step, other two assumptions of the mediation analysis were checked. According to this, the mediator variable, work effort, is supposed to have a statistically significant effect on dependent variable, perceived school effectiveness. However, as can be seen in Table 6 the path coefficient between work effort and perceived school effectiveness is not statistically significant (β=.113; p>.05). Based on this finding, the third assumption of mediation is not satisfied which means work effort does not have a mediator role in the relationship between sustainable leadership and perceived school effectiveness.

The finding regarding the mediation was cross checked using Sobel (1982) test. In order to conduct the analysis an online calculator *(http://quantpsy.org/sobel/sobel.htm)* and SPSS was exploited. The result of the Sobel test confirmed our previous finding that work effort does not have a mediator role in the relationship between sustainable leadership and perceived school effectiveness (z=0.244; p>,01; S.E.=0.401). The findings regarding the test can be seen in Figure 5 below.

Input:		Test statistic:	Std. Error:	*p*-value:
a 0.442	Sobel test:	0.24444449	0.40141628	0.80688659
b 0.222	Aroian test:	0.19104915	0.51360607	0.84848709
s_a 0.36	Goodman test:	0.40576609	0.24182405	0.68491448
s_b 0.89	Reset all	Calculate		

Figure 5. Findings of sobel test

Discussion, Conclusion and Suggestions

This study aims to reveal the level of principals' sustainable leadership behavior, perceived school effectiveness and teachers' work effort based on teachers' perceptions. It also aims to determine the relationship amongst those variables. Additionally, the study tested the mediator role of teachers' work effort in the relationship between sustainable leadership and perceived school effectiveness.

The findings showed that principals display sustainable leadership behavior at *"I agree"* level. On the other hand, perceived school effectiveness is at *"Partially agree"* and teachers' work effort is at *"Strongly agree"* levels. It is observed that the findings regarding the level of variables are consistent with the literature (Cerit & Yıldırım, 2017; Cook, 2014; Çayak, 2018; Lambert, 2012; Memduhoğlu & Karataş, 2017; Negiş Işık & Gümüş, 2017; Özdemir, 2013a; Şenel & Buluç, 2016; Tatlah & Iqbal, 2012; Turhan, Demirli & Nazik, 2012; Yıldırım, 2015; Yıldırım & Ada, 2018; Yılmaz, 2015; Yollu, 2017). While studies on perceived school effectiveness are prevalent in literature, sustainable leadership and teachers' work effort need further investigation both nationally and internationally. In this context, it can be said that this study made a substantial contribution to the literature.

Considering the relations among variables, it can be said that there is a medium level positive relationship between work effort and perceived school effectiveness; high level positive relationships between sustainable leadership and perceived school effectiveness and work effort. In other words, it can be said that a higher level of work effort means a higher level of school effectiveness; higher level of sustainable leadership higher level of work effort and school effectiveness and vice versa. On the other hand, the findings are consistent with the literature (Avery & Bergsteiner, 2011; Lee, 2017; Morris, 2009; Pandey, 2018; Suriyankietkaew & Avery, 2016).

Another striking finding of the current study is that sustainable leadership is a statistically significant predictor of perceived school effectiveness. Likewise, it was found in the literature that leadership styles of principals play a crucial role in school effectiveness (Cerit & Yıldırım, 2017; Herrera, 2010; Tatlah & Iqbal, 2012; Zembat, Koçyiğit, Tuğluk & Doğan, 2010). It is possible to mention a similar relationship between sustainable leadership and school effectiveness. There is affluent evidence in the literature sustainable leadership boosts organizational effectiveness (Avery & Bergsteiner, 2011; Lee, 2017; Pandey, 2018; Suriyankietkaew & Avery, 2016).

The study also found that sustainable leadership has a statistically significant effect on teachers' work effort. Hargreaves & Fink (2006) state that sustainable leadership is an approach that freshens employees' energy. On the other hand, Šimanskienė & Župerkienė (2014) suggested that sustainable leadership has outcomes such as creating a mutual trust, goodwill and cooperation in the organization. It also encourages the employees' effort based on cooperation. Additionally, sustainable leadership has outcomes such as organizational commitment (Arovic, 2018), motivation (Okechukwu, Chinyere & Ikechukwu, 2015) and satisfaction (Suriyankietkaew & Avery, 2014) in individual level.

In conclusion, this study shows that principals display sustainable leadership behavior at a satisfactory level except for social sustainability. On the other hand, teachers' work effort is considerably high, and they perceive their schools effective. There are positive relationships amongst the variables high and medium in strength. Considering the casual relationships, sustainable leadership has a statistically significant effect both on perceived school effectiveness and teachers' work effort. In other words, it can be concluded that the higher level of sustainable leadership means higher levels of teachers' work effort and school effectiveness. However, it was found that work effort does not play a mediator role in the relationship between sustainable leadership and perceived school effectiveness which means that the effect of sustainable leadership does not occur through teachers' work effort.

Though it has some considerable implications, we can mention some limitations of the present study. First of all, the data were obtained from a study group which means the findings cannot be generalized to a population. In this sense, further studies can be carried out with appropriate sampling methods to obtain generalizable findings. A second limitation of the present study is that the measurement of the variables is based on the subjective perceptions of the participants which may bring about some respondent bias. Additionally, the structural model tested in the study includes only three variables. Further studies can be carried out with more comprehensive models. This enables researchers to include more organizational behaviors and demographic variables in the model. Lastly, to measure perceived school effectiveness and teachers' work effort unidimensional scales were used. Similar models can be tested with multidimensional tools.

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The Effect of Collaborative Strategic Reading Model on Fourth Grade Students' Understanding Skills in Informative Texts

M. Serhat Semercioğlu*[a], Kasım Kıroğlu[b], Kaya Tuncer Çağlayan[c]

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Abstract

The aim of study is to investigate the effect of teaching with Collaborative Strategic Reading Model on fourth-grade students' reading comprehension skills. In the quantitative section, a quasi-experimental design was used with a pretest-postest control group. The study group consisted of 39 students in the Dumlupınar Primary School located in the central district of Gümüşhane in the 2017-2018 academic year. There are 20 students in the experimental group and 19 students in the control group. Measurement tools developed by the researchers have been used during the determination of the groups and the application. During the implementation phase, lecture have been given to the experimental group in accordance with the Collaborative Strategic Reading Model throughout five sessions as each session lasted four course hours; and the same texts have been given to the control group by way of the same course hours according to the Government Teaching Method included in the 2017 Turkish Program. As a result, it has been determined that the mean score of the pre-test which was conducted to both experimental and control groups have been close to each other, and that the experimental group has had higher average than the control group in the last test average.

İşbirlikçi Stratejik Okuma Modelinin İlkokul Dördüncü Sınıf Öğrencilerinin Bilgilendirici Metinleri Anlama Becerisine Etkisi

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Makale Türü: Araştırma makalesi

Öz

Bu çalışmanın amacı, İşbirlikçi Stratejik Okuma Modeliyle öğretimin ilkokul dördüncü sınıf öğrencilerinin okuduğunu anlama becerilerine etkisini incelemektir. Araştırma kapsamında yarı deneysel desenlerden ön test-son test kontrol gruplu eşleştirilmiş desen kullanılmıştır. Araştırmanın çalışma grubunu, 2017-2018 eğitim-öğretim yılında Gümüşhane ili merkez ilçesinde bulunan Dumlupınar İlkokulundaki 39 kişilik dördüncü sınıf öğrencileri oluşturmaktadır. Deney grubunda 20, kontrol grubunda 19 öğrenci bulunmaktadır. Gruplar belirlendikten sonra ve uygulama boyunca daha önce araştırmacılar tarafından geliştirilen ölçme araçları kullanılmıştır. Uygulama aşamasında deney grubuna 5 oturum boyunca, her oturum 4 ders saati olacak şekilde İşbirlikçi Stratejik Okuma Modeline uygun; kontrol grubuyla yine aynı metinler ve ders saati üzerinden 2017 Türkçe Programında yer alan geleneksel öğretim metoduna göre dersler işlenmiştir. Sonuçta deney ve kontrol grubuna yapılan ön test ortalamalarının birbirine yakın olduğu, son test ortalamalarında ise deney grubunun kontrol grubuna göre daha yüksek ortalamaya sahip olduğu belirlenmiştir.

***Corresponding Author:** s.semercioglu@gumushane.edu.tr
[a] Dr. M. Serhat Semercioğlu, Gümüşhane University, https://orcid.org/0000-0001-9689-0850
[b]Assoc. Prof. Dr., Kasım Kıroğlu, Ondokuz Mayıs University, https://orcid.org/0000-0001-5711-9182
[c]Prof. Dr., Kaya Tuncer Çağlayan, Ondokuz Mayıs University, https://orcid.org/0000-0002-9834-8034

Introduction

The process of reading comprehension is a process that needs to be cognitive and structured. It is an important step to increase students' reading comprehension, especially when the students determine these processes and support them in a strategy-based and reading-related understanding of their shortcomings. In addition, it is necessary for individuals to apply strategies that help them to understand the texts they read and to know in which situations they will be used.

Reading strategies that help the reader in the process of interpreting the text contribute to analysing and interpreting the meaning completely, and also make contribution to the readers to understand the content and the structure of the text. The reader gives his attention to the text through strategies, both evaluate the text in an easy way and facilitates the process of remembering the text (Akyol, 2013, p. 18). Text readers who use comprehension strategies activate their prior knowledge about the text they read, then choose the right strategy, make predictions about the text, and continuously control the configuration process between the prior knowledge and the new information they have obtained. Thus, they can easily find the main idea, the subject and the supporting idea of the text (Bauman, 1984, p. 95).

The first type text encountered by students in primary school is narrative texts. Then the type of poetry, and finally the informative texts begin to be read by students. The teaching of narrative texts is easier than informative texts (Sulak, 2014, p. 7). The reasons for the emergence of this difficulty; more foreign words and terms are included in the informative texts and fewer personal experiences are found in such texts (Hall, Sabey and McClellan, 2005, p. 213). Informative texts are the main reading source used to present academic content (Roehling, 2017, p. 71). Two techniques are used to teach informative texts: the first technique is to teach the existence of different types of informative texts, and the second technique is reading comprehension strategies used to teach informative texts (Simonsen, 2004). Based on the fact that both teachers and students with different characteristics; instead of the only method and single approach to understanding reading, the teacher's tendency to method, individual differences of the students, the possibilities of the school, the requirements of the age, etc. a variety of methods and approaches should be taken into account considering the variables (Taş and Kıroğlu, 2018).

The informative texts which are firstly encountered in the third or fourth grade are not given much importance. It can be said that the most important reason for this situation is that teachers think that students understand the informative texts (Read, Reutzel and Fawson, 2008, p. 214-215). Moreover, some of the following features of informative texts may be thought to cause this difficulty (Roehling, 2017, p. 71):

- High number of technical words
- High density of information
- The presence of unknown contents and words
- Being new a concept that is demanded cognitively

There are five basic ways for the authors to organize information in informative texts (Meyer, 1975; Gunning, 2005; Akyol, 2008): Explanatory explanations, comparison, ranking of events/ordering, problem solving, cause and effect. This classification is selected as the baseline on this study.

As is seen, because the informative texts which are confronted for the first time in the third year of primary school and are a kind of text which is more difficult to interpret in comparison to other texts, they are taught with the help of different models. It has been observed that the studies based on the teaching of informative text structures for the fourth grade of primary school in our country have increased in recent years (Sulak and Güneş, 2014; Kuşdemir and Güneş, 2014; Tavşanlı and Seban, 2014; Kocaarslan and Akyol, 2015; Kuşdemir and Katrancı, 2016; Özdemir and Kıroğlu, 2017). Within the study, the effects of the Collaborative Strategic Reading model, which is likely to be used when teaching informative texts, has been tested.

The Collaborative Strategic Reading Model began as an extension of research by Palinscar and Brown (1984) on mutual teaching and cooperative learning by Johnson and Johnson (1989). Reading in the model is interactive; both cognitive and social variables affect the reader's understanding of the text. In the process of understanding, readers take an active role in accessing basic information about texts, applying cognitive resources using the

Collaborative Strategic Reading Model, and developing the interpretation of what they read through meaningful social interaction (Fan, 2009, p. 38). The basis of the Collaborative Strategic Reading Model is carried out with the techniques which are going to be applied before, during and after the reading. Within this scope, "Previewing Method" before reading, “Click and Clunk Method” during reading and “Find the Main Idea Method” and “SQ4R Method" after reading are used.

Previewing Method

In previewing method, before starting to read the text, teachers and students shall use the Previewing Method together to obtain preliminary information about the text, to make a connection between the subject of the day and the previous learned subject and to make predictions what the subject will be and to determine the purpose of the reading (Klingner, Vaughn, Boardman and Swanson 2012, p. 25). The Previewing Method is the only method that should be applied before reading.

Through the Previewing Method, the teacher provides the students with an opportunity to relate the new knowledge with background knowledge (Boardman, Klingner, Buckley, Annamma and Lasser, 2015, p. 1257). At this stage, the teacher leads the students to scan titles, images or tables in the text. The teacher invites students to brainstorm what they already know about the topic and leads them to share ideas with their classmates (Sofyan and partners, 2016, p. 145). The background knowledge of the students is one of the most important factors affecting the level of reading comprehension (Rattanasaeng, 2011, p. 14).

Click and Clunk Method

Grabe (1988, p. 56-59) and Sweet and Snow (2002, p. 17-23) indicate that limited vocabulary is the main obstacle to reading fluently and understanding what they read for students who are learning a mother tongue or a second language. In dealing with this difficulty, these authors suggest that learners should be taught vocabulary strategies to overcome the reading comprehension problems. The name of the word finding method for the Collaborative Strategic Reading Model is Click and Clunk Method. This method is applied while reading text.

During reading, students use this method to fully understand what they are reading and to describe confusing words or concepts. They continue to read when there are no unknown words in the text and the section which is read becomes completely meaningful; when they are not meaningful, they stop and learn the meaning of the unknown word (Sofyan and partners, 2015, p. 146).

In this method, the following paths are used while the unknown word is found:

- First of all, the sentence which includes the unknown word is read again and it is tried to obtain a meaning.
- If it is not found by this way, the words before and after the sentence which contains the unknown word are read again. Clues are searched for the meaning of the word from the relevant sentences.
- If the meaning of the unknown word cannot be reached by the first two methods, the relevant word is divided into prefixes, suffixes and the stem, and the hint is searched.
- Finally, it is said that the words that can be the logical synonym of the word divided into syllables will be looked at and the meaning of the word will be estimated. If the meaning of the word cannot be found in any way, the meaning of the word is provided to be found using the word cards. (Klingner et al., 2012, p. 28).

Once the students have fully understood all the words and text, they begin the “Find the Main Idea Method” which they will identify the main idea.,

Find the Main Idea Method

In order to make sure that students understand the most important ideas of the text they are reading, they must reword the important information with their own words after the reading has been completed (Vaughn and others, 2013, p. 146). In Finding the Main Idea Method, students should be able to identify the most important point of the text (people, places and activities). While making definitions, students are expected to reword what they understand with their own sentences firstly paragraph by paragraph until they obtain a single sentence. Applying these steps helps them to find out the main idea of the text (Rahmah, Hasan and Sudirman, 2017, p. 5).

The Question - Answer Method (QAR)

The Question - Answer Method has been designed to help students review the information they have learned from the text (Yen, 2009, s. 8). The main purpose of this method is to review the text for the last time, to summarize the text, to produce questions and to check whether the whole text is understood. At this point, Question-Answer Relationship (QAR) technique is used to produce questions about the text and to check whether the whole text is understood (Klingner and Vaughn, 2000, p. 80).

Question-Answer Method is used for introducing three different types of questions and students should prepare a question about the text according to these question types. These types of questions below are explained to the students (Klingner and others, 2012, p. 35):

1. Type - Answer is in the text: This question type helps identify important details and ideas. The answers are found within the text and from one slot.

2. Type - Think and research: It helps students relate the basic ideas in a text; for example, comparing information. It should not be forgotten that the required answer should be found in several parts of the text.

3. Type - Author and reader: The questions should be prepared in such a way as to help students connect with the knowledge and experience of the reader has had before and the important information in the text. The answer is generated by co-synthesizing the information in the mind of the reader and the text.

Method

Detailed information about the research model, population and sample information, data collection tools, data collection process and data analysis will be given in this section.

Main Problem Sentence

In international studies such as TIMSS, PIRLS and PISA, our students' reading comprehension and other measured skills were found to be quite low compared to expectations. At this point, increasing the reading comprehension skills of our students shows that it is possible to use different strategies than the ones currently being applied. It predicts that new strategies that will be used to increase the comprehension of reading comprehension can be easier and more successful for students and teachers to understand the text they will read or do meaning study (Dönmez & Yazıcı, 2006, p. 139-141). Since there is no study on reading comprehension with the Collaborative Strategic Reading Model applied in primary schools in our country, the study takes an important step towards bringing a new model to the literature.

The main research question is “Does the Collaborative Strategic Reading Model significantly affect the informative text skills of primary school fourth grade students?

Sub-Questions

1.Problem sentence; Does teaching with the Collaborative Strategic Reading Model have a significant effect on the reading comprehension skills of primary school fourth grade students?

2.Problem sentence; Does teaching with the Collaborative Strategic Reading Model significantly affect primary school fourth grade students' ability to determine main ideas?

Research Design

This research investigates the effect of traditional teaching method on fourth grade students' level of reading comprehension and identifying the main idea via the Collaborative Strategic Reading Model. In this study, quantitative research method is used and the research represents the pre test-post test control group model which is one of the real trial models. In a pre-test-post-test control group research, it is found that two groups have been formed by random sampling method. In both groups, pre- and post-test measurements are carried out. Making preliminary tests in this model help to know the degree of similarity of the groups before the experiment and to arrange and interpret the final test results accordingly (Karasar, 2011).

While the students' reading comprehension and main idea identification scores are dependent variables; the current program applied to the control group and the Collaborative Strategic Reading Model applied to the experimental group are independent variable. The effect of independent variables on dependent variables has been tried to be identified with different teaching methods applied to the students. The research was planned between March 26 and April 19, 2018 as 5 sessions and 20 periods.

Population and Sample/Study Group/Participants

The population of the study consists of the fourth-grade students in primary schools studying in public school in the central district of Gümüşhane in the 2017-2018 academic year. The most important reason for choosing the fourth-grade students for the research population is that the students start reading more informative texts beginning in the fourth grade.

While the sample of the study has been selected, Purposeful Sampling which is non-random sampling method has been chosen. Purposeful Sampling is attempted to test one or more specific conditions which have specific characteristics (Patton, 1990). In this study, Typical Sampling technique of Purposeful Sampling has been chosen as a sample. A typical situation is determined by Typical Sampling and information gathering is carried out on this sample. The features of the sample in relation to the problem are typical, namely they are normal (Büyüköztürk, Aygün and Çakmak, 2016).

Within the scope of the study, a school with similar characteristics has been found and the school administrators have been consulted. As a result of the interview, it has been decided to implement the project in Dumlupınar Primary School located in Gümüşhane city center. The 4-D and 4-C classes has been selected from between three fourth-grade schools as the application classes as a result of the lots drawn with the school administrators. As a result of the new lots between the two classes, the 4-D class has been determined as the experimental group and the 4-C class has been designated as the control group.

The characteristics of the groups included in the study are shown in the tables below.

Table 1. Characteristics of Experimental and Control Groups in Pilot Scheme

		4-B Experimental Group		**4-C Control Group**	
		n	**%**	**n**	**%**
Gender	Female	10	50.0	10	52,64
	Male	10	50.0	9	47,36
	Total	20	100.0	19	100.0

As seen in Table 1, the number of female students in both groups is equal. In addition, when we look at the number of male students, it is seen that 50.0% of the 4-B class and 47.36% of the 4-C classes are male students. According to this table, it is determined that the number of classes and gender ratios are very close to each other.

Another factor that will affect the study is the characteristics of classroom teachers. Even if the researcher will perform the activities in both groups, the characteristics of the class teachers can be effective on the students' readiness. For this reason, it is important that the characteristics of the classroom teachers involved in the practice should be similar. The characteristics of the classroom teachers are given in Table 2.

Table 2. Characteristics of Classroom Teachers Involved in the Scheme

	Experimental Group Teacher	**Control Group Teacher**
Gender	F	F
Age	38	32
Seniority	17	10
Span of teaching the classroom	4	4
Department of graduation	Primary school teacher program	Primary school teacher program

When Table 2 is examined, it is seen that classroom teachers have the same gender, span of teaching classroom and the department. It is seen that the features of seniority and age are close to each other. In this case, it can be said that the teacher characteristics of 4-B and 4-C classes are similar.

Data Collection Tools

Within the scope of the research, “Reading Comprehension Test in Informative Texts” to deliver students' reading comprehension and "Main Idea Determination Test in Informative Texts" to reveal the main idea and topic of the text have been used.

The questions prepared to determine the students' reading comprehension and main idea determination levels have been prepared using the related acquisitions mentioned in the Primary School Turkish Curriculum. While reading comprehension test, 8 achievements which are measurable and related to informative texts from the curriculum have been selected. While preparing the Finding Main Idea Test, 5 measurable achievements from the program have been selected. Both tests measure a total of 13 achievements. The KR-20 index for the reliability of the reading comprehension test has been 0.86 and the KR-20 index for the reliability of the main idea test has been found as 0.87. Both tests were applied to 62 students studying in three different grade 4 branches in a public school in a school in Aksaray. During the test, students' behaviors, duration of the test, disruptions in the outputs and the opinions of the students were noted. At the end of the pilot study, the difficulty and discriminative indices of each item to be measured were calculated.

Practise Phase

During the study, Collaborative Strategic Reading Model was conducted for the experimental group, while the control group was conducted within the framework of the activities included in the Turkish Teacher Guide. In order to avoid any problems in the tests performed, the researcher and the researcher made the activities of both experimental and control groups. During the practices, the classroom teachers of both groups were present in the classroom. As a result of the application, both the experimental and control groups were subjected to post-tests.

In order to ensure internal validity, 4-B and 4-C classes were determined as application classes as a result of the evaluation made with the school administrators and classroom teachers from three fourth grade students at

Dumlupınar Primary School. While determining the classes, the number of students (female, male distribution), the total class size, the presence of inclusion students, the students' desire to make the application were taken into consideration.

Data Analysis

In order to determine the effect of the Collaborative Strategic Reading Model on fourth-grade students' reading comprehension and finding main idea skills in informative texts, experimental and control group students were subjected to some measurement procedures. In the research, reading comprehension test and finding main idea test in informative texts have been used as a data collection tool. The data have been analysed with SPSS 20.0 package program.

Within the research, in order to determine whether the distributions of the score of the Reading Comprehension Test are normally distributed, Kolmogorov-Smirnov and Shaphiro-Wilk tests have been used, and to determine the significance of gain scores and pre-test and post-test findings t-test has been tested. And again, in order to determine whether the distributions of the score of the Finding Main Idea Test are normally distributed, Kolmogorov-Smirnov and Shaphiro-Wilk tests have been used, and to determine the significance of gain scores and pre-test and post-test findings t-test has been tested.

Findings

The findings and comments about the findings are presented in this section. In the first part of the study, students and groups consisting the experimental and control groups have been determined. Informative text teaching has been professed to the students who were included in the experimental group according to the program prepared by adopting Collaborative Strategic Reading Model. The control group was taught according to the traditional teaching methods included in the Turkish Curriculum which is still being applied. Thus, the effect of informative text instruction on reading comprehension and finding main idea skills has been examined with the help of Collaborative Strategic Reading Model.

Before the comparison between the groups, it has been examined whether the scores of the groups showed normal distribution. Shapiro-Wilk test is used for normality distribution when group sizes are less than 50 (Büyüköztürk, et. 2016). The table below shows the results of the normality test applied to the groups.

Table 3. Shapiro-Wilk Normality Test Results of Pre-Test Scores

	Statistics	**P**
Experimental Group Reading Comprehension Pre-Test Scores	.921	.155
Control Group Reading Comprehension Pre-Test Scores	.921	.074
Experimental Group Finding Main Idea Pre-Test Scores	.886	.230
Control Group Finding Main Idea Pre-Test Scores	.765	.701

According to Table 3, pre test scores of the experimental and control groups' reading comprehension and finding main idea and finding main idea test of the control group show normal distribution ($p > .05$). For this reason,

the independent inter-group samples t-test was used in the comparison of reading comprehension and finding main idea pre-test scores.

Table 4 which shows The Independent Groups t-test results which was performed to determine whether there was a significant difference between the groups in comparison of the pre-test scores of the reading comprehension test is given below.

Table 4. Reading Comprehension Test Pretest/Independent Samples t-Test Results

Group	**N**	**x̄**	**S**	**df**	**t**	**p**
Experimental Group	20	11,65	1,98	37	-0.350	.683
Control Group	19	12	3,21			

As is seen in Table 4, while the average of reading comprehension of the experimental group was 11.65, the control group's average was 12. According to the results of independent samples t-test, there is no significant difference between the pre-test scores of reading comprehension of the classes [t(37)=-0,350, p>.05].

The effect of the finding main idea pre-test scores on whether there is a significant difference between the groups has been examined by t-test. Test results are given below in Table 5.

Table 5. Finding Main Idea Scale Pre-Test/t-Test Results

Group	**N**	**x̄**	**S**	**df**	**t**	**p**
Experimental Group	20	10,25	2,59	37	-1.644	.078
Control Group	19	11,89	3,09			

As is seen in Table 5, there has been no significant difference between the 4-D and 4-C groups that applied the finding main idea test [t(37)=-1,644, p>.05]. According to these results, no significant difference has been found between the groups in terms of reading comprehension and finding main idea tests. In this case, it can be said that both groups are equivalent.

Throughout the study, while the Collaborative Strategic Reading Model was conducted in the experimental group, studies which are in the context of activities in the Turkish Teacher's Guide were conducted to the control group. In order to avoid any problems in the tests, the researcher himself performed the activities of both the experimental and the control groups. During the practices, the classroom teacher of both groups was present in the classroom.

As a result of the pilot scheme, final tests were applied to both experimental and control groups. The results of the normality test for post-test scores are shown in the Table 6 below:

Table 6. The Results of Shaphiro-Wilk Normality Test of Post-Test Scores

	Statistics	**p**
Experimental Group Reading Comprehension Post-Test Scores	.927	.155
Control Group Reading Comprehension Post-Test Scores	.941	.274
Experimental Group Finding Main Idea Post-Test Scores	.910	.074
Control Group Finding Main Idea Post-Test Scores	.948	.368

According to Table 6, the post test scores of the experimental and control groups show normal distribution (p>.05). The pre-test and post-test scores of the groups have been compared with the dependent t-test to reveal the effectiveness of the pilot study. The table for the dependent t-test results is given below.

First Problem

In the first problem of the study, the effect of teaching with Collaborative Strategic Reading Model on fourth-grade students' reading comprehension skills has been tried to be revealed. According to the results of the study, it has been determined that the students of the experimental group studying with the Collaborative Strategic Reading Model increased their averages compared to the control group students who applied the traditional learning method. Besides, there has been found no significant difference between the experimental and control groups. Relevant statistical information is given below.

Table 7. Comparison of Pre-Test and Final Test Scores of Experimental and Control Group Students' Reading Comprehension

Group		N	x̄	S	df	t	p
Experimental	Pre-Test	20	11,65	1,98	19	-7.62	.000
	Post-Test	20	14,45	1,73			
Control	Pre-Test	19	12,00	3,21	18	-.47	.644
	Post-Test	19	12,15	2,73			

As is seen in Table 7, it is seen that the number of the correct answer of students applying the Collaborative Strategic Reading Model increases from 11.65 to 14.45. It is seen that the increase in the score revealed with this result increases significantly according to the dependent t-test [t (19) = - 7,62, p <.05]. Although there is a slight increase in the number of the correct answer of the control group, there is no significant increase according to the dependent t-test [t(19)=-.47, p>.05].

Whether the experimental and control groups had a significant difference between the reading comprehension post-test scores measured after the application has been tested by independent t-test. The test results are given in Table 8 below.

Table 8. Reading Comprehension Post-Test Independent Samples T-Test Results

Group	N	x̄	S	df	t	p
Experimental Group	20	14,45	1,73	37	3,145	.119
Control Group	19	12,15	2,73			

Even though the increase in the experimental group after the pilot study according to Table 8 is higher than the control group, this increase does not show a significant difference [t(37)=3,145, p>.05]. Finding Main Idea pre-test and post-test scores for the pilot study must be compared. As all groups showed normal distribution in pre-test and post-test, dependent samples t-test has been used. Analysis results are given below.

Second Problem

In the second problem of the study, it is tried to reveal the effect of the Finding Main Idea skills of the fourth-grade students of the primary school with the Collaborative Strategic Reading Model. According to the results of the study, it has been determined that the averages of the students of the experimental group studying with the

Collaborative Strategic Reading Model increased compared to the control group students who applied the traditional learning method. Besides that, there has not been found any significant difference between the experimental and control groups. Related statistical information is given below.

Table 9. Comparison of Pre-Test and Post-Test Scores of Finding Main Idea Scale of Experimental and Control Group Students

Group		N	x̄	S	df	t	p
Experimental	Pre Test	20	10,25	2,59	19	-4,98	.000
	Post Test	20	12,60	2,81			
Control	Pre Test	19	11,87	3,07	18	-1,00	.326
	Post Test	19	12,47	3,07			

As seen in Table 9, Dependent t-test has been used to determine whether the change in average of pre-test and post-test tests was significant. According to the results of the test, there is a significant difference between the pre-test and post-test of the experimental group [t(19)=-4,98, p<.05]. However, any significant difference has not been found between the pre-test and post-test of the control group [t(18)=-1,00, p>.05].

Although the Collaborative Strategic Reading Model significantly increased the finding main idea score of the experimental group, it was examined whether there was a significant difference between the post-test scores of the experimental and control group students in order to compare the post-test scores of the experiment and the control group to show the effectiveness of teaching. As the post-test scores of the two groups were normally distributed, independent samples t-test has been used to compare the scores. The independent samples t-test results are presented in Table 10:

Table 10. Finding Main Idea Post Test Independent Samples t-Test Results

Group	N	x̄	S	df	t	p
Experimental Group	20	12,60	2,81	37	.134	.829
Control Group	19	12,47	3,07			

As shown in Table 10, no significant difference has found between the experimental group and the control group's main idea scores in the independent groups t-test conducted to determine whether the differences between the groups were significant [t(37)=,134, p>.05)].

Discussion and Conclusion

According to the findings obtained from this research, it was determined that informative text teaching with Collaborative Strategic Reading Model positively affected fourth grade students' reading comprehension and main idea determination skills.

The results of the first problem of the study are similar when the other studies conducted with the Collaborative Strategic Reading Model are examined, Vaughn et al. (2013) found that the model had a positive effect on reading comprehension in language teaching in his study with 48 secondary school students (Rattenasaeng, 2011). In the result of Nurhayati (2015) study which he conducted to 60-person secondary school students, it has been determined that the experimental group was more successful than the control group. At the end of the study, the

result of reading comprehension post-test has showed that the experimental group was 25.50 and the control group was 14.50. Again, as a result of a similar study conducted by Barberio (2005) in the third-grade primary school students it has been concluded that reading comprehension test scores significantly increased. It was determined that the model has affected positively the reading comprehension skill with the significant increase in reading comprehension post-test scores after the training with Collaborative Strategic Reading Model conducted to the fifth-grade students in Thailand. In the study conducted by Seacrist (2012) with fourth grade students, a significant increase has been found in the reading comprehension test scores throughout five weeks of the courses taught according to the model. As a result of the study conducted by Rosalina (2014) with sixth grade students, the post-test score of the experimental group was 82,20 and the control group was determined as 64,57.

The results of the second problem of the study are similar when the other studies conducted with the Collaborative Strategic Reading Model are examined. In the study conducted by Simamora, Sihombing and Gultom (2015) with seventh-grade students, it has been determined that the students were more successful in verbal expressions about the questions in finding main idea. In addition, in the study conducted by Sari and Tamah (2015) with sixth-grade students, it has been found that experimental group was more successful in the questions of reading comprehension included in reading comprehension test than the control group. It has been observed that there is not much work when we look at the other surveys that measure the ability of finding main idea of the Collaborative Strategic Reading Model. Generally, reading comprehension skills have been measured and these results have been supported by qualitative data. The finding main idea test developed for this research differentiates this research from other studies. Again, the test applied in the research provides a better understanding of the effectiveness of the Collaborative Strategic Reading Model and finding main idea method within the model.

According to the findings of this research, informative text teaching with Collaborative Strategic Reading Model positively affects the comprehension of reading comprehension and main ideas of primary school students. In addition to this study, the effectiveness of different models or strategies should be demonstrated to make it easier to understand informative texts. In addition, it was concluded that it is important to understand the effects of the students on the use of the Cooperative Strategic Reading Model, the use of multiple methods of the Collaborative Strategic Reading Model together, and the effects of finding the main ideas and subjects that affect the understanding.

Although the result of the study positively affects their reading comprehension and main idea determination skills; test or open-ended questions may be insufficient from time to time to measure different measurement techniques can be used. Researchers can also make collaborative strategic reading model experimental studies in different courses since informative texts are frequently used in the fourth grade of primary school, Social Studies and Science courses. Finally, if teachers make use of reading comprehension strategies as they often do in their classes, students are predicted to be a strategic reader at every moment of their lives.

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Investigation of Mathematical Skills of 60-72 Months Old Children Attending Preschool Education in Terms of Some Variables

Yasin TOK*[a], Merve ÜNAL[b]

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Abstract

The aim of this study is to determine mathematical skills of 60-72 months old children attending preschool education and whether these skills make a significant difference in terms of gender, mother education, father education, number of siblings, duration of preschool education and socio-economic status of family. The research was designed with descriptive scanning model. The sample of the study consisted of 372 children, 60-72 months of age, who were randomly selected from each of official independent kindergartens of Ministry of National Education in Battalgazi and Yeşilyurt districts of Malatya in 2018-2019 academic year. Early Childhood Mathematics Education Content Standards Scale was used as data collection tool. The data obtained from data collection tool were analyzed by using Mann-Whitney U and Kruskal Wallis-H tests. As a result of research; It was found that mathematical skill levels of 60-72 months old children attending pre-school education institutions were above average. However, mathematical skill levels of children did not show a significant difference according to gender variable; it was found that the educational level of mother, father education status, number of siblings, pre-school education period and socio-economic level of the family were significantly different according to the variables.

Okul Öncesi Eğitim Kurumuna Devam Eden 60-72 Aylık Çocukların Matematiksel Becerilerinin Bazı Değişkenler Açısından İncelenmesi

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Öz

Bu araştırma ile okul öncesi eğitim kurumuna devam eden 60-72 aylık çocukların matematiksel becerileri ve bu becerilerin; cinsiyet, anne eğitim durumu, baba eğitim durumu, kardeş sayısı, okul öncesi eğitim süresi ve ailenin sosyo-ekonomik durumu açısından anlamlı bir farklılık oluşturup oluşturmadığının belirlenmesi amaçlanmıştır. Araştırma betimsel tarama modelinde tasarlanmıştır. Araştırmanın örneklemini, 2018-2019 eğitim öğretim yılında Malatya ili Battalgazi ve Yeşilyurt ilçelerindeki MEB'e bağlı resmi bağımsız anaokullarının her birinden tesadüfî olarak seçilen bir sınıfındaki okul öncesi eğitime devam eden 60-72 aylık çocuklar olmak üzere toplamda 372 çocuk oluşturmaktadır. Veri toplama aracı olarak "Erken Çocukluk Dönemi Matematik Eğitimi İçerik Standartları Ölçeği" kullanılmıştır. Veri toplama aracından elde edilen veriler, Mann-Whitney U ve Kruskal Wallis-H testleri kullanılarak analiz edilmiştir. Araştırma sonucunda; okul öncesi eğitim kurumuna devam eden 60-72 aylık çocukların matematiksel beceri düzeylerinin ortalamanın üzerinde olduğu bulunmuştur. Bununla birlikte çocukların matematiksel beceri düzeyleri, cinsiyet değişkenine göre anlamlı bir farklılık göstermezken; anne eğitim durumu, baba eğitim durumu, kardeş sayısı, önceden alınan okul öncesi eğitim süresi ve ailenin sosyo-ekonomik düzeyi değişkenlerine göre anlamlı olarak farklılaştığı bulunmuştur.

***Corresponding Author:** yasintk@hotmail.com
[a] Teacher, Zübeyde Hanım Kindergarten, Malatya/Turkey, https://orcid.org/0000-0002-8601-8732
[b]Asst. Prof. Dr., İnönü University, Malatya/Turkey, https://orcid.org/0000-0001-9101-0666

Introduction

Early childhood is the framework of life. In the process of forming the basic framework of the lives of children, they want to know everything that is around them with a sense of innate curiosity. This will lead them search, explore and to curb their curiosity. As a result of curiosity and discovery tendencies, they begin to gain first experience, knowledge and skills. Therefore, early childhood has a critical importance in gaining the basic concepts, skills and habits that will play an active role in the construction and maintenance of life (Akman, Üstün & Güler, 2003; Çelik, 2012; Ölçer, 2017; Taştepe, 2012). In this context, early childhood is the main component that constitutes the basis of the gains that lead to the shaping of life.

The process of acquiring scientific concepts starts from infancy. Learning efforts begin by smelling, tasting, watching, listening and touching (Akman et al., 2003). Children try to arouse their curiosity with sound-silent objects, tools, machines, containers, boxes and toys (Şentürk, 2017). Early childhood is a process in which children learn basic process skills and actively use basic concepts (Charlesworth & Lind, 2010). In this learning process, the learning content of children should be focused at rather than learning content (Büyüktaşkapu, 2010) When this process of action is supported and developed, there is no doubt a solid foundation for science, mathematics and literacy in the future (Ölçer, 2017). Therefore, by enabling children to be autonomous from an early stage, learning efforts should be promoted and non-intrusive directions should be made.

Children interact with the environment firstly physical, then cognitive, after that begin to gain practical mathematical experience (Yıldız, 2016). When children start school, they continue to learn by adding systematic learning to their previous experience and skills (Akman, 2002). Children's interest in mathematics can be more effective and easier in terms of understanding mathematical concepts and relationships through play in early childhood (Tural, 2005). In this respect, children start to take their first steps in mathematics by playing, asking and trying (Nunes & Brgant, 2008). Based on the fact that the most important task of the child is the game, the early mathematical activities must be integrated with the games in order to learn while the child is having fun through play.

Mathematical learning that is started in early childhood continues in adulthood. While shopping, walking the path at a certain distance or feeding on a certain amount of food, every moment of life, mathematics is an indispensable element of life. The important point here is that, from the early childhood onwards, mathematical skills are acquired correctly and systematically to children. Mislearned or inadequate mathematical knowledge of children is associated with educators or education program responsible for early childhood education (Arias-de Sanchez, 2010). In this respect, the importance of early childhood period is seen as the main factor in the fact that the concepts learned in childhood and the acquired skills constitute the basis of learning in adulthood and any missing or wrong learning in these periods will affect the whole structure.

The pre-school education program includes basic knowledge and skills that children should acquire, the methods and techniques that will carry out them to these knowledge and skills, and various activities that will enable them to reach the goals through these tools. The contents of mathematics education and the standard of these contents may vary according to the age and level of children. For example; In pre-school mathematics education, different mathematical content standards may be formed for 3-4-5 age groups. Each semester supports each other as a spiral and provides the basis for pre-learning (Taştepe, 2012).

Preschool mathematics education has four basic elements. These are: child, teacher, mathematics and program. In the process of mathematics education, these four elements interact with each other. Naturally, the greatest task and responsibility in this interaction falls to the teacher (Baki & Hacısalihoğlu-Karadeniz, 2013). Teachers need to know and use methods that make children willing to think, explore, question and explore freely. (Çelik, 2012). Therefore, for a mathematics education with high quality and high standards, teachers who are the main factors in this process should have comprehensive pedagogical field knowledge (Aksu & Kul, 2017). Basically, pedagogical field knowledge is a part of the teacher's knowledge base that combines both a comprehensive understanding of what to teach and how to teach them (Mccray, 2008). In this context, teachers, who are the strategic elements of education, should be able to enable children to acquire the highest level of skills by revealing their existing talents and potentials by keeping their feelings of curiosity alive, investigating, questioning and problem solving.

Beginning from early childhood; matching, comparison, classification and ranking skills are preliminary skills that will form the basis of children's mathematics education. With the acquisition of these skills, the development

of mathematical skills such as number / counting process awareness, measurement awareness, geometry and spatial logic awareness, data collection and statistical awareness will be supported (Taştepe, 2012).

In the studies, it is stated that preschool mathematics skills are affected by various variables. In the research, mathematical skill levels of 60-72 months old children attending preschool education institution were examined in terms of various variables such as gender, (Aktaş-Arnas et al., 2003; Avci, 2015; Bulut-Pedük, 2007; Dağlı, 2007; Demir & Dere-Çiftçi, 2018; Karaman, 2012; Polat-Unutkan, 2007; Sezer, 2008; Taşkın, 2013), number of siblings,(Aslanargun, Bozkurt & Sarıoğlu, 2016; Avci, 2015), duration of preschool education, (Avci, 2015; Dağlı, 2007; Polat-Unutkan, 2007), parental education status, (Avci, 2015; Bulut-Pedük, 2007; Dağlı, 2007) and socio-economic status of the family (Kandır & Koçak-Tümer, 2013; Starkey & Klein, 2000). In some of the studies, it was determined that mathematics skills changed according to variables such as gender, number of siblings, duration of pre-school education, parental education status and socio-economic status of the family, while some studies did not. In this context, it is important to determine the mathematical skills in preschool period for the mathematical achievements of children in their learning stages. It is important to examine mathematical skills according to variables such as gender, number of siblings, duration of preschool education, parental education status and socio-economic status of the family. Therefore, in this study, it was aimed to determine whether the early mathematical skill levels of 60-72 months old children attending preschool education institutions make a significant difference in terms of gender, mother education status, father education status, number of siblings, duration of pre-school education and socio-economic status of the family. As a result of the research, it is expected to contribute to the education system in general and the possible solution suggestions to the problems in pre-school mathematics education in particular. In addition, it is stated that the mathematical skills of preschool children need to be supported and there is a need for further studies in this field (Çelik, 2015; Karaman & İvrendi, 2015). Therefore, this research problem, which is intended to provide these contributions, is further divided into the following sub-problems:

a) What is the level of mathematical skills of 60-72 months old children attending pre-school education institutions?
b) Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly by gender?
c) Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly according to the mother's educational status?
d) Do the mathematical skills of 60-72 months old children attending pre-school education differ significantly according to the education level of the father?
e) Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly according to the number of siblings?
f) Do the mathematical skills of 60-72 months old children attending preschool education show a significant difference according to the pre-school period of the child?
g) Do the mathematical skills of the 60-72 month old children attending pre-school education differ significantly according to the socio-economic status of the family?

Method

Research Design

The aim of this study is to determine the mathematical skills of 60-72 months old children attending pre-school education institutions and whether these skills make a significant difference in terms of independent variables. For this purpose, survey research model, one of the quantitative research methods, was used. The survey research model aims to describe a present or past situation as it is. The individuals in the research are evaluated as they are in their own conditions. Descriptive research is generally a survey research (Karasar, 2015). They are usually made in order to determine the various characteristics of large groups in social sciences (Can, 2018). In order to determine the mathematical skills of preschool children, the research was designed in a descriptive survey model that aims to define a situation as it exists.

Population and Sample

The population of the study consists of all children aged 60-72 months (N: 9395) attending pre-school education in official independent kindergartens affiliated to MEB in Malatya province in the 2018-2019 academic year. The sample of the study can be taken as 370 children according to the 95% reliability rate according to the sample calculation over the universe. In this context the sample of the study consists of 372 children, 60-72 months of age, who were randomly selected from each of the official independent kindergartens in the Battalgazi and Yeşilyurt districts of Malatya province in the 2018-2019 academic year. Sample size table (Yazıcıoğlu & Erdoğan, 2007: 72) was used for $\alpha = 0.05$ when determining the sample size.

Table 1. Frequency Distribution of Demographic Information Related to the Sample of the Study

Variable	Group	Frequency(n)	Percent (%)
Child's gender	Girl	188	50.5
	Boy	184	49.5
Educational level of the child's mother	Literate- Elementary School	39	10.5
	Secondary School	37	9.9
	High school	169	45.4
	University	127	34.1
Educational level of the child's father	Literate- Elementary School	30	8.1
	Secondary School	35	9.4
	High school	136	36.6
	University	171	46.0
Number of siblings	Single child	37	9.9
	1 siblings	177	47.6
	2 siblings	104	28.0
	3 and more siblings	54	14.5
Pre-school education period of the child	No	199	53.5
	1 year	139	37.4
	2 years and more	34	9.1
Socio-economic level of child's family	Low	48	12.9
	Middle	295	79.3
	High	29	7.8
Total		372	100

When the frequency distribution according to gender was examined, it was found that 188 (50.5%) of the sample children were girls and 184 (49.5%) were boys. It was seen that 39 (10.5%) of the mothers' education level were literate, 37 (9.9%) were secondary school, 169 (45.4%) were high school and 127 (34.1%) were university level. The fathers' education level is 30% (8.1%) literate, 35 (9.4%) secondary, 136 (36.6%) high school and 171 (46%) university level. 37 children (9.9%) had one child, 177 (47.6%) had 1 sibling, 104 (28%) had 2 siblings and 54 (14.5%) had 3 siblings. It was determined that 199 (53.5%) of the children had not received pre-school education before, 139 (37.4%) had 1 year pre-school education and 34 (9.1%) had 2 years or more pre-school education. It is seen that 48 (12.9%) of the families of the children are at low socio-economic level, 295 (79.3%) are at medium socio-economic level and 29 (7.8%) are at high socio-economic level.

Data Collection Tools

In the first part, "Child Personal Information Form" was used as the data collection tool. In the second part, "Early Childhood Mathematics Education Content Standards Scale" which was developed by Taştepe and Temel (2013) was used (to be filled in by teachers). The scale provides the opportunity for the teachers to evaluate the mathematical skills of the children in terms of development, and to make developmental predictions about the competence of the applications and whether the children acquire the skills related to the mathematics content in determining the mathematical skill level of the children (Taştepe & Temel, 2013).

Mathematics education content standards scale consists of 4 dimensions and 27 items in total. These are Number / Counting Process Awareness (9 items), Measurement Awareness (5 items), Geometry and Spatial Reasoning Awareness (7 items) and Data Acquisition and Statistical Awareness (6 items). The scale is a five-point Likert type that is in the range of "Always", "Mostly", "Sometimes", "Rarely" and "Never". The lowest score that can be obtained from the Number / Counting Process Awareness dimension of the scale is 9 and the highest score is 45 points. The lowest score that can be obtained from the Measurement Awareness dimension is 5 and the highest score is 25 points. The lowest score that can be obtained from the Geometry and Spatial Logic Awareness dimension is 7 and the highest is 35 points. The lowest score that can be obtained from the Data Collection and Statistical Awareness dimension is 6 and the highest 30 points.

The Cronbach's alpha coefficients for the reliability of the test were .95 for Number / Counting Process Awareness, .85 for Measurement Awareness, .94 for Geometry and Spatial Awareness, and .94 for Data Collection and Statistical Awareness. The Cronbach's alpha coefficients for the reliability of the test were calculated as .96 for Number / Counting Process Awareness, .88 for Measurement Awareness, .95 for Geometry and Spatial Reasoning Awareness, and .94 for Data Collection and Statistical Awareness. This result shows that the scale can be used as a reliable measurement tool.

Table 2. Matematics Education Content Standards Scale, Size Items, Item Numbers and Reliability Coefficient

Dimensions	Substances	Number of items	Cronbach Alpha Coefficient
Number / Counting Process Awareness	1,2,3,4,5,6,7,8,9	9	.96
Measurement Awareness	10,11,12,13,14	5	.88
Geometry and Spatial Reasoning Awareness	15,16,17,18,19,20,21	7	.95
Data Acquisition and Statistical Awareness	22,23,24,25,26,27	6	.93

Data Collection

In order to collect data, the teachers of the children included in the sampling were interviewed and the forms were distributed to the teachers. As a result of the data collection stage, 389 forms were reached. With the controls performed on the obtained forms, 17 forms were considered invalid due to incorrect filling of forms and entering incomplete data and a total of 372 forms were included in the research.

Data Analysis

In line with the data obtained from the scales, incorrect or incomplete data checks were performed. In the data set, the distribution of extreme values and normality of the distribution were investigated. The Skewness value was calculated as -884 and the kurtosis value was .518. Although the skewness and kurtosis scores were between -1 and +1, the Kolmogorov-Smirnov test was calculated as 0.00 ($p < .05$), and the Histogram graph showed a left skewed structure and when the Q-Q Plot and Box plot graphs were analyzed it is observed that distribution is not normal. The data obtained were summarized with percentage and frequency tables and calculated and evaluated by using SPSS statistical package program. Mann-Whitney U test and Kruskal Wallis-H test were used for non-parametric test groups in cases where normal distribution was not provided for the data. The error level is accepted as .05.

In the analysis of the data, the Mann-Whitney U test was used to determine whether the math skills of 60-72 months old children showed a significant difference according to the gender, the educational status of the child's mother, the educational status of the father, the number of siblings, the state of pre-school education and the Kruskal Wallis H test was applied to determine whether there is a significant difference according to the socio-economic situation.

Findings

Findings for First Sub-Problem

The first sub-problem of the research is expressed as "What are the mathematical skills of 60-72 months old children attending pre-school education institutions?". In order to find an answer to this sub-problem, the scores obtained from the mathematics education content standards scale, the arithmetic mean and standard deviation values and the dimensions of the scale were calculated on the whole scale and shown in the table in Table 3.

Table 3. Descriptive Analysis Results of the Scores of Children in Mathematics Education Content Standards Scale

Scale / Dimensions	Size Number of Items	$\bar{x}^*$	sd
Number / Counting Process Awareness	9	36.73[4.08]	8.36
Measurement Awareness	5	16.78[3.35]	4.36
Geometry and Spatial Reasoning Awareness	7	28.82[4.11]	6.05
Data Acquisition and Statistical Awareness	6	20.97[3.49]	5.92
All Scale	27	103.31[3.82]	22.54

* Average brackets in square are the average scores which are translated into 5-score Likert-type scale by dividing the total scores obtained from the scale by the number of items.

When the table is examined, it was found out that the lowest score obtained in the number / counting process awareness dimension was 9, the highest score was 45, and the arithmetic average was = 36.73 (sd = 8.36). In the answers given to the scale items in the Number / Counting Process Awareness dimension, it can be stated that the skill level of children is between "Most of Time" and "Always". The lowest score obtained in the measurement awareness dimension was 5, the highest score was 25 and the mean was 16.78 (sd = 4.36). In the responses given to the scale items in the Measurement Awareness dimension, the skill level of children can be said to be between Sometimes and Most of the time. Geometry and Spatial Reasoning Awareness has the lowest score of 7, the highest score is 35 and the arithmetic average was = 28.82 (sd = 6.05). In the answers given to the scale items in the dimension of Geometry and Spatial Reasoning Awareness, it can be said that the skill level of children is between Most of Time and Always. The lowest score obtained in Data Awareness and Statistical Awareness dimension was 6, and the highest score was 30 and arithmetic mean was = 20.97 (sd = 5.92). In the responses given to the scale items in the dimension of Data Acquisition and Statistical Awareness, it can be said that the skill level of children is between Sometimes and Most of the time. The lowest score obtained from all scale was 27 highest score 135, and arithmetic mean was= 103.31 (sd = 22.54). In the responses to all scale items, the skill level of children can be said to be between Sometimes and Most of the time.

Findings and Comments Related to the Second Sub-Problem

The second sub-problem of the research is expressed as "Do the mathematical skills of the 60-72 month old children attending preschool education differ significantly by gender?". In order to find an answer to this sub-problem, Mann Whitney U test was applied to the obtained data. The results are shown in Table 4.

Table 4. Analysis of Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education by Gender

	Gender	N	Mean Rank	Sum of Ranks	U	P
Number / Counting Process Awareness	1) Girl	188	187.98	35340.50	17017.500	.787
	2) Boy	184	184.99	34037.50		
	Total	372				
Measurement Awareness	1) Girl	188	186.27	35019.50	17253.500	.967
	2) Boy	184	186.73	34358.50		
	Total	372				
Geometry and Spatial Reasoning Awareness	1) Girl	188	187.28	35208.50	17149.500	.887
	2) Boy	184	185.70	34169.50		
	Total	372				
Data Acquisition and Statistical Awareness	1) Girl	188	186.43	35049.50	17283.500	.990
	2) Boy	184	186.57	34328.50		
	Total	372				
Total Mathematical Skill Level	1) Girl	188	187.19	35192.50	17165.500	.900
	2) Boy	184	185.79	34185.50		
	Total	372				

* $p < .05$

When the table is examined, the mathematical skill levels of 60-72 months old children who attend preschool education do not show a significant difference according to gender. [U:17165.50; p>05]. In this context, it can be said that 60-72 months old children attending pre-school education have similar mathematical skill scores in terms of boys and girls.

Findings Related to the Third Sub-Problem

The third sub-problem of the study is expressed as "Do the mathematical skills of the 60-72 month old children attending the pre-school education institution differ significantly according to the mother's education level?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in table 5.

Table 5. Results of the Analysis of Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education According to Mother Education Status

	Mother education level	**N**	**Mean Rank**	**df**	χ^2	**P**	**Difference**
Number/ Counting Process Awareness	1) Literate-Elementary School	39	115.19	3	51.129	.000*	1-3, 1-4
	2)Secondary School	37	147.49				2-4, 3-4
	3)High school	169	174.70				
	4)University	127	235.47				
	Total	372					
Measurement Awareness	1) Literate-Elementary School	39	115.29	3	49.597	.000*	1-3, 1-4
	2) Secondary School	37	149.01				2-4, 3-4
	3)High school	169	174.76				
	4)University	127	234.91				
	Total	372					
Geometry and Spatial Reasoning Awareness	1) Literate-Elementary School	39	119.72	3	48.972	.000*	1-2
	2) Secondary School	37	174.36				1-3, 1-4
	3)High school	169	167.18				2-4, 3-4
	4)University	127	236.25				
	Total	372					
Data Acquisition and Statistical Awareness	1) Literate-Elementary School	39	104.19	3	46.883	.000*	1-2
	2) Secondary School	37	165.35				1-3, 1-4
	3)High school	169	177.14				2-4, 3-4
	4)University	127	230.39				
	Total	372					
Total Mathematical Skill Level	1) Literate-Elementary School	39	104.27	3	59.924	.000*	1-2
	2)Secondary School	37	152.35				1-3, 1-4
	3)High school	169	173.18				2-4, 3-4
	4)University	127	239.43				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend pre-school education show a significant difference according to their mothers' educational status. [χ2 (df=3, n=372)=59.92; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. At the end of the study, a significant difference was found between the education level of the mother, the level of literate-primary education, and the level of secondary school, high school and

university education, between the secondary education level and the university education level, and between the level of high school education and university education level. The differences were in favor of those with higher education levels in each group.

Findings Related to the Fourth Sub-Problem

The fourth sub-problem of the research is expressed as "Do the mathematical skills of 60-72 months old children attending pre-school education differ significantly according to their father's education level?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in Table 6.

Table 6. Results of the Analysis of the Mathematical Skills of 60-72 Months Old Children Attending to PreSchool Education According to Father's Education Status

	Father education level	**N**	**Mean Rank**	**df**	χ^2	**P**	**Difference**
Number/ Counting Process Awareness	1) Literate-Elementary School	30	106.95	3	47.265	.000*	1-3, 1-4
	2) Secondary School	35	131.24				2-4, 3-4
	3)High school	136	173.33				2-3
	4)University	171	222.24				
	Total	372					
Measurement Awareness	1) Literate-Elementary School	30	113.62	3	39.116	.000*	1-3, 1-4
	2)Secondary School	35	148.44				2-4, 3-4
	3)High school	136	169.36				
	4)University	171	220.71				
	Total	372					
Geometry and Spatial Reasoning Awareness	1) Literate-Elementary School	30	123.30	3	45.268	.000*	1-3, 1-4
	2) Secondary School	35	137.40				2-4, 3-4
	3)High school	136	165.15				
	4)University	171	224.62				
	Total	372					
Data Acquisition and Statistical Awareness	1) Literate-Elementary School	30	100.72	3	46.556	.000*	1-3, 1-4
	2) Secondary School	35	139.20				2-4, 3-4
	3)High school	136	173.19				
	4)University	171	221.82				
	Total	372					
Total Mathematical Skill Level	1) Literate-Elementary School	30	104.20	3	52.969	.000*	1-3, 1-4
	2) Secondary School	35	130.86				2-4, 3-4
	3)High school	136	169.72				
	4)University	171	225.67				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend pre-school education show a significant difference according to their fathers' educational status. [χ2 (df=3, n=372)=52.96; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. At the end of the study, a significant difference was found between the educational level of father, literate-primary education level, high school and university education levels, between secondary education level and university education level and between high school education level and university education level. The differences were in favor of those with higher education levels in each group.

Findings Related to Fifth Sub-Problem

The fifth sub-problem of the research is expressed as "Do the mathematical skills of the 60-72 month-old children attending pre-school education differ significantly according to the number of siblings?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in Table 7.

Table 7. Results of the Analysis of Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education According to the Number of Siblings

	Number of siblings	N	Mean Rank	df	χ^2	P	Difference
Number/Counting Process Awareness	1)Single child	37	189.23	3	34.153	.000*	1-4, 2-3
	2)1 siblings	177	215.13				2-4, 3-4
	3)2 siblings	104	169.47				
	4)3 and more	54	123.58				
	Total	372					
Measurement Awareness	1)Single child	37	188.46	3	25.929	.000*	1-4, 2-3
	2)1 siblings	177	211.73				2-4, 3-4
	3)2 siblings	104	171.25				
	4)3 and more	54	131.83				
	Total	372					
Geometry and Spatial Reasoning Awareness	1)Single child	37	204.88	3	16.328	.001*	1-4, 2-4
	2)1 siblings	177	202.29				3-4
	3)2 siblings	104	177.67				
	4)3 and more	54	139.18				
	Total	372					
Data Acquisition and Statistical Awareness	1)Single child	37	203.77	3	23.509	.000*	1-4, 2-3
	2)1 siblings	177	205.99				2-4, 3-4
	3)2 siblings	104	177.51				
	4)3 and more	54	128.09				
	Total	372					
Total Mathematical Skill Level	1)Single child	37	199.24	3	29.555	.000*	1-4, 2-3
	2)1 siblings	177	211.15				2-4, 3-4
	3)2 siblings	104	172.14				
	4)3 and more	54	124.64				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend preschool education show a significant difference according to their siblings' numbers. [χ2 (df=3, n=372)=29.55; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. As a result of the application, the number of siblings, between one child and 3 and more siblings are significant differences in favor of one child, between 1 sibling and 2 or 3 siblings are in favor of one sibling, between 2 siblings and 3 or more siblings are in favor of 2 siblings.

Findings Related to Sixth Sub-Problem

The sixth sub-problem of the research is expressed as "Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly according to the pre-school education period of the child?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in Table 8.

Table 8. Results of the Analysis of Mathematical Skills of 60-72 Months Old Children Attending Preschool Education Institutions According to Their Past Preschool Education Time

	Education period of the child	N	Mean Rank	df	χ^2	P	Difference
Number/Counting Process Awareness	1)No	199	143.21	2	75.547	.000*	1-2, 1-3
	2)1 year	139	227.17				2-3
	3)2 years and more	34	273.65				
	Total	372					
Measurement Awareness	1)No	199	140.31	2	80.977	.000*	1-2, 1-3
	2)1 year	139	234.48				
	3)2 years and more	34	260.71				
	Total	372					
Geometry and Spatial Reasoning Awareness	1)No	199	143.15	2	75.753	.000*	1-2, 1-3
	2)1 year	139	227.36				2-3
	3)2 years and more	34	273.16				
	Total	372					
Data Acquisition and Statistical Awareness	1)No	199	142.04	2	75.030	.000*	1-2, 1-3
	2)1 year	139	232.49				
	3)2 years and more	34	258.71				
	Total	372					
Total Mathematical Skill Level	1)No	199	136.50	2	96.757	.000*	1-2, 1-3
	2)1 year	139	235.72				2-3
	3)2 years and more	34	277.91				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend preschool education show a significant difference according to the preschool education period. [χ2 (df=2, n=372)=96.75; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. At the end of the application, there is a significant difference between the years of pre-school education, between 0 and1or 2 years, between 1 year and 2 or more years. Differences have been in favor of those with higher education levels.

Findings and Comments Related to Seventh Sub-Problem

The seventh sub-problem of the research "Do the mathematical skills of the 60-72 months old children attending the pre-school education differ significantly according to the socio-economic status of the family?" is expressed as. Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in table 9.

Table 9. Results of the Analysis of the Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education According to Their Socio-Economic Status of Family

	Socio-Economic stuation	N	Mean Rank	df	χ^2	P	Difference
Number/Counting Process Awareness	1) Low	48	81.21	2	64.667	.000*	1-2, 1-3
	2) Medium	295	195.91				2-3
	3) High	29	265.02				
	Total	372					
Measurement Awareness	1) Low	48	107.55	2	40.178	.000*	1-2, 1-3
	2) Medium	295	192.19				2-3
	3) High	29	259.28				

	Total	372					
Geometry and Spatial Reasoning Awareness	1) Low	48	110.38	2	34.538	.000*	1-2, 1-3
	2) Medium	295	193.06				2-3
	3) High	29	245.76				
	Total	372					
Data Acquisition and Statistical Awareness	1) Low	48	90.39	2	56.506	.000*	1-2, 1-3
	2) Medium	295	194.18				2-3
	3) High	29	267.50				
	Total	372					
Total Mathematical Skill level	1) Low	48	86.35	2	61.625	.000*	1-2, 1-3
	2) Medium	295	194.38				2-3
	3) High	29	272.12				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend preschool education show a significant difference according to the socio-economic status of the child's family. [$\chi 2$ (df=2, n=372)=61.62; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. As a result of the application, there is a significant difference between the socio-economic status of the family, the low socio-economic status and the medium or high socio-economic status, the middle socio-economic situation and the high socio-economic situation**.** The differences were in favor of their higher socio-economic situation.

Discussion and Conclusion

In this section, the mathematical skill levels of the 60-72 months old children attending a preschool education institution which constitutes the study group of the research and their skill levels; gender, mother education status, father education status, number of siblings, previous education period and socio-economic level of the family were examined according to the variables; all dimensions of mathematical skills are discussed according to the sub-problems appropriate for the purpose of research.

The mathematical skill levels of 60-72 months old children attending pre-school education institutions are generally closer to “Most of the Time” between “Sometimes” and “Most of the Time”. In this respect, we can say that the general mathematical skill levels of the children are above average. As the mathematical skill level of the children is the sub-dimension, Geometry and Spatial Reasoning Awareness is the sub-dimension that they get the highest score, followed by Number / Counting Process Awareness sub-dimension and Data Acquisition and Statistical Awareness sub-dimension respectively. The sub-dimension where children get the lowest score as mathematical skill level is Measurement Awareness. While the highest mathematical skill level was the 6th item (Counts rhythm one by one forward from 1 to 10) as the scale items, the lowest mathematical skill level as the scale items was determined as the 10th item (The penny shows coins of 10 cents, 25 cents, 50 cents, 1 liras and says that these coins have different values). In this context, it can be said that rhythmic counting from 1 to 10 is achieved significantly before the children start preschool education and almost all of the children show this skill. The results of the study on the mathematical skills performed by Ertürk-Kara (2017) found that children's mathematics skill scores were generally high. However, the reason for the low level of skills related to the concept of money is that the studies on the concept of money in pre-school education institutions are either insufficient or the level of achieving the goals is low.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness and scores from the whole scale do not show a significant difference according to gender. In other words, the mathematical skill scores of 60-72 months old children who attend pre-school education are similar in terms of boys and girls. In the researches (Aktaş-Arnas, Deretarla-Gül & Sığırtmaç, 2003; Avci, 2015; Bulut Pedük, 2007; Dağlı, 2007; Demir & Dere Çiftçi, 2018; Karaman, 2012; Polat-Unutkan, 2007; Sezer, 2008;

Taşkın, 2013), there was no significant relationship or difference between the mathematical skills levels and genders of the children attending pre-school education as a result of relationship and difference analysis. In this context, it can be said that gender variable is not a factor affecting mathematical ability / skill. The reason for this can be stated that mathematical ability can be affected first by genetic factors and then by environmental factors (Turan, 2013).

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores obtained from all scale differ significantly according to mother education level. When the rank averages are considered, it is seen that the highest level of mathematical skills is that mothers have university-level learning. It is seen that those who have the highest rank average and whose mothers have high school education and then secondary education level. The lowest mathematical skill scores are observed in the children of mothers with literacy and primary school levels. The reason for this may be explained that the higher the education level of the mothers, the higher their academic knowledge, knowledge and support (Yenilmez & Özbey, 2006), the better they can reflect their increasing potential to their children and become more knowledgeable about mathematical concepts at the cognitive development level. It is stated that the mother with a certain level of education cannot provide cognitive and other developmental support to her child by another person or practice (Aslanargun et al, 2016). When the results of the related research are examined there is a significant difference between the educational level of mothers and the mathematical skill levels of their children. In the study conducted by Karaman (2012), no significant difference was found between the educational level of parents and their children's mathematical skill levels.

The mathematical skill levels of 60-72 months old children attending preschool education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores obtained from all scale differ significantly according to father education level. In terms of rank averages, it is seen that the highest level of mathematical skills are fathers with university level education. Then, the ones having the highest order average, respectively, have the fathers' education at high school and secondary school level. The lowest mathematical skill scores are those of fathers who are at the level of literacy and primary school. This may be explained by the fact that as fathers' educational levels increase, they can support their children cognitively, form a positive mathematical perspective (Yenilmez & Özbey, 2006), increase their father's educational roles with increasing educational level, guide their children instructively and guide their children as well as teaching (Hortaçsu, 1995; akt. Aslanargun et al., 2016). In the literature, similar results were obtained in the studies examining the relationship between mathematical skills of the children and the level of father education. In a study by Dağlı (2007), a significant difference was found between the mathematics achievement scores of the fathers according to their education level. The difference in achievement between the children whose father was a primary school graduate and whose father was a high school or university graduate was significant. In addition, the achievement scores among the fathers of middle and high school graduates are also significant. In the study conducted by Bulut Pedük (2007), it was seen that pre-test and post-test math scores of the children differ according to the level of father education. In a study conducted by Avci (2015), it is observed that children generally have a high mathematics talent score as their fathers' educational level increases.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores from the whole scale differ significantly according to the number of siblings. Looking at the averages, it is seen that the mathematical skill levels of the children who have 1 sibling are higher than the other groups. One child with one sibling is followed by one child, and then there are 2 siblings, 3 and more siblings respectively. In general, as the number of siblings increases, the level of mathematics skills decreases. However, contrary to this situation; The ones with the highest mathematical skill level are the children with 1 sibling and not the single child. The reason for this finding is that peer-sibling learning of children with 1 sibling or a sample of the instructional behaviors of the sibling may lead to an increase in mathematical skill level. The reason for the decrease in the mathematical skill level with the increase of the number of siblings can be explained as the increase in the number of siblings, which can shorten the time for parents of each child, and can offer less educational materials by dividing the opportunities for each child. In the literature, similar results were obtained in the studies examining the relationship between mathematical skills of children and the number of siblings and the difference, and different results were obtained. In a study conducted by Avci (2015), it is observed

that the children of the families with 2 children tend to get higher scores, followed by the children of the families with one child and 4 children, and the siblings of the families with 3 children are the lowest. In the study conducted by Aslanargun et al (2016), no significant relationship was found between academic achievement and the number of siblings, whereas two siblings were found to be more successful than single children and more siblings. In the study conducted by Sezer (2008), it was observed that success in the number and operation concepts did not differ significantly according to the sibling presence as a result of the training given to children.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores from the whole scale differ significantly according to the previous training period. In terms of rank averages, the highest mathematical skill level scores were taken by children who preschool education for 2 years or more, followed by 1 year of preschool education. The lowest mathematical skill level score was taken by children who have never taken preschool education. Based on this finding, it is clear that there is a true proportion of mathematical skill levels between the participation of children in preschool education. In this context, as the pre-school education period of children increases, so does the mathematical skill level. The reason for this is that children can improve their mathematical skills through the education they receive, and that they can improve their cognitive development through better connections between learning and mathematical concepts. The results of the research in this context (Dağlı, 2007; Polat-Unutkan, 2007; Avci, 2015) support the current research findings. Aunola, Leskinen, Lerkkanen and Nurmi (2004) states that the increase in mathematics competence is more rapid especially in preschoolers with more mathematics education.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores obtained from the whole scale differ significantly from the socio-economic level of the family. In terms of rank averages, the highest level of mathematical skill is at the high socio-economic level of the child's family and follows the middle socio-economic level. The lowest level of mathematical success is seen in the low socio-economic level of the family. In other words, it can be said that as the socio-economic level of the family increases, the child's mathematical skill scores increase. The reason for this can be explained by the increasing income situation, the academic and social opportunities given to the child may be more and more diverse (Aslanargun et al, 2016), the access to mathematical educational materials more, the availability of technological devices such as computers and tablets at home and the provision of environments where they can improve their mathematical skills. In the study conducted by Kandır and Koçak-Tümer (2013), the parents of 5-6 year-old children attending pre-school education have higher early learning skills than those in the upper income group compared to the middle and lower income group, and the children of the parents in the middle income group compared to the lower-income groupIn a study by Starkey and Klein (2000), he created a developmental gap between the low-income pre-school and middle-class peers in terms of the scope of their numerical knowledge. It was found that the children of low-income families had lower mathematical skills.

This study is limited to the data obtained from 372 children aged 60-72 months in the official independent kindergarten in Battalgazi and Yeşilyurt districts of Malatya province in 2018-2019 academic year.

Based on the research findings, recommendations for parents;

- Parents with low educational level can contribute to the development of their own and therefore their children by attending courses, panels, seminars and conferences on subjects such as child development, child rearing and child education e.t.c.
- Families with one child can offer their children more opportunities to spend time with their peers and friends, considering that their children can gain quicker and lasting skills through peer interaction.
- Parents can further support their children in preschool education to help them gain more systematic and accurate information, to follow their progress regularly, and to develop mathematical skills such as problem solving, cause-effect relationship, analytical thinking.
- Parallelism between the socio-economic level of the family and the child's mathematical skill level highlights the environmental factors in the child's learning. Families can facilitate learning of children by providing the presence of concepts enriched with stimulants and by enabling concretization of concepts. In this respect, parents can contribute to the development of mathematical skills of their

children with qualified and various educational materials, technologic tools such as computers and tablets.

Suggestions for teachers;

- Number and type of measurement activities for children can be increased.
- An abstract concept, such as the concept of time, can be associated with concrete objects and situations to increase the level of skill in this field.

Suggestions for researchers;

- The research can be conducted using a wider sample and different independent variables.
- In addition to the quantitative research method, in-depth knowledge can be obtained by using qualitative research methods and suggestions can be made to improve the mathematical skills of children.

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The Effect of Cyberbullying and Traditional Bullying on English Language Learners' National and Oriented Identities

Hilal Peker*[a]

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Abstract

Bullying is defined as aggressive, repeated and intentional harm doing as a result of imbalance of power among individuals. Both traditional bullying and cyberbullying towards English language learners (ELLs) increased immensely as a result of recent political events in the U.S. ELLs are the most exposed victims of bullying due to language barriers in responding to bullies, which affects their identities, as they adapt to and settle in their new community. However, little research has addressed the bullying victimization of racial and ethnic minority students, although 54% of Asians and 34% of Latinos have been bullied in classrooms compared to 31% of White students. Therefore, the purpose of this quantitative study was to investigate bullying victimization and second language (L2) identity among the adult ELLs in the U.S. The quantitative data were collected from 1464 ELLs through an adapted survey consisting of five-point Likert scale items. The quantitative data were analyzed using partial least squares structural equation modeling (PLS-SEM). Results indicated that cyberbullying was a more powerful factor than traditional bullying affecting both national and oriented ELL identities.

Siber Zorbalığın ve Geleneksel Zorbalığın İngilizce Öğrenen Bireylerin Ulusal ve Adapte Olmuş Kimlikleri Üzerine Etkisi

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Öz

Zorbalık, bireyler arasındaki güç dengesizliğinin bir sonucu olarak agresif, tekrarlanan ve kasıtlı zarar verme olarak tanımlanmaktadır. İngilizce öğrenen bireylere (ELL) yönelik hem geleneksel zorbalık hem de siber zorbalık, ABD'deki siyasi olayların bir sonucu olarak son derece artmıştır. İngilizce öğrenen bireyler, yeni toplumlarına uyum sağlama surecinde zorbalara tepki vermedeki dil engelleri nedeniyle zorbalığa maruz kalan en mağdur gruplardır. Ayrıca, Asyalıların% 54'ü ve Latinlerin% 34'ü beyaz öğrencilerin zorbalığa uğrayan % 31'lik kısmına kıyasla sınıfta zorbalığa uğramış olsa da, ulusal ve ırksal azınlık öğrencilerinin zorbalık mağduriyetine yönelik çok az araştırma yapılmıştır. Bu nedenle, bu nicel çalışmanın amacı ABD'deki yetişkin ELL'ler arasında zorbalık mağduriyetini ve dil öğrenme kimliğini araştırmaktır. Sayısal veriler, uyarlanan beş maddeli Likert ölçek maddelerinden oluşan bir anket aracılığıyla toplanmış ve kısmi en küçük kareler yapısal eşitlik modeli (PLS-SEM) kullanılarak analiz edilmiştir. Sonuçlar, siber zorbalığın ELL'lerde ulusal ve uyum sağlamış/adapte olmuş kimliklerini etkilediğini ve geleneksel zorbalığa göre daha güçlü bir faktör olduğunu göstermiştir.

***Corresponding Author:** hilalpeker@utexas.edu
[a] Assistant Professor, Bilkent University, Ankara,Turkey, https://orcid.org/0000-0002-2642-3015

Introduction

Identity is a concept referring to the meanings of individuals' selves that are attached by themselves or others. Specifically, Holland, Lachicotte, Skinner, and Cain (1998) stated, "people tell others who they are, but even more important, they tell themselves and then try to act as though they are who they say they are" (p. 3). Identity is both how individuals perceive their selves to be and how they describe themselves based on the other individuals around within a small or large culture. Since the beginning of Greek times, identity has been examined by philosophers, psychologists, anthropologists, and educational researchers. Mead (1934) is the pioneer of modern identity-concept. He put forward the idea that identity is constructed as a result of interaction with the others, and language development is crucial in having this interaction. He claimed that the mind and one's self come to life through the language, and he differentiated "I" from "me" as being the parts of one's self. "I" refers to the organism's response to others' attitudes while "me" refers to an "organized set of attitudes of others that one assumes to be, and the attitudes of others creates the organized "me", to which one reacts as an "I" (Uslu-Ok, 2013, p. 46). Since "I" and "me" live without each other, individuals must be the object of themselves in order to reach the social "me." This is achieved through having interaction with others and getting their attitudes. As mentioned before, the only way to achieve this is the language. Therefore, the self is a social construct that can only emerge within a social community. According to Mead (1934), interaction is the only way to reach individuals' "me" self. Through communication with others, one can become an object to himself or herself, and this process is realized through the conversation of gestures and through language (conversation of significant gestures). In both of the cases, the individual needs to interact with others to emerge his/her self.

One of the proponents of Mead, Goffman (1963) offered a sociological aspect on the concept of identity. He proposed the distinction between virtual and social identity. Virtual identity is that individuals assume another person's identity when they first meet, and they try to compare this person's identity with the others in the society to find if this person is within the standards of the society that they are assigned to. However, social identity refers to the category and the features that this person proves to have. If this person does not have the normed features or cannot prove to have the standards assigned by others within this community, this person is stigmatized. Then, in this condition, personality identity emerges. It refers to the image of an individual in another individual's mind; therefore, social and personal identities are mingled (Goffman, 1963). Regarding this, Mauss (1979) conducted anthropological studies that proved this mingled structure of belonging to a community. Based on his studies, there were some rituals among some communities. These rituals were for naming the individuals in order to create belongingness to a certain community. Names were given to the individuals based on their established roles or responsibilities in the community. This showed that those names did not necessarily indicate the individuals but their membership within a society, and when their positions changed the individuals could change their names. By showing this, Mauss (1979) manifested the dynamic structure of identity. Identity is culturally or socially constructed and it is dynamic or subject to change.

Another study was done by Fajans (1983). In her study, the individuals' personal developments in Papua New Guinea were reported, and it was found that individuals in this society construct their identities based on others. For instance, the children were not accepted as adults until they gain some social features such as responsibilities or behaviors. Based on her studies, actions of individuals are in constant change depending on the dynamic structure of their interactions with others and the situations that they have been to. To sum up, the identity of individuals is shaped by the community and the individuals' interactions with others who surround them within a society. Even though the individuals have the opportunity to choose their actions or who they are, social values and interactions play a large role on this decision making. Therefore, construction of identity must be examined carefully within the social contexts.

Identity as a Construct in Second Language Acquisition (SLA)

Even though identity has been an issue that has been searched since the Greek times, it has been gaining more and more popularity in the second language acquisition (SLA) field. Norton-Pierce (1995) has a great impact in SLA studies focusing on identity construction and language acquisition. She studied the immigrant women in Canada and asserted that individuals' social identity has multifaceted structure and it is dynamic. Even though some researchers such as Dörnyei (2009) thinks that motivation is also a dynamic structure and explains language learning most through motivational studies and offers second language (L2) Motivational Self System theory, Norton-Pierce believes that this concept should be called as investment because motivation, as a construct, does

not take the relations between power, identity and language learning into account. She asserted that individuals invest time and effort in order to learn languages, and this, in return, help them to obtain "symbolic resources" to boost their cultural capital. Therefore, when individuals invest in learning languages, they also invest in the construction of their own social identity.

In SLA studies, identity is seen as a dynamic structure rather than a fixed or stable structure. Therefore, when individuals change countries or communities and acculturate themselves within another culture, their perception of their own identity starts changing. The individuals seek for adaptation to the new community and try to close the difference between the current identity and the identity-to-be through the interactions with others in the new community. Therefore, the concept of identity is not a stable one; it keeps changing through the interactions with others.

As mentioned before, identity studies have gained popularity in SLA with Norton-Pierce's (1995) work. The studies investigated the effect of identity construction on language learning, individuals' identity construction and study abroad programs, and identity construction regarding gender. For instance, Kim (2003), in her ethnographic study, investigated the relationship between English acquisition and social identity construction in a multicultural society in Malaysia. The results indicated that the identities of the participants changed constantly and strategically in order to preserve their acceptance and sense of belonging to a certain community. One of the participants stated that she chose not to speak her second language, English, because she thought she would sound Westernized and others might think that she was showing off. She was concerned that others from her community would exclude her when she sounded westernized. Another participant reported that she did not speak English as she associated English with non-Muslim communities. These findings indicated that language as an interaction symbol depends on social context and is a determinant in one's self that he/she likes to show.

Furthermore, in Gao's (2011) study, the effect of Chinese learners' identities on their English learning in Britain was investigated. Gao also looked for how these learners' identities were reconstructed as Chinese national identities. The results indicated that these learners realized the unique side of Chinese culture and the effect of values on their classroom communication with the other people from different cultures. Interacting with other people from different cultures made reevaluating their own national identities possible. The participants' identities shifted depending on the interaction they had with the other students from different cultures in the class. As a result of their study abroad experience and learning English in Britain, they reflected their own values and changed their identities. Lam (2004) also studied two Chinese female English learners in order to understand how they constructed their identities in an online community. The participants did not want to associate themselves with the American or American-Chinese individuals. However, participating in the online interaction caused the participants to adopt new identities anyways. Participants' past identities as Hong Kong-Chinese individuals were reshaped through their interactions. Lam (2004) asserted that individuals' perception of who they are is recreated when they move from one sociocultural context to the other.

In addition, Polat and Mahalingappa (2010) focused on how language learning is affected by gender and identity. The researchers examined the gender differences in identity and acculturation patterns and L2 accent attainment. In this quantitative study, 121 middle school Kurdish students participated and the results showed that girls had more native-like accent ratings than boys. In addition, girls and boys showed different patterns in their identification with the dominant Turkish society, family structure, and acculturation patterns. Boys reported that they speak less Turkish as an L2 than Kurdish outside and in the family. Therefore, they identified themselves with more Kurdish patterns and less Turkish patterns. The situation was the opposite in girls' situation.

Moreover, in his research study, Roger (2010) studied the role of the "ideal second language self" with 7 highly-proficient Korean learners of English as a global language and investigated how these learners perceived their identities as global citizens. The results indicated that most of the participants reported English language as part of their identity. On the contrary, inclination to adopt a bicultural identity as both a national one and global one was not a universal desire for them. Three participants out of seven rejected being a world citizen while four of the participants associated knowing English as an L2 would help them to travel and connect with the other people around the world. Based on the results, imagining one's ideal L2 self was not enough for motivation to learn a language.

Another study done by Menard-Warwick (2008) focused on language teachers' identities. They investigated two ESL teachers and the results indicated that these teachers described their identities as a mixture of both cultures; the one that they adopted through their U.S. experiences when they were in the U.S. (e.g., oriented identity) and the other one bing their original identity (e.g., national identity). They reported that they addressed their students' cultural and ideological concerns better through their new adopted and oriented identities.

Overall, previous study findings indicated that language learners reconstruct their identities and own oriented identities when they feel immersed in L2 and the L2 community, while maintaining their already existing identities that may be called national identities (Uslu-Ok, 2013). They reevaluate their positions and make changes on their identities depending on the L2 community in which they live (Norton-Pierce, 1995). However, referring back to the beginning, it should be emphasized that identity is how individuals perceive their selves based on the other individuals around within a small or large culture. In an L2 culture or community, L2 learners may encounter both positive and negative attitudes or approaches towards them. For instance, some ELLs' identities may be threatened by the words of others due to their limited English or their culture that would be different than native speakers. In such cases, they may be victimized and eventually their identities may be affected.

Bullying Victimization

Bullying can be defined as an aggressive behavior or intentional harm action that is repeated relatively often by a stronger person due to a power imbalance in interpersonal relationships (Olweus, 1993). Bullying is classified into two broad categories. The first one is called traditional bullying, and it refers to physical harm-doing such as hitting and/or beating. Racism can be included in this category such as teasing a person based on his/her ethnicity when both the bully and the victim are physically in the same environment. The other type of bullying is cyberbullying that has been increasing due to the development of the technology and social media. Cyberbullying involves acts such as sending offensive text messages to others.

The severity of bullying cannot be overlooked because it can lead to verbal threats or suicide in the worst cases besides its effect on individuals' identities. In addition, the extent of bullying may reach extreme dimensions (Batsche & Knoff, 1994). Some examples include isolation, losing one's friends, hopelessness, emotional adjustment, depression, anxiety, low self-esteem, and other difficulties in life (Hazler, Hoover, & Oliver, 1992). Given the severity of bullying, there are particularly vulnerable populations. For example, immigrants and refugees are among the most exposed ones to bullying in the U.S. (Hong, Peguero, Choi, Lanesskog, Espelage, & Lee, 2014; Lim & Hoot, 2015; Mendez, Bauman, & Guillory, 2012; Qin, Way, & Rana, 2008).

They experience a series of negative consequences in their host country that they have immigrated because they are linguistically and ethnically different. These experiences not only affect their academic achievements, but they can further affect their identities and lives. This situation is even worse when bullying victims attempt to communicate in a target language other than their native language to achieve their goals in their new society such as attending a school to obtain a degree.

These language learners are not only often bullied by native speakers but also by other language learners. This is mainly because bullying involves an imbalance of power and other language learners whose L2 proficiency is superior to the victim may bully other L2 learners whose proficiency is lower than the bully to gain power over them (Boulton, 1995; Strohmeier, Kärnä, & Salmivalli, 2011). Native speakers, on the other hand, may bully L2 learners to show their unearned privilege or higher status due to victim's race, ethnicity, or the target language proficiency. This is a serious incident that can negatively affect individuals' future life goals and their identities. They may be more nationalistic or they may opt for fighting with bullies.

Bullying occurring toward L2 learners in the L2 community has a major impact on their L2 learning (Peker, 2016). L2 learners tend to adjust language learning goals and motivations based on the judgments expected from others. As Hoffman (2015) stated, an individual's previous language learning experience determines future learning motivation. For example, Isabel, a participant in Mendez et al.'s (2012) study, reported that she was less bullied over time trying to learn English to defend herself. When perceived to be bullied because of their language barriers, L2 learners may either refrain from L2 community and become more nationalistic or they may choose to learn L2 faster to avoid being bullied in the future (Peker, 2016).

As explained earlier, leaners' identities are shaped and determined by others' actions and words (Brutt-Griffler, 2002; Cho, 2012; Ushioda, 2009; Vygotsky, 1978). Therefore, the detrimental effects of bullying victimization on L2 identity should be investigated. However, little research has addressed the bullying victimization of racial and ethnic minority students, although 54% of Asians and 34% of Latinos have been bullied in classrooms compared to 31% of White students (National Center for Education Statistics, 2016). In addition, even though there is an increasing number of studies on bullying at schools, no study has been conducted to investigate the impact of bullying on ELs' L2 identity (Hong et al., 2014; Lim & Hoot, 2015; Mendez, 2012; Qin, Way, & Rana, 2008). Therefore, this study aims to investigate the impact of bullying on L2 identity and contribute to the field by making explanations on the relationship between bullying victimization and L2 identity. Therefore, the purpose of this quantitative study is to investigate bullying victimization (i.e., cyberbullying and traditional bullying) and L2 identity (i.e., oriented and national identity) among the adult ELLs in the U.S. as a country that would host a wide variety of language learners. To this end, operational definitions of the key terminology are as follow:

Bullying: Bullying refers to "aggressive behavior or intentional 'harm doing', which is carried out repeatedly and over time in an interpersonal relationship characterized by an imbalance of power" (Olweus, 1993, p. 9).

Traditional Bullying: Traditional bullying can be defined as a form of bullying that involve direct aggression such as physical violence (hitting, kicking) and verbal violence (taunting, teasing, threatening) (Hawker & Boulton, 2000) or indirect aggression such manipulative acts as extorting, ostracizing, or intimidating another person (Hinduja & Patchin, 2010; Nansel, Overpeck, Pilla, Ruan, Simons-Morton, & Scheidt, 2001; van der Wal, de Wit, & Hirasing, 2003). In addition, it may include overt aggression (name calling, pushing) and relational aggression (gossip, rumor-spreading, sabotage, and other subtle behaviors destructive to interpersonal relationships) (Crick & Grotpeter, 1995; Hinduja & Patchin, 2010; Prinstein, Boergers, & Vernberg, 2001; Wolke, Woods, Bloomfield, 2000).

Cyberbullying: Cyberbullying means willful and repeated harm doing carried out through the use of computers, cell phones, and other electronic devices (Hinduja & Patchin, 2009, 2010; Patchin & Hinduja, 2006).

L2 Identity: L2 identity refers to constructing "new ways of linking the self to new worlds and words (i.e. forge new identities and new ways of expressing our identities)" (Ushioda, 2011, p. 202). Identities are socially reproduced and negotiated through individuals' interactions with each other. Imbalanced power dynamics in these social negotiations trigger the contested, resisted or denied L2 identities that affect the degree of L2 learners' motivational investment in the L2 and participation in the L2 setting (Norton, 2000, 2001).

National Identity: Individuals' perception of their L2 identity that is tied to their national values rather than an L2 integrated one (Uslu-Ok, 2013).

Oriented Identity: Individuals' perception of their L2 identity that is more inclined toward L2 community and culture; a well adapted one (Uslu-Ok, 2013).

Method

In this section, type of the study, target group, data collection tools, validity and reliability, data collection methods, data analysis, and limitations will be covered. The current study is a quantitative cross-sectional study (Dörnyei & Taguchi, 2010; Fraenkel, Wallen, &Hyun, 2012). A survey was constructed by using some items from Uslu-Ok (2013) and Hinduja and Patchin's (2010) bullying victimization survey, and the variables are not manipulated; therefore, these kinds of studies are sometimes called descriptive studies (Fraenkel et al., 2012).

The research questions were as follow:

1. Is there any relationship between traditional bullying victimization and ELLs' national and oriented identities?
2. Is there any relationship between cyberbullying victimization and ELLs' national and oriented identities?
3. Is there any relationship between ELLs' national identities and oriented identities?

Research Design

In this cross-sectional study, correlational design was used. Researchers conducting correlational research studies measure two or more variables in order to determine the extent of the relationship or the change among the variables measured. One of the advantages of using this design is being able to analyse the relationship among the variables at a single sitting and providing explanations based on the extent of the change among the variables (Gall, Gall, & Borg, 2007). For this reason, correlational design was more appropriate considering the research questions and the purpose of the current study.

However, it is important to note that in using survey for a correlational design study, there are some limitations. One of these limitations is that self-report surveys may be biased (Fraenkel et al., 2012). Specifically, if the topic is about individuals' bullying victimization experience, some adults may not be able to reveal their bullying experience easily due to the emotional trauma they go through. Therefore, this is considered as a limitation and it is acknowledged in the current study. Next limitation would be about not piloting this study. This could have affected the construct and internal validity of the study; however, to compensate this, the researcher analyzed all the constructs in the measurement model of the Partial Least Squares Structural Equation Modeling (PLS-SEM) by using Smart-PLS software (Hair, Hult, Ringle, & Sarstedt, 2016). After the careful analysis, the items that had lower outer loadings were removed from the analysis and constructs' AVE scores met the criteria.

Sampling and Data Collection

In this study, convenience and criterion sampling were used (Fraenkel et al., 2012; Gall et al., 2007). The accessible population was ELLs all over the U.S. Most of the participants were from Florida State; however, thanks to Amazon Mechanical Turk (AMT) website, the researcher was able to reach out to the other states all over the U.S. in 2016, which increased the number of participants who participated in this study. AMT is an online platform that enables researchers to collect survey data across the world. Previous studies focusing on AMT's reliability indicated that it is an efficient and helpful data collection platform (Buhrmester, Kwang, & Gosling, 2011; Mason & Suri, 2012). Compared to other data collection platforms, it is more reliable and (Buhrmester et al., 2011; Johnson & Borden, 2012; Sprouse, 2011). Furthermore, on AMT, there is a section on which researchers can set up their criteria to choose the right participants based on the purpose of their studies. For the current study, the criteria was a) being an ELL (learning English as an L2), b) being either an international student, faculty, staff, or immigrant, c) being 18 years of age or older.

Based on the criteria mentioned above, the researcher reached out to 1991 individuals and received answers from 1464 participants. However, 1022 of them completed the survey without missing any items. Therefore, the data results in this current study are obtained from these 1022 participants to provide more generalizable conclusions regarding participants' bullying victimization and their L2 identities. The response rate was calculated as 74%. This percentage is an extremely high response rate especially for the studies making use of surveys (Baruch & Holtom, 2008). According to Rogelberg and Stanton (2007), higher response rate helps with a higher representation of the results and higher statistical power. This could also lead to a better generalizability. Therefore, it could be stated that the results were generalizable considering the higher response rate and the sampling technique through which the data were collected all over the U.S.

Among the 1022 participants mentioned above, 970 of them completed the demographics section of the survey and it was found that 80.6% of the participants were between the ages of 18 and 34. The education levels ranged from doctorate degrees to no schooling; however, 27% of them had a high school or an equivalent degree and 26% of the participants were holding bachelor's degrees (see Appendix I). In terms of ethnicity, 29% of the participants were White and 28% of them were Hispanic or Latino. In addition, 10% of the participants were from Brazil, 11% of them were from China, and 3% of them were from Colombia. However, there were also participants whose nationalities were from Cuba, Dominican Republic, Germany, Haiti, India, Iraq, Japan, Kazakhstan, Kuwait, Mexico, Morocco, Philippines, Russian Federation, Saudi Arabia, South Korea, Turkey, United States of America (including Porto Rico), Venezuela, and Vietnam (see Appendix I).

Data Collection Tools

After obtaining the necessary ethics committee and institutional review board permissions, the data were collected through both online and paper-based surveys. Online surveys were collected on AMT, and the paper-

based ones were collected by making connections and partnerships with schools. For the purpose of the current study, two types of instruments were used. These instruments were a) Traditional Bullying and Cyberbullying Victimization Scale (Hinduja & Patchin, 2010), and b) L2 Identity Scales (Uslu-Ok, 2013).

The bullying instrument included the traditional bullying and cyberbullying victimization sections (Hinduja & Patchin, 2010), and five-point Likert Scale was used for each section of the adopted survey (e.g., Strongly Agree [5], Agree [4], Neither Agree/Disagree [3], Disagree [2], and Strongly Disagree [1]). To exemplify, traditional bullying items extended from "*I was called mean names*" to more serious forms of bullying such as "I was threatened or forced to do things I didn't want to do". In Hinduja and Patchin's (2010) study, Cronbach alpha level for the traditional bullying construct was .88. In addition, cyberbullying victimization section included such items as "*something was posted online about me that I didn't want others to see*" and the Cronbach alpha level for cyberbullying victimization construct was .74 (Hinduja & Patchin, 2010).

The second part of the survey included national L2 identity and oriented L2 identity, which was adopted from Uslu-Ok (2013). In her study, Cronbach alpha for the national L2 identity was .80, while the oriented L2 identity one was .84. National L2 identity items focused on ELLs' nationalistic values such as "*I am worried that I might lose a part of my national identity if I speak English like a native speaker.*" Oriented L2 identity, on the other hand, focused on such items as "*After coming to the U.S., I am no longer only a citizen of my country. I am a different person now*." Both national and oriented L2 identity constructs measured ELLs' identities within social and academic contexts in the U.S.

Data Analysis

Structural Equation Modeling ([SEM]; Tabachnick & Fidell, 2013) was utilized to investigate the relationship(s) between national identity, oriented identity, traditional bullying victimization, and cyberbullying victimization variables. However, for the current study, Partial Least Square SEM (PLS-SEM; Hair et al., 2014, 2016) was used thanks to its advantages over a regular SEM. Some of the advantages include PLS-SEM's working well with non-parametric data as well as single and multi-item constructs. It also minimizes unexplained variance amount and maximizes R^2 values in the algorithm. In addition, reliability and validity can be done by multiple criteria (Hair et al., 2016). These are some of the PLS-SEM advantages over a regular SEM, and it was safer to use PLS-SEM considering the current data coming from all over the U.S.

The data were analyzed at three steps, the last step being the structural model that yielded the results; therefore, the last stage is considered under the results section. First, the data were screened for normality, especially for skewness and kurtosis values. Skewness refers to the level on which the scores deviate from the perfect symmetry and kurtosis refers to the extent of the peakedness of a distribution (Lomax & Hahs-Vaughn, 2012). These values should be within the range of +/-2.0 (Lomax & Hahs-Vaughn, 2012). When each item was examined carefully for the skewness and kurtosis values, it was observed that these values were within the limits. Table 1 shows the lowest and highest points of each construct.

Table 1. Lowest and Highest Skewness and Kurtosis Values in Each Construct

	Traditional Bullying	Cyberbullying	National Identity	Oriented Identity
Skewness	.62 & 1.42	.81 & 1.25	.47 & .95	-.89 & .08
Kurtosis	-.76 & 1.37	-.11 & 1.00	-.73 & .35	-1.02 & .33

The second stage of the data analysis was the assessment of the measurement model for reliability, convergent validity, and discriminant validity (Hair et al., 2016). PLS-SEM analysis for the path weighing was conducted on SmartPLS (v. 3.2.4). The initial algorithm converged in 45 iterations and the estimation parameters showed PLS-SEM's algorithm output. Each indicator was examined carefully and some items were removed because their outer loadings were lower than .40, as suggested by Hair et al. (2016). With each removal, the PLS algorithm was run again to examine the measurement model.

Table 2. Reflective Measurement Model of Bullying and ELL Identity

Latent Variables	Indicators	Outer Loadings >.70	Composite Reliability .60 & .90	AVE >.50	Discriminant Validity	
					Cross Loadings	Fornell Larcker
Traditional Bullying	16	.71	.94 (initial) .94	.59 (initial) .61	Yes	No
	17	.74				
	23	.77				
	24	.74				
	46	.79				
	47	.81				
	48	.83				
	49	.82				
	50	.83				
Cyberbullying	18	.74	.93 (initial) .99	.63 (initial) .66	Yes	No
	25	.80				
	26	.75				
	51	.85				
	52	.86				
	53	.87				
	54	.83				
National Identity	14	.75	.88	.59	Yes	Yes
	43	.75				
	44	.81				
	45	.84				
	70	.70				
Oriented Identity	42	.74	.81 (initial) .82	.46 (initial) .60	Yes	Yes
	71	.74				
	72	.85				

Overall, after removing one item from traditional bullying construct, one item from cyberbullying construct, and two items from oriented identity construct, the PLS algorithm was run again and all the outer loadings met the criteria (i.e., above .70) along with other parameters suggested by Hair et al. (2016). For instance, convergent validity (Average Variance Extracted [AVE]), composite reliability, and discriminant validity were evaluated. AVE values of each construct should be more than .50, composite reliability should be between .60 and .90, and discriminant validity should discriminate between similar constructs (Hair et al. 2014; 2016). According to the criteria, measurement model was evaluated and removing four items with lower outer loadings improved the overall quality of the model (see Table 2 for initial and final composite reliability and AVE values).

Findings

The last step in data analysis focused on the assessment of structural model and this part is where the results were drawn. This final stage consisted of evaluating four parameters. These are collinearity (VIF) by means of examining predictors in the model, significance of each path coefficients by means of running bootstrapping, coefficients of determination (R^2), and the effect size (f^2). First, collinearity values of indicators were between .20 and 5, and multicollinearity among the exogenous constructs directly connected to the same endogenous construct was good and within the limits, which allowed the path coefficients to be examined next. In bootstrapping stage, path coefficients were analyzed for a significant alpha level each time bootstrapping was run, and all of them were significant at .01 and .001 levels (see Table 3). Then, coefficient of determination was evaluated for the predictive power of the structural model. In other words, coefficient of determination of endogenous variables explains the variance that is accounted by exogenous variables (Hair et al., 2016). The criteria for the coefficient of determination are as follow: 0.75 and above as substantial, 0.50 as moderate, and 0.25 as weak (Hair et al., 2016).

Based on the criteria, R^2 values of cyberbullying and national identity were moderate while the R^2 value of oriented identity was weak in the final structural model (see Table 3). Last, effect sizes, in other words, removal effects (f^2) of exogenous variables on the endogenous variable (i.e., oriented identity) were examined. The criteria for f^2 is as follows: 0.02 indicates a small effect size, 0.15 indicates a medium effect size, 0.35 indicates a large effect size, and if it is lower than 0.02, it refers to no effect (Cohen, 1988; Hair et al., 2016). According to the criteria, traditional bullying had a large removal effect on cyberbullying (f^2 = 2.23), while cyberbullying (f^2 = .15) had a medium effect on national identity. The rest of the effect sizes were either small or there was no effect (see Table 3).

Table 3. Structural Model Results

Constructs	Paths	Path Coefficients	Indirect Effects	Totals Effects	f^2	R^2
Traditional Bullying Victimization	TB ➔ CB	0.831***		0.831***	2.228***	
	TB ➔ NID		0.555***	0.555***		
	TB ➔ OID	0.129**	-0.142**	-0.013	.007	
Cyberbullying Victimization	CB ➔ NID	0.335***	0.225***	0.560***	.146***	.690
	CB ➔ OID	-0.199***	-0.128***	-0.327***	.015*	
National Identity	NID ➔ OID	0.124***		0.124***	.010	.568
Oriented Identity						.359

Note. * indicates $p < .05$, ** indicates $p < .01$, *** indicates $p < .001$

After the structural model parameter examination, the relationships between the variables in the model were evaluated carefully (see Table 3 and Figure 1). First, there was not a statistically significant relationship between traditional bullying victimization and national identity ($p > .05$) and the pathway was removed during the bootstrapping stage. However, when the indirect relationship between the two was examined, it was observed that the indirect relationship was significant ($p < .001$). On the other hand, there was a statistically significant relationship between cyberbullying victimization and national identity and their path coefficient was .335 ($p < .001$). The effect size (f^2) of cyberbullying victimization on national identity was calculated as .146 ($p < .001$), which indicated a medium effect on the R^2 of national identity.

Figure 1. A Model of Bullying Victimization and ELL Identity

Furthermore, there was also a statistically significant relationship between traditional bullying victimization and oriented identity, and the path coefficient was .129 ($p < .01$). The effect size (f^2) of traditional bullying victimization on oriented identity was .007 (p > .05), which did not show any effect of traditional bullying victimization on the R^2 of oriented identity. In addition, the relationship between cyberbullying victimization and oriented identity was statistically significant, and the path coefficient was -.199 ($p < .001$). The effect size (f^2) of cyberbullying victimization on oriented identity was .015 ($p < .05$), which indicates a small effect. Finally, there was a statistically significant relationship between traditional bullying victimization and cyberbullying victimization, and the path coefficient was found to be .831($p < .001$). The effect size (f^2) of on cyberbullying victimization was 2.228 ($p < .001$), which indicated a large effect on the cyberbullying victimization R^2.

Discussion and Conclusion

The current study sheds light on several aspects in the field. First, both traditional bullying victimization and cyberbullying victimization contributed to ELL identity development either positively or negatively overall. Even though national identity was not directly affected by traditional bullying victimization, it was affected by cyberbullying victimization. This indicates that ELLs feel more nationalistic when they are cyberbullied. This may be because cyberbullying was a constant factor affecting ELLs' lives everyday. As mentioned in the literature review section, studies indicated that bully victims in cyberbullying cases couldn't escape from the bully even if they change their school, work or environment because bullies are online and they can reach the victim any time on social media (Ovejero, Yubero, Larrañaga, & de la V. Moral, 2016).

Furthermore, the relationship between traditional bullying victimization and oriented identity was positive. This means that ELLs became more oriented into the target culture and language, as they were bullied physically or face-to-face. This is actually an interesting finding because ELLs may have fought against bullies in a non-online environment and gained self-confidence. According to Vitanova et al. (2015), ELLs may act as agents and take actions while learning an L2. They draw upon others' words such as family members, friends, teachers and peers, and then, they appropriate what other say or do to them. They use language as a tool to orient their identities. Considering this situation, ELLs possibly mediated the traditional bullying coming from others and their oriented identity to adjust in the target society while appropriating the discourse with others around them, as these bullies are the individuals that they would always see in their daily lives and within the community (van Lier, 2008; Vitanova, 2010). In other words, this connection may be "one of active participation in the L2 community or of resistance as in the case of national identity" (Peker, 2016, p. 112). However, to be able to make a definite conclusion on this, the participants whose oriented identities were higher could have been interviewed. This could be a future direction to examine.

The negative relationship between cyberbullying victimization and oriented identity also support the findings above. When cyberbullying occurs towards ELLs, they possibly do not want to be more involved in the L2 community, and they become more nationalistic. This also explains the positive relationship between national identity and cyberbullying. However, to stay connected and oriented within the society as active agents for their L2 learning, they may have preferred to resist and not use English as an L2. This could be true especially when bullies victimize an ELL by focusing on ELL's language proficiency. In some cases, ELLs may have responded in their native language as an indication of their resistance. Therefore, L2 agency could be considered as a part of both oriented and national identity (Norton, 2013; Uslu-Ok, 2013).

Overall, it could be concluded that ELLs who were traditionally bullied might have considered their L2 identity as more oriented by adopting some agency roles because of having to live with the bullies around them. However, in cyberbullying case, they probably became more nationalistic. This finding may align with Ovejero, Yubero, Larrañaga, and de la V. Moral (2016)'s statement "the size of the potential audience in cyberbullying is much larger" and "cyberbully has access to his or her victims 24 h, 7 days a week, while a traditional bully only has access at school" or outside school (p. 6). Therefore, cyberbullying victims "cannot avoid the bully, not even by changing school or moving to another city or town; the victims' fear of the bully can trigger genuine panic" (Ovejero et al., 2016, p. 6). In addition, in the previous study findings, it was indicated that cyberbullying victimization was predicted by the number of friends on Facebook (Dredge, Gleeson, & de la Piedad Garcia, 2014; Staksrud, Olafsson, & Livingstone, 2013). This may also explain why they opt for becoming more nationalistic.

Unfortunately, there is no other study focusing on learners' bullying experiences and its effect on their language learning processes either in Turkey or in other countries. Therefore, this study is the first one examining bullying effects on L2 learning. Future research should be conducted on bullying victimization effects on L2. Based on future research and the current study results, some anti-bullying clubs could be established to help individuals who are bully victims because of their language and ethnicities. These clubs could offer workshops that could take place at schools or community centers. In addition, cyberbullying and traditional bullying prevention programs could be integrated into school curricula.

Last, compared to the U.S. context, most of the bullying related studies in Turkey focused on cyberbullying and they did not focus on traditional bullying (Eroğlu, Aktepe, Akbaba, Işık, & Özkorumak, 2015; Sengupta & Chaudhuri, 2011; Sticca, Ruggieri, Alsaker & Perren, 2013; Şentürk & Bayat, 2016; Turan 2013). Even though these studies focused on the relationship between cyberbullying and participants' demographic features such as age and grade levels, none of them focused on bullying effects on L2 identity (Beyazit, Simsek, & Ayhan, 2017; Sengupta & Chaudhuri, 2011; Şentürk & Bayat, 2016). These studies indicated that as the grade level and age increase, the risk of being a cyberbully victim increases. Considering the age range in this current study, it is not surprising that cyberbullying has been a significant contributor to the model of L2 identity. Since this indicates a gap in the literature, future studies should be conducted with adult participants who are bullied due to their L2 proficiency levels and ethnicity.

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Appendix I

Demographic Category	Demographic Characteristics	Valid	Valid %
Ethnicity	White	280	28.9
	Hispanic or Latino	273	28.1
	Black or African American	57	5.9
	Native American or American Indian	10	1.0
	Asian / Pacific Islander	241	24.8
	Arab	65	6.7
	Egyptian	1	.1
	Indian	5	.5
	Middle Eastern	28	2.9
	Other	10	1.0
Country	Brazil	101	10.4
	China	103	10.6
	Colombia	30	3.1
	Cuba	14	1.4
	Dominican Republic	12	1.2
	Germany	20	2.1
	Haiti	11	1.1
	India	41	4.2
	Iraq	10	1.0
	Japan	11	1.1
	Kazakhstan	12	1.2
	Kuwait	30	3.1
	Mexico	50	5.2
	Morocco	13	1.3
	Philippines	10	1.0
	Russian Federation	11	1.1
	Saudi Arabia	49	5.1
	South Korea	12	1.2
	Turkey	90	9.3
	United States of America	61	6.3
	Venezuela	37	3.8
	Vietnam	29	3.0
	Other	213	22.2
	Total (missing 52)	***970***	***100***