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Contact Address:
Prof. Dr. Aytekin İŞMAN
TOJET, Editor in Chief
Sakarya-Turkey

Message from the Editor-in-Chief

Dear Colleagues,

TOJET welcomes you. TOJET would like to thank you for your online educational interest. We are delighted that more than 677000 educators, teachers, parents, and students from around the world had visited since October, 01 2002. It means that TOJET has continued to educate academic people on new developments on educational technology around the world. It is hope that the volume 20 issue 4 will also successfully accomplish our global educational goal.

I am very pleased to publish volume 20 issue 4 in 2021. This issue is the success of the reviewers, editorial board, and the researchers. This issue covers different research scopes and approaches by valuable researchers.

Turkish Online Journal of Educational technology looks for research paper about using educational technology for teaching and learning activities. The research papers should discuss the perspectives of teachers, students, parents, school managers and the ministry of education about using technology to enhance learning and teaching environment.

The Turkish Online Journal of Educational Technology is the center of research about educational technology used in instruction. The main goal of TOJET is to establish a bridge the gap between theory and practice. To help bridge the gap, TOJET provides readers with the new developments in educational technology world-wide and a main source for academics and professionals in the expanding fields of educational technology. Articles consist of all kinds of quality research on theory, applications, and development of educational technology.

I am always honored to be the editor in chief of TOJET. I am always proud of TOJET for its valuable contributions to the field of educational technology.

TOJET thanks and appreciate the editorial board who have acted as reviewers for one or more submissions of this issue for their valuable contributions. TOJET's reviewers are drawn quite widely from all over the world.

Call for Papers

TOJET invites article contributions. Submitted articles should be about all aspects of educational technology and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJET. All authors can submit their manuscripts to tojet.editor@gmail.com for the next issues.

October, 01, 2021

Editors,
Prof. Dr. Aytekin İŞMAN
Sakarya University
Prof. Dr. Jerry WILLIS
The College of New Rochelle

Editorial Board

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A Study of the Relationship between Secondary School Students' Computational Thinking Skills and Creative Problem-Solving Skills

Muhammed PAF*
Republic of Turkey Ministry of National Education, 09100 Aydin, Turkey
muhammedpaf@gmail.com
ORCID: 0000-0002-4033-4115

Beste DİNÇER
Faculty of Education, Education Programs and Teaching, Aydin Adnan Menderes University, 09100 Aydin, Turkey
bestedincer@gmail.com
ORCID: 0000-0002-9264-3665

**Correspondency: bestedincer@gmail.com*
This research is based upon the master thesis titled "The Relationship between Secondary School Students Computational Thinking Skills and Creative Problem Solving Skills" which is authored by Muhammed PAF and supervised by Dr. Beste DİNÇER.

ABSTRACT
The primary goal of this research is to investigate the relation between computational thinking skills and creative problem-solving skills in secondary school students over the 2018-2019 academic year (5th, 6th, 7th, and 8th grades). The study's sample size is made up of 1098 secondary school pupils. The T-test, one-way ANOVA, and multiple linear regression analysis were used. As can be observed from the research findings, the students' numerical thinking abilities and creative problem-solving skills average scores were strong in terms of total scores and sub-dimensions. According to the results, the mean scores of students' numerical thinking skills and creative problem-solving skills differed considerably in favour of girls. As the pupils' grade level progressed, statistically significant disparities in their computational thinking abilities scores appeared. Another major conclusion from the study is that there is a substantial link between students' thinking skills, creative problem-solving skills, and their capacity to keep up with technological advances. Furthermore, a somewhat favourable and substantial connection between students' computational thinking skills and creative problem-solving skills was discovered. Due to the findings of multiple linear regression analysis, sub-dimensions of creative problem-solving skills highly predicted computational thinking skills.
Keywords: creative problem-solving computational thinking; 21st century skills

INTRODUCTION
Scientific, social, economic, and technical advancements in various sectors appear to be changing the individual traits required and the abilities that must be held correspondingly in the twenty-first century. It may be argued that, particularly in the 2000s, when information technology evolved fast, an education strategy based on knowledge transfer was insufficient for individual growth. Many different styles of thinking arise as a child's brain grows and new life experiences are gained (Relkin, 2018). Modern times require individuals with high-level skills instead of individuals who memorize the information transmitted to them (Saracaloğlu, Yenice & Karasakaloğlu, 2009).

It is an indisputable reality that information technologies have a direct influence on individual behavior and modify our requirements in many aspects of our life. These innovations have an influence on education systems, and many talents that people should acquire must be adjusted. As a result, persons in the twenty-first century can think creatively and critically, generate unique answers to issues they meet, and adapt these solutions to new contexts. Individual and social requirements change because of the great advancement of information technology, making it critical for individuals to acquire certain abilities, referred to as 21st century skills.

According to Pakman (2018), 21st century talents include computational and creative thinking, as well as algorithmic thinking. Kuleli (2018) noted that in the twenty-first century, students and instructors must be technologically literate, problem solvers, researchers, and collaborators. Individuals entering the corporate world nowadays are expected to have certain abilities such as digital literacy, entrepreneurship, creativity, problem solving, and critical thinking (Kölemen, 2017). As Tanrıöğen and Sarpkaya (2011: 5) mentioned in their book, the major approach to build the targeted society and lifestyle in the twenty-first century, which is defined as the era of science, technology, and innovation, is via education through qualified manpower. Individuals that can think and regulate their cognitive processes are considered to adapt better to this altering environment (Dinçer,

2009). Individuals who create information, find proper information, and use information efficiently are needed in this setting.

In the report published by OECD (2018), it is stated that certain jobs will be replaced by new occupational categories during the next ten years. According to recent studies, many occupational groups that exist today will not exist in the future, and other occupational groups will arise. Many occupational categories that exist today will not exist in the future, according to current research, and other occupational groups will arise. Therefore, along with fundamental qualities such as algorithmic thinking skill, inovative thinking skill, logical cause, and effect relationship, and being a productive individual, being able to develop individuals with 21st century abilities should be our major aims.

Furthermore, the primary goal of education has been to raise individuals who can create, criticize, determine, question, and solve issues, and in recent years, the importance of teaching methods for higher order thinking abilities has grown. As a result, it is recognized in educational institutions that it is critical for students to prepare for new situations that may develop and to gain the necessary skills. As a result, when newly updated curriculum is evaluated, it is stressed that the content of all courses is designed to create persons with high level thinking skills. In this perspective, it is an important issue how these important skills that are emphasized in the revised curriculum have an impact on students.

More than in previous years, the Ministry of National Education (MNE) made a major and dramatic modification in the programs in 2005. It was discovered in the Ministry of National Education's revised curriculum that fostering computational thinking of students was one of the objectives of computer science (MNE, 2018a) and information technologies and software classes (MNE, 2018b). In this context, it can be said that computational thinking and creative problem solving are among the skills that individuals should have. Wing (2016) states computational thinking as a key skill for children in the 21st century. Therefore, computational thinking skills should be among the basic skills that students should have in the 21st century (ISTE, 2016; Yıldız, Çiftçi & Karal, 2017).

Being able to think in a computational way in daily life helps to learn the basic structure of the emerging problems and to perceive the repeated mistakes better. In addition, computational thinking skills can be taught with skills such as social interaction, communication, and working as a team. Problem solving and computational thinking are related skills and can be transferred to other numerical fields such as mathematics (Çiftçi, Çengel & Paf, 2018). As a result of this disclosed information, computational thinking has been an important skill to be examined in recent years. It is stressed in the literature that there is a continuous link between computational thinking, creative thinking, and problem solving, all of which are referred to be 21st century abilities. Individuals with creative thinking talents are also excellent problem solvers, according to this statement. Studies on 21st century abilities stress the need of developing students' creativity and innovative skills (Fox, 2011).

In the light of this information, computational thinking and creative thinking have become key skills of the 21st century. When the individuals, having creative thinking skills, encounter a problem in their daily lives, they can produce fast and creative solutions to this problem. For this reason, it is expressed as a requirement that students acquire higher order thinking skills since a young age.
In this context, answers to the following sub-problems were sought in the study:

(1) What level is the computational thinking skills of secondary school students participating in the research?
(2) Is there a substantial difference in computational thinking skills among secondary school pupils based on gender, class, or the degree to which they are following technology developments?
(3) What level is the creative problem-solving skills of secondary school students?
(4) Do creative problem-solving skills of secondary school students show a significant difference according to gender/class, the state of following the technological developments?
(5) Is there a correlation between creative problem-solving talents and computational thinking skills in secondary school students?
(6) Do sub-dimensions of creative problem-solving skills predict computational thinking skills in a meaningful way?

METHOD

RESEARCH DESIGN

The goal of this study was to examine the relation between computational thinking skills and creative problem-solving skills in secondary school pupils. This goal was achieved using a relational (correlational) model within

the scope of the investigation.

POPULATION AND SAMPLE

The population of the study comprises of secondary students studying in the Germencik district of Aydn province during the 2018-2019 academic year. According to the theoretical sample size table in determining the number of samples, the research universe consisting of 2000 people should have 322 with levels of α = .05 significance and 5% tolerance; It is stated that it can represent 1661 people at the level of α = .01 significance and 1% tolerance (Can, 2014: 28). Accordingly, the number of samples in this study represents 49% of the universe. While selecting the sample, two classes (A-B) were taken from each school as a cluster to increase the possibility of the study population to represent the sample group and a single-stage cluster sample was made. In single-stage cluster sampling, the main population (schools) is first divided into clusters, and the desired number of clusters (classes) are drawn randomly from these clusters (İslamoğlu & Alnıaçık, 2016). Since the number of classes and students in each school is not equal, two classes from all schools were included in the sample except two village schools. In this way, the study's sample group consists of 1098 secondary school students chosen by proportionate cluster sampling from the Germencik district of Aydın province during the 2018 – 2019 academic year.

On analysis of the distribution of high school pupils volunteering in the study, 570 of them girls (51.9%), 528 of them were boys (48.1 %). 269 of the children in the research were in the fifth grade (24.5 percent), 282 in the sixth grade (27.5 percent), 348 in the seventh grade (31.7 percent), and 199 in the eighth grade (18.1%) as it was presented in Table 1.

Table 1. Demographic Features of the Students

Variable	Group	N	%
Gender	Male	528	48.1
	Female	570	51.9
Class level	5 th Class	269	24.5
	6 th Class	282	25.7
	7 th Class	348	31.7
	8 th Class	199	18.1
Status of Following Technological Developments	Yes	697	63.5
	No	381	34.7
	Unknown	20	1.8
	Total	**1098**	**100**

DATA COLLECTION TOOLS

The Computational Thinking Skills Scale (for Secondary School Students) developed by Korkmaz, Çakır and Özden, (2015) as well as the "Creative Problem-Solving Features Inventory" adapted to Turkish by Baran-Bulut, İpek, and Aygün (2018) were used to collect the data.

COMPUTATIONAL THINKING SKILLS SCALE

The scale, designed by Korkmaz, Çakır, and Özden (2015), and tested on secondary school students has a total of 22 items. Original scale developed in accordance with the university level, Korkmaz et al. (2015), validity and reliability at secondary school level were also examined.

In addition, because of confirmatory factor analysis, it was stated that the observed values of the scale model differed between .51 and .87 and showed an acceptable level of agreement. The validity and reliability of the scale were tested again with the data obtained within the scope of the research. As a result of the confirmatory factor analysis, it was observed that the standardized regression loads received different values between .52 and .73.

In accordance with the confirmatory factor analysis, fit indices were examined, and the values were determined as GFI = .995, AGFI = .947, CFI = .939, IFI = .939, NNFI = .927, RMSEA = .038, SRMR = .055. The model formed in this direction has been found to provide excellent fit indices. The Cronbach Alpha reliability coefficients calculated for the scale and its sub-dimensions are in the sub-dimension of "Creativity".62, in the sub-dimension of "Algorithmic Thinking".71, in the sub-dimension of "Cooperation".73, and "Critical

Thinking".69, "Problem Solving" sub-dimension.75, and across the scale.83. Accordingly, when the value related to the scale is examined, it is seen that the measurement tool has high reliability.

CREATIVE PROBLEM-SOLVING INVENTORY

The Creative Problem-Solving Inventory, designed by Lin (2010) and converted to Turkish by Baran-Bulut, İpek, and Aygün (2018), has 40 items and five variables. The inventory has dimensions for convergent and divergent thinking, motivation, environment, general knowledge, and skills. As a result of the analysis, it is claimed that the 40-item inventory translated to Turkish meets the goal. The scale's validity and reliability were once again assessed using data collected as part of the study. Confirmatory factor analysis showed that standardized regression loads received different values between .31 and .76. In accordance with the confirmatory factor analysis, the fit indices were examined, and the values were determined as GFI = .891, AGFI = .878, CFI = .888, IFI = .888, NNFI = .876, RMSEA = .045, SRMR = .071.

The model formed in this way has been found to have acceptable fit indices. The Cronbach Alpha reliability coefficients calculated for the scale and its sub-dimensions are as follows: “Divergent Thinking”.80, “Convergent Thinking”.76, “Motivation”.74, “Environment” sub-dimension.87, “General Knowledge and Skills” sub-dimension.76, “for the whole scale was .93. In this direction, when the value related to the scale was analysed, it was seen that the measurement tool has a very high reliability.

DATA ANALYSIS

A statistical package application was used to analyze the research data. When interpreting the data, $p<.05$ significance level was taken as the basic criterion. More than one parameter was taken as a basis for the examination of the normal distribution of data.

In the examination of the test result, the degree of closeness of the average, mode and median values of the data; skewness and kurtosis coefficients, normal distribution (histogram), Normal Q-Q graphs were examined, and it was concluded that the data showed normal distribution. If it is examined in more detail; the average, mode and median values of the data were found to be very close to each other. Since this is a feature stated in the normality assumptions (Leech, Berrett & Morgan, 2005), it was accepted among the normality parameters within the scope of this research. Altman and Bland (1995) argued that when the sample is above certain limits, the assumption of normality can be neglected and when the size of the sample within the scope of this study is analyzed (N = 1098), it is seen that this assumption is sufficient to be fulfilled. In addition, according to George and Mallery (2019: 211) and Hair, Black, Babin and Anderson (2014: 39), it is acceptable for the normality assumption to be within the ± 1 range of skewness and kurtosis values. The scale's skewness and kurtosis values of the mean scores for the computational thinking skills scale -.276 to -.523; for creative problem-solving skills inventory -.142 to -.524. In this context, it was seen that the data were in the range of ± 1. and the skewness and kurtosis coefficients, which were accepted as the biggest indicator for normality assumption, were accepted as another important parameter. In addition to this situation, normal distribution graph (histogram) and Normal Q-Q graph were examined, and the data was found to have a distribution that is acceptable as near to normal.

Considering the meeting status of the normal distribution assumptions described above and the size of the sample number (N = 1098), it was accepted that the data used in this study showed a normal distribution. As a result, parametric statistical approaches were used for data processing activities. The sample t-test, ANOVA, and Pearson correlation test were used to analyse the data in this way. Five-point Likert-type grading intervals were used to evaluate students' computational thinking and creative problem-solving abilities. As a result, the ranges 1.00 - 1.79 are considered "very low," 1.80 - 2.59 are considered "low," 2.60 - 3.39 are considered "mid," 3.40 - 4.19 are considered "high," and 4.20 - 5.00 are considered "extremely high."

FINDINGS

Table 2 displays descriptive data connected to the students' computational thinking ability levels in relation to the research's first sub-problem.

Table 2. Descriptive Statistics of Average Scores of Students' Computational Thinking Skill Levels and Sub-dimensions

Sub-Dimensions	N	$\bar{X}$	SS
Creativity	1098	4.07	.72
Algoritmic thinking	1098	3.70	.81
Collaboration	1098	4.08	.87
Critical thinking	1098	3.67	.87

Problem solvin	1098	3.53	.95
Computational Thinking(total)	1098	3.78	.58

Table 2 shows that the average scores of the students' computational thinking ability levels are typically high ($\bar{X}$ = 3.78). Furthermore, when the scores on the computational thinking abilities sub-dimensions were investigated, it was discovered that the greatest score was in the cooperation dimension ($\bar{X}$= 4.08), and the lowest score was in the problem-solving dimension ($\bar{X}$=3.53).

THE DIFFERENCE IN COMPUTATIONAL THINKING SKILL LEVELS AMONG SECONDARY SCHOOL STUDENTS BASED ON GENDER VARIABLE

In accordance with the first variable of the second sub-problem of the research, a t-test for unrelated samples from parametric tests was performed to evaluate whether the computational thinking skills of secondary school pupils varied significantly by gender. Table 3 contains information on the test findings obtained in this context.

Table 3. The t-Test Results Related to the Differentiation Status of the Students' Computational Thinking Skill Levels and Sub-Dimensions According to the Gender Variable

Sub-Dimensions	Gender	N	$\bar{X}$	SS	t	Sd	P
Creativity	Female	570	4.18	.63	-5.32	1096	.000*
	Male	528	3.95	.79			
Algoritmic Thinking	Female	570	3.74	.76	-1.80	1096	.073
	Male	528	3.65	.85			
Colloberation	Female	570	4.22	.80	-5.74	1096	.000*
	Male	528	3.92	.92			
Critical thinking	Male	570	3.73	.87	-2.37	1096	.018*
	Female	528	3.60	.86			
Problem Solving	Male	570	3.68	.95	-5.39	1096	.000*
	Female	528	3.37	.94			
Computational Thinking in General	Male	570	3.89	.56	-6.31	1096	.000*
	Female	528	3.67	.59			

***p<.05**

When the test results given in Table 3 were examined, that the average computational thinking scores of female students ($\bar{X}$= 3.89) were significantly higher than those of male students ($\bar{X}$= 3.67) was found. There was a significant difference in favour of girls (t (1096) = -6.31, p<.05). In this case, it can be stated that the gender variable has a significant effect on students' computational thinking skills generally.

Apart from the average scores of algorithmic thinking (*t* (1096) =1.80, *p*>.05) sub-dimension; creativity ($t_{(1096)}$ = -5.32, *p*<.05), collaboration (*t* (1096) = -5.74, p<.05), critical thinking ($t_{(1096)}$ = -2.37 It is observed that, *p*<.05) and problem solving (*t* (1096) = -5.39, p<.05) sub-dimensions made a significant difference in favor of girls.

DIFFERENTIATION OF SECONDARY SCHOOL STUDENTS' COMPUTATIONAL THINKING SKILL LEVELS BASED ON CLASS VARIABLE

In accordance with the second variable of the second sub-problem of the research, one-way analysis of variance, which is one of the parametric tests, was done to evaluate if the computational thinking skills of secondary school pupils varied significantly by class. Information on the test findings obtained in this context was presented in Table 4.

Table 4. ANOVA Results Regarding Differentiation of Average Scores of Students' Computational Thinking Skill Levels and Sub-Dimensions by Class Variable

Sub-Dimensions	Groups	Sum of Squares	df	Mean Squares	F	*p*	Difference
Creativity	Between Groups	3.088	3	1.029	1.984	.115	
	Within Groups	567.559	1094	.519			
	Total	570.647	1097				
Algoritmic Thinking	Between Groups	.521	3	.174	.265	.850	
	Within Groups	715.773	1094	.654			
	Total	716.294	1097				
Colloberation	Between Groups	10.682	3	3.561	4.732	.003	5-7* 5-8*
	Within Groups	823.169	1094	.752			
	Total	833.851	1097				
Critical thinking	Between Groups	1.114	3	.371	.495	.686	
	Within Groups	820.657	1094	.750			
	Total	821.771	1097				
Problem Solving	Between Groups	30.705	3	10.235	11.569	.000	5-6* 5-7* 5-8*
	Within Groups	967.828	1094	.885			
	Total	998.534	1097				
Computational Thinking in General	Between Groups	6.571	3	2.190	6.568	.000	5-7* 5-8*
	Within Groups	364.856	1094	.334			
	Total	371.426	1097				

p< .05

As it was shown in table 4, the average scores of the secondary school students studying at different 4 grade levels regarding their computational thinking skills were compared with the One-way variance analysis for unrelated samples according to the class variable (5th, 6th, 7th and 8th grades). The results showed that the averages of students in 5 th grade is as ($\bar{x}$ $\bar{X}$= 3.66), averages of students in 6th grade is ($\bar{x}$ $\bar{X}$= 3.77), averages of students in 7th grade ($\bar{x}$ $\bar{X}$= 3.85) and averages of students in 8th grade have ($\bar{x}$ $\bar{X}$= 3.86) statistically significant differences between at least two ($F_{(3-1094)}$ = 6.56, p<.05). The effect size (η^2 = .02) calculated that this difference is low. As a result of the Tukey multiple comparison test, it was observed that the difference was between the 5th and 7th grade students and the 5th and 8th grade students, and the differentiation was in favour of the 7th and 8th grades, respectively.

When the analysis results given in Table 4 were examined, creativity ($F_{(3-1094)}$= 1.99, p>.05), algorithmic thinking ($F_{(3-1094)}$= .27, p>.05) and critical thinking mean scores ($F_{(3-1094)}$= .50, p >.05) subscales did not make a significant difference according to the class variable; collaboration ($F_{(3-1094)}$= 4.73. p< .05) and problem solving ($F_{(3-1094)}$= 11.57, p< .05) it was found that there was a significant difference. As a result of the Tukey multiple comparison test, the problem solving sub-dimension between the 5th grades ($\bar{x}$= 3.96) and 7th ($\bar{x}$= 4.17) and 8th grades ($\bar{x}$= 4.18) in the collaboration sub-dimension of the significant difference It was observed that it was between 5th grade ($\bar{x}$= 3.26) and 6 th ($\bar{x}$= 3.53), 7th ($\bar{x}$ = 3.66) and 8th grades ($\bar{x}$= 3.68). When the average scores were analysed in this direction, it was seen that the differentiation occurred in favour of the upper classes.

DIFFERENTIATION OF SECONDARY SCHOOL STUDENTS' COMPUTATIONAL THINKING SKILL LEVELS BASED ON THE VARIABLE TO FOLLOW THE TECHNOLOGICAL DEVELOPMENTS

In accordance with the third variable of the second sub-problem of the research, a t-test was performed for unrelated samples from parametric tests to determine whether the computational thinking skills of secondary school students differ significantly depending on the state of the following technological developments. Data related to the test results carried out in this context are given in Table 5.

Table 5. T-Test Results Related to the Differentiation of the Average Scores of the Computational Thinking Skill Levels and Sub-Dimensions of the Students According to the Status of Following Technological Developments

Sub-Dimensions	Groups	N	$\bar{X}$	SS	T	sd	p
Creativity	Yes	697	4.12	.68	3.56	1076	.000*
	No	381	3.96	.78			
Algoritmic Thinking	Yes	697	3.76	.80	3.55	1076	.000*
	No	381	3.58	.81			
Colloberation	Yes	697	4.12	.84	2.62	1076	.009*
	No	381	3.97	.92			
Critical thinking	Yes	697	3.73	.89	2.98	1076	.003*
	No	381	3.56	.80			
Problem Solving	Yes	697	3.57	.97	1.75	1076	.080
	No	381	3.46	.92			
Computational Thinking in General	Yes	697	3.83	.57	4.02	1076	.000*
	No	381	3.68	.59			

***p<.05**

As it is shown in table 5, according to the state of following the technological developments, significant differences were observed in all dimensions apart from problem solving sub-dimension of students' computational thinking skills scores. A significant difference was observed in favour of the students who stated that they followed the technological developments between the mean scores of students who indicated ($\bar{x}$ = 3.68) ($t_{(1076)}$ =4.02, p<.05) in general. In this case, it can be said that the state of following technological developments had a significant effect on students' computational thinking skills.

Additionally, the average scores of problem solving ($t_{(1076)}$ = 1.75, p>.05) sub-dimension did not make a significant difference according to the state of following the technological developments; but creativity ($t_{(1076)}$ =3.56, p<.05) algorithmic thinking ($t_{(1076)}$ = 3.55, p<.05), collaboration (t (1076) = 2.62, p<.05) and critical thinking ($t_{(1076)}$ = 2.98, p<.05) sub-dimensions created significant differences in favour of students who state that they follow technological developments.

FINDINGS ON SECONDARY SCHOOL STUDENTS' CREATIVE PROBLEM-SOLVING SKILL LEVELS

In line with the third sub-problem of the research, descriptive statistics about students' creative problem-solving skill levels are given in Table 6.

Table 6. Descriptive Statistics of Students' Creative Problem-Solving Skill Levels

Sub-Dimensions	N	$\bar{X}$	SS
Divergent Thinking	1098	3.70	.78
Convergent Thinking	1098	3.86	.72

Motivation	1098	3.75	.81
Environment	1098	3.98	.78
General knowledge and Skills	1098	3.56	.86
Creative problem solving Skill in General	1098	3.81	.62

In Table 6, it was shown that the average scores of the students regarding their creative problem-solving skill levels were high ($\bar{x}$= 3.81). In this context, it could be stated that students' creative problem-solving skill levels were at high level ($\bar{x}$= 3.81). In addition, when the average scores of the creative problem-solving skills, sub-dimensions were examined, it was seen that the highest average score was in the environment ($\bar{x}$= 3.98), and the lowest average score was in the general knowledge and skills ($\bar{x}$= 3.56) dimension.

GENDER DIFFERENCE IN SECONDARY SCHOOL STUDENTS' CREATIVE PROBLEM-SOLVING SKILL LEVELS

In accordance with the first variable of the fourth sub-problem of the research, a t-test was performed on unrelated samples from parametric tests to evaluate if there was a significant difference in creative problem-solving skills among secondary school students based on gender. Findings related to the test results in this context are given in Table 7.

Table 7. t-Test Results of Differentiation of Secondary School Students' Creative Problem-Solving Skill Levels by Gender

Sub-Dimensions	Gender	N	$\bar{X}$	SS	t	sd	*P*
Divergent Thinking	Female	570	3.72	.78	-.55	1096	.585
	Male	528	3.69	.77			
Convergent Thinking	Female	570	3.93	.71	-2.98	1096	.003*
	Male	528	3.80	.73			
Motivation	Female	570	3.79	.81	-1.85	1096	.065
	Male	528	3.70	.82			
Environment	Female	570	4.09	.76	-5.04	1096	.000*
	Male	528	3.86	.77			
General knowledge and Skills	Female	570	3.53	.84	1.30	1096	.193
	Male	528	3.60	.87			
Creative Problem Solving Skill İn General	Female	570	3.86	.61	-2.91	1096	.004*
	Male	528	3.75	.63			

***p< .05**

When the test results given in Table 7 were examined, a significant difference was observed between creative solving average scores of female students ($\bar{x}$ = 3.86) and those of male students ($\bar{x}$= 3.75) ($t_{(1096)}$ = -2.91. p < .05) in favour of female students. Additionally, divergent thinking ($t_{(1096)}$ = -.55, p>.05), motivation ($t_{(1096)}$ = -1.85, p>.05) and general knowledge and skills ($t_{(1096)}$ = 1.30, p>.05) sub-dimension did not make a significant difference according to gender; but convergent thinking ($t_{(1096)}$ = -2.98, p<.05) and the environment ($t_{(1096)}$ = -5.04, p<.05) sub-dimensions had significant differences in favour of girls. In this case, it can be stated that gender variable has some significant effects on students' creative problem-solving skills.

DIFFERENCE IN CREATIVE PROBLEM-SOLVING SKILL LEVELS AMONG SECONDARY SCHOOL STUDENTS BASED ON CLASS VARIABLE

In accordance with the second variable of the fourth sub-problem of the research, ANOVA, one of the parametric tests, was used to evaluate if the creative problem-solving skills of secondary school pupils varied significantly by class. Table 8 summarizes the findings linked to the test results in this context.

Table 8. ANOVA Results Regarding Differentiation of Average Scores of Students' Creative Problem-Solving Skills Levels and Sub-Dimensions by Class Variable

Sub-Dimensions	Groups	Sum of Squares	df	Mean Squares	F	*p*
Divergent Thinking	Between Groups	.655	3	.218	.363	.780
	Within Groups	658.568	1093	.602		
	Total	659.222	1097			
Convergent Thinking	Between Groups	.229	3	.076	.145	.933
	Within Groups	574.374	1094	.525		
	Total	574.602	1097			
Motivation	Between Groups	.919	3	.306	.462	.709
	Within Groups	725.039	1094	.663		
	Total	725.958	1097			
Environment	Between Groups	.516	3	.172	.285	.837
	Within Groups	661.306	1094	.604		
	Total	661.823	1097			
General Knowledge and Skills	Between Groups	3.059	3	1.020	1.394	.243
	Within Groups	800.386	1094	.732		
	Total	803.445	1097			
Creative Problem Solving Skill in General	Between Groups	.353	3	.118	.301	.825
	Within Groups	427.549	1094	.391		
	Total	427.902	1097			

When the analysis results given in Table 8 are examined, there were no statistically differences between divergent thinking ($F_{(3\text{-}1094)}$= .36, p>.05), convergent thinking ($F_{(3\text{-}1094)}$= .15. p>.05), motivation ($F_{(3\text{-}1094)}$= .46, p>.05), environment ($F_{(3\text{-}1094)}$= .29, p>.05) and general knowledge and skills ($F_{(3\text{-}1094)}$= 1.39, p >.05) of creative thinking scores and the class variable. It could be said that class level did not make significant effect on the students' creative problem-solving skills.

DIFFERENTIATION OF SECONDARY SCHOOL STUDENTS' CREATIVE PROBLEM-SOLVING SKILL LEVELS BASED ON TECHNOLOGICAL DEVELOPMENT STATUS

In accordance with the third variable of the fourth sub-problem of the research, a t-test was performed on unrelated samples from parametric tests to determine whether secondary school students' creative problem-solving skills make a significant difference based on the state of the following technological developments. Table 9 summarizes the findings relating to the test results obtained in this context.

Table 9. T-Test Results Regarding the Differentiation of the Average Scores of the Students' Creative Problem-Solving Skill Levels and Sub-Dimensions According to the Variable Follow-Up Technological Status Variable

Sub-Dimensions	Groups	N	$\bar{X}$	SS	t	sd	p
Divergent Thinking	Yes	697	3.81	.76	5.99	1076	.000*
	No	381	3.52	.77			
Convergent Thinking	Yes	697	3.92	.69	3.78	1076	.000*
	No	381	3.75	.77			

Motivation	Yes No	697 381	3.81 3.63	.81 .81	3.48	1076	.001*
Environment	Yes No	697 381	4.04 3.86	.77 .79	3.79	1076	.000*
General knowledge and Skills	Yes No	697 381	3.64 3.43	.84 .85	3.84	1076	.000*
Creative Problem Solving Skill in General	Yes No	697 381	3.88 3.67	.61 .63	5.39	1076	.000*

***p< .05**

When the test results given in Table 9 were examined, significant differences were found in all dimensions calculated as divergent thinking ($t_{(1076)} = 5.99$, $p<.05$), convergent thinking ($t_{(1076)} = 3.78$, $p< .05$), motivation ($t_{(1076)} = 3.48$, $p< .05$), environment ($t_{(1076)} = 3.79$, $p< .05$) and general knowledge and skills ($t_{(1076)} = 3.84$, $p<.05$) of creative problem solving skills of the students according to following up technological developments. It could be said that significant differences were in favour of students who state that they follow technological developments in the sub-dimensions.

SECONDARY SCHOOL STUDENTS' COMPUTATIONAL THINKING SKILLS AND CREATIVE PROBLEM-SOLVING SKILLS: FINDINGS AND COMMENTS

In accordance with the fifth sub-problem of the research, Pearson moments multiplication correlation analysis was used to investigate the link between students' computational thinking skills and creative problem-solving skills and sub-dimensions. Table 10 presents the results of the correlation study.

Table 10. Pearson Moments Product Correlation Analysis Results Related to the Correlation between Students' Computational Thinking Skills and Creative Problem-Solving Skills

Sub-Dimensions		**Divergent T.**	**Convergent T.**	**Motivation**	**Environment**	**GKS**	**CPS**
Creativity	Correlation	.473**	.478**	.446**	.382**	.365**	**.537****
	p	.000	.000	.000	.000	.000	.000
	N	1098	1098	1098	1098	1098	1098
Algoritmic Thinking	Correlation	.488**	.462**	.465**	.378**	.493**	**.558****
	p	.000	.000	.000	.000	.000	.000
	N	1098	1098	1098	1098	1098	1098
Colloboration	Correlation	.326**	.382**	.323**	.351**	.239**	**.417****
	p	.000	.000	.000	.000	.000	.000
	N	1098	1098	1098	1098	1098	1098
Critical thinking	Correlation	.567**	.492**	.538**	.410**	.458**	**.611****
	p	.000	.000	.000	.000	.000	.000
	N	1098	1098	1098	1098	1098	1098
Problem Solving	Correlation	.184**	.206**	.174**	.133**	.174**	**.213****
	p	.000	.000	.000	.000	.000	.000
	N	1098	1098	1098	1098	1098	1098
Computational Thinking Skills in General	Correlation	.554**	.553**	.529**	.448**	.474**	**.636****
	p	.000	.000	.000	.000	.000	.000
	N	1098	1098	1098	1098	1098	1098

**** p<0.01 GKS =** General Knowledge and Skills**, CPS =** Creative Problem Solving Skills in General

Table 10 evaluated the Pearson Moments Product Association Coefficient in evaluating the correlation between secondary school students' computational thinking skills and creative problem-solving skills, because the variables matched the requirements of normalcy. As a result, a somewhat positive and significant association (r

=.636, p.01) was discovered between students' computational thinking skills and creative problem-solving ability.

When the relationship between the computational thinking skills and the sub-dimensions of creative problem-solving skills were examined in line with the findings, it was found that there was a moderate positive and significant correlation with divergent thinking sub-dimension (r =. 554, p<.01), convergent thinking sub-dimension (r = .553, p<.01), motivation sub-dimension (r = .529, p <.01), environment sub-dimension (r = .448, p<.01), and with the general knowledge and skills sub-dimension (r = .474, p<.01) and computational thinking skills.

In other words, as students' creative problem-solving skills increase, their computational thinking skills also have tendency to increase. Similarly, between critical thinking and divergent thinking sub-dimensions of the highest relationship among sub-dimensions; the lowest relationship was observed between problem solving and environmental sub-dimensions (r=.133, p<.01).

MULTIPLE LINEAR REGRESSION ANALYSIS RESULTS IN SUB-DIMENSIONS OF COMPUTATIONAL THINKING SKILLS AND CREATIVE PROBLEM-SOLVING SKILLS

Multiple linear regression analysis was used to see if computational thinking skill can be predicted based on creative problem-solving sub-dimensions. The problem of multiple coupling is the most difficult condition in multiple regression analysis. By examining the tolerance and VIF values, it was determined that there would be no multi collinearity problem (Leech, Barrett, & Morgan, 2005).

Table 11. Multiple Linear Regression Model Summary on predicting Computational Thinking Skill with sub-dimensions of creative problem-solving skills

Sub-Dimensions	B	Std. Error	β
Constant	1.536	.084	
Divergent Thinking	.159	.026	.211
Convergent Thinking	.157	.028	.195
Motivation	.089	.025	.125
Environment	.089	.021	.119
General knowledge and Skills	.102	.020	.150

**** p<0.01**

The sub-dimensions of creative problem solving skills substantially predicted computational thinking skills, according to the analysis results (F (5-1092)= 155.209, p 0.01). All sub-dimensions contribute considerably to the model's development as well. According to the beta values in Table 11, divergent thinking is the most important contributor to the model's creation, followed by convergent thinking, general knowledge and skills, motivation, and environment sub-dimensions, in that order. The R2 value that has been modified based on the analysis results is 0.413. This demonstrates that the model explains 41% of computational thinking skills.

DISCUSSION AND CONCLUSION

In the study, students' computational thinking and creative problem-solving abilities were explored in connection to several factors (gender, class level, and computer ownership), and whether there was a significant relationship between variables was investigated. The computational thinking ability levels of the students were disclosed within the framework of the first sub-problem of the investigation. The average scores of the students' computational thinking ability levels and sub-dimensions were high, according to the results.

The highest mean score was found as collaboration and the lowest mean score was problem solving. In their study, Korkmaz, Çakır and Özden (2015) reached the conclusion that students' computational thinking skills are quite high, and the lowest average in terms of sub-dimensions is in the problem-solving dimension. Similarly, Oluk (2017) concluded that students' computational thinking skill levels were high Korkmaz et al. (2015), in another study, individuals' perceptions of computational thinking skill levels were half high and half medium; it was stated that the highest average was collaboration, and the lowest averages were algorithmic thinking and problem solving. Çakır (2017) concluded that students' computational thinking skills were above average, and the highest average was collaboration, and the lowest average was problem solving. In this context, the fact that

students' computational thinking skills are at a high level and that students are computational thinkers is an important finding for modern days of the 21st century.

According to the results obtained in line with the second sub-problem of the study, a meaningful difference was found in favour of girls between the average scores of female students' computational thinking skills and the average scores of male students. When the average scores of the sub-dimensions were examined, that the average scores of the female students were higher than male students and a significant difference was observed in favour of the girls in all sub-dimensions except for algorithmic thinking.

Sarıtepeci (2017) stated that the computational thinking skill levels of women were higher, but this situation did not create a significant difference. According to a similar result, Oluk (2017) stated that the average of female students is higher than that of boys. Some studies in the literature differ with the results achieved. Gonzalez et al. (2017) concluded that their scores on computational thinking skills were higher in favor of men. Kuleli (2018) also found that the gender variable did not make any difference on the computational thinking skills. Oluk and Korkmaz (2016) and Turan (2019) found that the gender variable did not make a difference in computational thinking skills in their studies.

As a consequence of the results obtained in the context of the class variable, it was discovered that as students' grade levels grew, so did their mean scores for computational thinking skills and sub-dimensions, with a substantial difference between classes. According to Gonzalez et al. (2016), as students' grade levels improved, so did their computational thinking skills. According to Korucu et al. (2017), kids' computational thinking skills fluctuate considerably across grade levels. Some research provides outcomes that differ from those found in the literature. Korkmaz et al. (2015) and Oluk (2017) state that there was a decrease in their computational thinking skills as their grade levels progress.

The outcomes regarding the condition of following the technological improvements show that mean scores of the computational reasoning skills differ in favor of the pupils who express that they follow the accomplished technological improvements. It can be said that the state of following technological developments in this direction has a significant effect on students' computational thinking skills. Çiftçi et al. (2018) stated that in their study, there was a negative relationship between following technological developments and self-efficacy regarding programming, and prospective teachers with high skills follow the developments in the field less. This study compared to the other students who follow technological developments in the computational thinking skills were found to be higher. In addition, it is striking that the results obtained in the studies with different sample groups differ in the literature. It is thought that accessing and using technology correctly is an expected result that will have a positive effect on students' computational thinking skills, but the differentiation situation in some studies may be due to the profile of the sample group.

According to the results obtained in accordance with the study's second sub-problem, there was a substantial difference in favor of females between the average scores of female students and the average scores of male students in terms of creative problem-solving ability. Unlike the research findings, Toraman (2017) found that male students are more likely than female students to achieve a creative solution. Unlike previous research, Zeytun (2010) revealed that teacher applicants' judgments of creativity and problem-solving skills are not gendered. In this study, the fact that female students' computational thinking and creative problem-solving skills were statistically higher than men reveals that gender variable is a significant factor. Accordingly, it can be thought that skills affect each other positively.

The third sub-problem of the research focused pupils' innovative problem-solving abilities. According to the findings, the average scores of the students for their creative problem-solving ability levels and sub-dimensions were high. A high degree of creative problem-solving ability among students was attained in this study, which was a desirable conclusion. In this setting, students' high levels of creative problem-solving abilities are crucial in terms of giving innovative solutions to challenges faced by pupils.

According to the class variable, students' creative problem-solving skills increased on average within the framework of general and sub-dimensions. In the context of the variable of following technology advancements, it was discovered that the average scores for creative problem-solving skills differ in favor of students who claim to follow technical advances. It was shown that students that adhere to technology advances in their creative problem-solving skills and sub-dimensions scored higher on average. In this respect, it is possible to assert that the status of the following technical advances has a substantial impact on research.

The link between students' computational thinking ability levels and creative problem-solving talents was investigated in the study's fifth sub-problem. There is various research in the literature that look at the relation between problem solving skills and computing skills (Sarıtepeci, 2017; Gonzalez et al., 2017). However, no skills have been discovered that explicitly investigates the link between computational thinking and creative problem-solving. A somewhat favourable and substantial link was discovered between students' computational thinking skills and creative problem-solving skills in this setting. In other words, as students' computational thinking skills improve, so do their creative problem-solving abilities. The discovery that the two variables have a positive influence on each other lends credence to the idea that computational thinking talent is fundamentally articulated as a problem-solving process (Kalelioğlu, Gülbahar, and Kukul, 2016).

SUGGESTIONS

As a consequence of the research, the following recommendations for practitioners and researchers could be made.

- According to the findings, as pupils' grade levels improved, so did their computational thinking skills. To assist this development, it is formally recommended that computational thinking abilities be included into the curriculum beginning with preschool.
- It has been observed that having a computer is effective on students' skills. Accordingly, it can be suggested to increase / improve the technological equipment of educational environments.
- It may be suggested that courses such as information technologies and software, computer science, where computational thinking skills are directly related, should be taught from an early age.
- This study was carried out with learners on the secondary school level. By broadening the area of the study, it may be proposed that studies be conducted at the elementary, secondary, and university levels.

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An Analysis of the Intention of Students Studying at Physical Education and Sports School to Use Synchronous Virtual Classroom Environments During the Covid-19 Pandemic Period

Mustafa Enes IŞIKGÖZ
School of Physical Education and Sports, Mardin Artuklu University Turkey
ORCID ID: 0000-0001-7804-1011
pdgenes@gmail.com

ABSTRACT
This study aims to analyze the intention of students studying at physical education and sports school to use synchronous virtual classroom environments during the Covid-19 pandemic period. The research was designed in a descriptive survey model with a quantitative approach. The study group of the research consists of 193 voluntary students studying at School of Physical Education and Sports in a State University in the spring semester of the 2020-2021 academic year. The data of the research were collected with the "Personal Information Form" and the "Synchronous Virtual Classroom Acceptance Scale" in order to determine the students' intention to use synchronous virtual classroom environments. It has been determined following the study that the intention of students to use synchronous virtual classroom environments is generally positive and these intentions are at higher level in the "Subjective Norm" and "Self-efficacy" sub-dimensions, and lower in the "Perceived Ease of Use" sub-dimension. We have found that the students' intention to use synchronous virtual classroom environments does not change significantly according to the variables of gender and the department they study, but changed significantly according to the variable of the class they studied while the students studying in the first year have more positive intentions to use the synchronous virtual classroom environments than the students studying in other classes. In addition, it has been concluded that the intention of using the synchronous virtual classroom environments of the students who have a personal computer and an internet-connected smart phone and the students who access the lessons from their home with a laptop computer is more positive than the other groups.
Keywords: Physical education and sports, student, synchronous virtual classroom, usage intention

INTRODUCTION

The Covid-19 epidemic due to the SARS-Coronavirus-2 agent, which emerged on December 31, 2019 in Wuhan city of China and showed rapid contagion, affected the whole world especially European countries. In the same period when the World Health Organization (WHO) declared a pandemic, the first case was reported in our country on March 11, 2020 and announced to the public by the Ministry of Health (İskit et al., 2021). Various measures have been taken and implemented in Turkey as in the whole world in order to reduce the speed of the epidemic. One of these measures is to interrupt formal education for a long time with the recommendation of the relevant health boards and the decision of the competent public authorities and to switch to online distance education in educational institutions at all levels. In addition to all the arrangements to prevent contagion by creating social distance in the Covid-19 epidemic, the best practice that can provide this in the field of education has been accepted to be the distance education environment, especially in all countries with a high viral distribution, and it has become the most preferred channel by administrators and experts in education (Yamamoto and Altun, 2020). As a matter of fact, distance education around the world has started to be used as an alternative education system in almost every institution, especially in universities and K-12 level schools, due to the risk of Covid-19 disease.

As in all primary and secondary education levels in Turkey, distance education has been started for three weeks in universities as of March 16, 2020 with the decision of the Higher Education Council (YÖK, 2020a). Afterwards, it was agreed with a new decision taken on March 26, 2020 that the spring semester education for 2019-2020 academic year would only be carried out with distance education, open education and digital education opportunities due to the increasing course of the epidemic (YÖK, 2020b). For the 2020-2021 academic year, YÖK (2000c) took a new decision, it paved the way for universities to plan their education calendars to start after October 1, 2020 to make different applications on the basis of faculty and program by providing wide opportunities for the decision-making processes of universities to "dilute students on campuses and reduce mobility". At this point, the relevant committees of the universities were asked to decide on the applications to be made for different programs according to the regional and local course of the epidemic. Upon this decision, it is observed that the 2020-2021 academic year was completed by switching to the distance education system in almost all universities. With the onset of the epidemic process, 72.6% of state universities and 60.6% of foundation universities started distance education as of March 23, 2020 and 27.5% of state universities and 39.5% of foundation universities completely

started distance education on a gradual basis as of March 31 – April 6, 2021 (YÖK Uzaktan Öğretim Anketi, 2020). Concerning the distance education practices of universities, we can observe that more than 99% of both state and foundation universities carried the theoretical courses to distance education. Along with the theoretical courses, the decision to teach the theoretical parts of the applied courses by distance education was approved by approximately 88% of state and foundation universities (YÖK Uzaktan Öğretim Anketi, 2020).

Distance education is defined as an education system where the teacher and the learner do not have to be in the same environment, and educational activities are carried out through information and communication technologies (İşman, 2011). Distance education can be performed synchronously and asynchronously. The educational environment in which the student and the teacher interact with each other in different places at the same time is called synchronous (simultaneous) while the educational environment where there is no communication between the student and the teacher at the same time, and the materials necessary for the course are shared with the student on the web regardless of the place and time is called asynchronous (not simultaneous) (Yorgancı, 2015). Universities carry out online learning or in short e-learning activities by using various teaching management systems (Adobe Connect, Academic LMS, Google Meet, Microsoft Teams, Perculus, Zoom etc.) according to their capacity and technological infrastructure in the distance education process. We may not define e-learning as a type of learning that is offered in electronic environment by using different technologies according to the time available (synchronous and/or asynchronous) (Yamamoto et al., 2010). Undoubtedly, there are many factors that affect e-learning carried out in the virtual environment synchronously and/or asynchronously. Among these factors, we can count the technological equipment of the students – being the basic input of education services – for online teaching, their ability to use technology, their perceptions, expectations and attitudes towards online learning. Regarding the courses conducted in the distance education process, the meaning of students' having the necessary technological equipment, skills, awareness, innovation and development in online learning largely depends on their intention to accept and use these technological systems, in short, their adoption of technology.

In the literature, many models have been generated in order to explain the technology acceptance and usage intentions of individuals. The most widely used of these models is the "Technology Acceptance Model (TAM)", which was developed by Davis (1985) to explain and predict the behavior of technology users. According to this model, it is predicted that the behaviors developed by the users towards the information system are affected from the perceived ease of use and perceived usefulness of the system. In the model, the efforts were made to explain the actions of users towards information technologies based on the causal relationships among six factors namely external variables, perceived usefulness, perceived ease of use, attitude towards use, behavioral intention to use and actual use. The model argues that the determinant of the adoption and use of new information technology is intention and the "perceived usefulness" and "ease of use" being two behavioral beliefs are effective on this intention. "Perceived usefulness" and "perceived ease of use", which correspond to process expectation and outcome expectation, respectively show the path of intention regarding the actual use of technologies (Çakır and Arslan, 2020).

Looking into the literature, it is seen that national and international studies are reported in which university students' use of technology in distance education e-learning environments is examined from various dimensions during the Covid-19 pandemic process (Adeyemi and Isaa, 2020; Atasoy et al., 2020; Dhawan, 2020; He et al., 2021; Kahya, 2021; Karatepe et al., 2020; Keskin and Özer, 2020; Korkmaz and Toraman, 2020; Latorre-Cosculluela et al., 2021; Papouli et al., 2020; Sarıtaş and Barutçu, 2020; Vargo et al., 2021). Again, it has been observed that there are some studies examining the attitudes of physical education and sports students towards distance education (Aktaş et al., 2020; Ekiz, 2020) during the pandemic process. However, no study was found in which the intentions of students studying in the field of physical education and sports sciences to use synchronous virtual classroom environments during the Covid-19 pandemic process were examined. In this regard, it is anticipated that this study will contribute to the relevant literature regarding the Covid-19 pandemic period. The purpose of this study is to examine the intentions of physical education and sports school students to use synchronous virtual classroom environments during the Covid-19 pandemic process.

METHOD

This research, which analyzes the intentions of physical education and sports school students to use synchronous virtual classroom environments during the Covid-19 pandemic process, were designed in a descriptive scanning model with a quantitative approach. The study group of the research consists of 193 voluntary students studying at a State University's School of Physical Education and Sports in the spring semester of the 2020-2021 academic year. The data of the research were collected with the "Personal Information Form" and the "Synchronous Virtual Classroom Acceptance Scale" used to determine the students' intention to use synchronous virtual classroom environments. "Synchronous Virtual Classroom Acceptance Scale" developed by Kang and Shin (2015) and adapted into Turkish by Bulutlu (2018) has a total of 24 items and 7 sub-dimensions namely "Self-Efficacy (SE-3

items), Systematic Lecture Content (SLC-3 items), Subjective Norm (SN-3 items), System Accessibility (SA-4 items), Perceived Usefulness (PU-4 items), Perceived Ease of Use (PEU-4 items), and Behavioral Intention (BI-4 items)". Together with the scale, the "Personal Information Form" developed by Kang and Shin (2015) and adapted into Turkish by Bulutlu (2018) contain 7 demographic questions about the students' age, gender, department, the devices they have and the place where they access the synchronous virtual classrooms.

The Cronbach's alpha reliability coefficients of the scale, which was subjected to exploratory and confirmatory factor analysis by Bulutlu (2018), were found between 0.76 and 0.86 in the sub-dimensions. In the current study, Cronbach's alpha reliability coefficients calculated by preserving the factor structure of the scale were found to be between 0.75 and 0.92 for the sub-dimensions, and 0.95 for the whole scale. There is no reverse item in the scale, and the scale items are graded in 5-point Likert type as "I totally disagree", "I partially disagree", "I am not sure", "I partially agree" and "I totally agree". The data obtained from the research were analyzed by using the SPSS-22 statistical package program. Independent sample t-test (Independent Sample t-Test) and one-way analysis of variance (One-Way ANOVA) were used to measure whether the difference between groups was significant. Bonferroni test was used to determine from which groups the significant differences determined as a result of ANOVA originated.

FINDINGS

Table 1. Distribution of students' demographic characteristics

Demographic Characteristics	Group	n	%
Gender	Male	90	46.6
	Female	103	53.4
Department	Physical Education and Sports	64	33.2
	Coaching Education	69	35.8
	Sports Management	60	31.1
Grade	1st Grade	57	29.5
	2nd Grade	63	32.6
	3rd Grade	41	21.2
	4th Grade	32	16.6
Personal Computer	Yes	51	26.4
	No	142	73.6
Smartphone with Internet Connection	Yes	183	94.8
	No	10	5.2
Device Used to Access Courses in E-Learning Environment	Laptop	51	26.4
	Smartphone	142	73.6
Place to Access Courses in the E-Learning Environment	Home	163	84.5
	Other	30	15.5

According to Table 1, 90 (46.6%) of the students participating in the research are male and 103 (53.4%) are female. 64 (33.2%) of the students study in Physical Education and Sports, 69 (35.8%) in Coaching Education and 60 (31.1%) in Sports Management department. 57 (29.5%) of the students are 1st graders, 63 (32.6%) are 2nd graders, 41 (21.2%) are 3rd graders, 32 (16.6%) are 4th graders. 51 (26.4%) of the students have a personal computer, 142 (73.6%) of them do not have a personal computer, 183 (94.8%) of the students have a smart phone with internet connection, 10 of them (5.2%) have stated that they do not have any smart phone with internet connection. 51 of the students (26.4%) use laptop computers to access the courses in the e-learning environment, and 142 (73.6%) use their smart phones, and 163 (84.5%) of the students access the courses in the e-learning environment from their homes, 30 (15.5%) access the courses from other places.

Table 2. Descriptive statistical results of students' intention to use synchronous virtual classroom environments

	Aver.	SD	Skewness	Kurtosis	Min.	Max.
Self-efficacy (SE)						
Systematic Lecture Content (SLC)	9.77	3.48	-0.48	-0.76	3.00	15.00
Subjective Norm (SN)	10.83	3.58	-0.86	-0.28	3.00	15.00
System Accessibility (SA)	12.70	4.94	-0.29	-1.06	4.00	20.00
Perceived Usefulness (PU)	12.30	5.30	-0.32	-1.14	4.00	20.00
Perceived Ease of Use (PEU)	12.14	4.82	-0.19	-1.00	4.00	20.00
Behavioral Intention (BI)	7.88	4.04	0.26	-1.28	3.00	15.00

Overall Average of Scale	75.66	24.23	-0.33	-0.73	24.00	120.00

According to Table 2, it is observed that the students' intention to use synchronous virtual classroom environments is generally positive (75.66±24.23) considering the lowest and highest mean scores that can be obtained from the scale. Regarding the sub-dimensions of the scale, students' intentions to use synchronous virtual classroom are high in the sub-dimensions of "Subjective Norm (10.83±3.58) and "Self-efficacy (10.04±3.17)" while the students' intentions to use synchronous virtual classroom environments are at a low level in the sub-dimension of "Perceived Ease of Use" (12.14±4.82). In addition, when Table 2 is examined, it is assumed that the skewness and kurtosis values of the data in all sub-dimensions remain between ±1.5; therefore, the data obtained from the scale show a normal distribution (Tabachnick and Fidell, 2013).

Table 3. Evaluation of students' intention to use synchronous virtual classroom environments according to demographic variables

Demographic Variable	Group	Intention to Use Synchronous Virtual Classroom Environments (n=193)		
		n	Aver±SD	Test value, *p*
Gender	Male	90	74.38±24.47	t: -0.682
	Female	103	76.77±24.086	[a]*p: 0.49>0.05*
Department	Physical Education and Sports	64	77.06±25.27	F: 0.406
	Coaching Education	69	73.56±24.33	[b]*p: 0.66>0.05*
	Sports Management	60	76.58±23.21	
Grade	1st Grade	57	82.59±23.67	F: 3.344
	2nd Grade	63	69.15±25.18	[b]*p: 0.02<0.05*
	3rd Grade	41	74.14±24.38	[c]*p<0.01*
	4th Grade	32	78.06±20.13	*Difference 1>2*
Personal Computer	Yes	51	86.49±22.03	t: 3.851
	No	142	71.77±23.87	[a]*p: 0.00<0.05*
Smartphone with Internet Connection	Yes	183	77.24±23.48	t: 4.017
	No	10	46.80±19.98	[a]*p: 0.00<0.05*
Device Used to Access Courses in E-Learning Environment	Laptop	51	88.01±17.50	t: 5.222
	Smartphone	142	71.22±24.82	[a]*p: 0.00<0.05*
Place to Access Courses in the E-Learning Environment	Home	163	77.19±22.94	t: 2.066
	Other	30	67.33±29.38	[a]*p: 0.04<0.05*

[a]*Student t-Test;* [b]*Oneway ANOVA Test;* [c]*Post Hoc: Bonferroni Test*

Looking at Table 3, it is seen that the students' intention to use synchronous virtual classroom environments do not change significantly according to the variables of gender ($t_{(191)=}$.682; p>0.05) and the department they study (F (2, 190)=0.406; p>0.05). According to other demographic variables, it has been determined that the students' intention to use synchronous virtual classroom environments differ significantly in the class variable (F (3, 189) =3.344; p<0.05). As a result of the Post Hoc analyzes applied by using Bonferroni correction to understand which groups the differentiation is between, we have determined that the intention to use virtual classroom environments of the 1st grade students is more positive than the 2nd grade students (p<0.01). Another point indicated in Table 3 is that the students' intention to use virtual classroom environments significantly differ in favor of students with a personal computer according to the variable of whether they have a personal computer ($t_{(191)}$=3.851; p<0.05), in favor of the students with an internet-connected smart phone according to the variable of having a smartphone with an internet connection ($t_{(191)}$=4.017; p<0.05), in favor of the students who access the lessons with a laptop computer according to the variable of type of device they access the lessons ($t_{(191)}$=5.222; p<0.05) and in favor of students accessing virtual classroom lessons from home by the variable of the place they access the lessons ($t_{(191)}$=2.066; p<0.05).

CONCLUSION

In this study which analyzes the intentions of physical education and sports school students to use synchronous virtual classroom environments during Covid-19 pandemic process, it has been concluded that the students' intention to use synchronous virtual classroom environments is generally positive, the level of students' intention to use synchronous virtual classroom is higher in the "Subjective Norm" and "Self-efficacy" sub-dimensions, and lower in the "Perceived Ease of Use" sub-dimension. Another result obtained in the study is that the students' intention to use the virtual classroom environments does not change significantly according to the variables of

gender and the department they study. According to other demographic variables, the intention of using the synchronous virtual classroom environments for the students studying in the first grade is more positive than the students studying in other classes. In addition, we have concluded that the intention of using the synchronous virtual classroom environments of the students who have a personal computer and an internet-connected smart phone and the students who access the lessons from their home with a laptop computer is at a more positive level than the other groups. When the literature is scanned, it is observed that there are many studies examining the different dimensions of the Covid-19 epidemic, its effects and results on education and training activities, but there are no similar studies directed to determine the intention of university students studying in the physical education and sports program to use synchronous virtual classroom environments. At this point, the results of this study were also examined in the light of the results of close research in the relevant field during the Covid-19 epidemic.

In the study of Bulutlu (2018), who adapted the data collection tool used in this study into Turkish, he states that the subjective norm levels of university students have a positive and significant effect on their perceptions of utility and ease of use and accordingly, as the subjective norm levels of students increase, their perceived usefulness and perceived ease of use also increases. In the study of Sarıtaş and Barutçu (2020) which examines digital transformation in teaching and students' readiness for online learning, they have generally evaluated students' readiness for online teaching positively. Moreover, they have found that the students' self-management skills, motivation, communication skills and computer/internet use self-efficacy regarding online learning are sufficient for online learning activities, but they need a control mechanism in the online learning process. In the study of Çetin et al. (2021) in which they have discussed distance education with a qualitative approach during the Covid-19 pandemic process from the perspective of physical education and sports teachers, within the scope of distance education advantages of some participants; they have reached conclusions that the 21st century in education and ICT use skills have improved and offered students an experience of conducting research and enabled individual teaching opportunities. Similarly, Serçemeli and Kurnaz (2020) have stated that students' self-efficacy is sufficient in understanding and using the distance education system, uploading their homework and searching internet resources. On the other hand, Altuntaş et al. (2020) have stated that they find the distance education provided online at the university during the pandemic process to be beneficial as it technically improves the abilities of the students. Turan and Gürol (2020) have determined to think that online education provides flexibility in the learning of students, the opportunity to watch the recorded lecture videos over the system is very good in terms of time management. The positive perceptions and intentions of students concerning their willingness to use digital environments such as virtual classroom, online learning etc. largely coincide with our study findings.

It has been observed in our study that the students' intention to use synchronous virtual classroom environments does not change according to gender. In their study, Çakır and Arslan (2020), who collected data with the scale used in this research, have examined the intentions of a group of distance education university students to use synchronous virtual classroom environments and their attitudes towards distance education, they have found that the students' intention to use synchronous virtual classroom environments is generally positive, the "subjective norm" sub-dimension average score is higher, and the students' intention to use synchronous virtual classroom environments does not differ statistically according to gender. In the study of Yılmaz (2020) examining the integration of the Google classroom distance education system and student satisfaction levels during the pandemic process, it has been found that the satisfaction levels of the students do not differ according to gender. These findings of the studies are largely in line with our study findings. Another result we reached in our research is that the students' intention to use virtual classroom environments does not change according to the department they study. We can utter that the admission of students to all departments with the same special talent exam, the almost homogeneous structure of student profiles for all departments, and the transition to online distance education in all departments at the same time have led to this result. However, the intention of students studying in the first year to use the synchronous virtual classroom environments is more positive than the students studying in other classes. It is thought that this result is due to the fact that first-year students have started their education in online virtual classroom environments due to the pandemic and have not yet met with university formal education. As a matter of fact, in their research, Sarıtaş and Barutçu (2020) have determined a significant relationship between students' readiness for online learning activities and their attitudes towards online teaching activities during the pandemic period, and students' readiness for online learning activities have also positively affected their attitude towards compulsory online learning applications due to the unexpected pandemic.

In our study, the intention of using synchronous virtual classroom environments of the students who have a personal computer and an internet-connected smart phone and the students who access the lessons from their home with a laptop computer has been found to be more positive as an expected result of the research. It is expected that the attitudes of the students who have the necessary technical equipment and system infrastructure will be positive at this point. Karatepe et al. (2020) have determined in their research that the vast majority of pre-service teachers can access sufficient cognitive devices and the internet to participate in synchronous education, the most used

communication tool by pre-service teachers after smartphones is laptop computers while desktop computers and tablet computers are the least used cognitive communication tools. Serçemeli and Kurnaz (2020) state that the majority of students (75%) attend online/distance education courses with their own smart phones, Yılmaz (2020) states that the fact that students have devices that can access the distance education system affects students' satisfaction levels, and the mean satisfaction score of students who can access the internet with a device increases significantly. Thus, according to the distance education survey conducted by YÖK regarding the pandemic process, 83% of the students have reported to have electronic devices that provide access to distance education, and 97% of the students have sufficient internet access (YÖK Uzaktan Öğretim Anketi, 2020). It is predicted that a large part of the student population in Turkey will adapt to online education. Technology adaptation of X, Y and Z generations is considered as the most important advantage of our country, which has a young population, in this transition (Yamamoto and Altun, 2020).

In conclusion, it has been observed that physical education and sports school students' intention to use synchronous virtual classroom environments is positive, and the vast majority of students have sufficient cognitive devices and internet infrastructure to participate in synchronous virtual classroom lessons. Since the results of the research are limited to the opinions of the students studying at one Physical Education and Sports School of a State University, it is recommended that the research must be conducted on a large sample group, and the research should be handled with a qualitative approach to obtain more in-depth results as well as quantitative approaches.

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Deaf Individuals and English Language Teaching[1, 2]

Cihat ATAR
Sakarya University, Faculty of Education, English Language Teaching Department.
cihatatar@sakarya.edu.tr
ORCID: 0000-0002-5879-3432

Özlem ASLAN BAĞCI
Sakarya University, Vocational School of Health Services, Child Development.
obagci@sakarya.edu.tr
ORCID: 0000-0002-8014-5140

Hakkı BAĞCI
Sakarya University, Vocational School of Adapazarı, Department of Computer Technology.
hbagci@sakarya.edu.tr
ORCID: 0000-0002-6211-9694

ABSTRACT
This paper aims to analyze the characteristics of deaf students from a pedagogic perspective and identify potential issues in the process of teaching English to them. English is the world language now, and knowing it provides many opportunities to its users ranging from following academic issues to trading internationally. There are so many different methods and applications for learning English. Learning English has become relatively easier via the widespread use of the internet, smartphones, and applications. However, few studies specifically discuss how to teach English to deaf students, and pre- and in-service English teacher training regarding this issue is still in its infancy. Hence, deaf students cannot sufficiently make use of the opportunity to learn and benefit from learning a lingua franca. In this paper, the current situation will be discussed, and some suggestions will be made regarding what can be done to improve teaching English to deaf students.
Keywords: deaf students, special education, English language teaching, teaching English to deaf students

1. Introduction

Education is a process that lasts from birth to the end of our lives. In this process, we can acquire most of the needed knowledge and skills through our senses. For the individuals without any disabilities, having a life-long education is not a difficult task relatively. However, for the individuals with disabilities, it is more challenging to increase their knowledge, communicate with other people, and maintain their lives seamlessly. As they lack circumstantial learning, deaf students are among the individuals who have difficulties acquiring knowledge about their surroundings compared to their peers. If individuals do not have any hearing problems, they can listen to other individuals, and as a result, this is a way by which they can improve themselves (Avcıoğlu, 2015). If an individual cannot hear fully or suffers from total deafness, they may have difficulties in communicating with others and expressing themselves. Deaf individuals may be weak at developing their social adaptation skills due to their problems in establishing communication (Hallahan & Kauffman, 2000; Sarıkaya & Börekçi, 2016). In other words, deafness is a type of disability that affects an individual's development, communication, socialization, and thus his/her life (Kösgeroğlu & Bozkurt, 1996).

2. Education of Deaf Individuals

Deafness can be defined as a disability that is caused by a problem in an individual's hearing faculty due to a problem in which s/he can sense auditory signals less than usual or not at all (Girgin, 2006). So, they are one of the groups that need special education. In order for disabled people to attend education efficiently and get sufficient support from these contexts, the educators and personnel in their educational institutions should know their characteristics. According to the Support Program for Deaf Individuals by the Turkish Ministry of Education, the characteristics of deaf individuals were categorized under cognitive development, language development, emotional/social development, and motor/coordination development (MEB, 2006). Cognitive development starts from birth, and hearing has a significant place in cognitive development as it provides input to the brain. People receive much of the language input via hearing as well. The lack of hearing ability or its total absence in the development of cognitive and language development leads to various communication problems (Sarı, Aslan-Bağcı & Gökdağ, 2021). The insufficient amount of auditory input and stimuli can lead to incomplete cognitive skills in

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deaf individuals (Kocabıyık, 2015). In addition, due to the underdevelopment of language skills and concept knowledge together with lack of auditory input, especially children are negatively affected in cognitive development (Başkonak, 2019).

Hearing disability can be classified according to the degree of loss, the place of loss, and the age of loss (Sarı, Aslan-Bağcı & Gökdağ, 2021). Especially the age of hearing loss is very critical in language acquisition. Whether it is before or after language acquisition immensely affects an individual's ability to communicate and socialize. Still, deaf individuals follow a similar developmental path as people without deafness. However, in time, differences emerge in the developmental pace. Although they follow similar stages, deaf people fall behind depending on their degree of disability. In deaf people, language development, which is similar until the babbling stage, deteriorates over time due to lack or insufficiency of auditory input, and the sound babies utter decrease and disappear eventually. In case of severe deafness, this lack of auditory input leads to a gap of 4-5 years between the deaf and their peers considering language development. In other words, the difference between the deaf and their peers is that they, just as any people, try to learn their surroundings and the objects around them from birth. However, their relationship with them is different as their input is limited due to hearing loss. Also, they only depend on the other three senses. Therefore, there is a difference between deaf individuals and ordinary people in terms of interacting with the outer world, which is reflected in their communication skills (Girgin, 2006). In addition, deaf students have difficulties in academic language-related skills, specifically in reading and writing. This is probably because they lack phonological and orthographical knowledge. This naturally weakens other aspects of language skills. As information in the contemporary world highly depends on written texts, acquiring the reading skill normally is vital for deaf people to function efficiently in their daily and work life.

As suggested above, deaf individuals are different from people without deafness in language and communication skills. This leads to problems when they interact with people without deafness. As a result of this, deaf people usually communicate with other deaf individuals who are similar to themselves (Kocabıyık, 2015). Hence, these individuals may isolate themselves from the rest of the society. The main reasons for this issue are that deaf individuals think that people who hear them will not understand them and will not be able to communicate with other people. This situation affects their social and emotional development negatively as well. Another development area is motor coordination. Deaf individuals show similar motor development compared to people without deafness. On the other hand, due to their specific central nervous system, they may experience difficulties in coordinating and balancing their bodies (MEB, 2006). Moreover, as deaf individuals cannot hear verbal expressions and instructions, some differences in major and fine muscle motor development may be expected.

The literature review indicates that although deaf people follow similar stages of development, they significantly fall behind other people with a gap of up to 5 years in language skills. Also, they may have some problems in motor development, and they may have difficulties in undertaking the activities in the lessons that include major muscles (e.g., moving quickly) and fine muscles (e.g., cutting out a picture). This may affect their participation in most of the typical activities undertaken in the classroom. They also have difficulties in their social and emotional development due to misconceptions, such as thinking that they cannot interact with other people except for other deaf people. Accordingly, to ensure that deaf individuals integrate into social life and catch up with their developmental weaknesses, they should not be excluded from society. Further studies should be undertaken to understand how this can be achieved through appropriate pedagogic measures. Another significant issue is that the learning environments should be adapted accordingly as it is evident that they fall behind in language skills dramatically in addition to mild underdevelopment in motor skills. With this support, deaf individuals can confront the difficulties they encounter due to their disability, and they will be able to integrate into their society rather than excluding and isolating themselves. They can also lead a more independent life without being dependent upon others.

3. Use of Technology and English Language Teaching

Thanks to the recent developments in technology, almost everybody benefits from these opportunities in their lives. Computers, the internet, tablets, smartphones, and personal digital assistants are the most common examples. These technological tools are used for many purposes in our lives ranging from entertainment to health care. They are obviously used for educational purposes as well, and there is an increasing trend, especially after the covid-19 pandemic. When the use of technology is reviewed in the literature, it is seen that computers were the primary tool in the initial years. Many computer-assisted learning environments and materials were developed, and they are/were utilized in classrooms. Thanks to computer-assisted learning, students can learn in line with their own pace and level (Şahin & Yıldırım, 2009). In addition, thanks to computer-assisted learning, students can do as many revisions as possible, and it is more enjoyable thanks to gamification. It also allows for self-control in learning, increasing students' success (Lee, 2000; Uşun, 2013; Kozikoğlu, 2013).

Thanks to technological developments, mobile devices and the learning environments designed for them have gained popularity in recent years. Mobil devices are relatively easier to use, and they can be moved around in various contexts in contrast to computers. They also tend to occupy a smaller place. Language learning applications have been adapted to or specifically created for mobile devices. Individuals have the chance to improve their language skills while they are doing sports or moving around doing different things (Özer, 2017). Mobile devices can also improve more than one skill at one go (Sung, Cang & Yang, 2015). One vital factor in language learning is the prospect of interacting with other individuals. Mobile devices are advantageous at this point as they can enable learners to contact and do practice with other learners around the world (Jung, 2015). These are the reasons that have made them more popular nowadays.

Cutting-edge applications in education provide environments where students can take notes verbally or in a written way, draw pictures, receive feedback, give feedback, have problem-based education, and use microblogs (Rogers, 2011). These aspects may be beneficial for deaf students, especially in terms of written and visual learning support. Thanks to mobile learning environments, deaf individuals can have the opportunity to benefit from visual and text-supported environments. Effective designs for students can increase their motivation as well. In addition, mobile applications are found to be effective at teaching vocabulary, improving pronunciation, improving reading, writing, listening and speaking skills, and teaching grammar (Demouy & Kukulska-Hulme, 2010; Huang, Yang, Chiang & Su, 2016; Kim, 2015; Lee & Kim, 2013; Rueckert, Kiser & Cho, 2012; Wang & Smith, 2013).

One of the resources of technology that can be used in educational contexts is mobile games. They can increase students' motivation at any age, and today, there is almost a game that is appropriate for each context or level. The significant issue is, of course, not having only fun, but at the same time using games for educational purposes. On the other hand, it is true that playing mobile games also takes a considerable amount of time. Hence, it is a good idea to design pedagogic games in a way by which they answer learners' needs in educational contexts. The reason is that the games that are pedagogically designed from the beginning not only contribute to the improvement of students' skills, but they also comprise the specific information/knowledge needed in their subject area (Kocadağ & Aksoy, 2015). Hence, it may be stated that learning requires significant physical and cognitive effort and self-control (Bozyer & Aslan-Bağcı 2018). Educational games enable individuals to have a good time and also undertake their learning sessions successfully. Considering this from a language teaching perspective, games can be used for both deaf individuals and also others who show normal development. Especially, educational games can be really beneficial for deaf people. Games can increase their satisfaction with the environment, and as a result, this may increase active participation. As argued above, deaf people may isolate themselves from society due to their misconceptions. However, games, especially those that require collaboration and interaction with others, can motivate them to learn another language. It may be suggested that visual support is essential in games and mobile applications for deaf individuals. Educational games/activities such as matching, contests, and earning rewards can be quite motivating.

With the development of the internet, technology is used for different proses ranging from health to education, and this is increasing each day. People can have education in different places and times via the opportunities the internet provides. One primary opportunity of the internet is online learning environments. Thanks to online learning, individuals of various ages can access learning opportunities regardless of time and place restrictions. At the same time, different individuals can interact and collaborate while doing activities. Therefore, they can learn from each other as a part of peer learning, which is precious pedagogically. This is also valid for deaf students. Visual and written activities can support their learning, and they can socialize, interact, and collaborate. There are already some distance education applications in the world designed for deaf children. For example, the distance education platform of the Royal Institute for Deaf and Blind Children (RIDBC) developed in Australia is used to support the education and development of deaf and blind children and their families. Thanks to this platform, an educator can track a child's development and realize the participation of the family directly. The ABC software developed for the disabled in California consists of three themes. In the reading and writing theme, deaf students are taught reading in English, and American Sign Language is resorted to in order to satisfy children's interaction needs. In the second theme, the phonetic symbols are the focus, and teaching them to the families and teachers who will work in this area via visuals is the goal. In the final theme, games and videos about American Sign Language are provided, and the goal is to achieve speaking and reading.

4. Special Education and Foreign Language Education

Thanks to globalization and the new world order that emerged after World War II, English has become the world language (Sifakis & Bayyurt, 2018). Obtaining up-to-date information about issues such as technological developments, novelties in medicine and culture is much easier when one knows English. The reason is that most articles and books on especially academic and technological studies are published in English. Due to this international status of English, today, around one billion people are learning/speaking English, in addition to nearly

400.000 native speakers (Atar & Amir, 2020). For these reasons, it is evident that English is the lingua franca (i.e., the world language), and if individuals aim to act, live and work internationally, it is essential to know and use English.

As discussed in the previous sessions, the unique case of special education for the disabled has only recently been acknowledged, and the case is much more recent in the field of English language teaching. When the literature is checked, it is seen that there are so few studies throughout the world. In this sense, teaching English to the deaf and learners with other disabilities is still in its infancy. Still, some suggestions may be made regarding this issue.

Firstly, and most importantly, pre-service teacher education and in-service teacher education programs should be revised per this need. To exemplify, when the curriculum of the ELT programs in Turkey is checked (CoHE, 2018), it is seen that there are no courses allocated for teaching English to learners with special needs except for an elective course named inclusive education. However, this course deals with theories, descriptions, and regulations regarding inclusive education rather than focusing on how to teach English to the students that need special education. Some universities (e.g., Sakarya University) provide a special education course, but again it mostly focuses on the characteristics of these students, and it provides implications for pedagogy in a general sense rather than specific implications for English language teaching. So, currently, in the case of Turkey, the only solution is to provide elective courses in which this issue may be covered, which is mostly true for other countries. If there is not a specialized department, it is improbable to find these kinds of courses in undergraduate English language teaching programs around the globe. Providing these kinds of courses is, in fact, only possible as long as there is a lecturer specialized in this issue or at least knowledgeable regarding this issue. Then, it is suggested here that there is a dire need for teachers who can teach English for special education groups, and more importantly, this problem is not expected to be solved easily or in the short term as there is a lack of teacher trainers as well.

Having argued the necessity of increasing knowledge and skills of the teacher trainers, in-service teachers, and pre-service teachers, now the focus is students. As argued in the initial part, deaf students have unique physical, psychological, social, and cognitive characteristics due to their disabilities. One of the obvious problems is the listening skill. In the case of deaf students, they cannot listen to English, and thus they cannot acquire one of the four main communication skills. In addition, they miss one of the two receptive skills (listening and reading), and in this sense, they are disadvantageous in being exposed to the language, which is critical for acquiring a language (Lighbown & Spada, 2013). Consequently, it may be argued here that English language teachers should utilize the only remaining receptive skill (i.e., reading) much more effectively, and the vocabulary should be developed via implicit and explicit methods to ensure that they can compensate for their lack of exposure.

In Turkey, the students who have hearing and mental disabilities or those with autism can be exempt from taking foreign language classes at any level of their schooling with a written request of the guardians (MEB-ÖEHY, 2020). Although this seems to be an advantage for them, this, in fact, severely worsens their career and chances of participating in social life. They also miss the chance of benefitting from various resources ranging from books to internet web pages in foreign languages. When the literature is checked, only one study that specifically focuses on the teaching of English to deaf students was detected in the Turkish context. Birinci (2014) investigated the effect of visual materials on deaf students' vocabulary acquisition. She found that visual materials led to more effective vocabulary retention in the immediate and delayed post-tests than sign language, which lacks visual support. This suggests that visual materials may be benefitted from when deaf students are taught English. Then, it is concluded that there are really few studies specifically discussing how to teach English to deaf students and pre- and in-service English teacher training, especially with the help of technology.

5. Conclusions

This paper set out to underline the characteristics of deaf individuals concerning pedagogic issues as it is essential to understand their special case to adapt English language teaching accordingly. As there is a massive gap in the literature, this paper aims to increase awareness regarding this issue in the field of English language teaching and underline some initial steps to take. It is suggested that deafness as a disability is not only a problem in one of the senses. Instead, it negatively affects individuals' intellectual capacity mainly because it limits their exposure to input, interaction with their surroundings, and communication with other individuals. These lead to relatively weaker adaptation skills in establishing communication, which are critical, especially from a socio-constructivist learning perspective. The problems mentioned above are much more salient while learning a foreign language. Learning English provides learners many opportunities to benefit from technology, academic studies, and many other cutting-edge developments.

On the other hand, teaching and learning English have been transformed dramatically, and it has started to depend on technology more and more, especially after the Covid-19 pandemic. Distance, mobile, and computer-assisted

language learning tools have shown remarkable improvements. Mobile learning tools obviously offer many benefits and opportunities for learners, despite having some disadvantages as well. Today, it is really easy and convenient to find many quality English learning web pages, mobile applications, YouTube channels, and many other resources for free. However, as argued throughout the paper, studies that aim to teach English to deaf students are limited, and this situation is worse when it comes to benefitting from technology. Studies and practices that offer a systematic way for training and educating pre- and in-service teachers are also lacking. Considering these problems, it is vital to support academic studies in English language teaching for special education, and then, the findings should be implemented to educate pre-service teachers and train in-service teachers via courses, workshops, and so on. More importantly, undertaking substantial work such as Ph.D. studies on special education and English language teaching is really advisable. Therefore, future studies on these issues will be a precious contribution to the field of English language teaching. Moreover, from a practice point of view, English language teaching departments should consider providing elective courses that focus on teaching English to students with special needs. Ideally, as deaf students are a part of inclusive education, and as there can be students needing special education in any classroom, providing a specific special education course to pre-service teachers should be mandatory. Moreover, the issue of teaching English for disabled students must be a topic to be included in in-service teacher training workshops.

To our knowledge, there is not a mobile application that specifically aims to teach English as a foreign language to deaf students. Consequently, it is suggested here that using a mobile application to teach English to deaf individuals, who are already disadvantaged in communication and use of language with others, can be an effective way of empowering them. As mentioned in the previous parts, deaf individuals have a significant problem in getting sufficient stimuli and exposure from the outside world, which cripples their receptive language learning skills. They also suffer from social and emotional problems. Mobile applications may enable them to find friends and interact with them more easily, considering the less face-threatening feature of online platforms. Also, as deaf students cannot listen, the other receptive skill, which is reading, may be exploited more to level this lack of exposure. In conclusion, the benefits of technology, especially mobile learning, should be resorted to as they may simply be more accessible to individuals with disabilities physically in addition to many pedagogic advantages.

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Electronic Conceptual Change Texts Prepared About Fractions

Ebru Güveli
Department of Mathematics and Science Education, Faculty of Education, Recep Tayyip Erdoğan University, Rize, Turkey
Email: ebru.guveli@erdogan.edu.tr
ORCID ID: orcid.org/0000-0003-3738-5496

Demet Baran Bulut
Department of Mathematics and Science Education, Faculty of Education, Recep Tayyip Erdoğan University, Rize, Turkey
Email: demet.baran@erdogan.edu.tr
ORCID ID: orcid.org/0000-0003-1085-7342

Hasan Güveli
Department of Mathematics and Science Education, Faculty of Education, Recep Tayyip Erdoğan University, Rize, Turkey
Email: hasanguveli@erdogan.edu.tr
ORCID ID: orcid.org/0000-0001-5432-9045

ABSTRACT
Fraction is one of the important mathematics topics, and it has been determined that students at every grade have misconceptions about fractions. Regarding the fact that technology has been developing rapidly, it is actively used in educational institutions. It has a great number of benefits. It has become inevitable to associate conceptual change texts (CCT) with technology. In this study, electronic conceptual change texts (ECCT), were designed in order to eliminate misconceptions on fractions and to strengthen the effective teaching by creating a different point of view. These texts were presented to 12 teachers, who work at different secondary schools and interviews were carried out with them. As a result of these interviews, teachers expressed positive opinions about these texts and said that it would be effective to develop them.
Keywords: Conceptual change texts, Electronic conceptual change texts, Fractions, Teachers' opinions

INTRODUCTION

Conception is the name of information representing the common features of different objects and phenomenon which makes sense in human's mind (Ülgen, 2001). The fact that the learnt concepts can't be shaped in mind or can't be associated with the existing schemas and they are used apart from their scientific meaning causes misconceptions in the individual (Bahçeci & Kaya, 2010). The misconception is the perception or understanding that is far from the opinion on which experts agree (Zembat, 2010). Cornu (1991) who was inspired by Bachelard's (1938) study, emphasized that mathematical difficulties and misconceptions that students have might be derived from three main reasons (Bingölbali & Özmantar, 2010). These are epistemological reasons (They are the reasons derived from the nature and the structure of information. These are related to the historical development of the conception), pedagogical reasons (The reasons such as teaching models, the applications of these models, metaphor and analogies that teachers use, course books, the array of the subjects are pedagogical reasons of misconceptions), psychological reasons (They are the reasons related with the self-development including biological, cognitive and affective aspects. Students' comprehension ability, stages of individual's development, their background information and readiness level are the psychological reasons of misconceptions).

There are many types of misconceptions. The misconceptions under four categories which are overgeneralization, overspecialization, mistranslation and limited conception (Zembat, 2015). Studies on misconceptions generally use two categories (overgeneralization and overspecialization) (Bingölbali & Özmantar, 2010).

Fraction defined as one or more parts of a whole divided into equal parts (Argün, Arıkan, Bulut & Hacıoğlu, 2014). According to Lamon (1999), fractions have 5 different meanings. These are part-whole, division, processor, rate and measurement (Alacacı, 2010).

Some studies show that students cannot make sense of fraction concept completely and they have misconceptions (Chinnappan, 2005; Brown and Quinn, 2006; Pesen, 2007; Fisher, 2009; Küçük & Demir, 2009; Alacacı, 2010; Siegler et al., 2010; Biber, Tuna & Aktaş, 2013; Şengül, 2015; Gagatsis, Deliyianni, Elia, Panaoura & Michael-Chrysanthou, 2016; Maelasari & Jupri, 2017). In these studies, we observe that most of the misconceptions of students stem from reading of the fractions, the relation of the amount that the fraction represents with the whole which is taken as a reference, dividing into equal parts in fractions, comparisons of fractions, and determining the unity in compound fractions, incorrect sums of fraction, the difficulties related to the effect of doing multiplication

and division with fractions to numbers. In addition, these studies indicated that students who have misconception produced their own rules. It is difficult to correct this misconception of the student who adopts his own rule. Topics in mathematics are interrelated. If the student has misconceptions about a topic, it will be more difficult to learn a new topic. Therefore, eliminating misconceptions is as important as teaching a new concept.

One of the alternative ways used in eliminating the misconceptions is the use of CCT. The CCT are defined as the texts which clearly present the contradictions between scientific truths and misconceptions (Çobanoğlu & Bektaş, 2012). In a CCT, at first, a question is asked in order to find out students' misconceptions and create confusion. Later, by establishing the common misconceptions related to that subject, the reason why this knowledge is incorrect is explained. In this way, students realize the insufficiency of their own knowledge by questioning their misconceptions. Lastly, the correct information about the topic is explained and it is enriched with examples (Pınarbaşı & Canpolat, 2002).

It was determined in a lot of studies that CCT eliminate the misconceptions, increase the students' academic success and facilitates meaningful learning (Diakidoy, Kendeou & Ioannides, 2003; Akbaş, 2008; Birinci-Konur, 2010; Çetingül & Geban, 2011; Çobanoğlu & Bektaş, 2012; Demircioğlu, Demircioğlu & Aydın, 2012). In addition, Güveli, Baran-Bulut and Güveli (2018) expressed that prospective mathematics teachers would prefer concept change texts in order to eliminate misconceptions. Besides, Toka & Aşkar (2002) carried out a study in order to compare the effect of cognitive conflict, CCT and the traditional mathematics teaching methods on the students' success. It was found that the success average of the classes to which cognitive conflict method was applied was significantly higher than the classes to which CCT were applied. In a research carried out by Guzzetti (2000), it was pointed out that CCT cannot change any of the misconceptions of students who have an insufficient ability to read texts by themselves. As a result of this study, it can be said that using the CCT alone will not be sufficient. This idea led us to discover another assisted and enriched model of the CCT that we will use in our study. Considering the contributions of computers to educational area, it was determined to enrich CCT via computer aid.

As a result, computers have already taken their part in the educational environment due to their features such as making the educational process interesting, concreting the abstract concepts, facilitating learning and increasing the success and motivation which was proven by some studies that were done on computer-aided teaching (Baki & Özpınar, 2007; Akinsola & Animahasun, 2007; Ke, 2014).Therefore, in CCT, it becomes inevitable to create CCT which are supported by computer animations by using visual and cognitive facilities that technology provides. It was thought that in this way a different dimension can be added to the texts. Taşdelen, (2011) prepared computer-assisted CCT on electrochemistry and carried out an experimental study with 66 students, 11th grade. As a result, he found out that students have a positive attitude towards computer assisted CCT. Kaya (2012) prepared computer-assisted CCT about photosynthesis and respiration in plants and revealed that these texts are more effective than CCT but they have similar efficiency for enabling the persistence of the conceptual change that occurred. In his study on static electrical, carried out with preservice teachers Ersoy, (2012) compared the teaching method that was prepared with computer animations and CCT and concluded that both methods are effective on the success. Although there are studies which were done on science related to computer-assisted CCT, there is not any study on ECCT related to fractions in mathematics.

In this study, CCT, which were enriched with computer animations, were prepared in order to eliminate the students' misconceptions on fractions. In order to determine whether these texts will be effective in removing the misconceptions or not, firstly teachers' opinions were taken regarding the fact that teachers' opinions are important. Experiences and opinions of teachers who will dominate the education will direct the process of this study. Thanks to this study, teachers will have documents which they can use in the educational environment and study aid that will be useful for themselves. Besides, their misconceptions about fraction will be presented and solutions for these misconceptions will be offered. These offers will have features of being used, developed and changed. They will be expected to reveal different points of view. This study aims to determine teachers' opinions related to ECCT that were prepared to eliminate the students' misconceptions on fraction.

METHOD

Qualitative study design which is one of the research approaches was used in this study. The research group consists of 12 mathematics teachers. Data were collected from interviews (unstructured) with teachers. Interviews were made before the materials were presented to the teachers, and between material sections. The data were obtained from face to face interviews which were recorded.

Table1 - Teacher profiles

Teachers	Age	Gender	Seniority	Teachers	Age	Gender	Seniority
T1	26	Female	4	T7	36	Male	14
T2	44	Male	21	T8	45	Male	19
T3	32	Female	9	T9	48	Male	21
T4	24	Male	1	T10	32	Female	8
T5	32	Female	9	T11	38	Male	14
T6	40	Female	15	T12	31	Female	8

The teachers are working in different provinces of Turkey. Teachers volunteered to participate in the study. ECCT was presented to teachers after the explanation.

Process

Before starting the research, misconceptions about fractions that were determined in literature were handled. These are;

Fraction of $\frac{2}{5}$ incorrect models

Figure 1 - Incorrect models
Source: Alacacı (2010, p.68)

Compared $\frac{6}{9}$ with $\frac{2}{3}$, $\frac{6}{9} > \frac{2}{3}$ cited by Alacacı (2010), similar misconceptions reported by Biber et al. (2013), Şengül (2015).

$\frac{5}{6} + \frac{1}{2} = \frac{5+1}{6+2} = \frac{6}{8}$ cited by Alacacı (2010), similar misconceptions reported by Biber et al. (2013), Şengül (2015), Gagatsi et al.(2016).

$\frac{2}{3} \times \frac{4}{9} = \frac{6}{9} \times \frac{4}{9} = \frac{24}{9}$ similar misconceptions reported by Biber et al. (2013), Maelasari and Jupri, (2017).

$\frac{2}{3} : \frac{4}{5} = \frac{3}{2} \times \frac{4}{5}$ similar misconception reported by Maelasari & Jupri, (2017).

$\frac{1}{4} : \frac{4}{5} = \frac{1}{\cancel{4}} \times \frac{\cancel{4}}{5} = \frac{1}{5}$ similar misconception reported by Küçük & Demir, (2009).

These misconceptions were inserted into the CCT. In preparation for the CCT, “Conceptual Change Approach” which was defined as reorganizing by Posner et al. (1982) was taken as the basis. In this approach, it cared about carrying out four conditions below in order to realize conceptual change.

a. Dissatisfaction: Students need to understand the inefficiency of existing conceptions.
b. Intelligibility: Students need to consider new conceptions intelligible.
c. Plausibility: Students need to find new conceptions reasonable.
d. Fruitfulness: Students need to be able to use new conceptions in other areas, too.

For CCT, at first, a question was asked in order to find out students’ misconceptions and create confusion. These questions were chosen from the misconceptions given above. Later, by establishing the common misconceptions related to that subject, it was explained why this knowledge is incorrect. Later, students move on to the next stage. In this stage, students realize the insufficiency of their own knowledge in cognitive conflict. Lastly, the correct information about the topic was explained. It was enriched with examples.

The ECCT

Computer animations were prepared by the researchers as a video. They were inserted into the CCT which were designed as Power Point presentation. Computer animations were prepared with 3ds max. “Refutation texts” added to slide.

Prepared ECCT were analyzed by two domain experts and one computer expert. After the necessary corrections were done, it was presented to teachers. In accordance with the analysis of two domain experts, common

misconceptions that are frequently faced and solution offers were determined, and the types of these misconceptions (overgeneralization, limited conception) were established. Regarding the analysis of one computer expert, the animation speed was adjusted, its colors were changed, and the size and design of the figures were reorganized. The ECCT which was taken for their final shape was presented in a mathematics class at a university in Turkey by doing the necessary explanations to the teachers.

Data Analysis

The data which were obtained from the unstructured interview, were analyzed by one expert and one researcher with the descriptive analysis method (Yıldırım & Şimşek, 2013). The data were collected with face to face interviews, and the interviews were both sound recorded and written down. The records were transcribed, and analysed by one expert and one researcher. The scripts of the interviews which were recorded were shown to the teachers again. During the interview, they were provided with a comfortable atmosphere, and it was observed that they were sincere, honest and warm.

FINDINGS

Twelve teachers were interviewed to receive their opinions towards ECCT that was prepared for fractions. Interviews with teachers before presenting material are as below.

Researcher: Which teaching methods do you use for fraction subject?
T2: I use drama method. Like shopping.
T3: I use fraction cards. I bring round cake to the classroom. I also benefit from the models.
T4:I use a story of two double decker buses analogy to teach multiplication and division in fractions.
T6: I use the didactic method to lecture. I use question-response. I don't take the time to use other methods because of transition exams from primary to secondary education.

Teachers (T6, T7, T8, T9, T10, T11, T12) stated that they generally use question-response and didactic methods (T6, T7, T8, T9, T10). Some of the teachers stated that they use discovery method (T1), drama (T2), and analogy (T4) in addition to modelling and fraction cards (T3, T5). Among these teachers, T4 expressed that he made a story of two double decker buses analogy to teach multiplication and division in fractions.

Researcher: What are the materials and reference books you use?

Teachers stated that they mostly use course books (T4, T7, T9, T11, T12), fraction cards (T1, T3), slices of cake (T3), models (T2, T3, T4, T5), test book (T6, T8, T9), education information network (T3,T10).

Researcher: How do you carry out assessment and evaluation at the end of the subject, and What are the results?

Teachers emphasized that they carried out assessment and evaluation with written exam (T1, T2, T3, T4, T5, T7, T10, T11, T12) and multiple choice test (T6, T8, T9). While T2, T3, T4, T8 and T10 reported that the overall situation was good, the other teachers reported that the success was low in fraction subject. After these interviews, material presentation started.

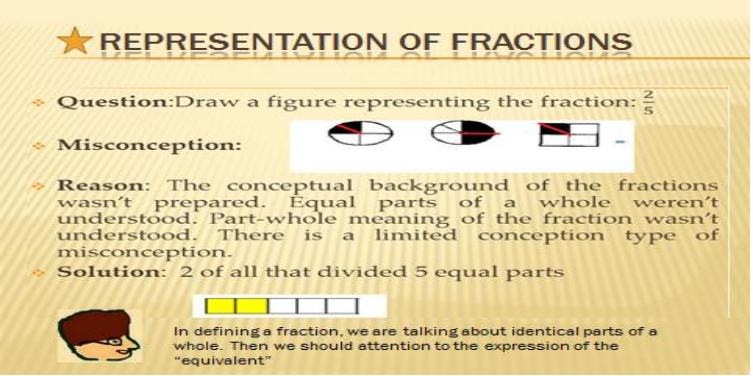

Figure 2 - Conceptual change text related to representation fractions

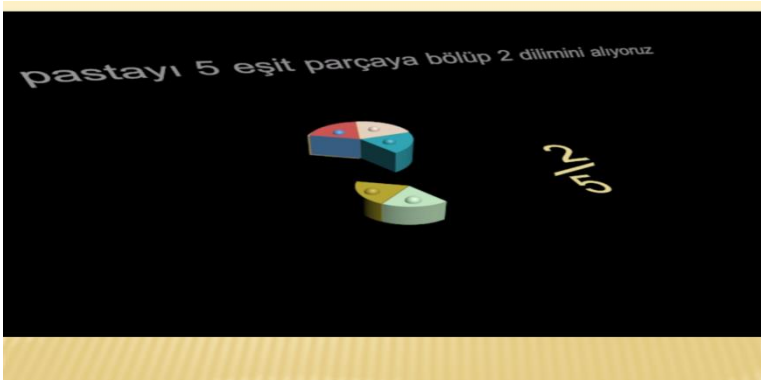

Figure 3 - 3ds max animation for representation of fraction

Researcher: What do you think about this presentation?

Some teachers reported that they came across with the similar misconception (T2, T7, T11).

T2: we should pay attention to the expression of the "equivalent". Students think fractions are just a fraction line. They don't understand the identical parts of a whole.
T3: I use fraction cards but more useful to use a computer
T5: Animations need to ensure student interaction. It should be supported with the games.

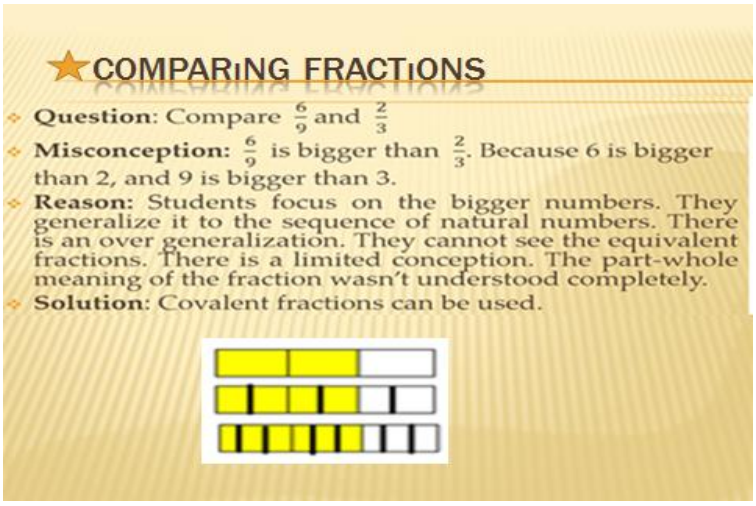

Figure 4 - Conceptual change text related to the fraction comparison

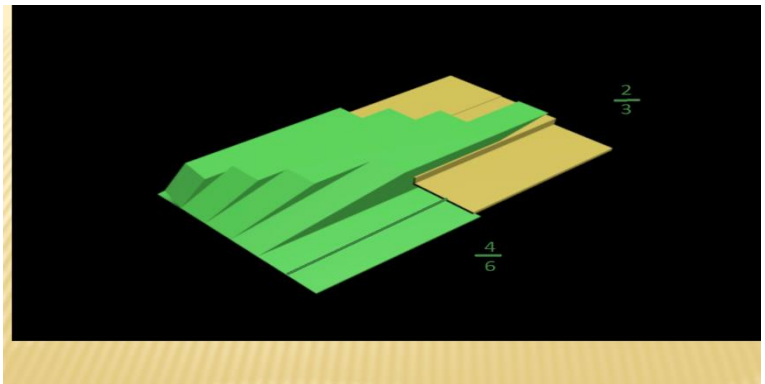

Figure 5 - 3ds max animation for the fraction comparison

Researcher: What do you think about this presentation?

Some teachers (T2, T7, T11, T12) reported that they came across with a similar misconception.

T1: They did not understand the equivalent fraction
T3: They do not match part-whole with equivalent fraction information
T5: Animation has been good
T6: Well-defined

T7: Very good!

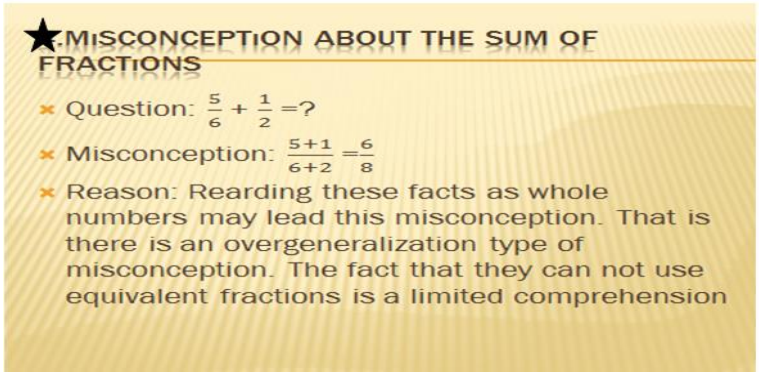

Figure 6 - Conceptual change text1 related to the sum of fractions

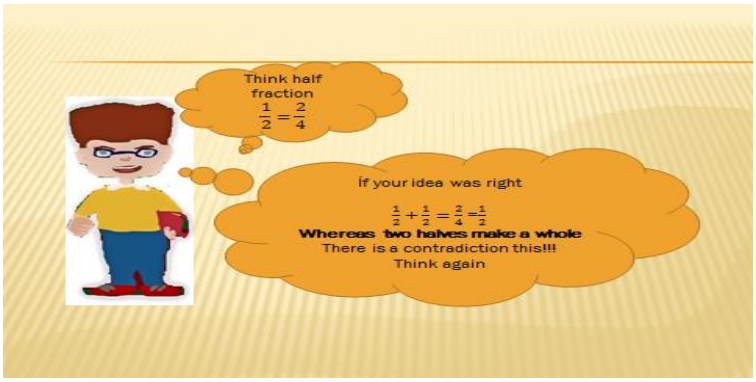

Figure 7 - Refutation text on the sum of fractions

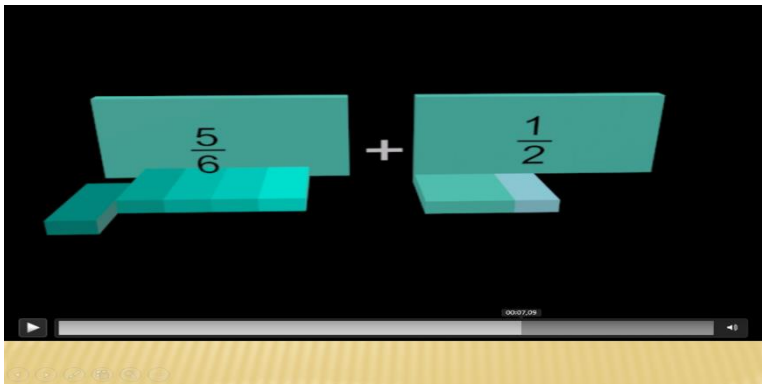

Figure 8 - 3ds max animation for the sum of fractions

Researcher: What do you think about this presentation?

Some teachers (T2, T3, T5, T7, T10, T11, T12) reported that they see misconceptions mostly about addition operations in fractions whose denominators are different. These teachers stated that while doing addition and subtraction in fractions whose denominators are different, students add (subtraction) numerators and write them to the numerator, and add (subtraction) the denominators and write them to the denominator.

T5: I came across with the same misconception. I have difficulty in explaining the fact that $\frac{5}{4}+\frac{2}{4}=\frac{5+2}{4+4}$ *is not possible to the students who did it."*

T7: The most interesting mistake I have ever seen is that a student answered the question $\frac{3}{4}+\frac{1}{2}=?$ *like that: (3+4) + (1+2) =7+3 =10*

T10: Students can produce rules that have no logical basis on the subject they have learned wrongly"

T11: When I realize the mistake I tell the subject over again, especially I do the operations again by using unit fractions.

T4: I draw attention to the part-whole relationship by using chocolate. I also use pizza model. I do fractions

by using equivalent fractions.
T6: Examples from daily life and stories can be used. Animations enriched with cartoon characters can be used, too.
T2: Two halves make a whole ($\frac{1}{2}+\frac{1}{2}=$ 1) Good description!

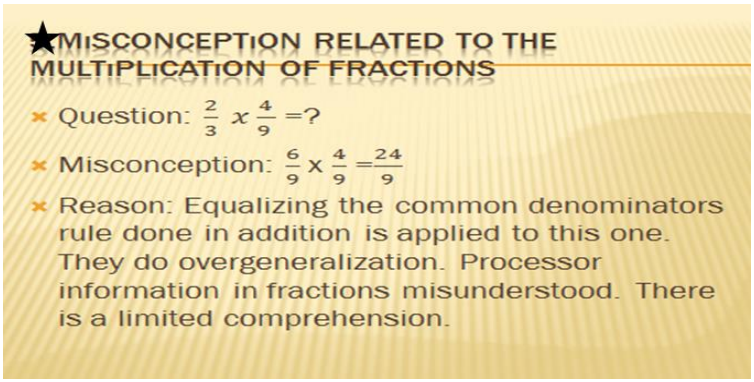

Figure 9 - Conceptual change text1 related to the multiplication of fractions

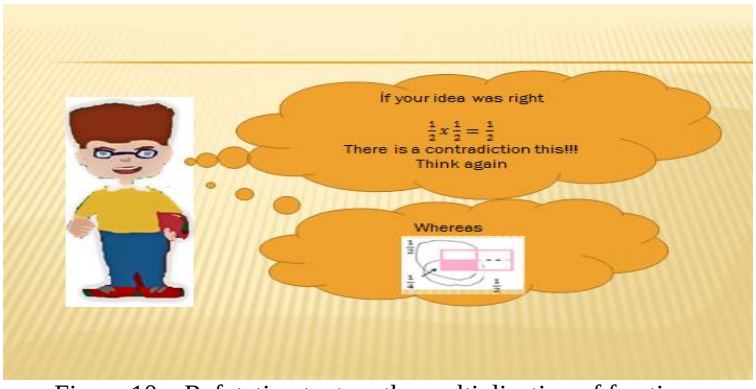

Figure 10 – Refutation text on the multiplication of fractions

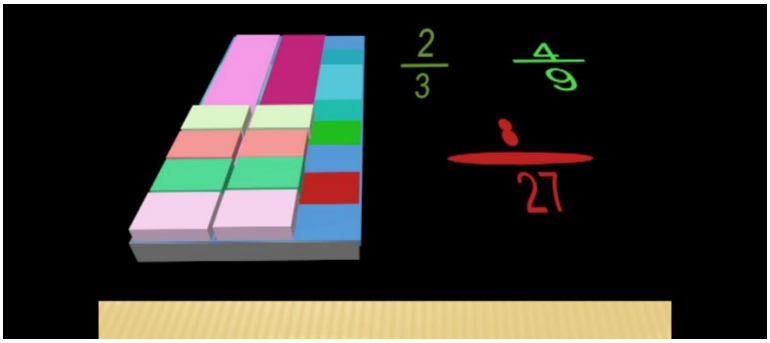

Figure 11 – 3ds max animation for the multiplication of fractions

Researcher: What do you think about this presentation?
Some teachers (T2, T5, T7) reported that they encountered similar misconceptions.

T2:While doing multiplication, students equalize denominators, multiply numerators and write them to numerator, and write the common denominator to denominator like $\frac{1}{3} x \frac{3}{4} = \frac{4x9}{12}$
Researcher: What do you do to correct the mistake when you realize them?
T2: Retelling
T7: Understanding the model is not easy. I don't think students will understand this model.
T8: Yes. Model is very difficult. Colors too much!
T3: Some students understand the model better. I use it. They understand.
T5: I use computer actively during the lesson. I don't use it constantly in the lesson, but I use it on occasion to ring the changes.
T10: I use it to answer the test questions with students after the lecturing. I solve the questions by using the

interactive whiteboard.
T3: It can be more colorful and attractive.
T4: Voiced narration can be added. Besides, it is better to be supported with more examples that provide students' participation.

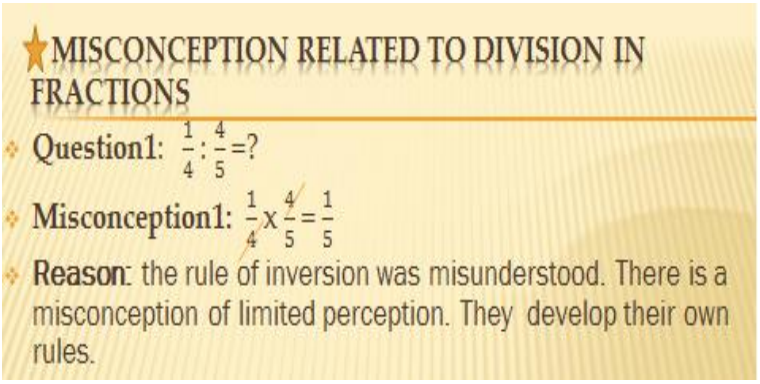

Figure 12 - Conceptual change text1 related to the division of fractions

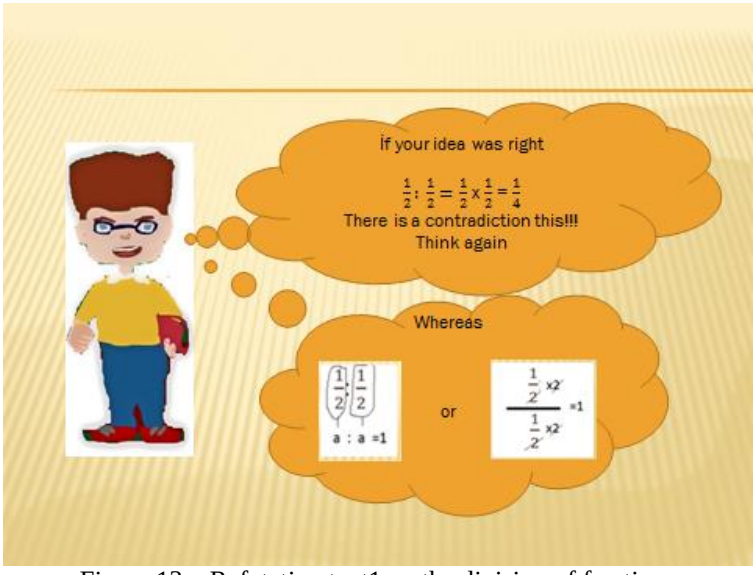

Figure 13 – Refutation text1 on the division of fractions

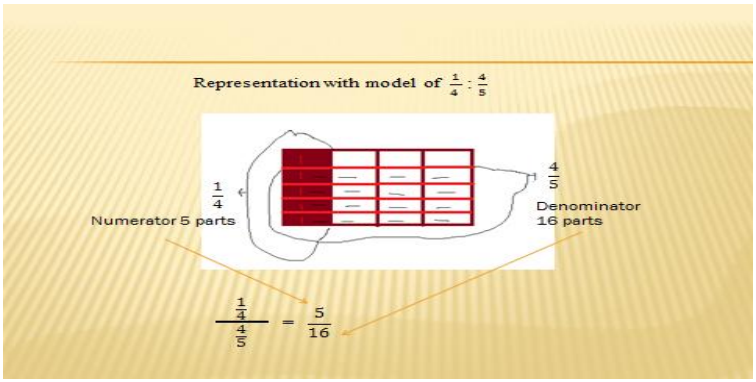

Figure 14 - Conceptual change text3 related to the division of fractions

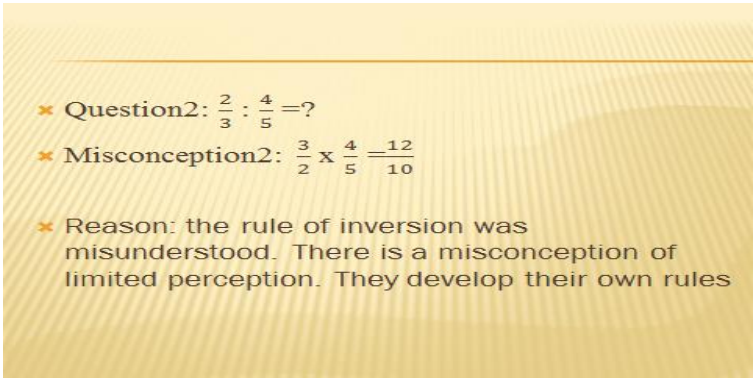

Figure 15 - Conceptual change text4 related to the division of fractions

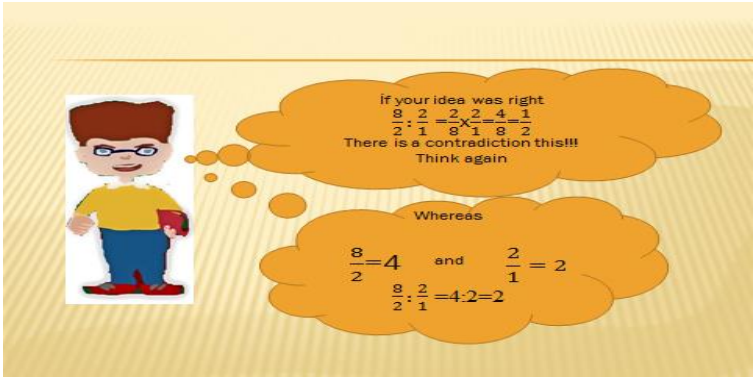

Figure 16 – Refutation text2 on the division of fractions

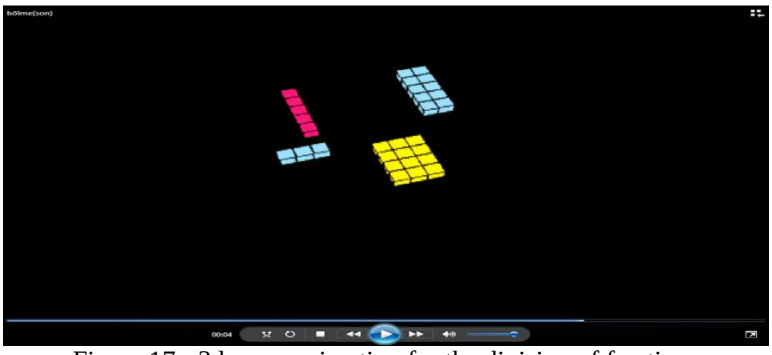

Figure 17 - 3ds max animation for the division of fractions

Researcher: What do you think about this presentation?
T3: Students directly do multiplication in division operations, or they write the inverse of the wrong fraction like $\frac{2}{5} : \frac{3}{4} = \frac{2x3}{5x4}$ *or* $\frac{2}{5} : \frac{3}{4} = \frac{5x3}{2x4}$ *or* $\frac{2}{5} : \frac{3}{4} = \frac{5x4}{2x3}$
T5: Students generally prefer dividing numerator and writing them to numerator in the division operations, and dividing denominator and write them to the denominators. For example they find out the result like that; $\frac{5}{4} : \frac{2}{4} = \frac{2,5}{1}$ *they prefer this way more.*
T12: Most of students don't understand inversion rule. if there is simplification, they convert the process to multiplication.

After these interviews, the teachers were introduced with ECCT and they were discussed. Then, the interviews continued.

Researcher: Do you use any of the computer or teaching technologies?

Some teachers (T3 and T10) stated that they use the computer and interactive whiteboard. They denounced that these materials are effective especially for drawing attention, concretizing the subject and visualization.

Researcher: Do you think that computer-assisted teaching materials will be beneficial for correcting the

misconceptions on fractions?

Teachers mostly point out that computer-assisted teaching materials are effective on correcting the mistakes and teaching fractions.

> *T2: Technology has been advancing and I think that it will be much more effective on the educational area by getting advanced.*
> *T3: I think it is very effective. It provides us with taking precautions against misconceptions.*
> *Researcher: Do you think that CCT will be effective on correcting the misconception about fraction subject?*

Teachers mostly enounced that *CCT* are effective on correcting the misconceptions, also especially they will ease teachers' work.

> *T2: It is a great facility for teachers. If teachers know what kind of misconceptions there are, it will be easier for them to see and lighten these blind spots.*
> *T8: It will be good for teachers. However, more enjoyable things should be added for students. Stories, games and visualization need to be included.*
> *Researcher: Do you think that ECCT will be effective on correcting the misconceptions about fractions?*

Mostly, teachers pointed out that ECCT is influential in eliminating the students' misconceptions about fractions. Some teachers stated that it will be difficult to understand the material without having a teacher.

> *T2: Yes. At least, they will be effective in terms of visualization. They will attract their attention. They make teaching effective with the guidance of teacher. However, it might be difficult to understand it alone.*
> *T3: Yes, they are effective because the children at that age are interested in the activities prepared in the computer environment and they can provide permanent learning since they are attractive.*
> *T4: I think they will be effective since they concretize the abstract concepts and they make students comprehend the logic of operations.*
> *T11: They will be effective because they provide visualization, attention, and enjoyable class instruction. I think that they have a pathfinder effect for teachers and the effect of correcting misconceptions for students.*
> *Researcher: What are your suggestions?*

Some suggestions of teachers about ECCT:

> *T1: There should be interaction in electronic teaching materials and students should get feedback. Visual cognitive thinking processes need to be supported with constructive questions and the development of the students' creativity should be ensured.*
> *T2: It would be better to support it with analogies. The stories can be created. Software developers, the people preparing analogies and the field experts need to work together.*
> *T8: Division subject could start with the question: how many halves are there in two complete loaves of bread?*
> *T10: Sharing a cake or slices of bread could be used.*

CONCLUSIONS

Teachers emphasized that using a model for fractions is effective; however, they can not use it because of the curriculum to be finished, the transition exams from primary to secondary education and limited time. Therefore, they stated that they teach their lesson with question answer and traditional didactic methods. A few teachers stated that they use the discovery method, drama, and analogy, and also benefit the modelling and fraction cards. Most teachers use question-answer and traditional didactic method since they provide the opportunity to teach more in less time. They prepare students for test examinations. Teachers often state their contextual causes when they are confronted with inconsistencies between their beliefs and practices. Their common cause is a test (Lim & Chai, 2008). This result has a similarity with the result of the study done by Çelikkaya & Kuş (2009). Teachers who make multiple choice exams in their classes did not talk about misconceptions because it is difficult to bring out misconceptions by multiple choice testing. Teachers pointed out that they mostly prefer private publications' test manuals. It shows that teachers would rather prepare their students for multiple choice testing than conceptual learning. Feedback and formative assessments are important to identify conceptual learning. The strong impact of formative assessment on success is meaningful feedback about what students know and where they make mistakes or misunderstandings (Gagatsis et al., 2016).

Many teachers said the success on fractions was low. Among the misconceptions that teachers frequently

encounter; the misconception of adding up (subtracting) numerators and writing them to numerator, adding up (subtracting) denominators and writing them to denominator in adding up (subtraction) of fractions with different denominators, and the misconception of equalizing the denominators and getting them to the common denominator in the multiplication of fractions; and not understanding the logic of division have similarities with the misconceptions that are present in literature (Brown & Quinn, 2006; Pesen, 2007; Fisher, 2009; Alacacı, 2010; Siegler et al., 2010; Biber et al., 2013; Şengül, 2015; Maelasari & Jupri, 2017). In their study, Brown & Quinn (2006) encountered the occasion on which students frequently divide numerators and write them to the numerator, and divide denominators and write them to the denominator. Even if this situation comes up with the correct result, it will make the situation more complicated and incomprehensible in different fraction statements. For instance; a student who does the operation $\frac{5}{6} : \frac{5}{3}$ like that: $\frac{5:5}{6:3} = \frac{1}{2}$ will be more confused about the operations such as $\frac{1}{\frac{1}{2}\times\frac{1}{3}}$ or $\frac{1}{\frac{1}{6}}$. This may cause them to make mistakes. If these errors are not reformed, they become systematic. These errors of the student may turn into misconceptions over time. Teachers state that in such situations students create their own rules. In this way, students have misconceptions about the fractions such as randomly practicing and overgeneralization or limited comprehension of the adding up, subtraction, division and multiplication that they have learnt previously in natural numbers. Most of the students, who do not know how to do, produce incorrect rules.

Teachers stated that it is beneficial to use unit fraction and modelling with figures in order to eliminate the misconceptions that they face about fractions. This result was also supported in the studies that were carried out by Pesen (2007), Alacacı (2010), Eroğlu (2012) and Biber et al. (2013). Besides, teachers stated that creating equivalent fractions (Orhun, 2007) and the part-whole relationship (Kocaoğlu & Yenilmez, 2010) are important in eliminating the misconceptions.

It was stated by the teachers that computer-assisted teaching is useful for students in terms of attracting their attention and making lessons more active. This result is compatible with the computer assisted studies which were done before (Baki & Özpınar, 2007; Akinsola & Animahasun, 2007). Bosman & Schulze (2018) reported that teachers should be creative about using visual media.

As stated in studies by Guzzetti (2000), teachers pointed out that CCT won't be enough alone in terms of students' learning the subject. But, teachers pointed that conceptual change texts will facilitate teachers' work and will lighten the blind spots.

Teachers said that ECCT will be effective in teaching the fractions and in removing the misconceptions, they can attract students' attention and make the lesson more enjoyable, and they will make it easy for teachers. These statements have similarities with the results of the studies by Kaya (2012), Taşdelen (2011), and Ersoy (2012) in science and which present that computer-assisted CCT increase the students' attitude and success.

Teachers suggested that it is necessary to prepare materials that provide more examples for ECCT that are believed to attract students' attention more in animations, that are told with daily life examples and that enable student interaction.

Suggestions

ECCT's can be used for formative assessment. It also allows students to make their own self-assessment. ECCT's can be used in eliminating misconceptions and concept change. For this reason, practices for other subjects need to be prepared in books and in electronic environment. Teachers should be able to supply the misconceptions that they have on the subject to be taught and solution offers as ECCT from the books or electronic environment. ECCT should be designed also for other mathematics subjects, researches should be done and they should be shared with other associations. With the animations that are turned into story with daily life examples and with interactive texts computer-assisted teaching materials need to be enriched. 3ds max animations are very effective in presenting visuals that are like real ones so they must be popularized in educational institutions. In order to realize it, studies should be carried out with students in schools. Its practicality in other mathematical topics, should be investigated. These animations can also be viewed with the 3D glasses. So students will be more motivated and enjoy. It is recommended to investigate the impact of ECCT on students for future studies.

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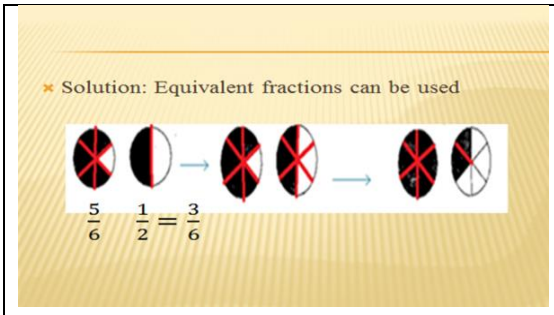
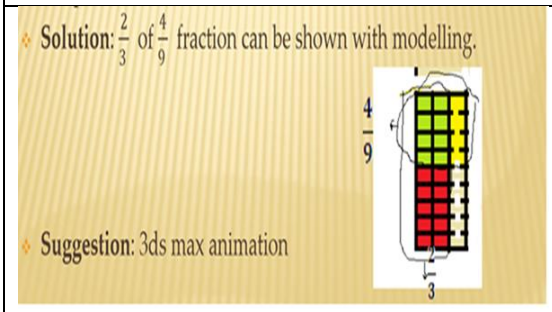
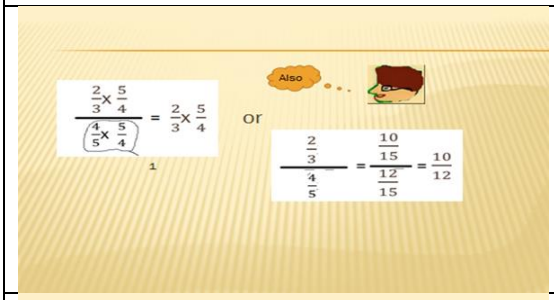
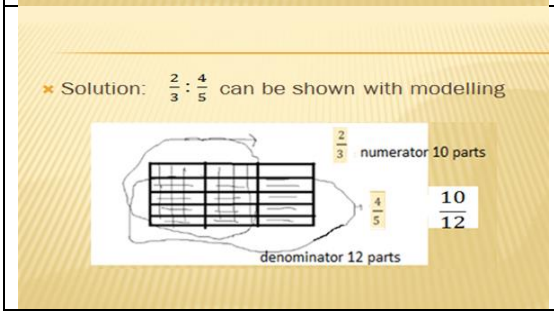
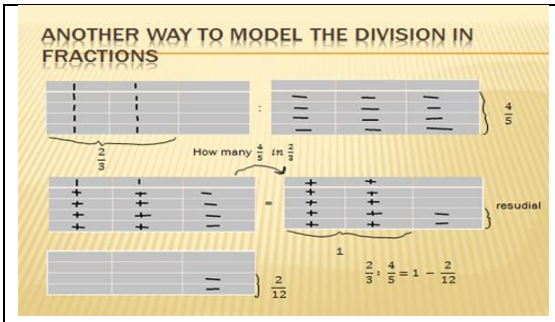
Attachments

Samples Texts of ECCT Prepared by the Researchers

	ECCT3 related to the sum of fractions models
	ECCT3 related to the multiplication of fractions
	ECCT6 related to the division of fractions
	ECCT7 related to the division of fractions

	ECCT8 related to the division of fractions

Personality Traits, Gender, Frequency of Internet Use as Predictors of Turkish Teenagers' Internet Addiction

H. Deniz Günaydın, Ph.D.
Konya Food and Agriculture University, Faculty of Social Human Sciences, Department of Psychology, Konya – Turkey
dgunaydin@gmail.com
Orcid: https://orcid.org/0000.0002.2062.4246

Abstract
In the current study, the associations between personality traits including extroversion, neuroticism, conscientiousness, agreeableness, open to experience, gender, frequency of Internet use, and teenagers' Internet addiction were explored. Participants in the study were 409 teenage high school students (289 female, 120 male:13 to 18 years old) in Turkey. The participants completed the Demographics Questionnaire prepared by the authors, the Big Five Inventory and Young Internet Addiction Test – Short Form to collect the research data. It was found out that FIU, neuroticism, conscientiousness and agreeableness explained 29.8% of the variance in adolescent Internet Addiction. Neuroticism was the most significant variable linked with teenagers' Internet addiction. However, gender (male vs female), extroversion and openness to experience were not significant predictors of teenagers' Internet addiction. At the end of the paper, the limitations were stated and suggestions for future studies were made. The research findings emphasize the significance of teenage Internet addiction in terms of teenagers' personality traits.
Keywords. Teenagers, Big Five, personality, gender, frequency of Internet use, Internet addiction

INTRODUCTION

Internet addiction was defined by Young (2017) as preoccupation with Internet use, losing interest in other activities, ignoring its outcomes and troubles in withdrawal. Excessive Internet use can lead to various problems including academic and professional setbacks, loneliness, disruptions in daily life routines, depression, telling lies, lower level of life quality, anxiety, and other psychiatric syndromes (Bozoglan et al., 2013; Bulut-Serin, 2011; Kim & Davis, 2009; Ko et al., 2011; Young, 1998). Several research have explored predictors linked with addictive Internet use (Bozoglan, 2018; Bozoglan, 2018; Chung et al., 2019; Demir & Ozdemir, 2020; Demir & Kutlu, 2018; Demirer & Bozoglan, 2016; Gezgib et al., 2018; Kutlu et al., 2016; Wang et al., 2019). However, few of them have focused on the relationship between personality traits and addictive Internet use among teenagers (Przepiorka et al., 2021; Zhou et al., 2017).

High school is a critical time in teenagers' lives. In particular teenagers may tend to do problematic behaviors because of insufficient cognitive control and susceptibility (Casey et al., 2005; Karaca et al., 2021; Steinberg, 2005). Teenage is regarded as risky addictive Internet use which may lead to negative outcomes (Tahiroglu et al., 2010). Teenage groups have tendency to use the Internet more frequently than different age groups (Widyanto & McMurran, 2004) because teenagers keep developing in terms of emotional, social, and cognitive skills (Yang and Tung, 2007), which are regarded to be risky in developing addictive Internet use.

Teenage addictive Internet use and Frequency of Internet Use

The related studies indicate a substantial relationship between frequency use of Internet and teenagers' addictive internet use (Johansson & Götestam, 2004; Samaha et al., 2018). Instead, few studies (Koyuncu et al., 2014; Önen et al., 2014) have concentrated on the association between frequent use of Internet and teenagers' Internet addiction in Turkish context. Koyuncu et al. (2014) suggest that FIU or duration and reason of Internet use were regarded to be connected with Internet addiction. Önen et al. (2014) discovered that high school students who used internet more frequently were under risk of Internet addiction. However, Johansson and Götestam (2004), in Norwegian teenage groups, revealed that the relationship between FIU and addictive Internet use was comparatively low, which is opposed to the perception that FIU would pose a risk for addictive internet use. Consequently, new research is needed to clarify the association between FIU and teenagers' addictive Internet use.

The suggested associations above seem acceptable when adolescents more frequently use the Internet, the greater possibility that adolescents would build an addiction to Internet, although some of the studies suggest that there was not a substantial association between FIU and addictive Internet use. It is, therefore, be remarkable to clarify the association between these two variables in the Turkish teenage population and not only with online gaming, but other type of Internet usage such as social interaction etc. Accordingly, it was hypothesized in this study that

frequent use of Internet will be significantly and positively connected to elevated levels of teenagers' addictive Internet use (Hypothesis 1).

Teenage Internet addiction and Gender

Gender difference regarding the pervasiveness of Internet addiction has been broadly established and gender has been found to be a significant factor to justify why teenagers use internet in an addicted way (Liang et al., 2016; Tang et al., 2017). Teenagers' gender was meaningfully related to their Internet addiction (Ko et al., 2005). There is steady indication that male teenagers are more probable to reveal greater level of addictive Internet use (Demirer et al., 2013; Griffiths, 1999) when compared to the females. Male teenagers have tendency to make use of the Internet for fun and to experience a sense of accomplishment, while females use for social interaction and academic support (Su et al., 2020; Weiser, 2000). However, some other studies (Cheng & Li, 2014; Malik & Khan, 2015) show that Internet use is widespread equally amongst both males and females. Likewise, Khan et al. (2017) and Zhang (2005) found that the female and male average scores addictive Internet use were statistically like in a sample of late adolescent group. Even though the universally acknowledged gender discrepancy in Internet addiction in various age groups and settings, there is a shortage of research paper and controversial findings assessing the gender impact on teenagers' Internet addiction in Turkish context in terms of personality traits. Exploring the gender distinction in the effect of Internet addiction can deliver crucial perceptions on how teenage girls and boys deal with Internet use problems in Turkey throughout the COVID-19 epidemic. Therefore, it was suggested that teenagers' addictive Internet use level will be different by gender in Turkish context (Hypothesis 2).

Teenage addictive Internet use and Big Five Personality Traits

A handful of studies (Błachnio et al., 2017; Kayiş et al., 2016; Kircaburun & Griffiths, 2018; Tian et al., 2021; Zhou …& Wang, 2017; Zhou …& Zhao, 2017) have indicated that Personality traits are intricately linked to Internet addiction. However, few studies (Kayiş et al., 2016) have searched the effects of personality on teenagers' addictive Internet use in Turkish context. Tian et al. (2021) established mutual relationships between the personality traits and addictive Internet use. A meta-analysis assessment at university context (Kayis et al., 2016) suggested that openness, conscientiousness, agreeableness, extraversion and were linked with addictive Internet use in a negative way, while neuroticism was linked with addictive Internet use in a positive way. These outcomes emphasize the crucial effect of Big Five on teenagers' addictive Internet use.

This study is important in assessing the effect of Big Five personality traits on addictive Internet use regarding teenage context. Additionally, an extensive review of the pertinent literature (Kayis et al., 2016) disclosed the effects of Big Five personality traits on Internet addiction should be further studied as the research findings are contradictory; consequently, the current study aims to investigate these impacts. Overall, it was hypothesized that Big Five personality traits will have noteworthy impact on teenagers' addictive Internet use (Hypothesis 3).

In brief, the current study attempts to broaden the related literature by means of focusing on teenagers. Additionally, this study seeks impacts of Big Five personality traits on teenagers' addictive Internet use in Turkey where prior studies focused on other age groups (e.g., Kircaburun & Griffiths, 2018). Subsequently, the current study aims to explore the association between teenage addictive Internet use and FIU, gender, Big Five personality traits including openness to experience, extroversion, conscientiousness, neuroticism, and agreeableness in Turkey.

METHOD

Participants

The inclusion criteria for the current study were that participants should be high school students who attended high schools in their adolescence in Konya -Turkey. A total 441 high school students completed the online survey through an online research company. However, fourteen incomplete surveys and eighteen outliers, which were detected by converting the numeric variables to the standard z-score values, and Whisker plots (the ones smaller than -2.68 and larger than +2.68) were excluded from the study analysis. Thus, final research participants were 409 students (289 girls and 120 boys). Participants were average of 16.10 years old (Min. 13 and Max. 18; SD=1.10). Demographic data on adolescent gender and high school grades are presented in Table 1.

Table 1: *Demographic characteristics of adolescent participants*, N=409.

	Characteristics	n	%
Gender	Female	289	70.7
	Male	120	29.3
	Total	409	100
High School Grades	9	85	21.1

10	158	39.2
11	111	27.5
12	49	12.2
Total	403	100

Ethics Statement. The survey forms were assessed by ethic review board and ethical approval was taken from the Konya Food and Agriculture University before the data were collected (REC 2021/02-03). Then, the consents were taken from participants who studied at different high schools in proportion to the provisions of the Declaration of Helsinki. The participants were informed about the research purpose and explained the research data would be kept secret. The researchers gave feedback about the research process and outcomes to the school management.

Variables and measures

In the current research, gender, frequency of Internet use and personality traits were independent variables while addictive Internet use was dependent variable to achieve the first research aim. Gender, frequency of Internet use and personality traits were used as predictors of Internet addiction to achieve the second research aim.

Demographics Questionnaire: It was created by the research authors, and it had items like gender (female and male), school grades (9^{th}, 10^{th}, $11^{th,}$ and 12^{th} grades), age (13 and 18 years old) and hours spend daily online.

The Big Five Inventory (BIF): Benet-Martinez and John (1998) developed the inventory and Sumer and Sumer (2005) adapted to Turkish. BIF has 44 items, and it is a Likert-type scale with 5-point, which is score between 5 (strongly agree) and 1 (strongly disagree). BFI consists of five sub-categories of agreeableness (e.g., "I see myself as someone who is helpful and unselfish with others"), extraversion (e.g., "I see myself as someone who is talkative"), conscientiousness (e.g., "I see myself as someone who does a thorough job"), neuroticism (e.g., "I see myself as someone who is depresses, blue"), and openness to experience (e.g., "I see myself as someone who is original, comes up with new ideas"). The English version of BIF had quite satisfactory internal reliability of α = .83. In the current research, Cronbach's alpha value was computed as α = .70.

Young Internet Addiction Test – Short Form (YIAT-SF): Young (1998) developed the test to assess the existence and seriousness of Internet and technology dependency among adolescents. Pawlikowski et al. (2013) converted the test into short form. Kutlu et al. (2016) adapted to the test Turkish. The 12-item test with no reverse item (e.g., "How often do you stay online longer than planned?") is evaluated over 5 categories (Always = 5, Often = 4, Sometimes = 3, Rarely = 2, Never = 1). The minimum score is 12 and maximum score is 60 from the test a respondent can obtain, where higher scores show a high level of addictive Internet use. Pawlikowski et al. (2013) calculated Cronbach Alpha value as α = .70. Kutlu et al. (2016) calculated Cronbach Alpha value as α = .93. In the current research, Cronbach Alpha value was calculated as α = .87.

Data Analysis

The research data was analyzed using SPSS 22 software (Statistical Package for the Social Science). Before the data was analyzed, the assumptions were examined. For the assumption of normality, the values of skewness and kurtosis were computed, and it was found that these values were adequate for a normal distribution. Besides, the residual distribution was fairly rectangular, and nearly all the scores were centered. Therefore, the homoscedasticity and assumptions of linearity were met in the present study. The data regarding high school students' personality traits, coping approaches, trait anxiety and addictive Internet use was interpreted utilizing mean, correlation, and hierarchical analyses. Before regression analysis was conducted, gender was dummy coded. Males were coded as "1" and females were coded as "0" sequentially.

RESULTS

Prior to the analyses, the assumptions for the regression were checked. It was found out the main assumptions for the hierarchical regression were congregated. A linear association was found among predictor and outcome variables as a result of a visual examination of scatter plots. The residuals regarding the regression models exhibited were not skew as suggested by the normal P-P plots and histograms; thus, regression models were robust against violations of normality. Additionally, scatter plots of regression standardized residuals were evaluated visually, and homoscedasticity of variance was found. The correlation values among independent variables are expected to be lower than .90. The VIF value should be lower than 4, and tolerance values are expected to not to be lower than .20 (Tabachnick & Fidell, 2007). Thus, no multi-collinearity was found between predictors, where correlation among independent variables were between -0.36 and 0.37, tolerance values were between .77 and .99 and VIF values were between 1.05 and 1.30.

Descriptive statistics like mean, range, standard deviation, and Pearson product moment correlations between gender (male), FIU, extraversion, neuroticism, conscientiousness, agreeableness, openness, and Internet addiction are presented in Table 2. Bivariate correlation analyses revealed that there were positive correlations between FIU (r=.38; p<.01) and neuroticism (r=.35; p<.01) and adolescent Internet Addiction, while there were negative correlations between conscientiousness (r=-.36; p<.01), extraversion (r=-.22; p<.01), openness (r=-.16; p<.01), agreeableness (r=-.21; p<.01) and adolescent Internet Addiction. Finally, adolescents (high school students) had average level of Internet addiction (Mean=31.17).

Table 2: *Descriptives and correlations between variables of research measures*

Study Measures	1	2	3	4	5	6	7	M	SD	Min.	Max.
1. FIU	-							6.27	3.07	1	16
2. Extraversion	-.05	-						3.20	0.79	1.25	5.00
3. Neuroticism	.14*	-.27*	-					3.37	0.88	1.00	5.00
4. Conscientiousness	-.16*	.31*	-.24*	-				3.40	0.74	1.44	5.00
5. Agreeableness	-.09	.22*	-.03	.36*	-			3.56	0.64	1.78	5.00
6. Openness	-.09*	.32*	-.09	.18*	.07	-		3.73	0.63	1.80	5.00
7. Internet Addiction	.38*	-.22*	.35*	-.36*	-.21*	-.16*	-	31.17	8.66	12.00	56.00

* p< .01

Table 3 introduces the outcomes of the hierarchical regression analysis. Three separate hierarchical regression analyses were performed to investigate whether gender (male), FIU and personality traits had significant impacts on teenagers' Internet addiction. Gender (male) (β = -.08, p=0.133) was added in the first block as the predictor, which did not significantly predict the variance in Internet Addiction (R^2=.006; $F_{1,406}$=2.271, p>.05). HSDO was entered in the second block as the predictor, after FIU was controlled. FIU (β = .37, p<0.001) predicted 13.5% of the Internet addiction (ΔR^2 = .141, $F_{2, 405}$ = 33.090, p<.001).

Table 3: *Hierarchical multiple regression analysis predicting Internet Addiction*

Model		B	SE	β	t	p	ΔR^2	R^2	p
Block 1	Gender (Male vs Female)	-5.01	3.32	-.08	-1.51	.133	.006	.006	.133
Block 2	Gender	-2.85	3.11	-.04	-.92	.36	.135	.141	.000
	FIU	3.68	.46	.37	7.97	.000			
Block 3	Gender	1.94	2.94	.03	.66	.509	.157	.298	.000
	FIU	2.97	.43	.30	6.93	.000			
	Extraversion	-1.52	1.85	-.04	-.82	.413			
	Neuroticism	8.75	1.65	.25	5.32	.000			
	Conscientiousness	-8.32	1.99	-.20	-4.18	.000			
	Agreeableness	-4.49	2.22	-.09	-2.02	.044			
	Openness	-2.42	2.15	-.05	-1.12	.263			

FIU= Frequency of Internet Use, B=unstandardized regression coefficient; SE= standard error of the unstandardized regression coefficient; β=standardized regression coefficient; t= t-test value; ΔR^2=change in coefficient of determination between steps; R^2 = Change in coefficient of determination.

Extraversion, neuroticism, conscientiousness, agreeableness, and openness were entered in the third block, after gender and FIU were controlled. These variables predicted 15.7% (ΔR^2 = .157, $\Delta F_{7,400}$ = 24.108, p<.001) of the variance. In the third model, FIU (β =.30, p<.001) and neuroticism (β =.25, p<.001) were significant positive contributors, while conscientiousness (β =-.20, p<.001) and agreeableness (β =-.09, p<.05) were a substantial negative contributor of the Internet addiction. FIU, neuroticism, conscientiousness and agreeableness together in the final model justified 29.8% of adolescent addictive Internet use (R^2=0.298).

DISCUSSION

The present study explored whether high school students' gender, FIU, and personality traits predicted their Internet addiction. The initial hypothesis was validated by the findings of this study, specifically FIU was positively and significantly linked with higher levels of teenage Internet addiction, revealing that FIU predicted 14% of the addictive Internet use. In proportion to the findings of this research, Koyuncu et al. (2014) discovered that FIU was linked with Internet addiction, meaning that higher FIU would lead to addictive Internet use among teenagers. On the contrary, Johansson and Götestam (2004) indicated a low correlation between the usage of Internet and addictive Internet use, decreasing the possibility of high FIU. The outcomes of the current study reveal a contradictory association between frequency of internet use and teenagers' Internet addiction. Further research

with different methodology can be beneficial to elucidate the association between these two variables. The study results revealed there was not a noteworthy relationship between teenagers' gender and addictive Internet use in line with other studies (Cheng & Li, 2014; Khan et al. 2017; Malik & Khan, 2015; Zhang 2005), uncovering female and male adolescents had similar level of addictive Internet use. Concerning the effect of gender on addictive Internet use, numerous studies have created contradictory outcomes. For example, Shek et al. (2016) established those male teenagers were more addicted to the Internet compared to female teenagers. The diverse findings concerning gender disparities and addictive Internet use could be ascribed to various causes such as social and regional differences, availability to Internet, family context and individual lifestyles or habits.

Big Five personality traits besides control variables including FIU and gender (male) were entered as predictors of teenagers' addictive Internet use. It found out that personality traits explained 16% of the variance of teenagers' addictive Internet use in the hierarchical regression model. In terms of personality traits, the present data analyses indicated no significant relationship between extraversion and teenagers' addictive Internet use. In support of the findings of existing study, Przepiorka et al. (2020) and Zhou … and Wang (2017) didn't yield a consistent association between Extraversion and addictive Internet use. However, some of the research have demonstrated that extraversion was positively linked to Internet addiction (Agbaria & Bdier, 2019; Andreassen et al., 2012; Zhou …& Zhao, 2017). It was suggested that high level of extraversion often indicates high level of impulsivity, and lower self-control making these people vulnerable to addictive Internet use (Vollrath & Torgersen, 2002) and extroverts can utilize the Internet to meet the social needs as well expressing themselves (Bianchi & Phillips, 2005). Other studies, in contrast, have discovered that Extraversion was a negative predictor of addictive Internet use (Błachnio et al., 2017; Przepiorka et al. 2019). A study which was performed in Turkey, Poland, and Ukraine established that Extraversion was a negative significant predictive Internet addiction (Błachnio & Przepiorka 2016). The negative or low/no association between extrovert teenagers' behaviors and addictive Internet use can be justified by the reality that the extrovert teenagers do not need to socialize using the Internet or social media as they are already sociable or socially interactive.

A positive significant relationship between neuroticism and teenagers' addictive Internet use was established. This indicates that those teenagers who have higher level of neuroticism have tendency to use Internet more addictively. In line with the current findings, some studies (Bulut-Serin, 2011; Tian et al, 2021; Zhou … & Zhao, 2017; Zhou …& Wang, 2017) have shown neuroticism was positively linked with addictive Internet use. Zhou … and Zhao (2017) suggested that neuroticism had significant positive impact on adolescents' Internet addiction. Additionally, Kuss et al. (2013) established that high neuroticism was meaningfully linked with addictive use. Neuroticism has a potential to be risky regarding teenagers' addictive Internet use because people with neuroticism traits may encounter more unsettled relationships and troubled conditions. Thus, they are more probable to involve in Internet to escape from the nasty life experiences. In addition, Internet use does not necessitate a face-to-face interaction and the neurotic people tend to use Internet more addictively as they are nervous, apprehensive and have immature self-perception (Costa & McCrae, 1992).

Hierarchical data analyses disclosed that teenagers who had higher scores of conscientiousness tended to be less addicted to Internet. Similarly, some of the other research (Agbaria & Bdier, 2019; Przepiorka et al., 2021; Tian et al., 2021; Zhou …& Zhao, 2017) established that addictive Internet use was negatively linked with Conscientiousness. Conscientiousness tended decrease teenagers' Internet addiction since it was regarded to be a protective issue against the development of addictive Internet use in various age groups (Przepiorka et al. 2019) regardless of culture (Błachnio & Przepiorka, 2016). Teenagers who have high scores regarding conscientiousness frequently put high importance on educational and learning objectives, and they have improved organization and self-discipline abilities, and high-level awareness of the results concerning frequent usage of Internet (Zhou …& Zhao, 2017). Consequently, these teenagers are less tendency to involve in Internet use and suffer from addictive Internet use. In other words, it can be inferred those teenagers with lower conscientiousness use the Internet more addictively compared to those with higher conscientiousness level, recalling that this personality trait could be a protective factor regarding Internet addiction. On contrary, Chwaszcz et al. (2018) observed that conscientiousness was positively linked with the addictive Internet use.

The outcomes of regression analysis signified that agreeableness was negatively and significantly correlated to teenagers' addictive Internet use. For the findings of this study, other papers (Przepiorka et al., 2021; Tian et al., 2021; Zhou …. & Zhao, 2017) confirmed that agreeableness as a protective factor had a negative relationship with addictive Internet use. In addition, Błachnio et al. (2017) noted agreeableness had a significant association with addictive Internet use, which has potential to decrease teenagers' addictive Internet use. However, Zamani et al. (2011) discovered that agreeableness was not linked with Internet addiction. In contrast, Agbaria and Bdier (2019) revealed that agreeableness as personality trait was positively and significantly associated to Internet addiction,

which suggest that people who convey high level of agreeableness may have an augmented wish to pursue social acceptance, and this can be achievable by means of Internet.

Regarding the relationship between openness and teenagers' addictive Internet use, the research showed no significant association in line with Zamani et al. (2011), which can be described by the dual characteristics of openness. Teenagers with high level of openness frequently possess a broad variety of interests and leisure activities, which may reduce their probability of Internet addiction. The current studies do not generate a constant portrait of associations between Openness and addictive Internet use (Przepiorka et al., 2020; Zhou … & Wang, 2017). Some studies (Servidio, 2014; Zhou …& Zhao, 2017) have demonstrated Openness to Experience was positively related to Internet addiction. Kuss et al. (2013) stated that Openness to Experience improved the probability of Internet addiction. This can be because teenagers with high openness to experience scores may have an enhanced need to try to find new connections and to investigate different ideas, leading to reinforce addictive Internet use. Other studies, in contrast, have shown that Openness was a negative predictors of addictive Internet use (Durak & Senol-Durak, 2014; Pilarska, 2018; Przepiorka et al. 2019; Tian et al., 2021).

These results indicate a number of implications for professionals working with teenagers. It is crucial to know strategies to help teenagers with various personality traits to cope with addictive Internet use and other negative influences of social media. The model of Big Five personality traits is the leading personality theoretic context involving five personality aspects: extraversion, neuroticism, conscientiousness, agreeableness, and openness to experience (Carver & Connor-Smith, 2010). Research has yielded varying contradictory result, thus there are inconsistencies regarding whether and how these traits are associated to teenagers' addictive Internet use (Zhou et al., 2017). Consequently, further new studies are required in order to clarify the relationships between these traits and teenagers' addictive Internet use.

The current research includes a few limitations to clarify. Personality traits and teenagers' addictive Internet use were evaluated centered on self-report. In self-report surveys, it was counted on respondents' correct assessment and comprehension as well as on their perception and their own emotions. Future studies can include social attractiveness variables to establish to what degree a respondent alters their ratings to represent themselves in a satisfactory light. Secondly, this research has a cross-sectional design which makes causal conclusions hard. Therefore, it may be speculated that FIU, gender, and personality traits may cause higher levels of Teenage Internet Addiction. In brief, the variables might be outcomes or predictor and longitudinal studies are necessary to explore causation. Another limitation of the study is that it was conducted in one city in Turkey. Obtaining samples from various parts of Turkey may be beneficial to ensure generalizability of the research outcomes. Finally, most of the respondents were female in the research.

In conclusion, the research findings revealed that frequency of Internet use, personality traits including neuroticism, conscientiousness, and agreeableness had significant relationship with the teenagers' Internet addiction. In contrast, extraversion and openness had negatively association with teenagers' addictive Internet use and they did not significantly predict addictive Internet use.

Ethical considerations

There are no conflicts of interest between authors.

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Postgraduate Students' Perceptions of Research Self-Efficacy and Critical Thinking Disposition and their Impact on Academic Creativity: Case of Mersin University

Ufuk Cem KOMŞU
Vocational School of Mersin, Mersin University
ucemkomsu@mersin.edu.tr
https://orcid.org/0000-0002-8348-8747

ABSTRACT
Postgraduate education plays a key role in assessing the welfare level of today's societies and in the process of creating labor in line with the social development needs of developing countries. The structure of this educational process requires graduates to be individuals that possess scientific research competencies, critical thinking skills who can create original academic studies. In this study, it was aimed to determine the self-efficacy, critical thinking dispositions and academic creativity of postgraduate students and to investigate their effects on academic creativity and; descriptive and relational survey model were used. Due to the factor analysis' findings, the sub-dimensions of both the Critical Thinking Disposition Scale and the Academic Creativity Scale differed, and the research hypotheses were arranged according to these new sub-dimensions. According to the findings, while the research self-efficacy of the students had a high impact on their academic creativity, it was found that the engagement sub-dimension of critical thinking dispositions could affect the investigative creativity. These results showed the role of research techniques education in postgraduate studies. In addition, the complex and multifactorial structure of the phenomenon of creativity has validated itself at the academic level, but new research is needed on how academic creativity is affected by different factors.
Keywords: *Academic creativity, critical thinking, postgraduate education, research self-efficacy*

INTRODUCTION

Regardless of the type or field of postgraduate education, it is expected to deliver products beyond the level of undergraduate education, both on personal development and on academic production levels. Macro reasons for such an expectation may include socio-economic conditions and the need for qualified human beings in developing countries. Particularly, underdeveloped countries have to train the highly qualified manpower they need in today's conditions through universities (Limon & Durnalı, 2018; Özmen & Aydın Güç, 2013). Postgraduate education is a planned and programmed process that aims to educate the scientists who can support the country's development by producing science-technology through research and which consists of the stages following the undergraduate process (Karaman & Bakırcı, 2010). Therefore, it should have principles, objectives, methods and contents different from the purpose and scope of undergraduate education.

When we look at the general objectives of postgraduate education, it is emphasized that besides the training of the scientists and faculty members needed in a country, researches on producing science and art and solving the problems of the country and providing technological development are emphasized. (Karaman & Bakırcı, 2010; Özmen & Aydın Güç, 2013). It can be said that master's degree with thesis focuses on developing the ability to use the relevant scientific methods in order to carry out a research process based on undergraduate education, whereas doctoral education aims to produce the results of an original research that will make new additions to the existing scientific knowledge, to develop new methods and to create new theories (Karaman & Bakırcı, 2010; Tonbul, 2017). Although there are different views on the overall objectives of doctoral programs, it is generally accepted that they contribute to the existing knowledge through new research and teach transferable skills and competences (Limon & Durnalı, 2018). Although this process works differently in different countries and universities, it is noteworthy that there are common points in terms of learning outcomes, among which scientific research skills, critical and creative thinking are prominent (Brodin & Frick, 2011). In the conditions announced by the European Council of Doctoral Candidates and Junior Researchers in 2005, it was pointed out that the main component of doctoral education is scientific research and that doctoral candidates should learn through research (As cited in Bitusikova et al., 2010). For example, the general standards in Germany's doctoral education system emphasize that doctoral candidates are to have the ability to solve problems, master scientific methods of research, and succeed in working in collaboration by participating in research projects (Bitusikova et al., 2010).

Looking at the postgraduate education practices in different countries of the world, although high emphasis has been placed on the development of creativity and critical thinking skills, it cannot be said that the expectations on this issue have been sufficiently fulfilled. Majid's (2010) study shows that although students are aware of the

importance of creativity and innovation, there is not enough support from educational institutions to develop these skills. According to Adriansen (2010), critical thinking and creativity, which are essential for effective learning, are co-existing and complementary processes, and the development of creativity is possible through collaborative social relations.

Based on the aforementioned matters, postgraduate education programs can be expected to target students who can produce quality studies with the self-efficacy of scientific research, question and contribute to the critical thinking disposition in doing so, and demonstrate creativity while conducting their research. Therefore, in this study, the effect of the variables of scientific research self-efficacy and critical thinking disposition on the assumption that the creativity of postgraduate students is the final product of the postgraduate education process was investigated. In research on postgraduate education processes in Turkey, it was observed that there are studies focused on problems and solutions, but there is no research on the effects of students' critical and creative thinking processes. When we accept the ability to conduct an original scientific research as an indicator of academic creativity, such a product should possess an original quality in a philosophical approach, theoretical structure or method (Brodin & Frick, 2011). Hence, it can be expected that obtaining such an output will depend on both the efficacy of conducting research and the ability to think critically. The main aim of this study is to determine the postgraduate students' perceptions of self-efficacy and critical thinking dispositions and to investigate their effects on academic creativity levels.

LITERATURE REVIEW

Research Self-Efficacy

Scientific research activity, which can be defined as the process of obtaining scientific knowledge, consists of social relationships, hypotheses, observations, measurements, statistical procedures and findings. To overcome this successive process requires research self-sufficiency, which covers basic skills in research methods, statistics, measurement and data processing (Keskinkılıç & Ertürk, 2009; Wester et al., 2019). From the point of Bandura's definition for self-efficacy, as one's belief in own ability to achieve an intended goal (As cited in Saputro et al.,2020), research self-efficacy can be described as confidence in conducting a whole research process from literature research to publishing the findings as an article (As cited in Baltes et al., 2010). Hence, postgraduate education is expected to enable to perform such efficacies. Besides, research self-efficacy is related with scholarly productivity, including faculty and postgraduate students (Wester et al., 2019). Due to structure of courses in postgraduate education (teaching and research combination) academic performance of students in postgraduate education might be associated with research self-efficacy (Tiyuri et al., 2018).

Some of the surveys conducted in Turkey's different universities have shown that many of postgraduates lack of research competencies and research self-efficiacy, whereas some of findings about doctoral students' efficacies indicate vice versa (Akgün & Güntaş, 2018; Bahadır & Tuncer, 2017; Büyüköztürk & Köklü, 1999; Kart & Gelbal, 2014; Keskinkılıç & Ertürk, 2009). In some foreign studies, significant positive correlations were observed between academic performance and research self-efficacy of postgraduate students, and in comparison with master students, the doctoral students' research self-efficacy scores were higher (Tiyuri et al., 2018).

Critical Thinking Disposition

Critical thinking, a high-level thinking skill, is a complex process in which most people fail to succeed. From an educational perspective, it can be argued that cognitive strategies are used to obtain the targeted product in this process (Erdamar Koç & Alpan Bangir, 2017). On the other hand, theoretical definitions for the conceptualization of critical thinking can be classified on the axes of philosophy and psychology and the nature and quality of critical thinking are emphasized as cognitive processes and components in the psychological perspective and as a product on the philosophical level (Atabaki et al., 2015; Lorencova et al., 2019). According to Brookfield, critical thinking begins with the definition and questioning of basic assumptions, resulting in the discovery and imagination of new options. However, it is emphasized that the individual needs to be supported and assisted (by consultants and other researchers) to turn this process into an academic skill (As cited in Brodin & Frick, 2011). In academic studies on critical thinking, it can be said to be represented by the following concepts: rationality, selectivity, analytical thinking and evaluative perspective (Adriansen, 2010). Additionally, critical thinking bi-dimensionally includes skills and dispositions, and dispositional aspect involves with self-confidence, broad-mindedness and truth-bearing (Saputro et al., 2020).

In recent studies on critical thinking in Turkey, it has been found that studies focused on both preservice and in-service teachers' level of critical thinking and the effect of independent variables that affect this level, and that their critical thinking dispositions are mostly low (Akyüz et al., 2015; Erdamar Koç & Alpan Bangir, 2017; Hayırsever & Oğuz, 2017; Karaman, 2016; Şahin et al., 2016; Şen, 2009). Additionally, it is observed that the relationship of critical thinking with many different factors was studied in researches around the world. For

instance, such studies' findings show that emotional intelligence may affect critical thinking as a behavioural disposition; critical thinking disposition is correlated with self-confidence; and critical thinking disposition is indispensable to gain effective thinking and learning skills (Sk & Halder, 2020; Lorencova et al. 2020).

Academic Creativity

Creativity as a psychological and learning term can be defined as the generation of new and useful responses, ideas or solutions to a task or problem solving and can be represented by concepts such as originality, diversity, imagination and innovation (Adriansen, 2010; Amabile, 2012; Meng et al., 2017). Simply, it refers to something (an invention or an idea) new and valuable (Mullen, 2019). However, creativity, defined in different ways according to different disciplines and approaches, is the subject of many theories from fields such as philosophy, psychology, fine arts and education according to its function on academic and artistic levels (Onur & Zorlu, 2017) and person, process, environment and product-oriented models stand out in the literature (Özaşkın & Bacanak, 2016). According to the Componential Theory of Creativity, individual's specific skills, cognitive processes leading to creativity, and intrinsic motivation of the individual are the determinant components of his/her creativity (Amabile, 2012; as cited in Meng et al., 2017). Kaufman and Bauer, on the other hand, emphasized three key elements necessary for an adult to become a creative person: Appropriate level of knowledge, a well-developed critical thinking ability, and a broad imagination as in a child (As cited in Brodin & Frick, 2011). Also, in the definition of creativity of Guilford fluency, flexibility, accuracy and authenticity are the main features described (As cited in Matraeva et al., 2020).

While general creativity refers to being outside the box, going beyond the ordinary and proposing new axes of thought, scientific/academic creativity involves defining a new product or process and developing a theory (Çeliker et al., 2015). At this point, the connection between creativity and education must be discussed. Some of the researches around the world have shown that there is a connection between creativity of students and creativity of teachers, related to teachers' character and way of leadership in class. Furthermore, as a cultural output beyond teachers, the educational system play critical role and have direct affects on students' skills and competencies within the context of creativity (Matraeva et al., 2020). In addition, in studies conducted on students of different educational levels from Turkey, the change of creativity levels according to various demographic factors was examined (Gülel, 2006; Kanlı, 2017) and there are not enough studies on the effects of different kinds of variables on creativity and its components either.

METHODOLOGY

Research Goal and Research Design

The aim of this study is to determine the postgraduate students' perceptions of self-efficacy and critical thinking dispositions and to investigate their effects on academic creativity levels.

The research questions of the study are as follows:

1- At what level are the postgraduate student's perceptions of self-efficacy, critical thinking disposition and academic creativity?

2- What are the views of postgraduate students' on postgraduate education's impact on the critical thinking disposition and academic creativity?

The hypotheses of the study are as follows:

H1: Scientific research self-efficacy of postgraduate students has a significant and positive effect on their academic creativity.

H2: Critical thinking disposition of postgraduate students has a significant and positive effect on academic creativity.

This study was carried out within the scope of survey research which is one of the quantitative research designs and due to the research questions and hypotheses, it has characteristics related to both descriptive and relational survey models. Survey research allows describing a past or present situation without having an impact on variables or factors. Survey researches that explain the exchange of variables are called relational screening (Mazlum & Mazlum, 2017). The independent variables of this study were the critical thinking disposition and research self-efficacy, and its dependent variable was academic creativity. Figure 1 shows the research model.

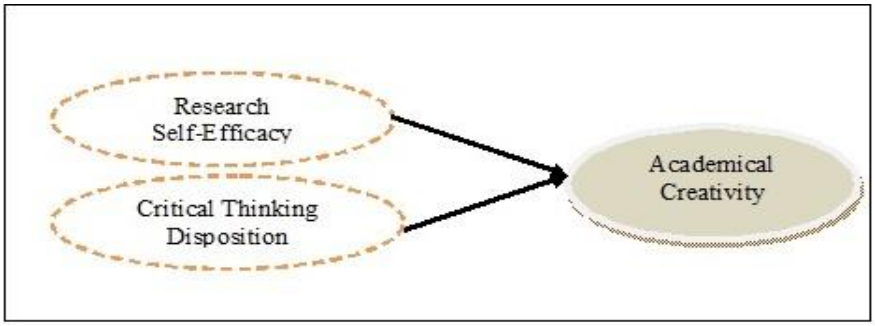

Figure 1. Research Model

Sample and Data Collection

The population of the study consists of students who are in postgraduate education at Mersin University. As of 2019-2020, the total number of students enrolled in the institutions of Social Sciences, Science, Educational Sciences, Health Sciences and Fine Arts at Mersin University, is 3560. A total of 330 forms were distributed and the number of questionnaires that could be accessed and obtained solid data was 300. Since the students who are continuing their postgraduate education were chosen, purposeful/intentional sampling was applied and voluntary participation was ensured. In this sample type, which includes the most appropriate ones for the purpose of the research, the selections are made using clusters in order to provide the widest representation (Balcı, 2010). To accomplish this, a study group was formed with participants from all institutes and different departments (30 different departments) at Mersin University.

The size of the study group was 300 and the demographic profile of the study group was as follows: 53% of the participants were female (159 people) and 47% (141 people) were male students. 60.3% (181 people) of the participants were between the ages of 20-29 and 34% (102 people) were between 30-39 years of age. The remaining 17 people (5.6%) were 40 years or older.

Table 1. Postgraduate Education Profile of the Study Group

Institute	**f**	**%**	**Program**	**f**	**%**	**Stage**	**f**	**%**
Social Sciences	158	52,7	Master degree	190	63,3	Course	165	55
Natural Sciences	58	19,3	Doctor's degree	110	36,7	Dissertation	135	45
Educational Sciences	60	20						
Other*	24	8						
Total	*300*	*100*	*Total*	*300*	*100*	*Total*	*300*	*100*

* Institute of Health Sciences and Institute of Fine Arts.

As can be seen in Table 1, 52.7% of the study group continues their postgraduate education within the Institute of Social Sciences. The majority of the participants (63.3%) are in the master's and 36.7% are in the process of doctorate and 55% of these participants are still taking courses.

In this study, Research Self-Efficacy Scale developed by Bieschke et al. and adapted to Turkish by İpek et al. (2010), UF/EMI Critical Thinking Disposition Scale, developed by the University of Florida and adapted to Turkish by Kılıç and Şen (2014) and Kaufman Domains of Creativity Scale developed by Kaufman and adapted to Turkish by Şahin (2016) were used. Data were collected through a questionnaire including 11 questions related to demographic profile and academic activities of the participants in addition to the 50-item scales that include the selected sub-dimensions.

Ipek et al.'s (2010) Turkish adaptation of the Research Self-Efficacy Scale is a 5-point Likert-type scale consisting of 4 sub-dimensions and 50 items: Preliminary preparation, conceptualization, application and reporting & presentation. Since the explained variance values of the Conceptualization and Application sub-dimensions of the scale were below 0.50, they were not included in this study, thus it has been applied as a total of 14 items with 6-item preliminary preparation and 8-item reporting-presentation dimensions. In the study of İpek et al.(2010), the Cronbach Alpha value of the Preliminary-Preparation sub-dimension was 0.860; the reporting & presentation sub-dimension was 0.870. In this study, the overall Cronbach Alpha value of the scale, which was applied in 2 sub-dimensions, was found to be 0.930.

UF/EMI Critical Thinking Disposition Scale, adapted by Kılıç and Şen (2014) into Turkish, is a 26-item 5-point Likert-type scale encompassing engagement, cognitive maturity and innovativeness sub-scales. All sub-

dimensions of the scale, which was reduced to 25 items in the Turkish version, were included in this study. While the overall Cronbach Alpha value of the scale was 0.910 in the study of Kılıç and Şen, it was 0.919 in this study. Kaufman Domains of Creativity Scale, developed by Kaufman for different fields and adapted by Şahin (2016) into Turkish has a total of 5 sub-dimensions and 42 items: Artistic, Daily, Artistic Performance, Scientific-Mechanical and Academic and is a 5-point Likert-type scale. For the scope and purposes of the study, only the 11-item sub-dimension of Academic Creativity was included in this study. In Şahin's study, the Cronbach Alpha value of the Academic Creativity sub-dimension was 0.870, and it was 0.912 in this study.

Reliability and validity of data collection tools

Reliability, which can be defined as the freeing a measurement of random errors, is a prerequisite for validity. As the reliability of the scale, which expresses the consistency of the scale and giving close results under all circumstances increases, the validity coefficient also increases. Validity is the level by which a measurement tool can accurately measure a property that it aims to measure and it can be found in different forms (Balcı, 2010).

Some criteria were taken into consideration while reliability analysis was performed and the items that did not meet these criteria were removed from the scales and the analyzes were renewed. The first of these criterions is that the Cronbach Alpha coefficient, which is considered as an indicator of scale reliability, is between 0.60-0.79, which is the accepted reliability range, and has a value of 0.80 and above if possible (Şencan, 2005). The second criterion is the effect of the items of the scale on the reliability. As a result of the analysis, it was found that the Scientific Research Self-Efficacy Scale and the Academic Creativity Scale were not an item that impaired the reliability of the scale. On the other hand, the multiple correlation coefficient of Maturity-4 (M4) and Innovativeness-7 (Ino7) items in the Critical Thinking Disposition Scale was found to be below .30, but it was decided to check the results of factor analysis to make a final decision to remove them. Cronbach Alpha statistics of the scales with sub-dimensions are given in the Table 2 and as shown below, the reliability values of all are high.

Table 2. Reliability Values of Measurement Tools

Scales with Sub-Scales	**Research Self-Efficacy**	**Critical Thinking Disposition**	**Academical Creativity**
α	Reporting& Presentation: ,891 Preliminary Preparation: ,844	Cognitive Maturity: ,806 Solution Oriented Engagement: ,768 Communication Oriented Engagement: ,820	Investigative Academic Creativity: ,852 Analytical Academic Creativity: ,807
Totally	0,930	0,919	0,912

In the literature, different types of validity are mentioned. The most commonly used ones are content and construct validity. Content validity explains how well a measurement tool can measure targeted subjects and targeted behaviors related to those subjects. Construct validity is the testing of the previously accepted cause-effect relationships in a study and one of the most common methods of this is factor analysis (Balcı, 2010).

Factor analysis is used to convert the data set of related variables into independent and less variable data sets, to create new conceptually meaningful structures from the variables in the newly created data set and to determine the impact power of these structures (Altunışık et al., 2010; Çokluk et al., 2010; Şencan, 2005). In the factor analysis application process, the inter-item load value differences in the factorization of the items were targeted to be more than 0,100, as a factorization technique, Varimax rotation technique, which is commonly used as a vertical rotation method, is used for Principal Component Analysis and rotation process, which aims to gather a large number of variables under a small number of factor structures (Çokluk et al., 2010; Hair et al., 2010).

Exploratory factor analysis attempts to determine the possible relationship between variables (Altunışık et al.2010). In this study, it was carried out in 3 stages, for two independent and one dependent variables. Firstly, as a result of the analysis applied to the Research Self-Efficacy Scale, it was found that the Reporting-Presentation (32.44%) and Preliminary Preparation (30.99%) subscales explained 63.48% of the variance; and KMO (,892 $p \leq 0.05$) and Bartlet's Sphericity Test statistics (1791,506; $p \leq 0.001$) were found to be significant. The reliability of both dimensions is high and the major dimension is the Reporting&Presentation which has a higher variance value. In the second step, although the items of the Innovativeness sub-dimension of the Critical Thinking Disposition Scale (three sub-dimensions) load more than one dimension, the factor load differences of the majority

of the items remain below 0.100 and these items are sorted out, this sub-dimension was removed from the scale because the innovation dimension was distributed irrelevantly to the other dimensions. In the last stage, a three-factor structure emerged in which the dimensions of Engagement which transformed into two sub-dimensions (*Solution-Oriented* 20.54% and *Communication-Oriented* 17.97%) and Maturity (21.18%), explained 59.69% variance. KMO (,863; p≤0.000) and Barlet's Sphericity Test (1375,709; p≤0.000) statistics of this structure were also found to be significant and the major dimension turned out to be the cognitive maturity. In the third step, although the Academic Creativity Scale was one-dimensional, a two-dimensional factor structure emerged from the first analysis. Items that load more than one dimension were removed; as a result of the second analysis, it was found that both KMO and explained variance values increased. The total variance value of these two sub-dimensional structures, which were named as *Analytical Creativity*(%34,09) and *Investigative Creativity* (27%) , was found to be 61.10%; and KMO (,890; p≤0.000) and Barlet Sphericity Test values (1354,455; p≤0.000) were also found to be significant.

Confirmatory factor analysis provides a test of the construct validity of the measurement tool (Hair et al., 2010). It tests the compatibility of the scale by showing the extent to which the determined factor structures correspond to the structure claimed to exist in theory (Altunışık et al.2010; Hair et al., 2010). The explained mean of variance (AVE) and composite reliability (CR) of each dimension were calculated. While a value of 0.50 for AVE is an indicator of adequate concordance between latent and observed variables. Values of 0.70 and above for CR indicate that the observed variables represent the latent variable at a high degree (Hair et al., 2010). As can be seen in Table 3, all t-values were statistically significant at 0.01 level; it was observed that the standardized load values ranged between 9.59 and 19.66, the highest error margin of the variables was 0.68, and therefore there was no item to be removed from the model. When the explained mean variance and combined reliability statistics were examined, no problem was observed in CR scores of any of the 7 variables calculated, however, problems were observed in 3 variables in terms of AVE values. It was observed that the variables of preliminary preparation and maturity of these three variables remained below the lower limit with a small score difference and only the solution-oriented variable (0.40) found to be noteworthy. Model modification suggestions for removing this were reviewed, and it was understood that none of the modifications would increase the goodness of model fit, so the scales were left as they were.

Table 3. Descriptive Statistics of Confirmatory Factor Analysis of Measurement Model

Sub-scales & Items	Std. load	Margin of Error	R^2	t	AVE	CR
Reporting&Presentation					**0,63**	**0,89**
RP4	0,68	0,53	0,47	13,07		
RP5	0,82	0,32	0,68	17,00		
RP6	0,90	0,19	0,81	19,66		
RP7	0,86	0,26	0,74	18,20		
RP8	0,69	0,52	0,48	13,31		
Preliminary Preparation					**0,48**	**0,85**
PP1	0,59	0,65	0,35	10,57		
PP2	0,75	0,44	0,56	14,40		
PP3	0,76	0,42	0,58	14,86		
PP4	0,72	0,48	0,52	13,79		
PP5	0,73	0,46	0,54	14,05		
PP6	0,60	0,64	0,36	10,75		
Cognitive Maturity					**0,46**	**0,80**
M1	0,73	0,46	0,54	13,59		
M2	0,69	0,52	0,48	12,62		
M3	0,65	0,58	0,42	11,59		
M5	0,65	0,58	0,42	11,54		
M7	0,65	0,58	0,42	11,58		
Solution Oriented Engagement					**0,40**	**0,77**
SOE1	0,59	0,66	0,34	10,05		
SOE2	0,56	0,68	0,32	9,59		

SOE3	0,72	0,49	0,51	12,91		
SOE4	0,61	0,63	0,37	10,53		
SOE5	0,68	0,54	0,46	12,01		
Communication Oriented Engagement					**0,61**	**0,82**
COE8	0,72	0,48	0,52	13,42		
COE9	0,78	0,39	0,61	14,93		
COE10	0,84	0,30	0,70	16,47		
Investigative Acad. Creativity					**0,50**	**0,85**
RAC6	0,80	0,36	0,64	16,01		
RAC7	0,79	0,37	0,63	15,81		
RAC8	0,70	0,51	0,49	13,30		
RAC9	0,66	0,57	0,43	12,17		
RAC10	0,66	0,56	0,44	12,37		
RAC11	0,59	0,66	0,34	10,58		
Analytical Acad. Creativity					**0,51**	**0,80**
AAC1	0,80	0,36	0,64	15,71		
AAC2	0,65	0,58	0,42	11,89		
AAC3	0,76	0,42	0,58	14,70		
AAC5	0,63	0,60	0,40	11,44		

In the CFA analysis performed by considering the structures in the exploratory factor analysis, Normalized Chi-Square statistics and RMSEA goodness of fit statistics (Hair et al., 2010; Şimşek, 2007) showing the basic agreement about the measurement model were examined. The normalized chi-square goodness of fit statistic of the model was found to be 2.02 (1025.05 / 506) and the RMSEA statistic was found to be 0.059. The convergent validity of the measurement model was tested in terms of other goodness of fit such as AGFI, GFI, RMR, SRMR, CFI, NFI, NNFI, IFI, RFI, CAIC which take into account or do not take into account the sample size, degrees of freedom in the model, and the complexity of the model (Şimşek, 2007). All in all, when the compliance statistics of the measuring instrument and the reference values are compared, as can be seen from Table 4, it is possible to suggest that the measurement model has an acceptable level of goodness of fit and convergent validity as a whole.

Table 4. Confirmatory Factor Analysis Measurement Model Goodness of Fit Statistics

Goodness of Fit Index	**Current Study's Scale Measures**	**Reference Values***	
		Adjusted Goodness of Fit	**Acceptable Goodness of Fit**
X^2/ df	1025,05/506=2,02	0≤ X^2/ df≤ 2,5	3<X^2/ df≤ 5
RMSEA	0,059	0≤RMSEA≤ 0,05	0,5<RMSEA≤0,08
AGFI	0,80	0,95≤AGFI≤1,00	0,90≤AGFI≤0,95
GFI	0,83	0,90≤GFI≤1,00	
RMR	0,048	RMR≤0,05	
SRMR	0,061	SRMR≤0,08	
CFI	0,97	0,95≤CFI	0,90≤CFI
NFI	0,94	0,90≤NFI	
NNFI	0,97	0,90≤NNFI	
IFI	0,97	0,95≤IFI	0,90≤IFI
RFI	0,93	0,90≤RFI	
Model CAIC/Saturated CAIC	1621,69 / 3988,75	Model CAIC<Saturated CAIC	

*Source: Hair et al., 2010.

Analyzing of Data

In this study, structural equation modeling which is considered as the combination of regression model and factor analysis was used. This model, which provides the opportunity to estimate and test the direct and indirect relationships between variables, is analyzed through computer software due to the mathematical complexity of the multivariate structure. LISREL software is one of the most widely used one for this purpose (İlhan & Çetin, 2014). Furthermore, path analysis including multiple regression analysis methods was used for causal modeling and, by

doing so, the significance, direction and effect levels of the correlations among the variables in terms of the hypotheses tested were investigated (İlhan & Çetin, 2014; Şimşek, 2007). In this context, data analysis was performed through LISREL 8.80 software.

FINDINGS

First of all, if we are to start with the research questions, it is necessary to look at the profile of graduate students' level of scientific research self-efficacy, critical thinking and academic creativity perceptions, and views about effects of postgraduate education on critical thinking disposition and academic creativity.

1- At what level are the postgraduate student's perceptions of self-efficacy, critical thinking and academic creativity?

Table 5. Postgraduate Students' Perception Levels Regarding Research Variables

Variables	**N**	**X**	**Sd**
Research Self-Efficacy	300	3,764	,667
Critical Thinking Disposition	300	4,133	,432
Academical Creativity	300	3,584	,658

As can be seen from Table 5, the postgraduate students' perceptions of critical thinking disposition (4,133) were found to be higher than the others. The lowest perceived score was in academic creativity (3,584).

Table 6. Correlation Analysis of Variables

	Res. Self Effic.	Matur.	S.Or. Enga.	C.Or Enga.	Inv. A.Crea.	Anly. A.Crea.
Res.Self Effic.	1	,310**	,416**	,488**	**,**554**	,595**
Maturity	,310**	1	,427**	,446**	,348**	,195**
Sol.Or. Engage.	,416**	,427**	1	,510**	,414**	,346**
Com.Or.Engage.	,488**	,446**	,510**	1	,442**	,393**
Inves.A.Creativity	**,554****	,348**	,414**	,442**	1	,620**
Anly.A.Creativity	**,595****	,195**	,346**	,393**	,620**	1

**Correlation is significant at the 0.01 level (2-tailed).

According to the correlation (r) values in Table 6, it can be said that all the correlation between the variables are positive and significant, but they are at low levels. The highest positive and significant correlations are between research self-efficacy and both investigative and analytical academic creativity, which are positive and moderate (r=0,554; p=0,000<0,01; r=0,595; p=0,000<0,01).

2- What are the views of postgraduate students' on the postgraduate education's impact on critical thinking disposition and academic creativity?

The participants of the study group were asked whether the postgraduate education they received had a positive effect on their critical thinking and creativity in their academic studies, and the profile of responses based on their personal views is presented in Table 7.

Table 7. Postgraduate Students' Opinions Regarding the Education They Received

	Agree		**Disagree**		**Total**	
Influence of Postgradute Education	**(f)**	**%**	**(f)**	**%**	**(f)**	**%**
Positive Influence on Academical Creativity	281	93,7	19	6,3	300	100
Positive Influence on Critical Thinking Disposition	278	92,7	22	7,3	300	100

As shown in the Table 7, the majority of postgraduate students think that their education has positive contributions to their academic creativity and critical thinking dispositions. However, the ratio of those who think that postgraduate education contributes to critical thinking was found to be lower.

Based on the research in the literature, the hypothesis H1 and H2 generated were reorganized by dividing the dependent variable of the model into two dimensions as a result of both EFA and CFA analysis (analytical and investigative academic creativity).

Hypothesis 1: The sub-dimensions that make up the perceptions of research self-efficacy of postgraduate students, have a significant and positive effect on analytical academic creativity.
Hypothesis 2: The sub-dimensions that make up the perceptions of research self-efficacy of postgraduate students, have a significant and positive effect on investigative academic creativity.
Hypothesis 3: The sub-dimensions that make up the perceptions of critical thinking disposition of postgraduate students, have a significant and positive effect on analytical academic creativity.
Hypothesis 4: The sub-dimensions that make up the perceptions of critical thinking disposition of postgraduate students, have a significant and positive effect on investigative academic creativity.

In the Table 8, standardized regression coefficients, standard error values, t-values that test the significance of regression coefficients of the model tested as a result of structural equation modeling path analysis, R^2 values showing the exploratory power of the independent variables and model goodness of fit statistics are included. When normalized chi-square and RMSEA, in particular, compliance statistics such as CFI, NFI, RFI, RMR and SRMR were compared with reference values, it was observed that the measurement model had a decent goodness of fit as a whole (Şimşek, 2007).

Table 8. Structural Equation Model Path Analysis Descriptive Statistics & Hypothesis Results

Hypothesis	Cor. & Direction			Coef.	Std.Er.	t	p	Result	R^2
H1a	Rep.Present.	→	An.A.Creat.	0.13	0.12	1.53	p≥0.05	Rejected	0,50
H1b	Pre.Prep.	→	An.A.Creat.	0.51	0.16	4.62	p≤0.01	Accepted	
H3a	Maturity	→	An.A.Creat.	-0.16	0.12	-1.82	p≥0.05	Rejected	
H3b	Sol.Or.Engage.	→	An.A.Creat.	0.13	0.13	1.42	p≥0.05	Rejected	
H3c	Com.Or.Engage.	→	An.A.Creat.	0.15	0.13	1.63	p≥0.05	Rejected	
H2a	Rep.Present	→	Inv.A.Creat.	0.19	0.11	2.43	p≤0.05	Accepted	
H2b	Pre.Prep.	→	Inv.A.Creat.	0.30	0.13	3.16	p≤0.01	Accepted	
H4a	Maturity	→	Inv.A.Creat.	0.05	0.11	0.67	p≥0.05	Rejected	0.48
H4b	Sol.Or.Engage.	→	Inv.A.Creat.	0.13	0.12	0.97	p≥0.05	Rejected	
H4c	Com.Or.Engage.	→	Inv.A.Creat.	0.22	0,13	2.45	p≤0.05	Accepted	

Goodness of fit: Chi-Square/df=2.19(1112.93/507), RMSEA:0.063, GFI:0.82, CFI:0.96, NFI:0.94, RFI:0.93, RMR:0.056, SRMR:0.070, AGFI:0.79

R^2An.A.Creat.$^{=}$ 0.18*Rep.Pres. + 0.72* Pre.Prep. - 0.22* Maturity + 0.19* Sol.Or.Engage.+0.22*Com.Or.Engage

R^2Inv.A.Creat.$^{=}$ 0.27*Rep.Pres. +0.42* Pre.Prep.+ 0.073* Maturity + 0.12*Sol.Or.Engage.+ 0.31*Com.Or.Engage

When the correlations in Table 8 are examined, it is seen that 4 of the 10 sub-hypotheses tested were accepted and 6 were rejected. In terms of the 4 main hypotheses, H1 and H4 were partially accepted, H3 was completely rejected and H2 was fully accepted.

In examining the sub-hypotheses in detail, it is seen that the only common variable that affects both sub-dimensions of Academic Creativity in a significant and positive way is the "preliminary preparation" variable of the research self-efficacy (p≤0.01). However, preliminary-preparation affects the analytical academic creativity (r=0.51, p≤0.01) more strongly than the investigative creativity (r=0.30, p≤0.01). Remarkably enough, the only variable affecting the analytical academic creativity was the preliminary preparation variable, there was no statistically significant effect of the other 4 variables observed (p> 0.05). When the variables that affect the investigative academic creativity were examined, "reporting & presentation" (r=0.19, p≤0.05) and "preliminary preparation" (r=0.30, p≤0.01) sub-dimensions of research self efficiacy, and "communication-oriented engagement" (r=0.22, p≤0.05), one of the sub-dimension of critical thinking disposition, were found to have a significant and positive effect. However, when the effects of these three variables are examined, it can be seen that the preliminary preparation variable has a higher positive effect (p≤0.01). No significant effect of "maturity" and "solution-oriented engagement" was observed (p>0.05). These two sub-dimensions are common variables that do not significantly affect both analytical and investigative academic creativity. The correlation between the variables is shown in Figure 2.

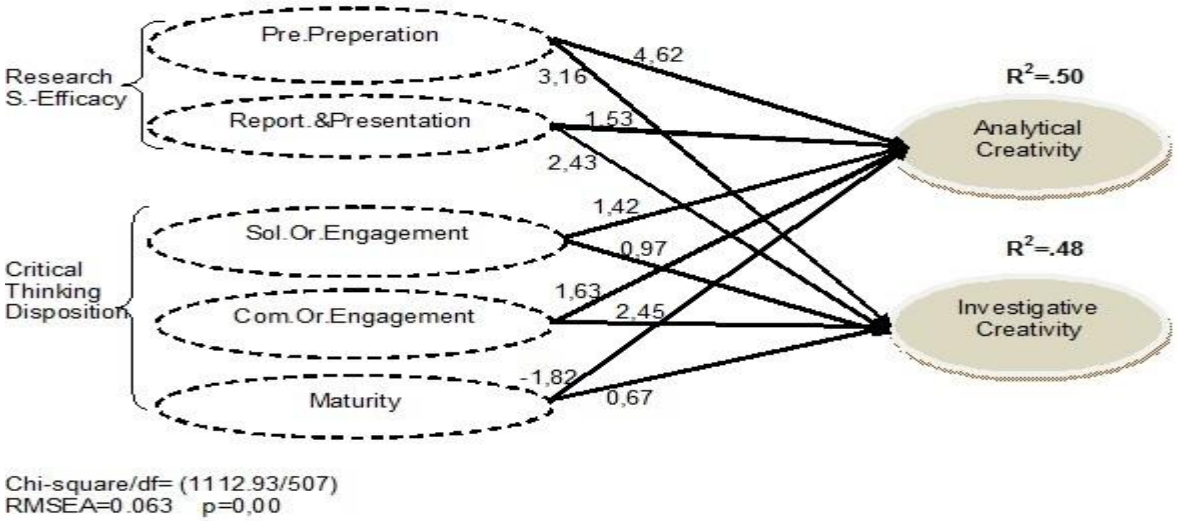

Figure 2 . Structural Equation Model Path Analysis Results

DISCUSSION AND CONCLUSION

As mentioned above, since the results of EFA and CFA analysis led us to restructure the basic hypothesis according to new sub-dimensional necessities, it can be argued that academic creativity's monolith looking structure which was included in the scale, has become invalid. Exploring such binary structure of academic creativity may deserve to be investigated in accordance with new independent variables. Particularly, the preliminary preperation as the main component of perception of research self-efficacy, was found to be a key variable to analyze academic creativity with its two sub-dimensions.

In the study by Wu et al.(2014), it was found that the social environment and family structure primarily affect creativity, and that the school environment is less effective. In addition, it was also seen that the achievements of the philosophy of lifelong learning are more important than professional knowledge and the formal education in increasing students' creativity. In Gupta's (2015) study, the learner and instructor based factors which affect students' academic creativity were personality, knowledge level, thinking style, motivation, family environment, group work and cooperation. These findings are not incompatible with the effect of research self-efficacy on academic creativity, which is an effective independent variable and a product of formal education process in this study. Because, it might be argued that academic creativity in postgraduate education has different components than general creativity.

According to our findings, research self-efficacy and academic creativity perceptions of postgraduate students in the study group were moderate and their critical thinking perceptions were at a high level. The majority of students think that postgraduate education has a positive effect on both their critical thinking disposition and their academic creativity. Whereas, according to the research findings of Limon and Durnalı (2018), while half of the participants expressed negative opinions about the doctorate education they received, their opinions towards the faculty members were more positive. In the study of Büyüköztürk and Köklü (1999) on the research efficacy of postgraduate students, according to the evaluations of the faculty members, it was seen that graduate students did not have research competencies and doctoral students had problems related to literature review. In the study of Şahan and Yasa (2017), the majority of students who have completed postgraduate studies on Lifelong Learning and Adult Education stated that postgraduate education has positive contributions to professional life and social relations, however, a certain group of participants stated that the achievements did not meet expectations. In the study of doctoral students in Sweden, nearly 20% of the students stated that there was insufficient training in scientific methodology which is essential for professional development (Bitusikova et al., 2010).

In our opinion, one of the most important findings of this study is that it is wrong to evaluate and measure academic creativity in uni-dimensional terms. As a matter of fact, the relational existence of the analytical and investigative creativity sub-dimensions according to the significance content of the scale items was partially confirmed. In this study, it can be said that the hypothesis about the research self-efficacy was validated more strongly than the hypothesis about critical thinking. Because it has been seen that both sub-dimensions of academic creativity can be affected by the preliminary preparation and reporting & presentation dimensions of research self-efficacy. On the other hand, it is interesting to note that the critical thinking disposition does not affect analytical academic

creativity, but instead the investigative academic creativity. Such finding may confirm a positive relation between critical thinking disposition and investigational curiosity that may provoke academic creativity.

Meng et al. (2017) 's research on graduate students showed that there is a positive correlation between students' intrinsic motivation and creativity and there is a negative correlation between intrinsic motivation and poor advisory service. Research on the creativity and innovation perceptions of postgraduate students in Malaysia showed that the relevant institutions need more support to put out innovative and creative graduates (Majid, 2010). In Olatoye et al.'s (2010) research on emotional intelligence, creativity and academic achievement among business students, it was found that there is no significant relationship between creativity and course achievement, whereas emotional intelligence has a strong connection with academic creativity. In Çeliker et. al. (2015) research, a high and positive correlation was found between students' motivation and scientific creativity levels. In the study of Kanlı (2017) examining gifted students at high school level, it was found that scientific attitude predicts scientific creativity.

As commonly conducted, the postgraduate education process results in a dissertation within classical model. Thus, while skills and competencies to prepare such a report which presents all stages and findings of a scientific research process should be acquired, many studies (Tonbul, 2017), which demonstrate that they cannot be adequately acquired, also confirm that research competencies and critical thinking skills cannot be given at the level that would lead to academic creativity. As a matter of fact, according to Tonbul's (2017) research findings, postgraduate courses are taught without having students acquire critical thinking.

This findings showed that the function of postgraduate education to help students acquire the scientific research skill and efficacy had a critical role in terms of academic creativity. The connection between critical and creative thinking skills in Brodin and Frick's (2011) model with transformative learning emphasized that critical thinking is a whole with creative thinking. As stated and disscussed in the systematic review, which was based on the analyzes of studies indexed in worldwide databases, of Lorencova et al.'s (2019) it has been shown that despite of it's widely shared feature as essential component for efficient learning and teachings, the critical thinking is not systematically included and employed in teacher education activities. As mentioned above, critical thinking is supposed to be both a means and a goal which may stimulate efficient learning and creativity, in this study, it was found that the critical thinking disposition did not affect academic creativity as a whole, in addition to the need to examine its engagement dimension into two new sub-dimensions as solution and communication orientedness. Such an unprecedented finding exhibits complex and bi-dimensional structure of critical thinking, as for creativity. In the relevant literature, there are a large number of studies from a wide range of countries on the factors affecting creativity in general, but there aren't studies sufficiently discussing academic creativity. In particular, the creativity of employees in the fields of business and business management was extensively studied. For example, in the compilation of Jovanovic et al.(2016), it was found that anger and positive-affect facilitate and stimulate creativity. In a study comparing Chinese and American students, it was seen that social values and school system directly affected students' creativity, and students who grew up in an environment supporting individualism and independent self could be more creative than others (Niu & Sternberg, 2003). According to the findings of another study for postgraduate students in China, participation of graduate students in various research projects affects academic and scientific creativity performance (Zhao et al., 2017). These findings show that creativity is open to combining the inner world of the individual and external factors. Therefore, it can be said that the variables of research self-efficacy and critical thinking disposition in this study confirm the effect of variables of school-education system once again. In fact, as stated in the European Union's report on the quality of doctoral education, postgraduate education models should be developed in accordance with the needs of research-oriented and massified education (Bitusikova et al., 2010).

In this study, it was also seen how such scales could demonstrate different factor loads according to the conditions in which they were used and the characteristics of the study group. Especially, the fact that the innovation dimension of critical thinking disposition becomes dysfunctional and that its engagement dimension should be divided are noteworthy. This showed that different scales related to critical thinking disposition should be adapted to different conditions.

RECOMMENDATIONS

Although research and discussions about the definition and components of creativity in general continue, there is not much research found on the sources and sub-dimensions of academic creativity. Hence, it can be thought that the investigative and analytical dimensions of academic creativity can also emerge in different study groups. It is important to target new curriculum and application models for the development of both scientific research techniques and critical thinking disposition in postgraduate education processes. In this context, the quality of

postgraduate education processes in universities should be improved with the help of experimental studies aimed at developing investigative and analytical academic creativity.

Hence, future researches on academic creativity must focus on its multidimensional structure and so curriculums of postgraduate programs to be designed in accordance with such results.

LIMITATIONS

The scope of the research is limited to the perceptions and opinions of the postgraduate students of the 2019-2020 academic year who were willing to take part in the study voluntarily at Mersin University. In addition, the interpretation of the findings was made within the framework of the research design and statistical methods.

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Requirements and Satisfaction Levels of Turkish Migrants for Participation in the BAP Program: Example of Germany

Yeliz ÇELEN
Millî Eğitim Bakanlığı, Ankara, Türkiye
yelizcelen@hotmail.com

Abstract
Turkish immigrants who have been to Germany since 1961 have experienced many problems due to different reasons such as not recognizing the destination country, not knowing the mother tongue of the country, and xenophobia during the process of their integration into the region. One of the problems experienced by immigrants is that they cannot get the desired or sufficient education. It is seen that the rigid and selective structure of the German education system plays a role in the integration of Turkish youth into social life and educational processes in Germany rather than their individual or group characteristics. In addition, although the young population of Germany does not increase, the rapid increase of the Turkish population in Germany plays an important role and determines the policies regarding the education system applied to the Turks. In this context, it bears any reason or unfinished education programs for people who want to get more qualified educational development and implementation of Turkey's importance in countries such as Germany. Republic of Turkey, Anadolu University, carried out in cooperation with the Ministry of National Education Curriculum in Western Europe is one of these applications. In this study, it was tried to determine the reasons and satisfaction levels of Turkish students who benefit from this program in Germany to participate in the BAP program. In this context, a questionnaire was applied to the students and a meeting was held with the BAP managers. The survey was applied to a group of 100 BAP students studying in Germany, and the working group consisting of administrators consisted of 10 people who actively communicate with BAP students. In the study, qualitative and quantitative data analysis methods were used together, and the reasons for the participation of the students in the BAP program were grouped personally and socially.
Keywords: BAP, Satisfaction Level, Turkish immigrants

GİRİŞ

Migration is defined as the movement of a person or a group to another place by crossing the borders of the nation or moving within the country they are in. Migration emerges as a sociological phenomenon that includes all movements that result in the displacement of people, regardless of its duration, purpose and structure. Although it is possible to group them at different levels, such as the reasons for migration, the strategies used to reach the goal and whether they are carried out voluntarily or compulsory, the most important feature of migration is that it gives rise to multicultural communities, regardless of the purpose or way it occurs (İçduygu and Sirkeci, 1999, 249).

The biggest migration movement in Turkey is the migration of Turks to Germany starting from 1961. These migrations took place within the scope of the Agreement on the Placement of Turkish Workers in Germany, which was signed in 1961 between the Federal Government of Germany and Turkey. This agreement also includes the feature of being Turkey's first migration agreement (Çsgb, 2014). The Turks, who went to Germany as guest workers, delayed their return to Turkey for reasons such as obtaining a job and profession, completing the process of reuniting with their families and adapting to the new culture, and in this context, their educational, social, economic and cultural expectations from Germany increased. Considering the number of those granted residence and settlement permits to third-country nationals in Germany in the first half of 2019, it is seen that Syria ranks first with 196 932 persons, while Turks rank second with 53 651 persons (Graf, 2019).

In this context, Turks living in Germany want to benefit from qualified and high-level education opportunities in order to obtain a good job and prestige and to access appropriate economic opportunities. Especially in primary and secondary schools, due to the fact that the opportunities offered by the German education system to immigrant children are different from those offered to their own children, the elimination education system, institutional discrimination, the absence of a multicultural education program, the problem of foreign language, the problem of education in the mother tongue, the parents do not feel safe in the education system. It is observed that generation Turks are unsuccessful in the German education system (Güllüpınar, 2010; Janzen, 2009). In the researches, it was emphasized that the most basic factor in the integration of new generations into social life, who immigrated to Germany, to be individuals with equal rights with German citizens, is to receive a "good education". It has been concluded that the unequal educational, social and economic conditions, differences in working conditions at

workplaces and discriminatory approaches in social life areas were effective in the failure of Turks in their previous social cohesion (Arslan, 2006; Perşembe, 2010).

During the migration adventure of Turks to Germany, expectations from education have also changed according to generations, and families who entrust their children to their families to receive education in Turkey in the first years of migration have, as time passed, made use of educational opportunities to pursue higher education and work in a good job in Germany, where they were born and socialized. While Turks in Germany want their children to receive education without breaking away from their own culture, they demand that they not forget their mother tongue. The fact that immigrants are not welcomed to receive education in their mother tongue in the German education system and the necessary research and studies on bilingual education have not been carried out cause Turkish immigrants to have problems in accessing education opportunities without forgetting their mother tongue and culture (Yılmaz, 2014). In this context, BAP (Western European Programme) emerges as an important option that can meet these expectations of families.

Article 5 of the Basic Law of National Education; "The National Education Service is organized according to the wishes and abilities of Turkish citizens and the needs of Turkish society"; Article 7 is; It is expressed as "Every Turkish citizen has the right to receive basic education" and as a requirement of the principles in both the Constitution and the Basic Law of National Education, the State of the Republic of Turkey; They have duties and responsibilities in ensuring that the new generations settled in Europe learn their mother tongue and are raised as individuals with national and cultural identity. BAP is a distance education program developed and implemented within these responsibilities.

In this respect, it is thought that determining the reasons for students to participate in the BAP program is important in terms of improving the studies on the program and disseminating the program.

METHOD

The aforementioned research is a descriptive study in which qualitative and quantitative data collection tools carried out in the relational survey model are used. In the researches in the general survey model, the universe consists of many elements and a sample or sample is selected from the universe in order to obtain information about the universe. In some studies, the entire universe can be included in the study. In studies using general screening models, singular or relational screening models can be used. In relational screening models, it is aimed to detect the existence or degree of change between more than one variable (Karasar, 2005). In this context, this model was preferred in collecting the data of the research, since there may be different variables in the research that affect the reasons for participating in the program and the satisfaction levels of BAP students. In the analysis of the survey data applied in the research, quantitative research techniques were used, whereas in the analysis of the data obtained from the interview, qualitative research techniques were used.

The survey data in question were collected in 2019, and interviews were held with BAP managers in 2019.

Universe and Sample

The universe of the research group surveyed consists of all students who continue their education in Germany within the scope of BAP. The distribution of the students, who constitute the universe of the research and currently continue their education within the scope of BAP, according to their countries and educational status is given in Table 1.

Table 1. Distribution of Students Studying within the Scope of BAP by Country and Educational Status

Country	City	Open Education Secondary School	Open Education High School	Toplam
Germany	Berlin	11	105	116
	Essen	12	146	158
	Frankfurt	20	149	169
	Hamburg	10	104	114
	Köln	43	214	257
	Münih	9	213	222
	Nürnberg	9	49	58
	Stuttgart	23	181	204
Grand Total		137	1161	1298

There are two different study groups in the study. For the case where the reasons for participating in the program and the level of satisfaction of BAP students are investigated, the sample group consists of 100 students living in Germany and continuing their education within the scope of BAP. Random sampling method was used while selecting the sample. Cluster sampling method, which is one of the random sampling methods, was used in the research due to the diversity of the countries where the BAP program is applied and the difficulties in implementation. In cluster sampling, since the universe of Germany is spread over a very wide geographical area, each city in this country is considered as a separate unit and randomly selected from these units. In this context, each city in Germany was considered as a cluster and 10 people were randomly selected from each of the 8 cities in Germany and included in the sample.

On the other hand, the working group consisting of BAP administrators, to whom the interview was conducted, consists of 10 BAP officers who have intensive communication with BAP students.

The findings regarding the demographic characteristics of the students who make up the student sample of the study are given below.

Table 2. Distribution of Students Participating in the Research by Gender

Araştırmaya Katılan Grup	**Cinsiyet**	**n**	**%**
BAP Students	Female	70	70
	Male	30	30
Total	**Total**	**100**	**100**

As seen in Table 2, 70 (70%) of the students participating in the research were women; 30 of them (30%) are men. The distribution of the students participating in the study by age is given in Table 3.

Table 3.Distribution of Students Participating in the Study by Age

Araştırmaya Katılan Grup	**Age**	**N**	**%**
BAP Students	15-22	70	70
	23-30	20	20
	31-37	8	8
	38-42	2	2
Total	**Total**	**100**	**100**

In this study, which was carried out to measure the satisfaction levels of Turks participating in the BAP program, interviews were also conducted with BAP managers. The interview was conducted using a structured interview form. The working group is a group of 10 BAP administrators. All of the group participants are male, 6 of them are between 50-60 years old and 4 of them are between 40-50 years old.

The data obtained from the interview questions were analyzed by using the steps of deciphering, coding, writing a researcher's diary and creating a category. After the document analysis, the data were presented in tables suitable for these categories. The managers participating in the interview in the tables are Y1, Y2, It is grouped as Y10. Managers have been determined from among those who have coordination or communication duties in the execution of the work and operations of the BAP program. The quality of taking part in communicative processes with BAP participants was sought as a priority condition for these people.

Data Collection Tools

A questionnaire and a semi-structured interview form were used as data collection tools in the research. The questionnaire developed as a data collection tool was designed in two groups, consisting of questions that determine the demographic data of the students and the reasons for participating in the BAP and their satisfaction levels, and were examined by field experts. The semi-structured interview form was examined by experts in the field of sociology of education and sociology.

As a result of the reliability study conducted for the questionnaire, the reliability level of the said questionnaire was determined as .73.

RESULTS

The reasons for participating in the BAP of the students participating in the research are given in the table below.

Tablo 4.Distribution of BAP Students' Reasons for Participating in the Program

Gerekçe	N	Yüzde
Have a certificate	78	78
Upgrade to a higher education level	70	70
Increasing my general culture	54	54
To gain respect in social life	59	59
To be able to work in a qualified job	69	69

When the reasons for BAP students to participate in this program are examined, it is seen that the students attend this program in order to have the most diplomas and to pass to a higher education level in the second place.

Doğan (2018) states that the implicit aims of the project, which the German governments have implemented since the first years of immigration, want Turks to be assimilated from generation to generation, and states that Turks do not pose a potential threat to Germany, and in this sense, the most appropriate expression for Turks would be ethnic cultural minority. Since the informal attitudes of people living in Germany are reflected from educational environments to social environments, it has become a necessity for Turks to express themselves as competent individuals in all areas of life. Because the definitions of Turks in Germany have not changed despite the lived experiences and Turks who have become the permanent population of Germany are still defined as guests working in politics and social life (Doğan, 2018).

Despite the efforts of Turks in Germany to integrate into social life, it seems difficult to say that their economic conditions, social status and level of consciousness required to continue their daily lives and receive a high level of education in Germany are high enough.

According to Çelik (2008), the fact that Turks in Germany are in search of individual identity, their perceptions of exclusion and oppression cause them to get closer to radical groups or identities. From this point of view, it is seen as the usual result of the current situation that the reasons for students to participate in the BAP program are to prove themselves and their success in the German society, such as being promoted in their job.

Turks have not been very successful in this system because the German education system has a selective structure that selects successful and talented children and directs them to professions that can do good works for the benefit of society, and the German government has not been able to develop a determined, multicultural education policy since the beginning of the migration (Thursday, 2004). According to Arslan (2006), education policy models in Germany are affected by the cultural autonomy of the states in this country and different immigration policy understandings, and therefore, a rational model cannot be created. In this context, it is among the possible predictions that Turkish students, especially second and third generation Turks, will be unsuccessful in the German education system. In this system, unsuccessful or foreign language, cultural discrimination, etc. It is an expected goal in this sense that people who leave their education midway due to reasons such as these want to complete their unfinished education through this program.

Again, Turkish immigrants have faced changing policies and situations such as assimilation, integration, marginalization and discrimination, which describe cultural influences and identities in their adventures (Çelik, 2008). In the study titled A Study on the Educational Problems of Turkish Youth aged 15-19 aged 15-19 living in Germany (The Case of North Rhine-Westphalia), conducted by Özdemir, Parlak, and Akbaş (2009), it was stated that the German society had negative attitudes towards immigrants. In the study conducted by Özdemir (1987), it is seen that nearly half of the German society, which has been burning since the early 1980s, has negative attitudes towards immigrants. Thursday (2004) stated that a large part of the German society has an exclusionary approach to foreigners with the increase in the number of foreigners.

Tribalat (2002) states that Muslims' inability to express themselves in public spaces and their educational, social and economic inadequacies cause the emergence of a mentality defined as backward culture. Gomolla and Radtke (2007: 278-85) also state that negative attitudes and exclusion movements against Turkish immigrants continue in Germany and emphasize that this situation causes immigrant children to be disadvantaged in social life.

Considering the findings obtained from these studies, it is a finding that Turkish students are expected to participate in this program for reasons such as having good job opportunities in their working life and increasing their prestige in the society.

The answers given to the question about the level of satisfaction of BAP students with the BAP program are summarized in Table 5 below.

Table 5.BAP Students' Satisfaction Levels with the Program

Area	I am not happy at all	I am satisfied	I am very pleased
Levels of meeting the reasons for participating in the BAP	3	67	30
BAP office and services	12	45	43
BAP contents and implementation	4	54	42
The effects of BAP on their lives in Germany	23	29	48

When Table 5 is examined, it can be said that the students are generally satisfied with the BAP program. The important findings of the study are that 97 of the students think that their expectations regarding the reasons for participating in the BAP are met. In general, it can be said according to the research findings that students are satisfied with the implementation processes of BAP, office services, course and teaching materials and BAP office services.

First of all, the BAP administrators were asked what they could say about the interest of Turkish students in BAP in Germany, and if the students showed interest, a question was asked about the reasons for this interest. In this context, the answers of BAP managers to this question are summarized in the table below.

Table 6. Reasons for Turkish Students' Interest in BAP

Category	Sample Reviews
Integration into the Turkish Education System request	**Y3:** The interest of Turkish students in BAP is very high. Because Turks, who are aware of the existence of such a program and cannot find a place in the German education system in any way, definitely want to participate in the program. **Y7:** The interest in BAP is very intense. Especially the desire to reach education and the desire to get a diploma directs Turkish students to this program.
themselves in the education system in Europe fear of not getting a place	**Y8:** In this context, they think that maybe they can study at a Turkish University if they return to Turkey, since they cannot go to Universities in Europe, which are very difficult to go to with their own qualifications. **Y10:** Some of the Turks in Germany are people who have not been able to find a place in the German education system or have failed. Especially the third generation Turks show interest in BAP because they think that they will not be able to receive education in higher education institutions in Europe.
Raising education levels	**Y3:** The people who continue the BAP program are generally Turks who have dropped out of their education.

	In this context, those who come to increase their education level are in the majority. **Y8:** Turks who want to increase their education level, gain different experiences and be equipped with skills in order to get a job or to be accepted in social environments prefer the BAP program. **Y9:** Especially children who come from Turkey as public servants and work in Germany are very interested in this program. However, the desire of people who left their education to complete their education because they had to come to Germany for various reasons and have to work, increases their interest in this program.

When the table is examined, among the reasons why people prefer this program according to BAP managers; The desire to integrate into the Turkish education system is listed as not being able to find a place in the education systems of other countries or thinking that they will fail, and the desire to increase their education level by completing their unfinished education.

BAP administrators answered the question about the satisfaction levels of students regarding BAP by stating that they had positive attitudes towards the program. In this context, the administrators emphasize that they receive comments from the students that the program is very good, and that the program fills a huge gap in this sense. The administrators also stated that most of the people who registered as the age population wanted to study in Turkey, and stated that the expectations of the students were met in this respect, and that the middle and elderly people had a high level of satisfaction with the program because they satisfied their desire to study in the past and fulfilled their desire to study at a university through open education.

AGUMENT

When the results of the research are examined, it is seen that the students' desire to complete their unfinished education is among the reasons for choosing the BAP program. In this context, it is seen that students have concerns such as getting a diploma first and then getting a high level education and as a result, taking a step towards working in a qualified job.

It is seen that the children of Turkish workers have difficulty in integrating into this education system due to reasons such as the fact that Turks are referred to as guest workers after their migration to Germany, they are not seen permanently in Germany, and the strict and hierarchical structure of Germany's education system. The lack of a rational education model for immigrants in Germany and the fact that the states have a say in the education system instead of determining national policies caused Turkish children to have difficulties in adapting to the education system (Arslan, 2006). In this context, BAP appears as a very reasonable option for Turks to reintegrate into the education system.

It is seen that young people who are unsuccessful in the German education system prefer BAP to realize their dreams of finding a qualified job and studying at university. The fact that immigrant children cannot benefit from an equal opportunity-based education in the German education system, the country offers temporary solutions to the education problems of immigrant children, and the failure to take measures at the federal level causes immigrant children to fall into a disadvantageous situation in the education system. In this context, BAP strengthens its feature of being a good option developed for individuals who do not fulfill the conditions of existence in the German education system. Because Thursday (2010) states that immigrant children cannot achieve the desired success in the German education system and lists the basic elements to achieve this success as a good educational environment, guidance and effective communication with the school. The successful integration of immigrants into this system and the practices that are not based on the equality principle applied by the German governments since the beginning of migration have made it impossible for Turkish immigrants to exist in the German education system.

Considering all these components, it is seen that BAP is a very good option for Turks in Germany to continue their education and to gain a respectable place in both their social and working lives.

CONCLUSION AND RECOMMENDATIONS

BAP is a program that people in Germany who have interrupted their education for any reason continue for reasons such as proving themselves, working in a good job, getting a diploma and gaining prestige. Even if it can be said from the results of the research that the BAP meets the expectations in this sense, it is a fact that the quality of this service should be increased. For this reason, increasing the promotion and information activities for the course program in question, increasing the accessibility of the attaché offices and educational consultancy offices in the studies on this subject, increasing the number of application centers and ensuring their suitability in terms of location, conducting studies on course equipment and material diversity are another matter presented by the researcher. is a suggestion. Since there may be various difficulties in reaching the materials and textbooks to the offices abroad, it is thought that providing students with asynchronous learning tools through distance learning and providing them to students on e-platforms at appropriate periods by the Ministry of National Education will increase the level of satisfaction towards BAP.

BAP is an important unifying element for the integration of Turks in Germany into the Turkish education system. In this context, equipping BAP course contents with elements that reflect our culture and national values will strengthen the ties of Turks living in foreign countries with their countries.

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Extended Abstract

Purpose:

The duration of migration, which is defined as "the movement of a person or" a person or a group of persons across an international border or from one place to another within a state "is a sociological process that expands its field by including population movements that result in the displacement of people regardless of their nature and reason. emerges as a phenomenon.

Turks are also changed training from expectations based on the generation of migration journey to Germany, children of the migration of the first year of their families entrusted families to be educated in Turkey, as time went on they were born, socializing they see higher education in Germany and has become evaluates educational opportunities for working a good job. Turks in Germany demand that their children not forget their mother tongue while they want their children to receive education without leaving their core culture. Germany's nation-state policy is still executive and therefore minority children to engage in prevention of mother-tongue learning rights of Turks living in Germany in Turkey and lived in Germany "other" state of being, remain limited studies on bilingualism and these studies to the appropriate authorities Turkish for Turkish Children Abroad, which has been put into practice for the purpose of not reaching, the lack of sufficient staff for raising bilingual individuals, the fact that the children of bilingual individuals do not show an academic development because the education given in Germany is usually done with the submersion model, the language education given to children is inadequate and the individuals develop their Turkish. In this context, BAP (Western Europe Program) emerges as an important option that can meet these expectations of families.

In this respect, it is thought that determining the reasons for the participation of the students in the BAP program is important in terms of improving the studies for the program in question and expanding the program.

Method:

The research in question is an experimental study of qualitative and quantitative data collection tools carried out in the scanning model.Survey group research group universe, continuing their education within the BAP, continuing their education in Germany. In this study, which was carried out to measure the satisfaction levels of the Turks participating in the BAP program, the BAP managers were also interviewed.

Results:

Considering the reasons of BAP students to participate in this program, it is seen that the students attend this program in order to have a diploma most and to move to a higher education level.

Considering the findings obtained from these studies, it is an expected finding that Turkish students are expected to participate in this program for reasons such as having good job opportunities in their working life and increasing their prestige in the society.

According to BAP managers, among the reasons why people prefer this program; The desire to integrate into the Turkish education system is listed as not being able to find a place in the education systems of other countries or thinking that it will be unsuccessful and to increase their education level by completing their unfinished education.

Discussion:

When the results of the research are examined, it is seen that the desire of the students to complete their education, which remains unfinished, comes first among the reasons for choosing the BAP program. In this context, it is seen that the students have concerns such as getting a diploma first and then getting a high-level education and as a result of taking a step towards a qualified job.

Conclusion:

BAP is a program that people in Germany who have lost their education for any reason, continue to prove themselves, to work in a good job, to get a diploma and to gain prestige. Even if it can be said from the research results that BAP meets the expectations in this sense, it is a fact that the quality of this service should be increased. For this reason, increasing the promotion and information activities for the course program in question, increasing the accessibility of attaché offices and educational consultancies in studies on this subject, increasing the number of application centers and ensuring their suitability in terms of location, the supply of course equipment and material diversity is another is a suggestion. Since there may be various difficulties in the delivery of materials and textbooks to offices abroad, it is thought that providing students with asynchronous learning tools through distance learning and presenting them to students on e-platforms at appropriate periods by the Ministry of National Education will increase the level of satisfaction for BAP.

Araştırma verileri 2019 yılında toplanmıştır. Veri toplama yönelik izinler söz Konusu programı yürüten Milli Eğitim Bakanlığı Hayat Boyu Öğrenme Genel Müdürlüğünden alınan izin dahilinde gerçekleştirilmiştir.

The Adaptation of the Instagram Addiction Scale (TIAS) into Turkish: Validity and Reliability Studies*

Aylin TUTGUN ÜNAL
Assoc.Prof., Faculty of Communication, Üsküdar University, İstanbul, Turkey
aylin.tutgununal@uskudar.edu.tr
ORCID ID: 0000-0003-2430-6322

Nevzat TARHAN
Prof., Department of Psychiatry, Üskudar University, NPIstanbul Neuropsychiatry Hospital, İstanbul/Turkey
nevzat.tarhan@uskudar.edu.tr
ORCID ID: 0000-0002-6810-7096

Patrizia MURADİ
Ph.D. Student, Department of Psychology, Üskudar University, İstanbul/Turkey
patricia_muradi@yahoo.com
ORCID ID0000-0002-1099-9925

Ayşe Sena KURT
Ph.D. Student, Department of Psychology, Üskudar University, İstanbul/Turkey
klinikpsikolog.aysesenakurt@gmail.com
ORCID ID: 0000-0001-5644-7571

ABSTRACT
In this study, the aim was to conduct Turkish linguistic equivalence, validity and reliability studies of The Instagram Addiction Scale (TIAS) developed by Sholeh and Rusdi (2019) so that it can be used in the Turkish sample. This measuring instrument consists of two parts namely Instagram Feed Addiction and Instagram Story Addiction compiled based on addiction components 1) Salience; 2) Mood modification; 3) Tolerance; 4) Withdrawal; 5) Conflict; 6) Relapse. In this study, TIAS was applied to a sample of 587 people across Turkey. Positive and significant values were obtained as a result of the Pearson correlation coefficients made to examine the compatibility between the English and Turkish forms of both scales. As a result of the exploratory and confirmatory factor analysis, the 20-item Instagram Feed Addiction Scale, originally consisting of 6 factors, consisted of 4 factors in Turkish scale. It was revealed that Instagram Story Addiction, consisted of 6 factors in the original scale and 3 factors in the Turkish scale. After the EFA and CFA, a 21-item and 3-factor Turkish ISA was obtained. The internal consistency coefficients of both scales ranged between .60 and .93. As a result, the factor structure of both scales was modeled and confirmed by confirmatory factor analysis, and the goodness of fit values was found acceptable.
Keywords: Instagram Addiction, Instagram Addiction Scale, Instagram Story, Validity, Reliability

INTRODUCTION

Addiction is an important chronic disease that scientists have been working on for centuries and trying to develop various treatment methods on how to overcome it. If this situation develops, addiction is not an innocent and easy phenomenon to get rid of. The development of addiction in substances such as cigarettes, alcohol, drugs or gambling is based on the changes in the pleasure pathways of the brain in the process.

In today's 21st century, the developing addiction related to the channels that can be accessed especially through the internet is one of the issues that should be emphasized. Recent studies on internet addiction, which has been one of the popular agenda topics of Clinical Psychology for more than twenty years, mentioned that internet abuse and internet addiction have a pathological side just like alcohol and substance abuse. While discussing the risk of daily behavior changing and becoming pathological (Billieux & et.al 2015), studies on overdose of internet use consistently provide data to prove that this behavior complies with addiction criteria (Kuss, Griffiths, Karila, & Billieux, 2014; Tarhan & Tutgun-Ünal, 2021).

The fact that the interest in social media is increasing day by day brings with some negative factors. Instagram, one of the social media platforms, has become one of the indispensable applications of the new generation smart

* A brief summary of this study was presented at the International Educational Technology Conference 2021 (IETC2021) on September 2-3, 2021, Lefkoşa (Nicosia), Turkish Republic of Northern Cyprus.

phones, and when the most used category is examined, it is seen that it occupies the 5th place in the world ranking (Tankovska, 2021). Instagram addiction has begun to turn into an increasing problem socially, physically and psychologically (Sholeh & Rusdi, 2019). Surely, it is of great importance today to prevent the increasing use and dependencies related to not only Instagram but also many social networking sites (Griffiths & et.al. 2020; Spence & et.al. 2020; Tutgun-Ünal, 2019, 2020a, 2020b, 2021; Tutgun-Ünal & Deniz, 2020).

When the published statistics are examined, it can be easily seen how serious the issue has become. While Instagram had 800 million active users all over the world in September 2017, this number reached 1 billion active users in June 2018. It is known that there are 38 million people actively using Instagram in Turkey. Turkey ranks 6th in the world with this number (Yılmaz, 2020). Although the application is still banned in China, it is one of the properties with four billion users owned by Facebook which is one of the most popular social platforms in the world (Tankovska, 2021).

Since the Internet has actively entered people's lives, it has brought many innovations and developments. One of these developments is that this type of social networks has begun to take their place in people's lives. Internet has many triggering factors and diversity, and this has affected individuals' tendency to use resources in different ways. The internet, which can offer different options to almost everyone, is divided into many sub-categories in its online platform features; social media collaborators (Wikipedia), social media blogs (WordPress), social media communities (Flickr), virtual worlds (Second Life) and social networking sites (Instagram) can be given as examples (Sholeh & Rusdi, 2019).

It is also extremely important to examine the factors that can develop addiction of Instagram, which contains more than one feature and offers new alternatives to its continuous user base. Among the factors that trigger addiction are Instagram users impulsively checking the people who look at their photos or videos, likes and comments, secretly checking profiles they know or do not know, or presenting themselves to the public in a different condition than they are. Being able to be used as desired, not limiting logins and logouts based on time, having a constant flow of movement can engulf the person with an uncontrollable effect, and excessive use can cause the person to be harmed in terms of bio-psycho-social aspects.

The results of a survey conducted by the Kingdom's Royal Society for Public Health show Instagram as the application with the strongest out-of-control effect, such as anxiety and depression, decreased sleep quality, bullying and FOMO (Fear of Missing Out) (Cramer & Inkster, 2017; Metin, Pehlivan & Tarhan, 2017; Tarhan, Ekinci & Tutgun-Ünal, 2021). In addition, it is stated in studies that Instagram posts also trigger voyeurism as a sexual disorder (Amâncio & Doudaki, 2017).

Although the history of addiction generally included issues related to alcohol, cigarettes or a drugs, and the internet or addiction to it was initially expressed by experts in the context of a problematic behavior (Carbonell & Panowa, 2017; Deniz & Tutgun-Ünal, 2016; Tutgun-Ünal & Deniz, 2015). However, the behavior changes the hormones secreted by the brain and its functions (Tarhan & Nurmedov, 2019). This state is characterized by some situations such as emotional discomfort, introversion, deterioration in social relations (Dalvi-Esfahania & et.al. 2019; Tutar, 2020), and it can also pose the danger of addiction (Leong & et.al. 2019), just like a double-edged knife.

Researches have also revealed that the interest of university students to be recognized on social media or to meet some of their social needs through this channel is an important factor in the development of addiction (Ponnusamy & et.al. 2020; Tutgun-Ünal & Deniz, 2016). For example, students in Italy spend most of their time on their phones and mostly spend time on Instagram (Longobardi & et.al. 2020).

Since easily portable phones, tablets and similar equipment make it easier to access these types of platforms, compulsive using and viewing anytime and anywhere deteriorates the usage behavior, leading to excessive use and related negative consequences (Choi & et.al. 2015; Montag & et.al. .2015). Due to the changing agenda within seconds, following the constantly renewed online world can turn into an unavoidable repetitive behavior after a while. This situation can create behavioral addictions with consequences such as relapse, withdrawal from society, developing tolerance, deterioration in life quality, withdrawal from hobbies, anxiety (Griffiths & et.al. 2020) as well as control problems (Griffiths, 2009; Wegman & et.al. 2017).

Emotional attachment to Instagram paves the way for ailments such as depression, stress, and anxiety, thus giving great importance to sharing can make a person more vulnerable in case of a negative situation (Lowe-Calverley, Grieve & Padgett, 2019). Being constantly on Instagram may cause poor performance in remembering the information stored in the short-term memory due to distraction while the news continues to flow with different images (Spence & et.al. 2020).

In the studies of internet addiction tendency conducted on the basis of gender, while some researches find results that women develop addiction more (Young, 1998), some researches mention that male individuals develop addiction more (Morahan-Martin & Schumacher, 2000). It is stated that due to the increase in use, the performance of the individual at work is negatively affected (Rozgonjuk & et.al. 2020), and individuals who use excessively, especially at a young age, show more symptoms of hyperactivity and attention deficit (Wang & et.al. 2017).

When the scales for Instagram addiction were examined in the literature, the thesis study titled "Examination of the Relationship Between Instagram Addiction, Personality Traits and Self-Liking in University Students" developed by Kırcaburun (2017) was found. While measuring Instagram Addiction, the researcher carried out his research by choosing "Instagram" instead of "Internet" expressions in the Internet Addiction Scale developed by Young (1996) and adapted into Turkish by Bayraktar (2001). Kırcaburun and Griffiths, published two articles about problematic Instagram use and the role of perceived feeling of presence, escaipism and self-liking (Kırcaburun & Griffiths, 2018, 2019). Then, a study called "A Research on Measuring Instagram Addiction" by Aslan and Ezin in 2018 was found and the "Instagram Addiction Scale" developed by Kırcaburun (2017) was used in the study. Lastly, it was seen that Instagram Addiction Scale (IAS) adaptation study of Kavaklı and İnan (2021), developed by D'Souza and colleagues (2018).

The first multidimensional developed scale for Instagram addiction is The Instagram Addiction Scale (TIAS) by Sholeh and Rusdi in 2019. TIAS itself consists of two scales; Instagram Feed Addiction and Instagram Story Addiction. Since linguistic equivalence studies have not yet been conducted in Turkish, it is considered important to bring these scales to Turkey. In this study, it is aimed to adapt the Turkish version of The Instagram Addiction Scale (TIAS) developed by Sholeh and Rusdi (2019), to be used in the Turkish sample and to carry out validity and reliability studies.

METHOD

Research Group

For the Turkish validity and reliability studies of The Instagram Addiction Scale (TIAS), the population was formed from people aged 15 and over. Accordingly, the sample of the study was composed of 587 people in Turkey. Since scale adaptation studies will be carried out, it has been tested whether the dataset is suitable for factor analysis. There are various opinions on this subject in the literature. It is stated that the sample size should be between 100-250 and the number of scale items should be at least five times or ten times (Preacher & MacCallum, 2002; Tavşancıl, 2002). In this study, the sample size was found to be sufficient as the number of items in the scales was 20 and 22.

When the sample is examined, 69.6% of the 587 participants are female and 30.4% are male. Their age distribution is between 15 and 70, with a mean age of 32. 50.7% of the participants are single, 41.6% are married. 51% of them have a university, 19.6% a master's degree, 15.4% a high school, 7% a doctorate, 6% a higher education level.

Data Collection Tool

The Instagram Addiction Scale (TIAS)

The research data required for Validity and Reliability studies were collected with The Instagram Addiction Scale (TIAS) developed by Sholeh and Rusdi (2019). TIAS includes two scales. Accordingly, the first scale named Instagram Feed Addiction (IFA) consists of 20 items and 6 dimensions. The second scale was named Instagram Story Addiction (ISA) and consists of 22 items and 6 factors. The factor names of both scales are the same. Accordingly, the factors of "Salience, Tolerance, Mood Modification, Relapse, Withdrawal, and Conflict" represent addiction components. The 5-point Likert-type scales form the TIAS as two separate scales. Although the factor names are the same, the number of items under the factors is not the same in the two scales.

Sholeh and Rusdi (2019) conducted validity and reliability studies of the scales in their research and found appropriate values. Cronbach Alpha values, which are the internal consistency coefficients of IFA, ranged from .65 to .92. The internal consistency of the factor named "Salience" of the ISA was found to be .34. This value indicates low reliability. The highest Cronbach Alp ha value was found to be .88. On the other hand, exploratory factor analysis (EFA) was performed with both scales, but confirmatory factor analysis (CFA) was not performed. In order to eliminate these deficiencies in the Turkish form, the scales will be subjected to linguistic equivalence studies and factor structures will be modeled and verified with EFA and CFA studies.

Process

***Translation Work*:** In order to obtain the Turkish form of the TIAS, the items in the original inventory were first translated into Turkish by an expert who is competent both in Turkish and English. Then, it was ensured that the sentences were understandable by checking them by two field experts who knew both languages well.

***Application of TIAS*:** Ethical approval was given to the research by the Üsküdar University Non-Interventional Research Ethics Committee with the number of 61351342/NİSAN2021-27. Data collection process was carried out on a voluntary basis by using an online survey form in 1-10 May 2021. The study group sample was randomly selected and consisted of people aged 15 and over. IFA and ISA scales were administered to the participants via an online questionnaire and it took an average of 15 minute to complete the questionnaire.

Data Analysis

Pearson correlation coefficient was used for the linguistic equivalence of TIAS, which is to determine the consistency between the Turkish and English forms. In order to test the construct validity of the TIAS, factor analysis was applied to 287 sections of the dataset consisting of 587 people. Afterwards, confirmatory factor analysis was applied to the section of 300 people. The Cronbach Alpha internal consistency coefficient was tested in the reliability studies. SPSS 26.0 statistical program was used for the validity and reliability analysis. Further, modeling was made for the relationship and harmony of the dimensions with the AMOS program and the goodness of fit values (Chi-square/freedom of degrees, RMSEA, NFI, NNFI, CFI, GFI and AGFI) were calculated.

FINDINGS

In this part of the study, evaluations are made for The Instagram Addiction Scale (TIAS). In this context, the findings obtained as a result of validity and reliability studies are included.

Linguistic Equivalence Study of TIAS

The English and Turkish forms of the TIAS were administered to 25 postgraduate students at the department of Psychology from Üsküdar University three weeks apart in Turkish and English. After the applications, the Pearson correlation coefficient was calculated. The time interval between the two tests is specified as 2 to 4 weeks or 3 to 6 weeks according to different opinions in the literature (Ergin, 1995; Özgüven, 1994).

It was made for two applications with Instagram Feed Addiction and Instagram Story Addiction scales. When the Pearson correlation coefficients were examined, the lowest value for both scales was .40 and the highest value was .82, and the correlation coefficient between the total scores of the items in the Turkish and English forms was also found to be positive and significant (r: .77; $p<0.001$). In addition, according to the independent group t-test for both scales, it was determined that there was no significant difference between the two applications (t: .34; df: 23; $p>0.05$). The results obtained showed that the consistency between the two applications of the scales was at an acceptable level.

Validity and Reliability Study of TIAS

Exploratory Factor Analysis (EFA) is frequently applied as one of the statistical calculation techniques made in accordance with a large number of variables within the scope of the construct validity of scale development (Balcı, 2001; Bryman and Cramer, 1997; Büyüköztürk, 2018; Hovardaoğlu and Sezgin, 1998; Kalaycı, 2010; Kleinbaum, Kupper and Muller, 1998). When the literature is examined, there are some techniques used to determine whether the dataset is suitable for factor analysis. These are tests such as the Bartlett Test of Sphericity, the Kaiser-Meyer-Olkin (KMO) and the creation of the correlation matrix (Kalaycı, 2010; Tavşancıl, 2002).

Before applying EFA, Bartlett test and Kaiser-Meyer-Olkin (KMO) test were applied (Büyüköztürk, 2018). A KMO value of .90 and above is considered “excellent”, between .80-.89 “very good”, between .70-.79 as “good”, between .60-.69 “moderate”, .50-a range of .59 is considered “weak”, and anything below that is considered “unacceptable” (Kalaycı, 2010; Sharma, 1996; Tutgun-Ünal & Deniz, 2015). Also, the Bartlett Sphericity value is expected to be significant. Accordingly, the KMO coefficient value of the Instagram Feed Addiction Scale was found to be ,902. The result of the Bartlett Test of Sphericity was found to be significant (X^2=2747,466, df: 190 p=0.000). Whereas, the KMO coefficient value of the Story Addiction Scale was found to be ,902. The result of the Bartlett Test of Sphericity was found to be significant (X^2=2747,466, df: 190 p=0.000). The results showed that the data were suitable for factor analysis (Sharma, 1996).

Construct Validity Study of Instagram Feed Addiction Scale

Factor analysis for the construct validity of Instagram Feed Addiction (IFA) started with 20 items in the original scale form. After EFA was applied, since values with an eigenvalue greater than 1 were accepted for factor formation (Tinsley & Tinsley 1987), a 5-factor structure emerged in the first stage in IFA. When the item and size distributions in the rotation table were examined, it was found that 4 dimensions in the original scale were formed in the same way, but the other 2 dimensions were mixed. Therefore, it was tested manually with 4-factor EFA whether the two dimensions could be combined or not. Compliance was achieved in the first stage in line with the Varimax Rotation Table. Accordingly, the item loadings were found to be the highest .859 and the lowest .456 for 20 items. The explained variance ratio was found to be 60,31. The eigenvalues of the factors are given in Table 1.

Table 1. IFA Factor Structure and Explained Variance Rates

IFA	Eigenvalue	Variance	Cumulative Variance
1.Dimension	7,73	38,67	38,67
2.Dimension	1,53	7,65	46,32
3.Dimension	1,48	7,43	53,76
4.Dimension	1,31	6,55	60,31

As seen in Table 1, the exploratory variance rate of the factor with an eigenvalue of 7,73 is 38.67%. The variance rate explained by the second factor with an eigenvalue of 1,53 was 7.65%, the rate of variance explained by the third factor with an eigenvalue of 1,48 was 7.43%, and the variance rate explained by the fourth factor with an eigenvalue of 1,31 was 6.55%. The total explained variance rate was 60,31%, which was acceptable. It is ideal when the explained variance rate revealed by factor analysis varies between 40% and 60% in social sciences (Büyüköztürk, 2002; Deniz & Tutgun-Ünal, 2019).

Another method used to determine the factor structure is the scree plot. According to this graph, the points where the slope starts to disappear are taken into account in determining the number of factors. The line graph of Instagram Feed Addiction, which is seen to be in a 4-dimensional structure, is shown in Figure 1.

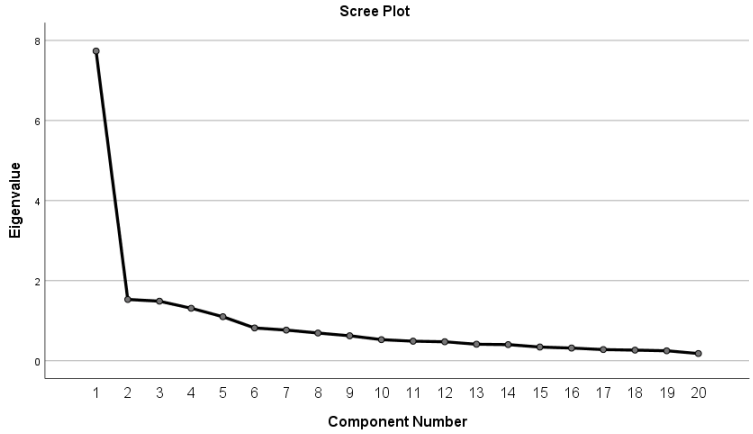

Figure 1. IFA Scree Plot

After determining the number of factors, item factor loadings were examined by applying the varimax rotation technique. Accordingly, the factor loading value of each item was checked for compliance with the lower cut-off point of ,45 and the factor structure was released. Accordingly, the item factor loading values of the 4-dimensional scale are given in Table 2.

Table 2. Factor Loading Values of Instagram Feed Addiction (IFA) Items

	Items	F1	F2	F3	F4
Relapse / Withdrawal / Conflict (α=.90)	**18.** I find it hard to share time for hobbies, rest, or exercise because I spend my time checking Instagram feed.	.756			
	17. I often see many contents of Instagram feed which cause me to neglect my work/lectures/study time.	.732			
	20. My family often complains because I spend too much of my time on Instagram (checking the feed).	.718			
	19. I find it hard to sleep early because I always see feed on Instagram.	.712			

	Items	F1	F2	F3	F4
	12. I decided to look at Instagram feed less often, but I did not manage to do it.	.692			
	16. I become anxious or I have problems if I am prohibited to check my Instagram (see the feed).	.689			
	13. I get easily irritated if I am prohibited from seeing the Instagram feed.	.647			
	11. I try to limit my time for Instagram (see the feed), but it does not work.	.627			
	15. I feel annoyed if someone else bothers me when I see Instagram feed.	.614			
	14. I often cancel appointments with other people because of Instagram (checking Instagram feed).	.537			
	10. I spend a lot of time looking at photo/video posts on Instagram feed.	.456			
Mood Modification (α=.79)	**9.** I see the contents of posts on the Instagram feed to reduce restlessness.		.859		
	8. I see the contents of the Instagram feed to forget about personal problems.		.842		
	7. I see the contents of Instagram feed posts to reduce feelings of guilt, anxiety, helplessness, or depression.		.615		
Salience (α=.71)	**2.** I often think about what is happening on Instagram when I do not access it.			.722	
	3. I keep thinking and feel curious when I do not see the contents of the Instagram feed.			.688	
	1. I often think of any photos/videos posted by others on the Instagram feed.			.650	
Tolerance (α=.60)	**5.** I commented on photos/videos posted by friends on Instagram feed to get feedback.				.695
	4. I post photos/videos on Instagram feed to attract others' attention.				.586
	6. I always think of what filters and captions for the photos/videos that I will post on Instagram Feed.				.557

When the item factor loading values were examined, the item loading values of the 4-factor structure of the scale took appropriate values. Items 1-10, which constitute separate factors in the original scale, formed a single factor together in the Turkish form. While naming the new factor, 3 words in the original scale were combined and named as "Relapse/Withdrawal/Conflict". Other factors were also found to be compatible. Accordingly, by adhering to the original scale, 1st, 2nd, 3rd items were named as "Salience"; 4th, 5th, 6th items were named as "Tolerance"; 7th, 8th, 9th items were named as "Mood Modification". On the other hand, while 10th item was under "Mood Modification" in the original scale, it was under the factor of "Relapse/Withdrawal/Conflict" in the Turkish version. Considering the meaning of the item which describes excessive use, the distribution of this was found appropriate.

Then, in the confirmatory factor analysis performed with a different dataset of 300 people, the factorial structure obtained was tested. In other words, its accuracy and goodness-of-fit values were questioned by modeling.

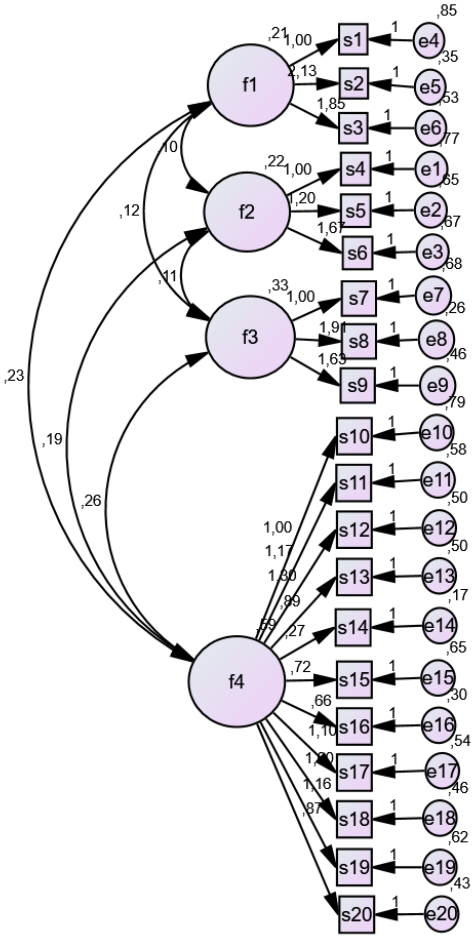

Figure 2. Confirmatory Factor Analysis of Instagram Feed Addiction

Table 3. IFA Goodness-of-Fit Indexes

Goodness-of-Fit Indexes	Acceptable Goodness-of-Fit Index Values	IFA Goodness-of-Fit Index Values
X^2/sd	<5	515,031/164= 3,14
RMSEA	<0,08	0,08
NFI	>0,90	0,81
NNFI	>0,95	0,88
CFI	>0,95	0,86
GFI	>0,90	0,82
AGFI	>0,85	0,77

Table 3 shows the Instagram Feed Addiction goodness-of-fit index values. According to the findings obtained in the confirmatory factor analysis, Chi-square/degrees of freedom was: 3,14; RMSEA: 0,08; NFI: 0,81; NNFI: 0,88; CFI: 0,86; GFI:0,82 and AGFI: 0,77. Thus, these goodness-of-fit index values were found acceptable. It was concluded that the Turkish version of IFA consisted of 4 factors.

Construct Validity Study of Instagram Story Addiction Scale

Factor analysis was performed for construct validity studies with 22 items in the original scale. In the factor analysis performed without any intervention, the eigenvalue value created more than 1 factor and 4 factors emerged. However, in the comparison with the original scale, item factor distributions did not show a appropriate structure. For example, the 1st and 2nd items and the 3rd and 4th items formed a factor together in the original scale, and in this study, they were all distributed into separate factors. Similarly, the 18th item formed a factor together with the 2nd and 4th items. In order to obtain a more meaningful structure, EFA was performed manually with 3 factors. Accordingly, the factor loading of an item was found to be low. Item 1 was eliminated with a load of .29, and EFA was performed again without including Item 1 and the appropriate structure was obtained. Accordingly,

the explained variance rates obtained in the 3-factor structure of the Instagram Story Addiction Scale are given in Table 4.

Table 4. ISA Factor Structure and Explained Variance Rates

ISA	Eigenvalue	Variance	Cumulative Variance
1.Dimension	9,49	45,20	45,20
2.Dimension	1,99	9,49	54,69
3.Dimension	1,33	6,34	61,04

As seen in Table 4, the variance rate explained by the 1st factor with an eigenvalue of 9.49 is 45.20%. The variance rate explained by the 2nd factor with an eigenvalue of 1.99% is 9.49%, and the variance rate explained by the 3rd factor with an eigenvalue of 1.33 is 6.43%. The total explained variance rate was found to be 61.04%. The scree plot, which is another technique to determine the factor structure, is shown in Figure 3.

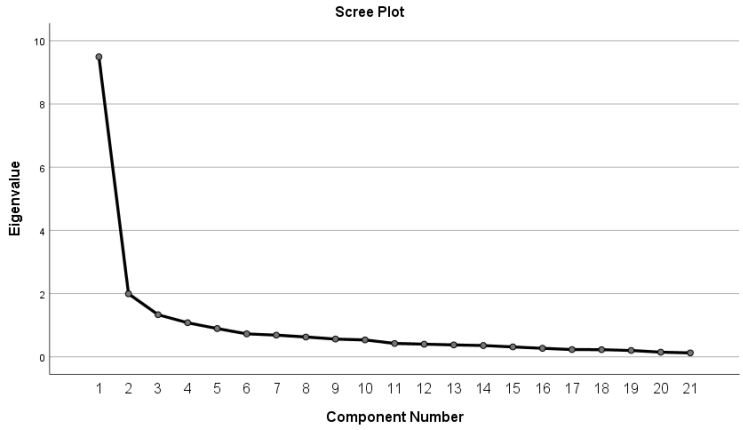

Figure 3. ISA Scree Plot

Table 5. Factor Loading Values of Instagram Story Addiction (ISA) Items

	Items	F1	F2	F3
Relapse / Withdrawal / Conflict (α=.93)	**15.** I tried to less watching others' Instagram stories, but it did not work.	.756		
	14. I decide to see the contents of Instagram stories less often, but it didn't work.	.732		
	20. I watch Instagram stories too much that I neglect work/lectures/study time.	.718		
	22. I find it hard to sleep early because I always check Instagram stories.	.712		
	21. I find it hard to spend my time into hobbies, rest, or exercise because of Instagram stories.	.692		
	8. I feel there is an urge to continue checking Instagram stories continuously.	.689		
	12. I spend a lot of time watching others' Instagram stories.	.647		

	Items	F1	F2	F3
	16. I get irritated easily if I am prohibited from watching Instagram stories.	.627		
	10. I keep thinking and feel curious when I do not see Instagram stories.	.614		
	13. I check Instagram stories the first time I wake up.	.537		
	17. I feel annoyed if someone else is bothering me when I'm looking at the contents of Instagram stories.	.456		
	11. I feel bored if I do not see the contents of Instagram stories.			
	9. I often think about what others upload on Instagram stories.			
	19. I get nervous if I am prohibited from watching Instagram stories.			
Mood Modification (α=.89)	**6.** I check the content of Instagram stories to forget personal problems.		.859	
	7. I see the contents of posts on the Instagram stories to reduce restlessness.		.842	
	5. I check the content of Instagram stories to reduce feelings of guilt, anxiety, helplessness, or depression.		.615	
Salience / Tolerance (α=.67)	**2.** I often plan to do a live stream (live stream) on Instagram.			.722
	18. I often cancel appointments with others because I see Instagram stories.			.688
	4. I give comment on my friends' Instagram stories to get feedback.			.650
	3. I make Instagram stories about my activities to get others' attention.			

When Table 5 is examined, the dimensional structure of the original ISA scale differed by combining some dimensions in the Turkish Version. It was observed that semantic integrity was achieved in the combination of factors. Item 1 was eliminated from the scale because its loading value was low. 2nd, 3rd, 4th, 18th items were formed by the combination of two separate dimensions in the original scale and were named "Salience/Tolerance". Although 18th item was under the "Withdrawal" dimension in the original scale, it was found to be significant under the "Salience/Tolerance" dimension in the Turkish version, since the item's content describes frequent use. The "Mood Modification" dimension, which includes the 5th, 6th, 7th items, is formed by the combination of the same items in the Turkish form. 8th, 9th, 10th, 11st, 12nd, 13rd, 14th, 15th, 16th, 17th, 19th, 20th, 21st and 22nd items were gathered together in a single factor. These items, which formed 3 different factors in the original scale, formed a factor called "Relapse/Withdrawal/Conflict" because they were combined in the Turkish scale.

The model confirmatory factor analysis created to confirm the 3-factor structure obtained after the EFA was verified. The CFA model made with a dataset of 300 people is shown in Figure 4. The goodness of fit values of the model are given in Table 6.

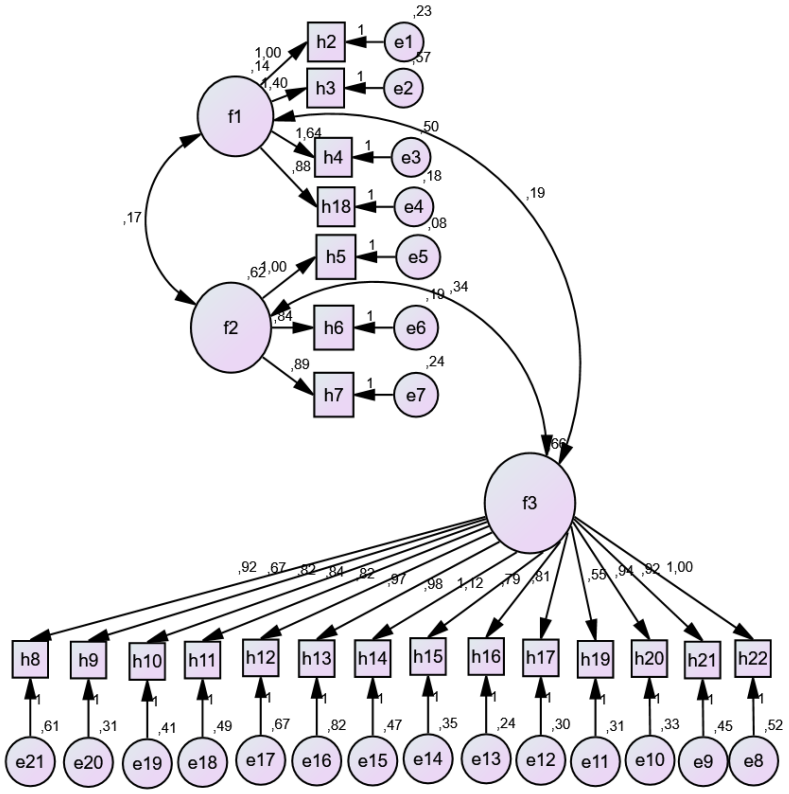

Figure 4. Confirmatory Factor Analysis of Instagram Story Addiction

Table 6. ISA Goodness-of-Fit Indexes

Goodnes-of-Fit Indexes	Acceptable Goodnes-of-Fit Index Values	ISA Goodnes-of-Fit Index Values
X^2/sd	<5	782,537/186= 4,207
RMSEA	<0,08	0,08
NFI	>0,90	0,82
NNFI	>0,95	0,84
CFI	>0,95	0,88
GFI	>0,90	0,87
AGFI	>0,85	0,78

Table 6 shows the Instagram Story Addiction goodness-of-fit index values. According to the findings obtained in the confirmatory factor analysis, Chi-square/degrees of freedom value was: 4,20; RMSEA: 0,08; NFI: 0,82; NNFI: 0,84; CFI: 0,88; GFI:0,87 and AGFI: 0,78. Thus, these goodness-of-fit index values were found acceptable. It was concluded that the Turkish version of the ISA consisted of 3 factors.

Since The Instagram Addiction Scale (TIAS) consists of two scales, validity and reliability studies of both scales were carried out. For the reliability studies of the Instagram Feed Addiction Scale, the internal consistency coefficient Cronbach Alpha values were calculated for each factor. Accordingly, these values given on the left side of Table 2 was found as .90 for the "Relapse/Withdrawal/Conflict" dimension, .79 for the "Mood Modification" dimension, .71 for the "Salience" dimension and .60 for the "Tolerance" dimension. The Cronbach Alpha values calculated for the Instagram Story Addiction Scale and included in Table 5 were found as .93 for the "Relapse/Withdrawal/Conflict" dimension, .89 for "Mood Modification" dimension, and .67 for "Salience/Tolerance" dimension.

Finally, the Pearson Correlation Coefficient values obtained as a result of the correlation test applied to the dimensions for IFA and ISA are given in Table 7 and Table 8, which show the relationship between the dimensions.

Table 7. Instagram Feed Addiction Scale Correlations

Subscale/Scale	Salience	Tolerance	Mood Modification	Relapse/Withdrawal/ Conflict
Tolerance	,350			
Mood Modification	,373	,314		
Relapse/Withdrawal/Conflict	,543	,390	,543	
Instagram Feed Addiction (IFA)	,697	,572	,701	,939

Table 7 shows the coefficient values showing the relationship between Instagram Feed Addiction factors. Accordingly, it can be said that IFA has a relational structure within itself.

Table 8. Instagram Story Addiction Scale Correlations

Subscale/Scale	Salience/ Tolerance	Mood Modification	Relapse/Withdrawal /Conflict
Mood Modification	,461		
Relapse/Withdrawal/Conflict	,525	,495	
Instagram Story Addiction (ISA)	,669	,648	,971

Table 8 shows the coefficient values showing the relationship between Instagram Story Addiction factors. Accordingly, it can be said that ISA has a relational structure within itself.

CONCLUSION AND DISCUSSION

This study aimed to establish the validity and reliability of the Turkish version of The Instagram Addiction Scale (TIAS) developed by Sholeh and Rusdi (2019) in a Turkey sample. At the beginning of the study, linguistic equivalence studies of two scales named Instagram Feed Addiction and Instagram Story Addiction in TIAS were carried out. As a result of the exploratory factor analysis and confirmatory factor analysis, it was found that both scales partially paralleled the original scale structure, but differed in some points.

Firstly, the Turkish construct validity studies of the Instagram Feed Addiction Scale consisted of 20 items in the Turkish scale form. It was found that 6 dimensions in the original scale exhibited a structure as 4 dimensions in the Turkish scale, and the 4-dimensional scale structure was confirmed in the model established with CFA. Accordingly, in the Turkish scale form, 3 items constitute the "Salience" dimension, 3 items constitute the "Tolerance" dimension, 3 items constitute the "Mood Modification" dimension and the remaining 11 items constitute the "Relapse/Withdrawal/Conflict" dimension. As can be seen, 3 different dimensions in the original scale were combined into a single dimension in the Turkish form. The scale structure was found to be acceptable in the analyses made with EFA and CFA and the factors are related to each other. The Cronbach Alpha internal consistency coefficients of the factors were found to be the lowest .60 and the highest .90.

The other scale, Instagram Story Addiction, created a structure with 21 items in the Turkish form, although there were 22 items in the original form. Since the factor loading of the 1st item in the Turkish version of this scale was found to be low, it was eliminated from the scale. The 21-item Instagram Story Addiction Scale consisted of 6 factors in the original scale form, while some factors were combined in the Turkish scale form. It consisted of 3 factors and it was seen that one item was under a different dimension. Accordingly, the EFA results showed that 4 items constitute the "Salience/Tolerance" dimension, 3 items constitute the "Mood Modification" dimension, and the other 14 items constitute the "Relapse/Withdrawal/Conflict" dimension. With this structure, the model established in AMOS was validated with CFA and the reliability coefficients were found to be the lowest .67 and the highest .93. It was found that the 21-item and 3-factor structure of the ISA was relational and significant. The scales are in 5-point Likert type, graded between "Strongly disagree" and "Strongly agree".

All validity and reliability studies have shown that Turkish TIAS is a current, valid and reliable scale that can be used in studies to be conducted in Turkey. It is natural that some differences occur in the Turkish scale form compared to the original scale, because cultural differences may differentiate the answers given to the scale. On the other hand, it is thought that some of the deficiencies in the original scale, such as the low internal consistency of one dimension of the ISA, and the fact that the factor structure was not tested with confirmatory factor analysis, were eliminated in the Turkish scales. Thus, two scales in TIAS have been added to the literature so that they can be used to measure Instagram Addiction of social media users of various ages. Factors can be tested by remodeling in new research on different samples.

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The Effect of Cooperative Learning on EFL Learners' Success of Reading Comprehension: An Experimental Study Implementing Slavin's STAD Method

Ümmü ASLAN BERZENER
M.A.,Teacher of English
springaurora@gmail.com
ORCID ID: 0000-0001-9837-9204

Selma DENEME
Trakya University, Faculty of Education, ELT Department
selmadeneme@trakya.edu.tr
ORCID ID: 0000-0001-7408-1163

ABSTRACT
Various teaching methods and techniques have been used for years to improve teaching English as a foreign language in Turkey. In order to increase student success, new methods and techniques are taking the place of teacher-centered traditional methods day by day. The cooperative learning method, which allows students to collaborate to achieve common learning goals rather than individual learning, has also become popular in English language classes. The purpose of this experimental study was to explore the effects of cooperative learning on EFL high school learners' reading comprehension. A pretest-posttest group research design was used. There was a total of 169 students involved in the study. The experimental groups (*n=85*) were treated with the techniques of the Student- Teams- Achievement Divisions (STAD) of the cooperative learning method for 4 weeks whereas the control groups *(n=* 84) were taught by the traditional method of direct instruction. An achievement posttest within the content taught was given to the groups at the end of the instruction. The mean scores of both groups on the test were compared through an independent samples t-test. The statistical results revealed the experimental groups progressed better than the control groups, indicating that the cooperative learning method was more effective on Turkish EFL learners' success of reading comprehension than the traditional method.
Keywords: Cooperative learning, Student Teams Achievement Divisions, STAD cooperative learning, teaching English, Turkish EFL learners

INTRODUCTION
With the advent of Humanism in the 1960s, traditional teaching left its place to student-centered learning methods such as the cooperative learning method which is a trending topic in the field of education. It is defined as one type of "instructional methods in which teachers organize students into small groups, which then work together to help one another learn academic content" (Slavin, 2011, p.344). Students involved in this method work together to maximize learning for themselves and for each other. Cooperative learning is an approach to learning a subject through working together, allowing students to create a common goal to solve a problem or fulfill a task (Christison, 1990). The communicative methods, constructivist ideas, and ordinary group work are fundamental to the approaches to cooperative learning. However, cooperative learning is more determined than conservative group work. This learning method has a clearer system, and it challenges students in various ways (Stenlev, 2003). During cooperative learning, students work in teams on structured learning tasks under conditions that meet five criteria; 1) Positive interdependence, team members must rely on one another to accomplish goal. 2) Individual accountability, members held accountable for doing their share of the work and mastering all material. 3) Face-to-face interaction, some or all work done by members working together. 4) Appropriate use of interpersonal skills. 5) Team members practice and receive instruction in leadership, decision-making, communication, and conflict management (Felder & Brent, 2004).

As the success of the individual depends on the success of the group, group members continuously contribute to the success of their friends. Group members help out either by teaching each other or by doing some of the work for each member. In other words, everyone in the group is responsible for each other's learning. In classroom practices, there is a competition between groups instead of competition between students. Thus, these practices improve trust among students. While the cooperative learning model gives each student the chance to help and receive assistance, it also enables students to interact face-to-face (Artzt, 1990; Ellis, 1990; Slavin, 1990).

Traditional teaching approaches usually require individual work and tend to be very demanding. Cooperative learning, on the other hand, requires active and effective working with others, which is a requirement of human

nature (Johnson & Johnson, 1994; Kagan 2014). In most of the studies which were tested in so many ways, it has been demonstrated that cooperative learning has positive and beneficial results like good morale, effective relations, student presence, confidence, and motivation (Johnson & Johnson, 2005; Johnson, 2009; Tran & Lewis, 2012). Studies on the cooperative learning model also reveal that this model is more effective than traditional teaching and positively affects the academic achievement of students (Johnson & Johnson, 1974; Sachs, Candlin, Rose & Shum, 2003; Peterson & Coltrane, 2003). According to studies, the outcome of cooperative learning (hereafter CL) which contributes to constructive relationships between students and their enthusiasm towards learning is more successful than individual working (Du, Yu, & Olinzock, 2011; Sachs et al., 2003; Slavin, 1988). In the same way, considerable research also demonstrates that CL produces higher achievement, more positive relationships among students, and healthier psychological adjustment than do competitive or individualistic experiences (Bonaparte, 1990; Cooper& Mueck, 1990; Doymuş, 2004; Johnson et al., 1991; Shemshadsara, 2012; Treisman, 1985). In addition, CL lessons can affect analytical thinking (Johnson & Johnson, 1994). Thus, it offers a solution to complications of training and teaching effectively which is insoluble using any other method (Slavin, 1991).

This solution also covers up language learning. After the popularity of the CL method in education, researchers, educators, and teachers started to implement this method into foreign language classes too. While exploring the effect of CL in language classes, some researchers have focused on students' attitudes and behaviors towards English classes after implementing CL and some others have dealt with learning differences between students who are part of CL and students who are not.

All teachers would admit that the most important aspect of language learning is that students need to practice the language. This belief has justified grounds. Brumfit (1984) claims that engaging communication and cooperation in language learning is obligatory because it is necessary for the learners to have the capability to progress in the specific language and also be capable of expressing themselves like they wish to do. In language learning, there are many advantages for CL. To begin with, CL teaching activities can enhance the academic development and problem-solving skills of second language learners besides their motivation. Additionally, second language learners have the opportunity to perform and use their logical thinking abilities better in collaborative contexts (Wentzel & Wakins, 2002). Another point is that students might not receive efficient results by interacting with only their teacher instead of communicating and learning new words and patterns with peers. Despite the fact that teachers are qualified to satisfy the requirements of students, they cannot think the same way as the pupils because of the difference between their cognitive levels. In line with this, Ghaith (2003) suggests that collaborating while learning a foreign language contributes to constructive attitudes and a sense of fulfillment among students helps to accomplish goals easier, and boosts students' confidence. It also helps them to wield the language according to their needs (Liao &Yang, 2012). Language skills improve when language learners are engaged in CL activities (Baquero, 2011; Ngubane, 2013) and there is a progress in students' learning level and positive attitude towards learning English (Chen, 2005). Research also shows that the use of CL aided significantly to boost language learners' grammar competence even though their tutors neglected this language component in teaching (Kezoui, 2015). In addition, it has been determined that CL has a positive effect on the enthusiasm of English learners and the intrinsic motivation of the learners (Ning & Hornby; 2014; Oksal, 2014). CL was also found to have a positive impact on improving English vocabulary skills (Bilen, 2015). In their research, Kartal and Özbek (2016) found that students learning English with CL developed a positive attitude towards learning English, CL, working in group and academic success.

Although the number of research studies conducted with the CL method in Turkey is not very high, the current researches have been comparing the traditional learning methods with the CL method. The common point of research conducted in different levels of education and subject areas at home and abroad is that the CL method is more successful and effective than the traditional methods in terms of attitudes towards school and schoolmates. The number of studies conducted in the field of teaching English and CL is quite low (Açıkgöz, 1991, 1994; Aslandağ-Soylu, 2008; Gömleksiz & Onur, 2005; Pala, 1995;). Since there is not much research on the application of the CL method in the teaching of English in the primary school dimension in our country, such research is needed (Baş, 2009).

Research shows that there are several purposes for the use of CL in foreign language teaching. It is an excellent way not only to let students use the language and master the grammar and terminology of the language but also to provide emotional help and encourage social activities between pupils. By providing this kind of environment, competition between students will diminish, thus it will facilitate more effective learning. Since the number of research investigating the effect and importance of CL in learning English as a foreign language is quite limited,

more studies are needed in this area. Therefore, this study aims to contribute to the literature by examining the role of CL on the overall success of Turkish EFL learners.

METHOD OF THE STUDY

The research method of this study is quantitative, a strategy of inquiry moving from the underlying assumptions and flowing to research design and data collection (Cohen, Manion, & Marrison, 2000). A pretest-posttest group research design was used under the quantitative experimental research method to explore whether the use of CL can improve the teaching and learning of English as a foreign language. Two types of data sources have been used: A placement test (Cambridge Empower Placement Test, 2018) to group the students equally, and an "Achievement Test" was circulated as the pretest and the posttest of the study. The test was prepared by experts adapting questions on the unit "legendary figures" from the question pool of the National Ministry of Education of Turkey.

The school where the research was conducted is a state school in İstanbul. One of the researchers of this study is an EFL teacher at the school where direct instruction, one of the traditional teaching methods, was used. The school was convenient for the research in terms of data collection and easy access during school hours. Furthermore, the researcher conducted the research in her classroom, which afforded her an opportunity to investigate teaching practices and possible solutions to the challenges in the teaching context. So, convenient sampling strategy was used to select the participant of this study. High school students were identified for the experiment. One hundred and sixty-nine 10^{th} grade students participated in the study. 67% of the students were females (n= 114), and 33% were males (n= 55). Their English level was assumed as A2 and both groups were taught by the researcher.

The study which hypothesizes that the students in CL classes would be more successful than the ones treated by the direct instruction was guided by the following research question: Is there a significant difference between the CL methods and the direct instruction approach on the success of reading comprehension of the EFL learners? In order to test the differences in success between the groups, an independent T-test was conducted. The experimental design of the study is illustrated in the following table.

Table 1. Experiment design for the study groups

Groups	Instructional Methods	Pretest	Treatments	Posttest
Experimental group	*STAD* method of the CL	Q1	X1	Q3
Control group	Traditional method of direct instruction	Q2	X2	Q4

Q1: How do the experiment group learners perform in the achievement test before they are trained through STAD model?
Q2: How do the control group learners perform in the achievement test before they are trained through the traditional direct method?
Q3: How do the experiment group learners perform in the achievement test after they have been trained through STAD model?
Q4: How do the control group learners perform in the achievement test after they have been trained through the traditional direct method?
X1: The experimental group received "CL instruction" via STAD method.
X2: The control group received traditional method of direct instruction.
O1, O2: Pretest included a Ministry of National Education (MoNe) Achievement Test (a test designed by experts on the covered language content by selecting questions from the MoNe question pool).
O3, O4: Another version of MoNe Achievement Test on the same language content was the reading comprehension posttest.

Implementing the *STAD* Method of Cooperative Learning

There are different forms of cooperative learning (illustrated in table 2), such as Teams-Games-Tournament (TGT), Jigsaw, Cooperative Integrated Reading and Composition (CIRC), Learning Together (LT), Student Teams-Achievement Divisions (STAD), Team Assisted Individualization (TAI), Academic Controversy (AC), Group Investigation (GI), etc. (Kagan, 1992). The idea which lies beneath all cooperative learning methods is that learners work together to achieve a task and they are responsible not only for their own learning but also for one another's (Slavin 1990). The experimental groups in the research were designed and treated by implementing Slavin's (1995) Students Team-Achievement Divisions (STAD) method of the CL. According to Slavin (1994) "the main idea behind STAD is to motivate students to encourage and help one another master skills presented by the teacher" (p. 23). In this method, students with different skills and gender are grouped and assigned to cooperate

to solve issues and help each other understand the lesson presented earlier by the teacher. It encourages team members to do well in both collaborative and individual works. Slavin describes five major components of STAD: a) class presentation: The teacher introduces the lesson to the students before they start cooperating. b) Teams: Students work in groups on the given task to reach the shared goal. c) Quizzes: Students take individual quizzes, they are not allowed to help each other during the test. d) Individual improvement: Individual improvement scores are valued to see whether students have improved according to their past performance and how much they have improved. e) Team recognition: Groups may win certificates or other kinds of rewards if their averages of improvement scores exceed a certain level.

Table 2. Modern Methods of CL (from Johnson, Johnson, & Stanne, 2000)

Reseracher-Developer	Method	Developed
Johnson & Johnson, 1999	Learning Together	Mid-1960s
DeVries & Edwards, 1973	Teams-Games-Tournaments (TGT)	Early 1970s
Sharan & Sharan, 1976, 1992	Group Investigation	Mid 1970s
Johnson & Johnson, 1979, 1995	Constructive Controversy	Mid 1970s
Aronson et al., 1978	Jigsaw Procedure	Late 1970s
Slavin, 1978	Student Teams Achievement Divisions (STAD)	Late 1970s
Cohen, 1994	Complex Instruction	Early 1980s
Slavin et al., 1982	Team-Assisted Instruction (TAI)	Early 1980s
Kagan, 1985	Cooperative Structures	Mid-1980s
Stevens, et al., 1987	Cooperative Integrated Reading and Composition (CIRC)	Late 1980s

SOURCE: Adapted from Johnson & Johnson (2002).

Forming the research groups

The research was conducted with four classes of students- two were experimental and two were control groups. The levels of the groups were equalized by the placement test consisting of forty questions testing reading comprehension, vocabulary, and grammar knowledge of the EFL learners. The test was used for homogenizing the linguistic levels of the participants. By doing so, the study bias that could occur between the control group and experimental group is reduced. In the control groups, the direct instruction method was used without informing the students about the research. Experimental groups, on the other hand, were informed about the research and the STAD method in advance. The participation process of the research was also explained to them. Experimental groups were divided into six subgroups by the first researcher to ensure equality in the groups. Groups were in a heterogeneous structure consisting of students with different abilities and personality traits. After grouping, the students' desks were rearranged in U shape so that the students could have comfortable eye contact with the teachers and to enable group work and discussion. Each group was then asked to choose a name for their groups. They chose their group names from colors. In order to provide a competitive environment based on the method, the students were asked to select a group representative in a democratic way. The distribution of participants by gender and groups is as follows:

Table 3. Descriptive statistics of the groups

Group		**Gender**	***n***	**percentage**
Control group	Group A	Female	32	19
		Male	11	6.5
	Group B	Female	22	13
		Male	19	11
Experimental group	Group A	Female	28	16.5
		Male	15	9
	Group B	Female	32	19
		Male	10	6

Teaching materials

This study was designed as part of the class time. Thus, the study material had to be part of the coursebook provided by the Ministry of National Education of Turkey, in our case, it was the coursebook "Count Me In", for the 10th graders. The third unit of the textbook "Legendary Figures" was selected as the main content of the study. The main reason for selecting this topic was because of the time period. In other words, the schedule of the study was

arranged in a way that the experiment had to be implemented in October as the Ministry of Education assigned teachers to teach this unit this month.

Lesson preparations

The research was conducted during four-course sessions. As part of the research, eight lesson plans (see appendix for a sample lesson plan) were designed by the researcher to teach both control and experimental groups. Each of the lessons took 40 minutes and each lesson plan was designed to cover 80 minutes (two lesson hours in the Turkish school system). The unit to be covered in the first lesson was titled "Legendary Figures" from the 10th grade English textbook "Count Me In".

Background of the lessons: Before proceeding to the new topic in the class of the 10th grade English textbook "Count Me In", all students were asked to come to class prepared. Students were responsible for reading the text and vocabulary of the new unit. Each student ensured to be ready for the lesson.

Lesson implementation

Eight lesson plans based on the literature and CL content were designed to teach the groups. The lesson plans for the control groups were simply based on the "Count Me In" coursebook which was already being taught in the public schools in Turkey. The experimental group received the treatment while the control group did not. According to the research hypothesis, we expect the STAD method to have an efficient impact on the experimental group. The control groups were taught by the traditional method of direct instruction whereas the lessons conducted in the experimental group classes used some special teaching techniques and procedures. In order to fit the research requirements, Slavin's (1995) STAD (Student Team- Achievement Division) method was applied during reading lessons in experimental groups adapting the five components of the method. The overall lesson process in experimental classes is as follows:

> *1)Firstly, the teacher briefly introduced the reading task then he asked the groups to read the text (class presentation). 2) After choosing the responsible group, the text was divided into sections and each individual in the group was allowed to read their sections with their group members. Meanwhile, the successful students and the other students were encouraged. Errors made during the reading activities were corrected by the teacher. The blackboard was used when necessary for the activities. After each CL task, learners were provided with an opportunity to discuss their experiences within their groups and then as a class. They studied the material as a group, and each group member checked their understanding by discussing the task. They also talked about what should be changed or improved for the next lesson. Different roles were assigned to the learners in each CL group, ensuring that each group had at least two high achievers, two average and two slow learners and that all groups were gender-balanced as far as possible. Contrary to the traditional classroom, the role of the teacher in cooperative classes was to facilitate the learning program by assigning the task to the learners, was to motivate, encourage, assist them when needed, promote discovery learning, and awarding the groups a score (teams). 3) After studying the text and its vocabulary, a quiz (the text-related questions) was answered by the students. During the quiz, they were not allowed to help each other (quizzes). 4) All activities processed throughout the course were rated based on individual ratings and grades of the students. The total score of the members in the group also created the group's rating (individual improvement). 5) At the end of the week, the group with the highest score was declared as the winners of that week (team recognition).*

During the four-week training (eight treatment in total), students in both groups improved their reading skills, vocabulary and grammar competencies. Students were observed to be more involved in the course with the STAD method. A positive competition between the students was observed by the researcher. Besides, the CL-class students tended to ask questions more comfortably in their groups. So, they were observed to develop self-esteem and were eager to help their group mates in CL classes. Thus, affective barriers to learning were decreased in CL classes. The lessons were processed for two months as described above. After two months, the students were then tested. A posttest was implemented to investigate the progress of the students.

FINDINGS OF THE STUDY

Normality test was conducted to analyze the distribution of data. We found the data was normally distributed ($p>0.05$) and therefore an independent t-test (see table 4) was conducted to compare students' scores in the placement test, pretest, and posttest. The analysis was designated by the hypothesis of the research. The t-test was used to investigate whether there was a significant difference between the mean score of the groups on the achievement tests. The level of significance was 0.05.

Table 4. A Comparison of Reading Comprehension Achievement Test Scores of the Groups

	Group	*n*	Mean	Std. Deviation	Std. Error Mean	t	df	sig
Placement Test	Control Experimental	83 83	25.398 25.181	6.2741 6.6957	.6887 0.7350	-.215	164	.830
Pretest	Control Experimental	86 83	74.6512 78,0542	10.45412 10,43534	1.12730 1,14543	2.117	167	.076
Posttest	Control Experimental	86 84	76.5349 84.9464	15.13737 9.35351	1.63230 1.02055	5.897	168	,000

There was no significant difference for placement test results between experimental group (*M*=25,181, *SD*=6,6957) and control group (*M*=25,398, *SD*=6,2741) results; t (164) = -0215, p= 0,830>0,05. There was also no significant difference for pretest results between experimental group (*M*=74,6512, *SD*=10,45412) and control group (*M*=78,054, *SD*=10,43) results; t (167) = 2,117, p = 0.076>0,05. On the other hand, there was a significant difference for posttest results between experimental group (*M*=84,9464, *SD*=9,35351) and control group *(M*=76,5349, *SD*=15,13737) results; t (168) = 5,897, p=0.000<0,05. These results suggest that there is a group difference for posttest but not for placement test or pretest.

When the pretest and posttest of the control group and the experimental group students compared, it was found that the students of the experimental group increased their mean scores from 78,0542 to 84,9464 by 6,8 where the students of the control group increased their mean scores from 74,6512 to 76,5349 by 1,8. This result shows that there was a significant improvement in the performance of the experimental group over the control group in the posttest. Thus, the hypothesis of the study; "Students who are taught by the CL method will be more successful than the students who are taught by traditional method" is accepted.

DISCUSSION OF THE FINDINGS

Analyzing the differences between the progress of the CL classes and direct instruction classes was the aim of this study. Thus, an independent t-test was conducted to compare students' scores in the placement test, pretest, and posttest for both class types. As seen in the statistics, there was no significant difference for the placement test and pretest results between the experimental group and the control group. However, there was a significant difference between the groups for their progress. These results suggest that there is a group difference for the posttest but not for the placement test or pretest. These results, therefore, prove the hypothesis that students who are taught by the CL method will be more successful than those who are taught by the direct instruction. The result of our study is similar to the results found by Bilen (2015) and Karabay (2005) who also found that there was a significant difference between the experimental group and the control group for the posttests (Bilen, 2015). Bilen's study was conducted with elementary school students and the current study was conducted with high school students. A further study may investigate whether there is a different effect of CL for different grade levels.

The finding of our study also coincides with the findings of some other studies (Gömleksiz, 2007; Kezoui, 2015; Pesen & Bakır, 2016) those showed significant differences in improving vocabulary knowledge and grammar competency in English. Similarly, in another study, Özkılıç (1996) investigated the effects of CL on students' progress and retention for English. The study found similar results that university students in the CL group had more progress than the students in the control group (Özkılıç, 1996). In addition to that, in their study on language teaching, Gümüş and Buluç (2007) found that students enjoy lessons with a collaborative learning method and understand the lesson better, become more active in the lesson, increase their self-esteem and learn more easily. On the other hand, there are studies whose results do not coincide with this study. For instance, CL was found to have a minor role in language teaching, as teachers are not familiar with this way of structuring group work (Árnadóttir, 2014).

The effect of the CL method on English learning was studied in another study showing similar results. Yaşar (1993) conducted research on students who took text reading and analysis lessons in the Department of Foreign Language Education in order to test the effect of the teaching method with small groups in comparison to traditional teaching methods in developing foreign language reading skills. In the research, the effectiveness of teaching with small groups and traditional teaching methods on student achievement has been tested in terms of developing reading skills in the foreign language and developing the comprehension power of reading in a foreign language. As a result of the data collected, it was concluded that the teaching method with small groups based on collaboration was more effective in developing listening and speaking skills in a foreign language (Yaşar, 1993).

The study conducted by Baş (2009) had similar results. In his study, Baş investigated the effects of CL on learning English. Thus, he designed a study with 40 middle school students in Konya, Turkey. Based on the analysis, the researcher found that collaborative learning method (Unification-II) activities provided more positive effects on learners' access levels at the end of the lesson "The Present Simple Tense" compared to traditional learning-teaching methods activities. In another study conducted on the fifth-grade students of primary education, it was concluded that CL activities were more effective than cluster study on students' attitudes towards social studies lessons (Oral, 2000).

In the research conducted by Açıkgöz (1992), the effects of collaborative learning techniques and the effects of traditional education on the academic success, retention levels and affective characteristics of university students were examined. The research was carried out on 48 students attending learning psychology lesson under experimental conditions. As a result of the findings obtained from the research, it was revealed that the CL method was more effective than the traditional teaching method on the affective characteristics of the students (1992). Even though our study was applied for a short period of time, there was significant progress of the students in the CL classes. This result supports the statement that the CL method increases the speed of the student in the learning process, motivates her for learning, and keeps her active in the process by improving her knowledge and skills (Liang, 2002). In short, there is overwhelming evidence that CL as a pedagogical practice has had a profound effect on student achievement and socialization (Slavin, 2014). When it comes to the effects of STAD on success, the studies found that STAD increased the academic success of students, that it gave a positive attitude to the study program and was effective in the teaching process (Hanafi & Basuki, 2018; Ünlü & Aydıntan, 2011; Van Wayk, 2007; Van Wayk; 2015). The CL method is found to be more effective on students' comprehension of what they read than traditional teaching (Adams 1995; Bölükbaş & et al. 2011; Güngör & Açıkgöz, 2005). In the same vein, our research result has also witnessed the positive effect of STAD on student progress in reading comprehension, vocabulary knowledge and grammar competency in English lessons.

In conclusion, the results of this study showed that experimental group students progressed more and that STAD is an effective learning method in teaching English as a foreign language. The findings of the study expose that CL is more effective for English learning than traditional teaching methods. Even though the traditional method which is applied in most of the schools also helps the students improve their English, CL contributes to student success more by promoting language skills. While many different cooperative learning methods are being advocated and used in education, educators have very little guidance as to which specific cooperative learning methods will be most effective in their situation and how to implement them in the classroom. From this aspect, this study aims to provide a contribution to the foreign language teaching methods and proposes a guideline for EFL teachers who wish to implement the STAD method to enhance their students' progress.

LIMITATIONS OF THE STUDY

This research was limited to four weeks and eight treatments in total due to the limitations caused by the curriculum and the course materials of the school. In addition, the number of the participants was limited to 169 students. Future research can increase the number of participants and make applications that extend over a longer period of time.

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APPENDIX A: Lesson Plan for Lesson 1 (Experimental Group)

The objectives:

- Talking about legendary figures such as Ataturk and Fatih Sultan Mehmet
- Describing characters and settings in an event in the past

Resources and Materials

1. Paper and pencil
2. Board marker

Class period: 40+40minutes (two class periods)

Language Skill: Reading Comprehension

Activities and procedures

1. Warm-up: the students will be asked to close their eyes for one minute and think about the legendary figure mentioned in the text
2. Group selection: The students are divided into six groups based on students' prior knowledge
3. After determining the group responsible for reading the text, the text is divided into sections and each individual in the group is assigned to read a section from the text. The students who are successful at reading are given scores and the other students are encouraged.
4. The teacher asks the students to read the whole text. The board is used when necessary for their activities.
5. Teacher participation: Errors are corrected by the teacher.
6. "If you were" activity: After reading the assigned text, the students will be asked what they would do if they were the legendary figure mentioned in the text.
7. The group members will discuss their ideas. They will be able to use the board allocated for them.

Evaluation: The best group who brings the best solution will be elected by the rest of the class. The voting will be done filling in anonymous survey.

APPENDIX B: Lesson Plan for Lesson 1 (Control Group)

The objectives:

- Talking about legendary figures such as Atatürk and Fatih Sultan Mehmet
- Describing characters and settings in an event in the past

Resources and Materials

1. Paper and pencil
2. Textbook

Class period: 40+40minutes (two class periods)

Language Skill: Reading Comprehension

Activities and procedures

1. The students work individually. The students are asked to match the words on the left column with their definitions on the right column
2. The students are asked to read "The Conquest of Constantinople" topic from the textbook.
3. Students respond to the reading questions about the topic listed in the textbook.
4. The students read rest of the text
5. The students fill in the blanks
6. There is no group work
7. Teacher participation: Errors made during the reading activity are corrected by the teacher.

Evaluation: The students do not get any grades for their class performance. They are assessed via their class exams.

The Effect of Stem Education on Academic Performance: A Meta-Analysis Study

Assoc. Prof. Dr. İbrahim Yaşar KAZU
Department of Education Science, Faculty of Education, Fırat University, Elazig, Turkey
iykazu@firat.edu.tr
ORCID: 0000-0002-1039-0482

Cemre KURTOĞLU YALÇIN
PhD Student, Department of Education Science, Faculty of Education, Fırat University, Elazig, Turkey
92401202@firat.edu.tr
ORCID: 0000-0002-2148-7466

ABSTRACT
STEM education is applied to raise individuals having 21st-century skills based on the integration of science, technology, engineering, and mathematics. This paper aims to present the overall effect of STEM education on students' academic achievement by analyzing 64 research findings obtained from 56 quantitative studies published between 2014 and 2021. Relevant studies were identified from the databases of scholarly publications such as ERIC, Web of Science, EBSCOHost, Google Scholar, SCOPUS, ProQuest, CHE Thesis Center. The sample was then meta-analytically examined using the CMA program. Education level, duration of the application, disciplines, and publication type were determined as moderator variables. The results showed that the effect of STEM education on students' academic success was statistically higher (g= 1.150) in the random-effects model. A heterogeneous distribution was obtained from the sample. Further subgroup analyzes using Analog ANOVA revealed that disciplines (Qb= 921.394; p= .000), and publication type variables were statistically significant (Qb= 7.229; p= .007). With respect to the disciplines, the effects of STEM education showed the largest effect size of 1.156 in the discipline of science. Regarding the publication type, national studies were presented the largest effect size of 1.155.
Keywords: STEM education, academic performance**,** science, technology**,** engineering**,** mathematics**,** meta-analysis

INTRODUCTION

Recent advances in information and communication technology continue to affect each aspect of society, along with important implications in the field of education. Countries aiming to be a leader in the scientific and technological race also attach great importance to science and mathematics education. For this reason, in order not to fall behind in the technological race, they have adopted the basic aim of raising individuals who understand science and mathematics conceptually well, associate these concepts with daily events, and can solve the problems they face in daily life with the information transferred in schools (Çepni, 2017). Dinçer (2014) argues that the basic resource of the economy is individuals who can produce knowledge and use them when necessary. For this reason, it is of great importance to educate the new generation with skills such as analytical, creative, and critical thinking, which are called 21st century skills. The way to gain these skills is through "STEM", in other words, science, technology, engineering, and mathematics which is the basis of today's and future science and technological developments. STEM education, a workforce consisting of individuals who are aware of STEM literacy, aims to continue their current work in the STEM field, to produce innovations that will provide an economic advantage to countries, and to be competent in future business areas (Thomas, 2014).

William (2011) defines STEM education as an approach that supports student participation using engineering and technology and improves students' learning in science and mathematics. In addition, Israel, Maynard, and Williamson (2013) describe it as student-centered and collaborative learning beyond the contexts of four STEM domains. STEM education is an approach that eliminates the boundaries between disciplines by enabling students to understand the world as a whole rather than parts (Lantz, 2009). Although there is no consensus on the exact definition of STEM education (Thomas, 2014), the general belief is that STEM involves military, economic, high-level thinking that brings together disciplines, leads to effective and qualified learning, takes existing knowledge, and puts it into daily life (Yıldırım & Altun, 2014). According to Şahin et al. (2014), STEM education aims to enable individuals to look at problems from a different perspective between fields by gaining skills and knowledge with a totalitarian approach to education.

The STEM curriculum includes moving beyond the four walls of the classroom by incorporating informal learning

and continuously expanding learning methods. It is based on combining formal and informal activities, such as mobile device use or museum visits, and it improves learners' interest in learning and increases their participation (Wang & Chiang, 2020). A brief literature analysis shows that many independent studies are examining the effect of STEM education on students' academic success. An examination of the studies in the literature demonstrates that some studies reported that STEM education increased academic success (Cotabish et al., 2014; Çetin, 2019; Dedetürk, 2018; Ercan, 2014; Gülen, 2016; Irkıçatal, 2016; İnce et al., 2018; İzgi, 2020; Olivarez, 2012; Ozan & Uluçınar Sağır, 2020; Salman-Parlakay, 2017; Uçar, 2019; Yaki et al., 2019; Yıldırım, 2016; Yıldırım & Altun, 2015; Yıldırım & Selvi, 2017; Young, Young & Ford, 2017). Given this situation, this study aims to conduct a reliable meta-analysis study called analysis of analysis (Glass, 1976), in a systematic effort to interpret the findings of previous studies and to guide future research. Although there are a number of meta-analysis studies in the literature (Angelo et al., 2014; Ayverdi & Öz-Aydın, 2020; Becker & Park, 2011; Belland et al., 2017; Saraç, 2018; Yücelyiğit & Toker, 2021), there is not a comprehensive international meta-analysis for the period 2014-2021. For this reason, a meta-analysis study on this subject is considered necessary to investigate the quantitative results of existing studies which have examined the effect of STEM education on academic achievement. The current study set out to synthesize these results and establish the overall magnitude of the effect. For this main purpose, answers to the following questions were sought:

1. What is the effect size of STEM education on academic success?
2. How does the effect of STEM education on academic success vary as a function of moderator variables (education levels, publication type, disciplines, and intervention duration)?

THEORETICAL FRAMEWORK

STEM is the abbreviation of Science, Technology, Engineering, and Mathematics (Gonzalez and Kuenzi, 2012). Different definitions have been put forward for STEM education. According to Morrison (2006), STEM education, which is a meta-discipline, is a new discipline in which other disciplines are integrated. Dugger (2010) also states that STEM education presents the including disciplines as intertwined as in daily life; thus enables students to perceive the world as a whole. On the other hand, Çorlu, Capraro, and Capraro (2014) define STEM education as the structuring of knowledge, skills, and thoughts by teachers and learners with the cooperation of more than one STEM field. In addition, Vasquez, Sneider, and Comer (2013) define STEM education as an interdisciplinary learning and teaching approach that removes the traditional barriers between science, technology, engineering, and mathematics disciplines. In the light of these definitions, it can be inferred that STEM education aims to teach science, engineering, technology, and mathematics courses in an interdisciplinary manner. Moreover, the major goal of STEM education is to help students to develop academic performance and to gain cognitive and critical competencies.

Radical changes have been put into force in the curriculum in order to raise young generations with 21st century skills. In the 1990s, the USA adopted a holistic approach to education in the curriculum in which the disciplines of science, technology, engineering, and mathematics are addressed together (Bybee, 2010). This approach is called STEM. The scientific and technological competition between developed countries and the trend of raising people with 21st century skills has led to the opening of STEM schools in many states in the USA, where teachers openly integrate engineering into lessons. Furthermore, in Europe, several STEM projects were carried out to apply science education based on questioning and increase students' interest in science (Akgündüz et al., 2015). On the other hand, Turkey keeping up with developments in the world, began to make STEM studies at the university level at first. Thus, a STEM Center was established at Istanbul Aydın, Hacettepe, and Bahçeşehir University established a STEM laboratory (Akgündüz et al., 2015). Then, in 2016, a report called STEM Education Report was prepared by the Ministry of National Education General Directorate of Innovation and Educational Technologies. In the report, it was stated that the 2015-2019 Strategic Plan aimed for strengthening STEM, and also the studies carried out in the 7th and 8th-grade Technology Design courses in schools are in accordance with the STEM logic. As a result, it can be observed that STEM education has become an indispensable part of 21st-century education programs (NRC, 2013). The age we are in expects individuals to be able to both produce and solve problems. STEM education has emerged on the education scene as it brings these competencies and approaches problems with a totalitarian perspective (Bybee, 2010). STEM education aims to bring these skills to the individual by focusing on literacy skills such as creative thinking, critical thinking, problem-solving, and collaborative work (Özdemir, 2016). Equipping individuals with such skills contributes to human development and promotes innovation, helping nations grow and compete in the global knowledge economy.

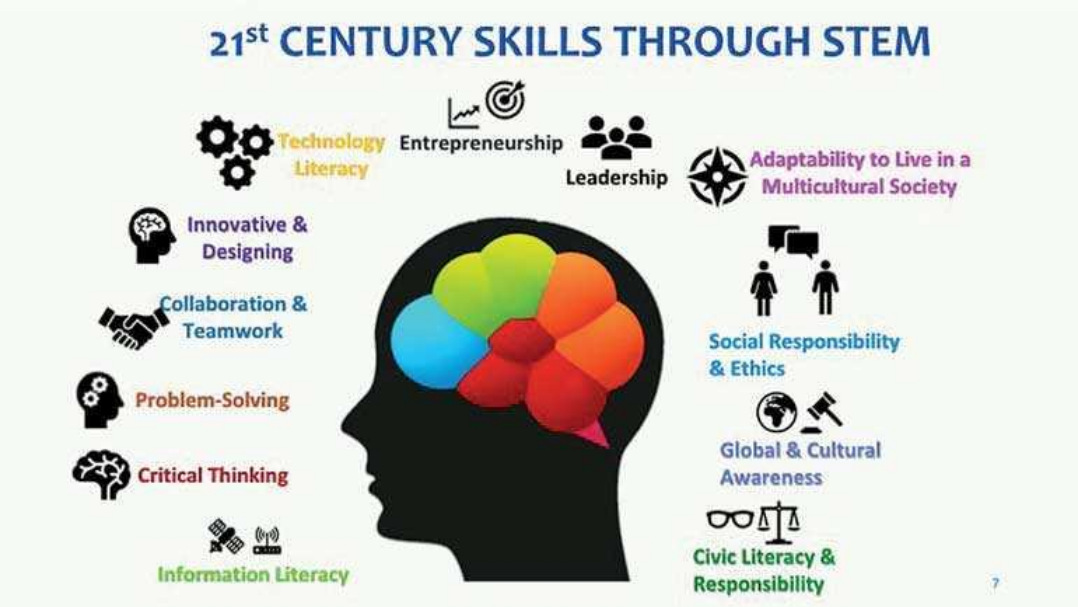

Figure 1. 21st century skills through STEM (Alwis, 2018)

In the 21st century, it has become significant for every country to raise individuals who are scientifically literate, who can keep up with the changing information and technology, who will respond to the needs of the education and business world, and who have high-level of cognitive skills. Along with the rapid development of information and communication technologies, 21st century skills have become different from 20th century skills. Therefore, the change in expectations of individuals in 21st century has required to take necessary measures in parallel with this change in educational goals. In the necessity of increasing the quality standards of education, students are required to have the skills to solve their daily problems and contribute to the needs of society (Şahin, Ayar & Adıgüzel, 2014). 21st skills are expressed in Figure 1 as being creative, innovative and thinking critically, solving problems, having communication skills, working in a team, information and communication technologies literacy, local and universal citizenship awareness, life and career awareness. On the other hand, Bybee (2010) addressed 21st skills as critical thinking, creativity, cooperation, motivation, and metacognitive skills. Hence, it is possible to comment that the emerging science and technology of our present century have shaped both education system and expectations for a future individual. STEM education is considered as a precious way to make the education system keep up with the developments and to meet the expectations.

The fact that the 21st century is an era in which dizzying developments are experienced in science, technology, art, economy and many fields also affects the education systems of countries. Countries are making reforms to their education policies in order to raise individuals who can prepare themselves for this rapid development and changing process, who make up the society, and who have the 21st century and life skills. Some of these skills are taking responsibility, being innovative, having communication skills, taking risks, having a critical point of view, science and technology literacy, creativity, etc. (Lin et al., 2019). As STEM education is a holistic perspective enabling individuals to both acquire 21st century skills and reach quality in education, it enhances individuals' competencies mentioned. Consequentially, a brief literature analysis shows that STEM education develops students' problem-solving skills, provides the opportunity to develop their creativity and design in the field of engineering by using their basic knowledge and skills, allows students to think logically and critically and to develop an interdisciplinary perspective and associate the learned information, enables to understand and explain the nature of technology by equipping them with 21st century skills.

METHOD

Research Model

The meta-analysis statistical method was selected to conduct a synthesis of the combined experimental findings obtained from relevant individual studies, and interpreting them in effect size form (Card, 2012; Wolf, 1986). The current study followed the meta-analytic procedures suggested by Glass et al. (1981), which include (1) collecting relevant studies, (2) coding the features of the studies, (3) calculating the effect sizes of each study's outcome measures, and (4) investigating the moderating effects of a study's characteristics on the outcome measures.

Collecting the Relevant Studies

This research was evaluated by E-97132852-302.14.01-31805 numbered meeting of XXX University Social and Human Sciences Ethics Committee on 31.03.2021 and was found ethically appropriate. Accordingly, the data were

collected from research articles, master and doctoral theses that met the inclusion criteria given in Table 1. Studies were identified with the help of national and international databases in the field of education and published electronically such as ERIC, Web of Science, EBSCOHost, Google Scholar, SCOPUS, ProQuest, CHE Thesis Center. In addition, the bibliography sections were also examined in the studies reached, in an effort to identify earlier works that may not have been published electronically.

Table 1: Inclusion criteria for the selection of studies

Criteria	**Inclusion**
Publication period	Completed between 2014 and 2020.
Publication type	An article published in a national or international refereed journal or a master's / doctoral thesis.
Language	Turkish or English.
Research design	An experimental design with a control group. The control group should be taught with the traditional method, while the experimental group with the STEM.
Outcome	Academic performance
Implementation	Measure the effect of the STEM education in the field of educational settings.
Accessibility	Full text available.
Data	Sample size, standard deviation, and mean values.

The researchers identified some keywords to assist the resource search. Binary combinations of such keywords as "STEM education and academic achievement", "STEM learning and learning outcome" were scanned in all databases during the research. Overall, the keyword search provides 11467 studies. Next, 4536 studies were eliminated because of the duplication, and 6932 studies were removed for not being suitable for the research problem. Considering the inclusion criteria, 77 studies were eliminated, leaving 56 studies to form the study sample. However, as Acar (2018), Olivarez (2012), James (2014), Judson (2014) showed the effect of STEM learning on academic success in their study by working with different disciplines, and Cotabish et al. (2014) showed on different grades, the researchers were able to increase the size of the sample to 64. A Prisma flow diagram showing how the study sample of 56 out of 11467 papers was reached is given in Figure 2.

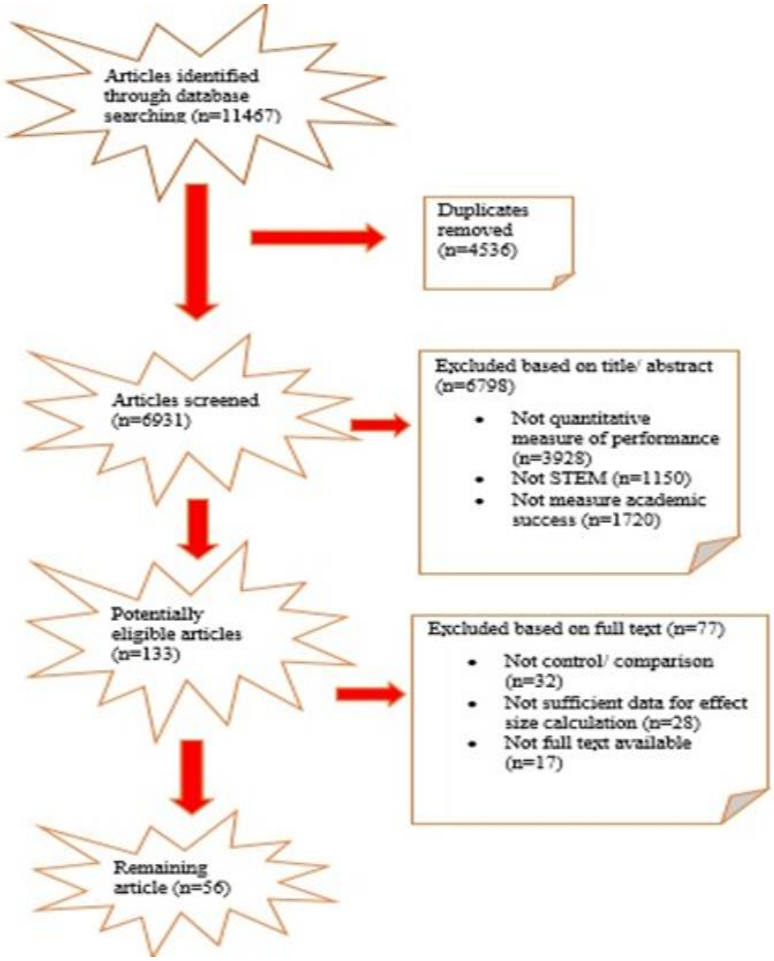

Figure 2. Prisma Flow Diagram

Coding the Features of the Studies

In this study, a coding form consisting of three parts as "study identity", "data of the study, and "study content" was developed to record the studies reached as a result of the literature review. In the first part, the author's surname, and publication year were coded. In the second part, the data of the studies were coded. In this section, pre-test sample size, mean, and standard deviation values, post-test sample size, standard deviation, and mean of the control, and experimental groups, respectively, were recorded. In the third part, the data of the moderator variables were coded. These variables were determined as the type of publication, the education level, the discipline, and the application period of the STEM education to the experimental group, and the data of these variables were recorded in this section.

The data of the studies included in the scope of the study were coded by opening an Excel file and numbering the studies. In order to ensure the reliability of the data encoded in the research, the coding process was performed by the first coder having a doctorate in the field of curriculum instruction and education, and also by the second coder, being an expert in that field. After the coding process was completed, the compatibility between the coders was evaluated. Inter-encoder reliability calculation (consensus / (consensus + disagreement) x 100) (Miles & Huberman, 1994) and the reliability was found to be 96%. The validity of a meta-analysis study is proportional to the validity of the studies included in the study (Petitti, 2000). In this context, the validity findings of the studies included in the study were examined and an effort was made to ensure their validity. Additionally, studies using inappropriate data and research methods were not included in the meta-analysis and contributed to increasing their validity (Başol & Johanson, 2009).

Analysis of Data

The data analysis process includes the calculation of the effect size for each study, the control of publication bias, the heterogeneity test, and the calculation of the combined effect size. Comprehensive Meta-Analysis (CMA Version 3) program was used to analyze the data. Effect size is an analysis that shows the size and sensitivity of the experimental effect (Thalheimer & Cook, 2002). In meta-analysis studies, two different coefficient calculation

methods are used, "Cohen's d" and "Hedges's g" which are the standardized mean difference effect size indicators, but it is stated that both of them give similar results in the literature (Dinçer, 2014). On the other hand, since it is known that the 'Cohen's d' value is an indicator of effect size that should be used when the number of samples in each group is above 20 (Lipsey & Wilson, 2001), the analyzes in this study were performed by calculating the "Hedges's g" values. Specific classifications are used when interpreting the effect sizes obtained from the meta-analysis. Cohen's (1988) the classification of effect size is as follows: • 0–0.20 = weak effect • 0.21–0.50 = modest effect • 0.51–1.00 = moderate effect • >1.00 = strong effect.

Two different models are used in the calculation of effect sizes in meta-analysis. These are the fixed effects model and random-effects model. The researcher needs to determine in advance which model to act according to the analysis process (Dinçer, 2014). In order to make a more generalizable study and because it is a model recommended to be used in the field of social sciences (Cumming, 2012), this study was based on the random-effects model. On the other hand, meta-analysis aims to determine how the effect size varies across studies. In this respect, the random-effects model has a distribution of true effects. Regarding that the moderator effect can vary across studies, as well as the sampling variability, the random-effects size model was selected to match the expected heterogeneity in this meta-analysis.

RESULTS

Meta-Analysis Findings of the Studies Included in the Study

In meta-analysis studies, a general conclusion is drawn from the effect size of each study. In order to examine the effect of STEM education on the students' academic success, 64 studies were included in the meta-analysis process, and the effect size for all studies included in the meta-analysis was calculated. Findings regarding general effect size and heterogeneity were given in Table 2.

Table 2: Regarding the effect of STEM education on academic success

		95% Confidence Interval			**Test of Mean**		**Heterogeneity**	
Model	k	Effect Size	Lower	Upper	Z	p	Q	p
Fixed	64	0.766	0.714	0.817	29.197	.000	802.686	.000
Random	64	1.150	0.958	1.343	11.733	.000		

As seen in Table 2, heterogeneity test is significant (Q model= 802.686; df (Q) = 63; p= .000). On the other hand, I^2 value above 75% is an indicator of high heterogeneity (Higgins & Thompson, 2002), I^2 value can be interpreted that it is 92% highly heterogeneous (I^2= 92.151). The examination of the obtained data showed that the effect size was 0.766 by the fixed effect model, and the random effect model effect size was 1.150, and was significant (p=.00<0.5). The latter corresponds to a "large effect" value according to the effect size classification of Cohen et al. (2007). A forest plot of the studies demonstrating the distribution of effect size values calculated by the random effects model was shown in Figure 3.

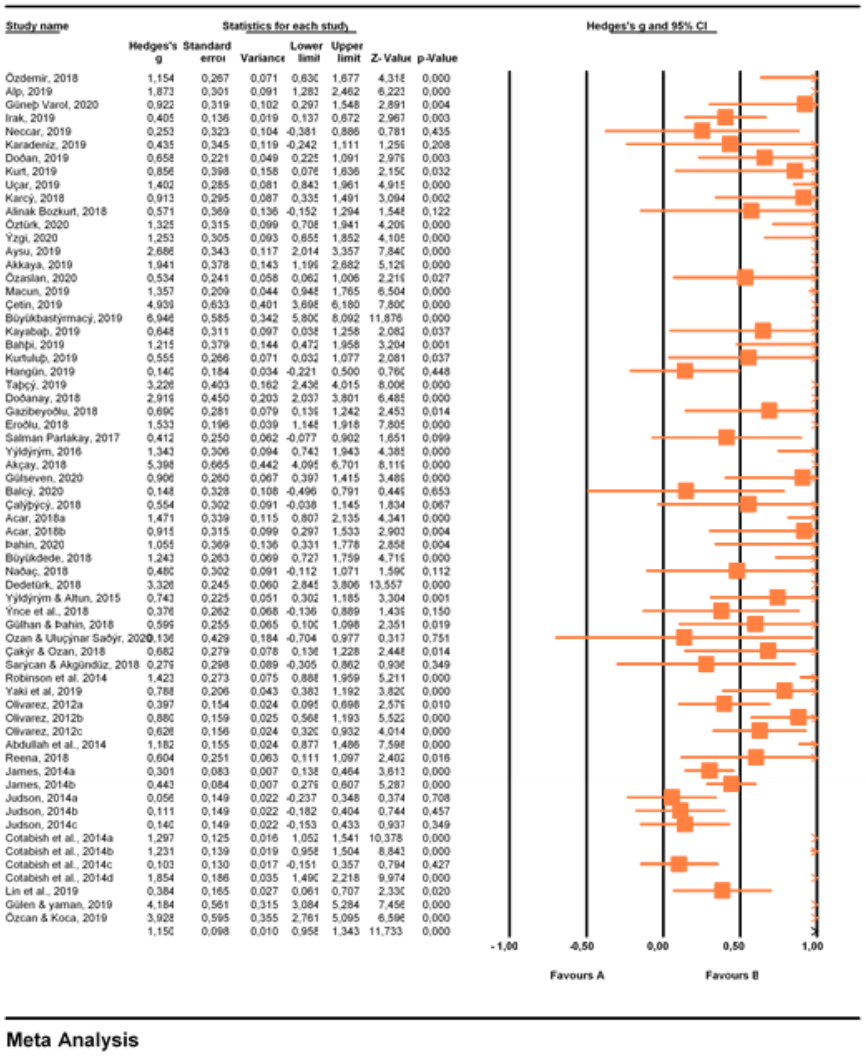

Figure 3. Forest plot demonstrating the distribution of effect size values

In the forest plot, the part determined with black vertical lines indicates the effect size of the relevant study in the meta-analysis, while the horizontal lines around it indicate that the effect size of that study is in the 95% confidence interval. In other words, the longer the horizontal line, the larger the confidence interval. According to the forest plot given in Figure 3, it is seen that the study with the largest confidence interval was attributed to Ozan and Uluçınar Sağır (2020), while the study with the smallest confidence interval was published by James (2014c).

When Figure 3 is examined in terms of effect sizes of the studies included in the meta-analysis, the study of the lowest effect size (g= 0.111) belongs to Judson (2014b), the largest belongs to (g= 6.946) Büyükbastırmacı (2019). While 41 studies (63.07%) have effect sizes below the average effect size, it is seen that 24 studies (36.92%) have a value above the average effect size of the study.

Publication Bias

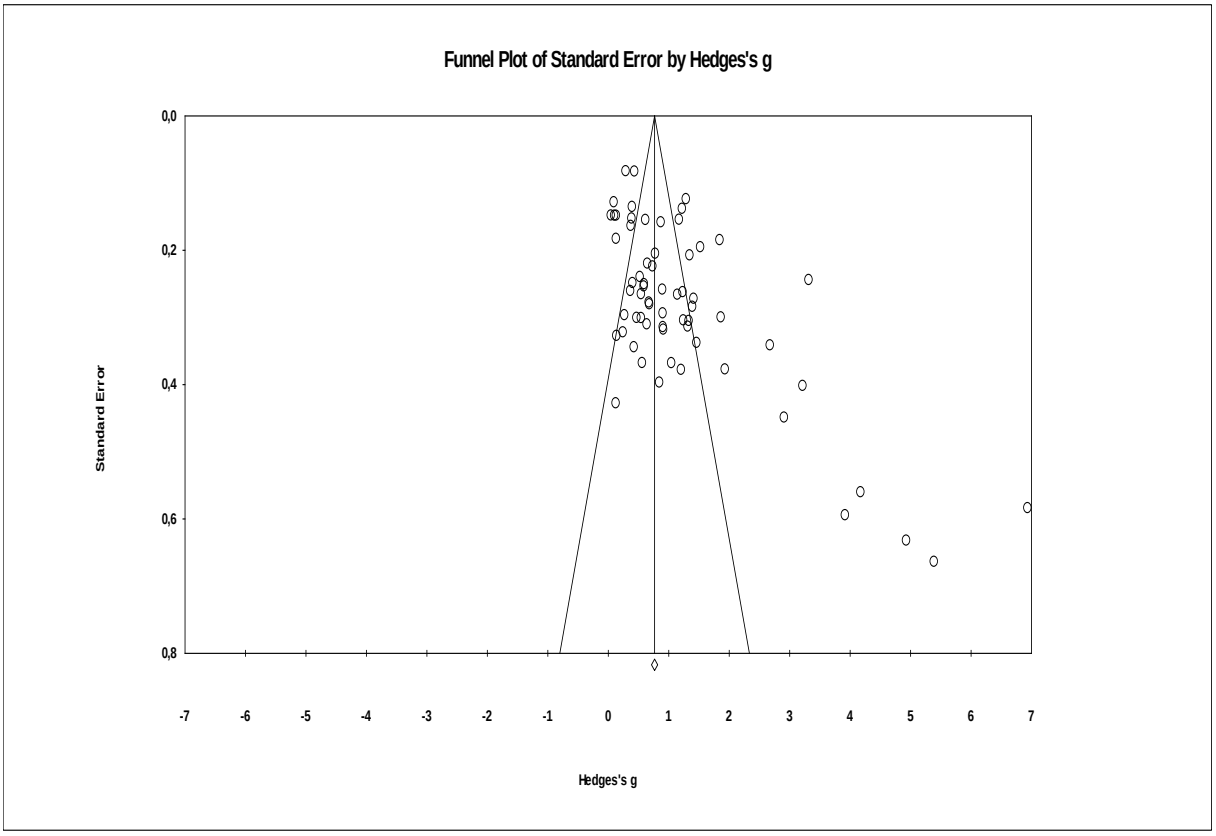

Figure 4. Funnel plot of standard error by effect size

Publication bias was evaluated using a funnel plot, the classic fail-safe N, and Orwin's fail-safe N. As shown in Figure 4, it was found that the funnel plot had a symmetrical distribution. Therefore, there was no publication bias in the present meta-analysis. The results of the classic fail-safe N indicated that 6115 missing studies would be needed to nullify the effect size, which was far larger than 330 (5k+10). Furthermore, the result of Orwin's fail-safe N revealed that 4747 missing studies would be needed to reduce Hedges's g to a trivial level (0.01). Therefore, the findings indicated that this meta-analysis was not affected by publication bias.

Findings Regarding Moderator Variables

Publication type, discipline, application period, and education level were determined as moderator variables to explain the founded heterogeneity. Moderating effect of these variables was given in Table 3.

Table 3: Analog ANOVA findings of the effect of STEM education on academic success according to the moderator variables

Moderator Variable	Heterogeneity between groups (Q_b)	p	K	Effect Size	Confidence Interval (95%)	Standard Error
Publication type						
National	7.229	0.007	47	1.1155	[0.904; 1.407]	0.18
International			17	0.083	[0.447; 0.918]	0.09
Discipline						
Science	21.394	0.000	47	1.156	[0.929; 1.383]	0.18
Mathematics			11	0.607	[0.324; 0.889]	0.11
Physics			3	1.140	[0.247; 2.033]	0.64
Other			3	0.290	[0.033; 0.612]	0.08
Application Period						
2-5 weeks	4.167	0.244	22	1.189	[0.794; 1.056]	0.33
6-9 weeks			20	0.830	[0.655; 0.845]	0.06
10-13 weeks			14	1.164	[0.665; 0.826]	0.23

14 weeks and above			8	0.832	[0.407; 0.661]	0.48
Education Level						
Primary school	1.929	0.587	7	1.055	[0.630; 1.481]	0.20
Secondary school			46	1.032	[0.808; 1.256]	0.17
High school			6	1.022	[0.541; 1.504]	0.23
University			5	0.749	[0.387; 1.111]	0.12

When Table 3 is examined, it is seen that 47 studies were national and 17 were international studies. Accordingly, there was a statistical difference between the effect sizes in the publication type (Q_b= 7.229, p= .00< .05). This difference is favored by national studies that have the highest effect size (g= 1.155). In other words, it was revealed that STEM education was found more effective on academic success in national studies. It is worth noting that national experimental studies that were carried out to investigate the effect of STEM education on academic success reached higher positive scores rather than international studies reached.

The effect of STEM education on the academic success were investigated on science in 47 studies, mathematics in 11 studies, physics in 3 studies, and other branches in 3 studies. Table 3 shows that there was a significant difference in the experimental group according to the discipline that the STEM education applied (Q_b= 21.394; p= .00 < .05). The meta-analysis shows that STEM education has a higher effect in the discipline of science (g= 1.156) than in mathematics (g= .607), physics (g= 1.140), and other disciplines (g= .290). Accordingly, it was interpreted that the effect size of STEM education on academic success differs with the difference in the discipline where the application is done.

The STEM education whose effect was to be measured was applied in 22 studies for 2-5 weeks, in 20 studies for 6-9 weeks, in 14 studies for 10-13 weeks, and also in 8 studies for 14 weeks, and above. Table 3 shows that while the highest effect size (g= 1.189) was performed between 2-5 weeks, the lowest effect size (g = 0.830) was performed for 6-9 weeks. However, the results in the Table 3 indicate that there was no significant difference according to the application period variable (Q_b= 4.167; p= 0.244 > .05). That is to say, the effect size of the STEM education on academic success doesn't differ according to the application periods of it to the experimental groups.

It is assumed that 7 studies were carried out at the primary school level, 46 studies at the secondary school level, 6 studies at high school, and 5 studies at university. The highest effect size is at the primary school level (g= 1.055), and the lowest effect size is at the university (g = 0.749). Accordingly, it can be said that there was no significant difference according to the education levels of the studies (Q_b = 1.929; p= 0.587> .05). Accordingly, it can be interpreted that the effect size of STEM education doesn't differ depending on the education level in which STEM education was applied.

DISCUSSION

Along with the developments in the 21st century, STEM education both aims to provide questioning, and learning by doing, and experiencing in the fields of science, technology, engineering, and mathematics, and to create an original product. In this way, students contribute not only to learning but also to the economic development of countries by understanding how to use this information (Gonzalez & Kuenzi, 2012). Furthermore, STEM education aims to raise a productive, scientifically literate society by adopting rapidly developing technological, and scientific changes (Bray, 2010).

STEM education is currently applied to increase the rate of students choosing professions in STEM fields, and also to increase their literacy in STEM fields, and to enable them to benefit from this information while solving problems in daily life (Thomasian, 2011). On the other hand, STEM education aims not only by using the disciplines of science, technology, mathematics, and engineering together, but also to acquire some skills called 21st century life skills which are generally being able to cooperate, communicate, think critically, and creatively (Yıldırım & Altun, 2014). Bybee (2010) stated that STEM education paves the way for having 21st century skills as being able to easily solve daily life problems encountered, having a different perspective, and analysis ability, and being more successful individuals. In order to keep up with the age's requirements, it is vital to acquire these skills, thus this emphasizes the importance of STEM education. For this reason, a lot of researches has been carried out on the STEM education recently, and different results have been acquired. That's the main reason why a meta-analysis study was needed in order to gather these results under a single roof, and show the big picture to readers, and researchers. This study aimed to determine the effect of STEM education on the academic success of students with the method of meta-analysis. In this context, 64 findings out of 56 studies that measure the effect of this education on student success with the experimental method and meet the criteria were included in the meta-analysis process. As a result of the analysis, the distribution of the studies included in the meta-analysis (Q value= 802.686, degrees of freedom= 63, p= .000) was found to be heterogeneous. On the other hand, since it is known that a value

of I^2 above 75% means that it is highly heterogeneous (Higgins & Thompson, 2002), I^2= 92.151, and 92% proved to be highly heterogeneous. Hence, this result confirmed that high heterogeneity of the effect size may come from the variety of the design, type, application period, assessment, population, and quality of the selected studies. As a result of the analysis, it was observed that only disciplines and publication type explained a significant degree of effect size heterogeneity among the moderator variables that were determined to explain the heterogeneity.

Based on the knowledge that it is more appropriate to use the random-effects model in the field of social sciences (Field, 2010), the findings in this study were interpreted accordingly. The average effect size of the studies included in the meta-analysis was g= 1.150; p =.00 was found, according to Cohen's (1988) classification, it was concluded that there was a large effect. In other words, STEM education has a high level of positive effect on students' academic success. Similarly, Ayverdi and Öz-Aydın (2020) conducted a meta-analysis with 38 studies which are on the effects of STEM education on learners' academic success, and reached a large effect. On the other hand, Yücelyiğit and Toker (2021) conducted a meta-analysis on STEM education on early childhood education, and they reached a moderate effect size. However, Saraç (2018) conducted a meta-analysis on 58 effect sizes, and reached a weak effect. It can be interpreted that the number of experimental studies in Turkey which are carried out to investigate the effect of STEM education on students' academic success increased recently, that's why the results of meta-analysis may vary. When meta-analysis studies conducted abroad on this subject are examined, Becker and Park (2011) reached an effect size of .63, D'Angelo et al. (2014) reported an effect size of .62, Belland et al. (2016) found an effect size of .46. Accordingly, it is possible to comment that national experimental studies that measure the effectiveness of STEM education on academic success has reached a positive effect. Regarding this comment, our present study is considered to contribute a more meticulous perception of the impact of this type of education on learners' achievement compared with the traditional learning approach.

Publication Type

Since a vast number of studies have been conducted to investigate the effectiveness of STEM education on academic success recently, publication type as national, and international studies was selected as a moderator variable to explain the founded heterogeneity. It was reached that there is a significant difference according to the publication type. In other words, the effect size of the STEM education on academic performance differs with the publication type of studies. The meta-analysis concluded that the effect size of STEM education on academic success differs according to the publication type in favor of national studies. Saraç (2018) and Ayverdi and Öz-Aydın (2020) conducted a meta-analysis on STEM education and reported the similar results with the present meta-analysis.

Discipline

The studies included in meta-analysis were conducted in STEM disciplines. These were science, mathematics, physics, and other disciplines. It is worth noting that since there was only one study carried out in some disciplines such as language, reading, art, these were categorized under the "other" group. It was concluded that STEM education has the highest effect size in the discipline of science. It was inferred that there is a significant difference according to the discipline to which the STEM education was adopted. In other words, the effect size of the STEM education on academic success differs with the discipline that the STEM education was used. The present study confirmed that the discipline of science has high effect size and this result is supported by the findings of Saraç (2018). Similarly, Becker and Park (2011) reported that the highest effect sizes belonged to mathematics and science achievement. When it is considered that the studies on STEM education were carried out in science classes (Cotabish et al., 2014; Gülhan & Şahin, 2018; Gülseven, 2020; Olivarez, 2012; Ozan & Uluçınar Sağır, 2020; Reena, 2018; Sarıcan & Akgündüz, 2018), this can be interpreted as an expected result. In this respect, it is possible to comment that experimental studies that measure the effect of the STEM education on science achievement have reported a positive effect. Our present study is considered to contribute a more meticulous perception of the impact of this type of education on learners' science achievement compared with the traditional learning approach.

Intervention

In this meta-analysis study on the effect of STEM education on academic success, the duration of applying the education to the experimental group was determined as another moderator variable. It was understood that there was no significant difference according to the duration of intervention. In other words, the duration of applying the model to the experimental group did not affect the average effect size. Moreover, the present study revealed that the short intervention duration (2-5 weeks) produced the largest effect size. Siregar et al. (2020) reached a similar result in their meta-analysis by confirming that short term intervention has the highest effect size rather than long term.

Education Level

The studies included in the meta-analysis consisted of studies conducted at primary, secondary, high school, and

university levels. However, no significant difference was reached, and it was concluded that the teaching level could not explain the effect of STEM education on academic achievement. Similarly, Siregar et al. (2020) determined the teaching level as the moderator variable in their meta-analysis, the findings of this study supports this result. In contrast with the present meta-analysis, Belland et al. (2017) determined education level as a moderator variable, and reach a significant difference in favor of adult learners whereas Becker and Park (2011), Ayverdi and Öz-Aydın (2020), and Saraç (2018) reported a significant difference in favor of young learners. The present meta-analysis shows that the highest effect size belongs to primary and secondary school level however significant difference could not be reached.

CONCLUSIONS AND IMPLICATIONS

To conclude, STEM education has the vital importance to be applied in order to raise individuals having 21st century skills. With the advancement of science and technology, it is expected to raise individuals with these skills such as creativity, critical reasoning, research and questioning, cooperation and problem solving. Today's century expects students to be productive and problem-solving individuals. STEM education has emerged on the education scene because it provides these competencies and approaches problems with a totalitarian perspective (Bybee, 2010). STEM education is universal; focuses on literacy skills such as creative thinking, critical thinking, problem solving, and collaborative work. It is essential that these skills are acquired by the individual. STEM education paves the way for being creative, productive, thinking critically, and analytically in the field of science, technology, engineering, and mathematics. This situation creates a need to examine the research findings based on the effects of STEM education on academic success. These findings are very promising and provide insight into the implementation of the STEM education in the future. This study concluded by the large effect size according to Cohen's classification. On the other hand, it is understood that the effect size differs with the discipline in favor of science. Consequently, this paper emphasized that STEM education paves the way for academic achievement especially in science. It is considered that this study contributes to the literature and sheds light for researchers and readers to apply STEM education especially in science education.

In the light of the findings obtained at the end of the research, it was seen that the effect size of the STEM education on the academic success of the students was at a high level. In line with the results obtained, it was deemed appropriate to make the following suggestions:

- As a result of the analysis, it was understood that STEM education had a large effect on the academic success of the students. For this reason, the use of STEM education in educational environments should be encouraged, and the necessary infrastructure, and facilities should be provided.
- In order to encourage meta-analysis studies, and reach reliable results, researchers may be advised to clearly write values such as mean, standard deviation, and sample size in their studies.
- It was understood that the discipline was a distinctive variable on academic success of the STEM education. It was found that studies applied to the disciplines of science had higher effect sizes. For this reason, it can be suggested that the application of STEM education in especially science classes should be encouraged.
- This meta-analysis study focuses on publication type, education level, application period, and discipline as moderator variables. Future studies can focus on different aspects.

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NOTE: References marked with '*'indicate studies included in meta–analysis.

The Effects of Micro-Reflective Teaching Practices on the Professional Skill Development of Pre-Service Physics Teachers

Demet BATMAN
Independent Researcher, Trabzon, Turkey
batmandem@yahoo.com
https://orcid.org/0000-0001-6209-7045

Ahmet Zeki SAKA
Department of Maths and Science Education, Fatih Faculty of Education, Trabzon University, Trabzon, Turkey
azsaka@gmail.com
https://orcid.org/0000-0002-0562-3640

ABSTRACT
The aim of this study is to find out the effects of micro-reflective teaching practices on the professional skill development of pre-service physics teachers. It was planned as an experimental study with one group pretest-posttest and supported by the case study method. The data were collected by using professional skill scale, observation form and reflective diaries. The sample of the study composed of 13 (6 female, 7 male) pre-service teachers were studying in a Physics Teaching Program in an education faculty in north-eastern Turkey. Each pre-service teacher implemented 5 micro-reflective teaching practice within the scope of the research. These practices were recorded by the camera. At the end of each practice pre-service teachers watched themselves and wrote their reflective diaries. The data obtained from the scales and the observation form were analyzed by using the Wilcoxon Signed Rank Test, and the data acquired from the reflective diaries were examined based on interpretive analysis. The findings based on the data obtained from the professional skill scale, observation forms and the reflective diaries indicate that micro-reflective teaching practices help improve pre-service physics teachers' basic professional skills; subject matter mastery, planning, communication, classroom management, and evaluation.
Keywords: Micro-Reflective Teaching, Pre-Service Physics Teacher, Professional Skill Development, Teacher Education, Reflective Diaries.

INTRODUCTION
In today's rapidly-changing age of information, the qualifications expected of teachers are changing as well. This requires teachers to constantly update their knowledge and gain the qualifications necessitated by the current age (Gökalp, 2004). Today, teachers intended teaching methods and techniques effectively in particular (Kavas, 2009). In order for pre-service teachers to determine effective teaching behaviors and to analyze their own teaching behaviors to make them effective, it is essential that they are provided the teaching experiences whereby they can demonstrate their professional skills in teacher training programs (Savran-Gencer, 2008). However, in the process of teacher training, most of the information is presented to the pre-service teachers in a theoretical way, and observation and practice work they carry out in schools is insufficient for them to transfer their theoretical knowledge into practice (Karaman, 2014; Kuran, 2009). Therefore, the pre-service teacher education process aims to raise pre-service teachers' professional competence to the highest level possible through feedback, and to give them the necessary professional experience before they can apply it to the real classroom environment (Batman, 2017).

The research conducted on effective teacher experiences, teaching methods applied, and teacher professional development (Amobi, 2005; Bower, Cavanagh, Moloney, & Dao, 2011; Çakır, 2010; Jay & Johnson 2002; Kpanja, 2001; Scheeler, Ruhl, & McAfee, 2004; Spurgeon & Bowen, 2002) strongly emphasizes that it is necessary to provide high-quality feedback on teaching practices. Techniques on how to provide feedback on the teaching process are classified as observations, checklists and video recordings by expert instructors or peer groups (Atay, 2003; Westhuizen & Smith, 2000; Zeichner & Wray, 2001). Especially with the advanced technology, the use of video recordings in teacher training has become very popular (Batman, 2017).

Micro teaching practices, which are small lesson practices that provide teaching experiences, develop students' analysis skills when supported with video recordings (McAleese & Unwin, 1997; Kavas, 2009). Micro-teaching practices help students understand innovative education by collaborating with peers and reducing their anxiety levels by getting feedback from their teacher (Alıncak, 2016; Fernandez, 2005; Kuran, 2009; Şen, 2009). Since they offer the opportunity to observe to what extent prospective teachers are able to implement their professional knowledge and skills, micro teaching practices are crucial factors worth examining in terms of how pre-service

teachers view the process of micro-teaching, and the level of success they have in making up for their shortcomings by considering the feedback and corrections given to them (Kuran, 2009). Moreover, most teachers who have just begun their professional career fail to apply their skills they gained during their undergraduate education to their professional environment, which is partly caused by lack of practice and an overemphasis placed on the theoretical courses in schools of education (Batman, 2017; Dedeoğlu, Durali, & Tanrıverdi-Kış, 2004; Taneri & Ok, 2014). This necessitates a greater inclusion in teacher training programs, which will help education faculties achieve their teacher training objectives and enable pre-service teachers to develop their professional skills as best as possible (Batman, 2017; Sancar & Deryakulu, 2020).

Performance measures such as self and peer assessment, which reflect the professional skill development of pre-service teachers, provide an alternative to the limitations of traditional assessment methods. The micro teaching method used in performance evaluation is implemented in an environment similar to simplified and real class environment in order to provide immediate feedback to the pre-service teachers about their teaching. This method, which is based on the experience of pre-service teachers, emphasizes video-recording of teacher practices, ensuring an analysis of what is missing by viewing video records and scoring pre-service teacher practices to improve their success (Kuran, 2009; Küçükoğlu, Köse, Taşgın, Yılmaz, & Karademir, 2012; Sherin, 2000). Thus, it is clear that micro teaching practices offer professional experiences for pre-service teachers. Experience is considered as a significant part of reflective thinking as well. However, only experience by itself is not sufficient for professional development and individuals can only improve when they reflect on their experiences (Dervent, 2012; Posner, 2005). On the other hand, it is stated that reflective thinking skills should be gained to teachers before the service, that is, during their education in education faculties (Eğmir, 2019).

Reflection is defined as a process or activity in which any experience is recalled, reflected, and widely evaluated for a purpose. The reflection process involves conscious recall and review of experience for planning, implementation, evaluation and decision making as a response to past experiences. In addition, this process consists of sections such as itself of events, being remembered the events, and reacting by reviewing (Richards, 1991; cited in Batman, 2017).

Güney (2008) has defined “micro-reflective teaching method” by synthesizing micro teaching and reflective teaching and as a modern, innovative, questioning teaching method. In the micro-reflective teaching method, which is a similar method to micro teaching, there is a controlled teaching environment. The concepts, skills and behaviors to be taught to students are determined in advance and presented in the classroom environment supported by various informatics tools. These tools have feedback, such as computers, CDs, and cameras. Pre-service teachers are recorded on the camera while they are teaching the lesson and then they are provided to reflect by watching these recordings (Güney & Semerci, 2009).

Research indicates that the most meaningful and effective teacher education programs combine theory and practice by using reflective instruction (Adler & Goodman, 1986; Kuran, 2009; Lanier & Little, 1986; Tarman, 2012; Yıldız, 2013; Yılmaz, 2013). Clearly, there is an urgent need for a study on micro-reflective teaching to help pre-service teachers to better prepare for teaching with self-confidence. To date, micro-reflective teaching research has been very limited in Turkey (Güney, 2008; Güney & Semerci, 2009; Akkuzu & Akcay, 2011) and these researchs’ samples consisted of only pre-service Turkish and Chemistry teachers. It seems necessary to find out the effect of microteaching on pre-service physics teachers’ professional skill development. In addition, the number of studies focusing on micro teaching and reflective thinking together and aiming to examine the professional skills development of Turkish pre-service physics teachers is quite low. Therefore, this study seeks an answer to the question "What are the effects of micro-reflective teaching practices on the professional skill development of pre-service physics teachers?"

METHOD

In this section, the research design used in this study, the sample, the data collection tools, and the data analysis are presented.

Research Design

The present study, which employs qualitative and quantitative methods for the data collection and data analysis procedures, was planned as a simple experimental study with single group pre-test/post-test. Robson (1998) emphasizes that scales do not elicit adequate information about teacher practices; and therefore, applying the case study method may yield a deeper analysis by strengthening the simple experimental method. Due to the limitations inherent in the simple experimental design, the case study method was also applied.

Quantitative and qualitative research methods are based on two different paradigms. These paradigms present us with two different windows with strengths and weaknesses. For this reason, using these two methods as a complement to each other helps to understand social events and phenomena (Yıldırım & Şimşek, 2005). In this research, qualitative data are used to support, confirm, explain and reinterpret quantitative results.

Research Group

The sample group of the study consisted of 13 pre-service teachers (6 female, 7 male) studying in their 4th (senior) year of Physics Teaching Program of the Department of Maths and Science Education at Education Faculty at an university in the north-eastern Turkey. The experiment was conducted during the Spring semester of 2013-2014, and Fall and Spring semesters of 2014-2015, was carried out during the delivery of the "Special Teaching Methods-II", "School Experience", and "Teaching Practice" courses.

Data Collection

The data collection tools used in this study, the implementation process, and the analysis of the data obtained are explained in detail below.

Data collection tools

- Professional Skills Scale was used to measure the teaching skills of the pre-service teachers. This scale was filled by pre-service teachers before the first and after the fifth practices.

Professional Skill Scale (PSS): It was developed by Kılıç (2006) based on the teaching skills assessment scale determined by YÖK (The Council of Higher Education in Turkey) / World Bank National Education Development Project and consists of a total of 39 items under six dimensions: Subject matter mastery (4), planning (4), teaching process (12), communication (8), classroom management (7), and assessment (4). The scale has the following grading: zero (0) is given for the behavior that is not exhibited at all, and the following scores are given from the worst to the best behaviors exhibited: 1 (low), 2 (middle), 3 (good), and 4 (very good). The reliability analysis for the scale revealed its reliability to be .75.

- Video records, an observation form and reflective diaries were used to reveal the self and peer assessments of the pre-service teachers.

Reflective Diary Form Based on Video Records: Pre-service teachers' 15-25 minute micro-reflective teaching practices were recorded by the researcher in each practice session, and at the end of each practice session, a copy was given to the pre-service teachers. Thus, the pre-service teachers were able to watch their own teaching practices and write their reflective diaries which based on self-assessment. Structured diaries were used in the study. The questions on the reflective diary form were developed by drawing from the related research (Çakır, 2010; Oner & Adadan, 2011). The questions developed by the researcher for the purpose of self-assessment to be done after the each practice by the pre-service teachers were examined by two academics who are experts in their field and finalized (19 questions) according to the data obtained in the piloting phase.

Observation Form: In the evaluation of pre-service teachers by peers and experts, the Micro Teaching Evaluation Form was used in the Faculty-School Cooperation Guide (YÖK, 1998). This form consists of 17 items; 9 of which are in the Lesson section and 8 of which are in the Presentation section. The items which are in the Lesson section are rated with "Yes", "Partially" and "No" categories, from positive to negative, and those in the Presentation section are rated with "Good", "Satisfactory" and "Attention required" categories. To increase reliability, the observation forms used in peer assessment were also used by the researcher.

Research procedure

During the first two weeks of the 2013-2014 academic year Spring semester, in the Special Teaching Methods-II Practicum course, the pre-service teachers were informed by the researcher about micro teaching, reflective thinking and planning of the practices they will carry out during the semester (theories, models, methods and techniques to be used, units, learning outcome selection and duration). At the end of this two-week period, units were assigned to the pre-service teachers.

The units of the 2013 high school physics curriculum implemented in the 9th, 10th, 11th and 12th grade (Material and its Properties, Force and Motion, Energy, Heat, and Temperature, Pressure and Lifting Force, Electricity and Magnetism, Waves, Optics, Simple Harmonic Motion, Regular Circular Motion, Wave Mechanics, Modern Physics, Introduction to Atomic Physics, and Radioactivity) were distributed to the pre-service teachers. This unit distribution process was repeated by the researcher at the beginning of the second semester (in the Fall term of 2014-2015 academic year), and in the last semester (in the Spring term of 2014-2015 academic year). However, in this last semester, the pre-service teachers were free to choose one of the units they had previously taught. The

pre-service teachers performed five micro-reflective practices: two in each of the first two semesters and one in the last semester. Pre-service teachers were provided to complete their recent practices before the first practices they would do in practice schools.

The implementation phases shown in Figure 1 were conducted during three semesters in the Special Teaching-II (pilot practice) and the School Experience and Teaching Practices courses. It was thought that the longer implementation time than the studies in the literature and a higher number of practices in the study would contribute to its reliability. The pre-service teachers were asked to write a diary after each practice in order to enable them to reflect on their experience. To find out the individual developments quantitatively, at the end of the three-term implementation process, the scale applied in the first implementation period was applied again.

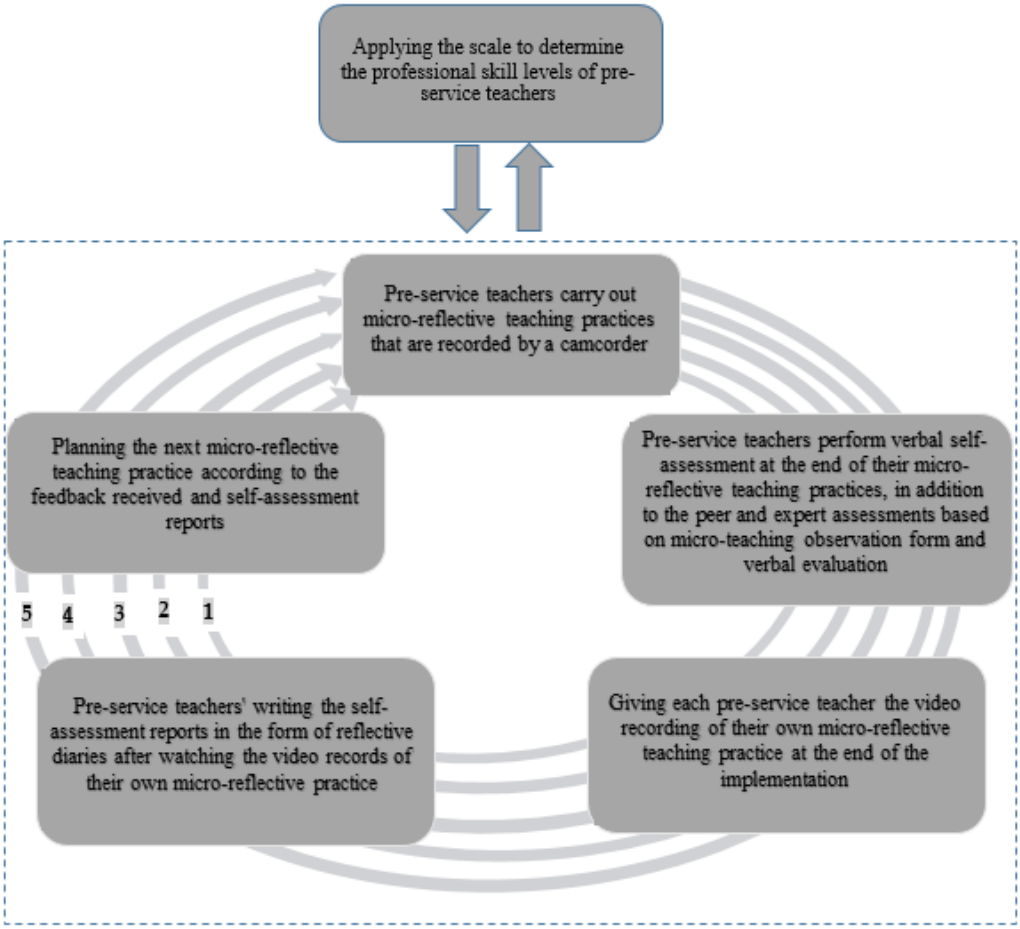

Figure 1: The Cyclical Structure Taken into Consideration During the Implementation of the Study (Batman, 2017)

The Role of the Researcher

At the beginning of the implementation, preliminary information, and distributing of the units processes expressed in “Research procedure” subheading carried out by the first researcher. Also, the applying process had managed and at the time of the teaching practices the camera recording, and expert assessments based on observation form had done by her. Add to this, she transferred the video recording on computer after each course and copied for the pre-service teachers. Then, each lesson (micro-reflective teaching) plan had evaluated by the researcher. Lastly, she analysed the reflective diaries and the other data collected from the pre-service teachers.

Data Analysis

Since the Professional Skill Scale (PSS) completed by the pre-service teachers in approximately 15-25 minutes has six sub-dimensions, the data were analyzed by taking into consideration the total scores from each sub-dimension and the mean scores of each sub-dimension. The "Yes", "Partially" and "No" categories in the Course section of the Micro-Teaching Observation Form used in the evaluation of peers and experts during the micro-reflective teaching practices were scored with “2, 1 and 0,” and the "Good", "Satisfactory" and "Attention required" categories in the Presentation section were scored with “2, 1 and 0,” respectively. Then, the first and last practice

of each pre-service teacher were scored by calculating the mean of the total scores given by the peers and the researcher for the Course and Presentation sections.

Since the analyses using the above-mentioned scores revealed that N(13)≤30, Wilcoxon Signed Ranks Test for Associated Measurements, a nonparametric test that allows comparing the mean scores in the related measurements, was used. The results obtained from the analysis of the SPSS 16.0 package program are presented in tables. The significance level was received as 0.05 in all the statistical analyses conducted. In order to calculate the interrater reliability rates of the observations made in peer and expert assessment, an evaluation of each pre-service teacher was selected randomly and compared with the expert assessment. These reliability percentages, which are calculated to determine the consistency between the data evaluated by different observers (Çepni, 2007), were found to be between 70.59% and 94.11% (0.71 to 0.94), indicating a high level of interrater reliability.

Reflective diaries, which were kept separately by the participants for each practice, were closely examined by assigning first-level codes and revealing the major themes, based on interpretive anlysis. To show the codes, themes, and data clearly, tables based on the category-based data display were created. To ensure the reliability in the analysis of the reflective diaries, the diaries selected randomly were also coded by an expert who was familiar with the practices and had qualifications similar to those of the researcher. By taking the common and non-common codes into consideration, the coefficiency of consistence was found to be 0.88, showing a high degree of reliability among the researchers.

RESULTS and DISCUSSION

In this section, the findings obtained by analyzing the quantitative and qualitative data collected through reflective diaries based on video recordings, PSS, and Micro Teaching Observation Form are presented, followed by a discussion of these findings and comparisons with the related studies in the literature.

Findings and Discussion about the Professional Skill Scale (PSS)

The results of Wilcoxon Signed Rank Test, indicating whether there is a significant difference between "Subject matter mastery", "Planning", “Teaching Process”, “Classroom management”, “Communication”, and “Evaluation” skills of pre-service teachers before and after the micro-reflective teaching practices, are showed in Table 1.

Table 1: The Results of the Wilcoxon Signed Rank Test of Subject Matter Mastery, Planning, Teaching Process, Classroom Management, Communication, and Evaluation Sub-Dimension Scores Before and After Micro-Reflective Teaching

Sub-Dimensions	Posttest-Pretest	N	Mean Ranks	Sum of Ranks	z	p
Subject Matter Mastery	Negative Rank	0	0.00	0.00	2.98*	.003
	Positive Rank	11	6.00	66.00		
	Equal	2	-	-		
Planning	Negative Rank	0	0.00	0.00	2.81*	.005
	Positive Rank	10	5.50	55.00		
	Equal	3	-	-		
Teaching Process	Negative Rank	2	2.50	5.00	2.83*	.005
	Positive Rank	11	7.82	86.00		
	Equal	0	-	-		
Classroom Management	Negative Rank	1	2.50	2.50	3.01*	.003
	Positive Rank	12	7.38	88.50		
	Equal	0	-	-		
Communication	Negative Rank	1	2.00	2.0	3.04*	.002
	Positive Rank	12	7.42	89.00		
	Equal	0	-	-		
Evaluation	Negative Rank	1	2.00	2.0	2.43*	.015
	Positive Rank	8	5.38	43.00		
	Equal	4	-	-		

*Based on negative ranks

As can be seen in Table 1, there is a significant difference between the pre- and post-test scores of the pre-service teachers regarding the "Subject matter mastery" ($z = 2.98$, $p < .05$), “Planning” ($z = 2.81$, $p < .05$), “Teaching process” ($z = 2.83$, $p < .05$), “Classroom management” ($z = 3.01$, $p < .05$), “Communication skills” ($z = 3.04$, $p < .05$), and “Evaluation” ($z = 2.43$, $p < .05$) sub-dimentions of the PSS. It is seen that this difference is in favor of positive ranks namely the posttest score for all sub-dimensions (Table 1).

Table 2 shows that the mean of pre-test and post-test sub-dimension total scores of the pre-service teachers in the research group. It is clear that the mean scores increased in the post-test (Table 2).

Table 2: Means of the Total Scores for the Sub-Dimensions

Sub-dimensions	Mean of Pre-test Total Scores	Mean of Post-test Total Scores
Subject Matter Mastery	10,85	13,08
Planning	11,54	13,77
Teaching Process	33	40,39
Class Management	19,92	25
Communication	24,38	28,77
Evaluation	10,92	13,23

There is a significant difference between pre- and post-test scores of the participants for the all sub-dimensions of the PSS (Table 1, Table 2). These differences are in favor of the positive ranks (ie. final test scores), which indicates that micro-reflective teaching practices help pre-service teachers to improve their professional skills. These findings support the participants' ideas on how they would achieve the lesson plan objectives, their explanations on their ability to implement the activities at the level they plan, their statements about the changes they will make if they repeat the practice, and their explanations on the improvements regarding their planning and teaching process skills included in the reflective diaries, and the findings obtained by comparing the peer and expert feedback. In addition, the study conducted by Kuran (2009) to determine the effects of micro teaching on the acquisition of teaching skills and knowledge supports the conclusion that micro-teaching has a great contribution to gaining knowledge and skills related to the profession. In line with these findings, based on his study on the use of micro-teaching in teacher training, Kılıç (2010) confirms that implementation of the micro-teaching model improves the planning, teaching process, communication, classroom management, and evaluation competencies of pre-service teachers.

Findings and Discussion about the Micro Teaching Observation Form

The findings obtained from observation forms filled out by the pre-service teachers and the researcher during the micro-reflective teaching practices are given below.

Findings obtained from peer assessment

The results of the Wilcoxon Signed Rank Test comparing the pre-service teachers' implementation scores of the 'course' and 'presentation' criterias in the micro-reflective first and last practices are presented in Table 3.

Table 3: Results of the Wilcoxon Signed Ranks Test Analysis of the First and Last 'Course' and 'Presentation' Scores

Sub-Dimentions	Last practice-First practice	N	Mean Ranks	Sum of Ranks	z	p
Course	Negative Rank	0	.00	.00	3.18*	.001
	Positive Rank	13	7.00	91.00		
	Equal	0	-	-		
Presentation	Negative Rank	2	7.00	14.00	2.20*	.028
	Positive Rank	11	7.00	77.00		
	Equal	0	-	-		

*Based on negative ranks

As shown in Table 3, there is a significant difference between the scores of the pre-service teachers on the micro teaching observation form's 'course' criteria implementation in the first and last practice ($z = 3.18$, $p < .05$). Similarly, it is clear that there is a significant difference between the 'presentation' skill implementation scores on the micro teaching observation form for the first and last practices ($z = 2.20$, $p < .05$). However, it is seen that these differences are in favor of positive ranks for both sub-dimensions (Table 3).

Findings obtained from expert assessment

The analysis results of the Wilcoxon Signed Rank Test comparing the pre-service teachers' implementation scores for the 'course' and 'presentation' criterias in the micro-reflective first and last practices are showed in Table 4.

Table 4: Results of the Wilcoxon Signed Ranks Test Analysis of the First and Last 'Course' and 'Presentation' Scores

Sub-Dimentions	Last practice-First practice	N	Mean Ranks	Sum of Ranks	z	p
Course	Negative Rank	0	.00	.00	3.19*	.001
	Positive Rank	13	7.00	91.00		
	Equal	0	-	-		
Presentation	Negative Rank	0	.00	.00	3.19*	.001
	Positive Rank	13	7.00	91.00		
	Equal	0	-	-		

*Based on negative ranks

As shown in Table 4, there is a significant difference between the scores of the pre-service teachers for the micro teaching observation form's 'course' criteria implementation in the first and last practices ($z=3.19$, $p<.05$). Add to this, there is a significant difference between the scores received by the pre-service teachers for the micro teaching observation form's 'presentation' skill implementation in the first and last practices ($z=3.19$, $p<.05$). It is seen that these differences are in favor of positive ranks for both sub-dimensions (Table 4).

According to the results of the analysis comparing the scores given by the peers based on the micro teaching observation form (Table 3), there is a significant difference between the pre-service teachers' scores on the 'course' and 'presentation' dimensions for the first practice and the last practice; and considering the mean ranks and sum of the difference scores, these differences favor positive ranks, that is, the last practices. The results of the analysis of the data obtained from the expert assessment also coincide with these findings (Table 3, Table 4). In addition, these findings support the findings obtained from the PSS. Considering the findings obtained, it can be said that the practices performed are helpful in improving the teaching process and presentation skills of the pre-service teachers. Furthermore, these findings support the explanations in the reflective diaries made by the pre-service teachers related to the attainment of the lesson plan objectives, application of the activities at the level they plan, and the changes they will make if they repeat the practices. These findings are also consistent with the results of the study repoted by Kuran (2009). Add to this, according to the results of the research reported by Ceyhun and Karagölge (2002), repeated micro teaching practices similar to micro-reflective practices increase the success of pre-service teachers in practice and enable them to develop their professional skills.

Findings and Discussion Regarding Reflective Diaries Based on Video Recordings

The pre-service teachers were first asked to specify the status of achieving their lesson plan objectives they developed for the micro-reflective teaching practice. In the first implementation, nine pre-service teachers (PsT) thought that they had achieved their goals in the lesson plans, three pre-service teachers reported that they failed to attain their objectives, and one pre-service teacher reported partial success at achieving the objectives (Table 5).

Table 5: Pre-Service Teachers' Opinions on Achieving their Lesson Plan Objectives in Micro-Reflective Teaching Practices

IRGP*	1st Practice	2nd Practice	3rd Practice	4th Practice	5th Practice
Yes	PsT2, PsT3, PsT4, PsT7, PsT8, PsT9, PsT10, PsT11, PsT12	PsT1, PsT2, PsT3, PsT4, PsT6, PsT7, PsT8, PsT9, PsT10, PsT11	PsT1, PsT2, PsT3, PsT4, PsT6, PsT7, PsT8, PsT9, PsT10, PsT11, PsT13	PsT1, PsT2, PsT3, PsT4, PsT5, PsT6, PsT7, PsT8, PsT9, PsT10, PsT11, PsT12, PsT13	PsT2, PsT3, PsT4, PsT5, PsT6, PsT7, PsT8, PsT9, PsT11, PsT12, PsT13
Partly	• Failure to implement the activity due to a technical fault (PsT1)	• Time management (PsT12) • Lack of technological equipment (PsT12)	• Time management (PsT12)		• Time management (PsT1, PsT10)
No	• Making an activity (PsT5) • Excitement (PsT5) • Compliance with the plan (PsT6)	• Being stuck in a question (PsT5)	• Implementing as planned (PsT5)		

	• Being effective (PsT13)

*The idea of reaching the goal of the lesson plan

In the second practice, PsT5 stated that the lesson plan did not reach its goal:

> *"My plan didn't reach exactly reach its goal. Because I was unable to put a question out of my mind during the lesson and this case affected the lesson; I forgot to receive student comments after watching the video".*

PsT12 stated that he could reach the aim partially due to the inadequacy of the technological equipment in the classroom and not managing the time effectively. This statement of PsT12 shows that during the planning of the lesson, he did not take into account the technological equipment in the classroom; to be more specific, the fact that students did not have computers. However, in view of the fact that the pre-service teacher did not encounter such a problem in his later practices, it can be said that he learned the lesson from his experience. PsT5's confusion about a question, which was negatively reflected in the flow of her micro-reflective teaching practice was due to her inexperience, and he later overcame this problem by gaining experience through practice. Similarly, in microteaching practices carried out with pre-service science teachers, it was determined that the candidates could not follow their plans due to excitement, and the reason for this situation was shown to be the lack of experience of the candidates (Babacan & Şaşmaz-Ören, 2018). At the fourth practice, all the pre-service teachers expressed that the lesson plans they developed for the micro-reflective teaching practice had reached their goals. In the last practice, two pre-service teachers reported that the lesson plans partially achieved their purposes due to poor time management, while the other 11 pre-service teachers stated that their plans had reached their goals. Table 5 shows that these two pre-service teachers had successfully managed their time in the previous practices. This might have resulted from the fact that during the fifth (the last) practice the pre-service teachers were bored and did not pay as much attention to the lesson planning as in the previous practices and made plans without considering the time. In this context, it is pointed out that a good balance between the similarities and differences with their previous experiences should be ensured in order to offer new learning opportunities to pre-service teachers (Karlström & Hamza, 2018).

In the first micro-reflective teaching practice, more than half of the pre-service teachers stated that they were not able to implement, or were able to only partially implement the activities at the level they planned (Table 6). PsT9 reported that with the sudden change in the plan he developed on the subject of "Capacitors", he applied the activity at the end of the course instead of throughout the course period, which caused the students to get bored. When PsT9's explanation for this is considered, it can be seen that he was not duly aware that the lesson plan is one of the main factors determining success and that teaching by following the plan is crucial. Considering that the pre-service teacher did not repeat this error after the third practice, it can be said that he acquired the skill to teach the lesson in accordance with the plan. Regarding the first practice, PsT12 expressed the problem of limited time as follows:

> *"...I think some of the things I have to teach remain incomplete due to the limited time. In addition to the questions I asked in order to draw attention before the beginning of the lesson, I had made a video, but I couldn't show the video because of the limited time".*

Table 6: Descriptions by Pre-Service Teachers of their Success at Applying the Teaching Activities in Their Plans

Implementation Status of Activities	1st Practice	2nd Practice	3rd Practice	4th Practice	5th Practice
Yes	PsT2, PsT3, PsT7, PsT8, PsT10, PsT11	PsT1, PsT2, PsT4, PsT7, PsT8, PsT11, PsT12	PsT1, PsT2, PsT4, PsT7, PsT8, PsT11, PsT13	PsT3, PsT4, PsT5, PsT6, PsT7, PsT11, PsT12	PsT2, PsT3, PsT4, PsT5, PsT6, PsT7, PsT8, PsT11, PsT12, PsT13
Partly	• Technical failure (PsT1) • Reflection in action (PsT4) • Change in plan flow (PsT9)	• PsT9 • Technical failure (PsT3) • The selection of method-technique (PsT10)	• Failure in experiment (PsT3) • Question and answer technique (PsT10) • Exclusion from the plan (PsT12)	• On account of material (PsT1, PsT2) • Time management (PsT8, PsT10) • Orienting the course (PsT9)	• Attendance to the course (PsT1, PsT10) • Failure to step out of the plan (PsT9)

			• Time management (PsT12) • Change in the plan flow (PsT9)	• Excitement (PsT13) • Sacking on using board (PsT13)
No	• PsT5, PsT13 • Drawing attention (PsT6) • Time management (PsT12)	• Mastery in the subject matter (PsT5) • Implementing the opposite of the plan (PsT6)	• Technical fault (PsT5) • Lack of material (PsT6)	

This shows that he failed to choose the activity appropriate to the time. However, considering that two other pre-service teachers experienced similar problems with using time in the following micro-reflective teaching practice, but this problem is not reported for the last practice, it can be said that the pre-service teachers' time management skills have improved. Similarly, based on his study on technology-supported micro-teaching practices, Babacan (2016) concludes that pre-service teachers' effective time management skill improves thanks to such practices. As it can be seen in Table 6, regarding the last two practices, all the pre-service teachers were able to implement the activities at the level they planned; the number of those who could partially implement them decreased, and especially in the last practice the number of those who were able to implement the activities at the level they wanted increased. Thus, it can be said that the micro-reflective teaching practices contribute to the skill development of pre-service teachers in terms of implementing the activities in the way they planned.

For the first micro-reflective teaching practice, regarding the changes the pre-service teachers wish to make if they repeat the practice; technique, planning, engaging learners in the introduction phase of the lesson, and communication were highlighted. In the first practice, the PsT5 wanted to make changes to overcome nervousness, but in the second practice he wanted conceal this nervousness. As such, it can be stated that thanks to his experience with the micro-reflective teaching practice, he became aware that even if he may not fully get rid of nervousness, he can still get his nervousness under control. Fernandez and Robinson (2006) also support this conclusion by stating that micro education gives pre-service teachers the opportunity to apply what they learned in the courses at the university, and helps them gain confidence, with relieving their anxiety when they begin their professional career in the real school (Alıncak, 2016).

Regarding the fourth practice, it was found that if they are allowed to do the practice again the pre-service teachers plan to make changes mostly about planning, equipment using, communication skills, and ensuring students' active involvement. Four pre-service teachers also expressed that they did not see any need to make any changes in their practices. Regarding the last practice, five pre-service teachers stated that they found their practices very successful and they did not think it would be necessary to make any changes if they repeated the teaching practice. PsT7 explained this with the following statement:

"I would repeat almost the same presentation. Because it was a very successful presentation".

Thus, it can be defend that the micro-reflective teaching practices increasingly reached the desired level. Erokten and Durkan (2009) also support this sentiment by stating that as a result of repeated microteaching practices, pre-service science teachers were more comfortable in their lectures, were able to solve the problems they encountered while teaching, and their classroom management and communication skills improved.

Regarding the first practice, five pre-service teachers gived reaction positively and three pre-service teachers responded negatively to the question of whether the micro-reflective teaching practices had gone as planned, according to peer and expert feedback. For the fourth practice, 10 pre-service teachers responded positively while there were no negative responses. For the last practice, while there were no negative responses, 11 pre-service teachers responded favorably (Table 7). Based on the increase in the number of positive responses for the last two teaching practices, it can be said that the feedback received by the pre-service teachers during the micro-reflective teaching practices has become more and more positive as time went by. This case shows that the pre-service teachers made remarkable progress towards meeting their expectations in their micro-reflective teaching practices. However, given the fact that not all these pre-service teachers responded positively to the question, it can be said that there are still shortcomings that need to be remedied.

Table 7: The Opinions of the Pre-Service Teachers on the Extent the Micro-Reflective Teaching Practices Went as Planned According to Peer and Expert Assessments

Realization Status of Practice as Planned	1st Practice	2nd Practice	3rd Practice	4th Practice	5th Practice
Yes	PsT2, PsT4, PsT6, PsT11, PsT12	PsT1, PsT2, PsT4, PsT6, PsT9, PsT10, PsT11, PsT12	PsT1, PsT2, PsT3, PsT4, PsT9, PsT10, PsT11, PsT12	PsT1, PsT2, PsT3, PsT4, PsT6, PsT7, PsT9, PsT10, PsT11, PsT12	PsT2, PsT3, PsT4, PsT5, PsT6, PsT7, PsT8, PsT9, PsT11, PsT12, PsT13
Partly	• PsT9 • Time management (PsT10) • Forgetting (PsT7) • Processing fast (PsT7)	• PsT8 • Excitement (PsT5, PsT7) • Communication skills (PsT5) • Mastery in the subject matter (PsT5)	• Minor defects (PsT7) • Pauses (PsT8) • Using board (PsT13) • Formulation (PsT13)	• Planning (PsT5) • Communication (PsT5) • Time management (PsT8) • Summary (PsT13)	• Time management (PsT1, PsT10)
No	• Technical failures (PsT1) • Excitement (PsT1, PsT3) • Fast (processing) finishing (PsT5) • Couldn't having the acquisitions enough (PsT5)	• Time management (PsT3)	• Planning (PsT5) • Answering questions (PsT6)		

In order to help candidates think about the feedback they received for their micro-reflective teaching practices, they were asked to compare the feedback they received for each practice. Regarding the first practice of the PsT1, while receiving negative criticisms about keeping his stress under control, ensuring mastery of the subject, and adjusting his tone of voice and facial expressions to ensure better communication in the earlier practices; in more recent practices, PsT1 received positive feedback about communication (tone of voice and gesture-mimic use), classroom management, mastery of the subject, use of the board, note-taking, excitement-enthusiasm, besides some criticism of his time management. Based on the feedback received by this pre-service teacher, class management, mastery of the subject, use of the board, giving students note-taking opportunities, and communication come to the fore as the skills he has developed. These findings are consistent with the results obtained by Sevim (2013).

It was found that PsT3 received rather negative criticism in his first two practices. However, it is noteworthy that for his fourth practice, he received a criticism in terms of communication because he did not walk around in the classroom, and in the last three practices, he did not receive any negative comments, while the points of criticism directed at him during the first practice have become positive. Thus, it can be said that he showed improvement in calming his nerves, mastery of the subject, use of the board, classroom management and communication skills. The PsT10 stated that he received negative feedback because he did not use the time well and did not give students adequate time to take notes. His comment on the second practice is as follows:

> *"I taught the course in the given time. But I still have shortcomings about note-taking by the students. I also delivered the course with too little enthusiasm. I agree with my friends, I could have been a little more enthusiastic in the class".*

Considering this explanation and the comments on the subsequent practices are examined, it is clear that he could not address his weakness about giving adequate opportunities to students for taking notes, but he was able to turn the criticisms about his time management into positive statements. That the negative statement about the lack of excitement and enthusiasm which was given in the 2nd and 3rd practices, was not given in the ensuing practice, but made again for the last practice suggests that this pre-service teacher failed to show a steady development in this regard. In addition, the fact that in response to the negative criticism on his tone of voice in the last two practices, he reported his plan to be careful about adjusting the tone of voice indicates that he is open to criticism and willing to evaluate the feedback constructively.

It is noteworthy that the PsT11 reflected on the negative criticism he received in his first practice for board use, and that he immediately improved on this in his 2nd practice. Likewise, he was able to convert the criticism on failing to make the lesson fun into a positive statement in the 4th practice and did not receive any negative feedback on this. Based on these findings, it can be said that he takes the feedback in the micro-reflective teaching practices into consideration and is trying to improve himself accordingly. When the findings regarding the comparison of the feedback provided by peers and experts are collectively examined, it is clear that in the period from the first practice to the last practice the negative feedback mostly decreased while the positive feedback increased. These findings support the findings obtained from the micro teaching observation form.

A closer analysis of the findings on the good aspects of the lessons as reported by the participants reveal that PsT6 reported that the lesson plans in the first two practices were good because they expressed the ideas clearly, whereas the third practice was good in terms of relating the subject at hand to the previous subjects, in other words, due to its review step. Therefore, it seems that as the practices progressed, he prepared the lesson plans more appropriately to the stages of constructivist theory and improved his planning skills in the implementation process. A study conducted by Babacan (2016) with pre-service science teachers found that one of the skills that contributed the most to the pedagogical content knowledge of the pre-service teachers during technology-assisted micro teaching practices is 'the skill of constructing a lesson plan according to the constructivist approach'.

According to the findings on the good aspects of the lessons stated by the pre-service teachers, drawing attention of the students to the lesson, engaging students in the lesson, planning, activity and material development-selection-use, language and expression, and communication skills were found to be at the satisfactory level. Also, it is observed that there is a remarkable development from the 3rd practice onwards in the skill of material development-selection-use. Within the scope of the micro-reflective teaching practices, these pre-service teachers were made aware of the good aspects of the lessons by ensuring reflection on their actions, and they endeavored to maintain these aspects, and also made significant progress on their material development-selection-use skills. These findings are supported by the findings obtained by Karaman (2014) and Kılıç (2010).

When the pre-service teachers were questioned to indicate their strengths as a teacher in the process of micro-reflective teaching, PsT4 stated his communication, language and expression, time management, and mastery of the subject as his strengths in the whole practice. He added benefiting from equipment and materials for the 2nd and 3rd practices; and for the 3rd, 4th, and 5th micro-reflective teaching practices, he also added selection of examples and use of the board as his strengths. Thus, it can be said that the PsT4 maintained his strengths gained in the first practice, and progressively improved in his example selection, material and board use skills from the 2nd practice to the last. Regarding his strengths, PsT8 pointed at positive character traits and communication skills, adding that he was able to control his nervousness and had mastery of the subject in his 3rd practice. PsT8's adding self-confidence to positive character traits, and the statements made by PsT6 about the development of teaching process skills in his last practice (now with his improved subject area knowledge, he was able to teach the course more confidently) shows that the pre-service teachers completed their practices by gaining professional self-confidence. These findings are supported by other studies conducted on micro teaching by Alıncak (2016), Babacan (2016), Benton-Kupper (2001), and Şen (2009).

When they are asked to express their thoughts about whether the micro-reflective teaching practices are successful or not, in the first practice, nine pre-service teachers were positive, one pre-service teacher was partially positive, and three pre-service teachers responded negatively. PsT7 and PsT11 stated that the positive feedback they received from the peers led them to think so, while Pst9 stated that he gained lasting experiences thanks to peer evaluation:

> *"…It is lasting and effective for people to learn from their mistakes and the ideas of their friends and being criticized by their peers".*

This finding is confirmed by Şahin (2010), who asserts that reflective teaching creates a social learning environment and thus rendering the learned knowledge more permanent. However, PsT1, PsT2, and PsT13 stated that the practices contributed to gaining experience and to develop professionally. These findings are supported by the research results obtained by Kuran (2009). In the third practice, PsT9 implied that; learning through experiencing, discerning the mistakes by reflection and peer evaluation has been effective in the professional development of him and he gained experience. In Bower et al. (2011), similar to PsT9, they found that there was a significant improvement in self-assessment scores of pre-service teachers in the practice-reflection-feedback cycle. Akıllı (2007) supports this finding by concluding that peer evaluation contributes to improving the quality

of teacher performance. Similarly, PsT13 emphasized that through micro-reflective teaching practices he gained experience and improved communication skills. As stated by PsT11:

"...I think it makes us aware of the being a teacher."

the micro-reflective teaching practices ensured gaining the professional awareness.

Regarding his last practice, despite being more successful than he was in his previous presentation, PsT5 believes that he has shortcomings, which shows that he was able to apply reflective thinking successfully and embraced professional development. Diana (2014) emphasizes this point by stating that the ownership is one of the important elements of professional development, and that many teacher educators should contribute to the professional development of both themselves and novice teachers.

Considering all of the above mentioned findings, it can be said that micro-reflective teaching practices conducted over three semesters help pre-service teachers gain professional self-confidence, experience, and awareness, and to develop professionally. Şen (2009) supports these findings, and emphasizes the fact that pre-service teachers' self-confidence increases as they gain experience through micro teaching implementation. In a similar way, Alıncak (2016) also states that micro-teaching practices are an important factor in developing self-confidence by decreasing stress-related processes such as nervousness and anxiety that pre-service teachers will experience in the classroom environment. Furthermore, the findings bring out that the number of the pre-service teachers who do not think that the micro-reflective teaching practice is successful decreases from the first practice to the last practice; and no pre-service teachers think this way in the last two practices. Based on these findings, it can be expressed that micro-reflective teaching practices help pre-service teachers to gain experience towards developing professional skills, and as they gain experience, they benefit from the practices better.

Regarding the findings about the unexpected events or situations encountered by preservice teachers during their micro-reflective teaching practices, that PsT6 solved an extra question because there was some extra class time in his second practice indicates that he followed the advice frequently given in the post-practice evaluations that a teacher always should be prepared with alternative questions and activities; and that he acted with this awareness by reflecting in action. This shows that PsT6 reflected on and tried to implement the suggestions made by his peers and by the experts. These findings are consistent with the results of the study by Tan, Tan, and Wettasinghe (2011), reflecting the opinions of pre-service teachers on how to transfer the good ideas they have learned during the practices to future teaching practices. Furthermore, the fact that although the battery of the laptop he was using died, the pre-service teacher continued teaching without interruption implies that he was able to overcome unexpected problems by reflecting in action from the 2nd practice onwards. In his study about reflective practices, Dervent (2012) emphasizes that reflections on experiences contribute to pre-service teachers' preparation for future professional life.

When the opinions of the pre-service teachers about their level of development in their planning and teaching process as skills are examined, regarding the 3rd practice, the emphasis placed by PsT13 on taking into consideration the positive and negative situations in peer practice when preparing his plans can be taken as a clear indication of the positive effect of the peer observations in micro-reflective practices. This finding is supported by the results obtained by Benton-Kupper (2001) on micro teaching implementations. Akıllı (2007) also supports this finding and emphasizes that the input from peer observation plays a key role in improving the quality of teacher performance. Likewise, Alıncak (2016) draws attention to the fact that in micro-teaching practices, pre-service teachers try to avoid repeating their peers' mistakes made before their own presentation, and in this way, they are able to deliver better presentations.

An analysis of the pre-service teachers' need for peer help in their practice reveals that two of them (PsT3 and PsT11) needed peer assistance in creating activities and experiments in three of the practices. This could have been due to these pre-service teachers' lack of experience, which indicates that especially in the early years of teachers, there is an urgent need for co-teaching practices as in Finland (Diana, 2014), especially in teaching science (ie. physics, chemistry, biology) courses which involve a lot of experimentation activities.

CONCLUSION

Based on the findings obtained from the Professional Skill Scale and the Micro-teaching Observation Form, it was resulted that the micro-reflective teaching practices are effective in developing pre-service teachers' basic professional skills expressed as teaching process, subject mastery, planning, classroom management, communication, and evaluation skills. However, by considering the findings obtained from the reflective diaries of the pre-service teachers, it was further concluded that whereas micro-reflective teaching practices contribute

significantly to the development of pre-service teachers' planning, teaching process, communication skills, these practices contribute to their mastery in the subject matter and classroom management skills to a lesser extent compared to other skills, and even less to the development of their evaluation skills. These results may have stemmed from the fact that the evaluation processes implemented during and after the practices were carried out on the basis of the observation form, and that the items in the observation form are especially related to planning, teaching process and communication skills.

According to the findings obtained from the reflective diaries, especially in the last two practices, no pre-service teacher remained who could not implement the activities at the level they planned, and the number of those who could partially implement decreased, while the number of those who taught at the desired level growed in the last practice. Therefore, it can be stated that the practices contributed to the development of the pre-service teachers' ability to apply the course by the plan and carry out the activities at the level they plan. Having as many (five) practices as possible, providing immediate feedback in the expert, peer and self assessment processes at the end of each practice, and strictly following the criteria considered in the assessment procedures may have helped attaining this positive result.

Considering the findings of the comparison of the feedback received by the pre-service teachers from their peers and experts, the negative feedback decreased and positive feedback has increased, and the negative fedback given in the earlier practices has become positive. The feedback given during this process helped eliminate the shortcomings of the pre-service teachers and supported the development of their professional skills (especially planning, communication, classroom management, and teaching process). Add to this, when the findings regarding the good aspects of the lessons in the reflective diaries were examined, it was found that, in general, attracting attention, encouraging student participation, planning, activity and material development-selection-use, language and expression, and communication skills were reported to be at a favorable level. In terms of material development-selection-use, a remarkable development was observed from the third practice on. Therefore, it was concluded that the pre-service teachers made efforts to maintain their good level, which they were aware through reflection, and that there was a significant improvement in the teaching process skills especially concerning the material development-selection-use.

As for the opinions of the pre-service teachers on the success of the practices, they reported that the micro-reflective teaching practices conducted during the three semesters were helpful in terms of gaining professional self-confidence and awareness, developing professionally, and accepting the necessity of professional development; and also, as they gained more experience, they were better able to benefit from the practices. Additionally, the pre-service teachers reflected the positive and negative aspects in their peers' practices in their own teaching, which indicates that pre-service teachers not only improve on the basis of their own micro-reflective practices, but also indirectly benefit from others'practices.

A closer look at the reflective diaries show that some pre-service teachers were able to turn the problems they experienced during the practices into positive factors by managing them successfully. Therefore, it can be said that the micro-reflective teaching practices revealed out within the scope of the research achieved the purpose of making the pre-service teachers see and correct their mistakes and deficiencies on criteria such as managing the stress-enthusiasm, using the board, and time management. In other words, these practices enabled professional skill development especially in the teaching process, by encouraging reflection on actions.

Clearly, the pre-service teachers participating in this study were able to reflect the experiences they gained in the practices to their professional skills. However, they experienced some problems, which was normal as well. Although the pre-service teachers made much progress in developing their professional skills during the study, there are many other experiences, knowledge, and skills that they need to acquire.

It should also be borne in mind that the formal inclusion of such micro-reflective teaching practices in the teacher education process, especially as part of the "Special Teaching Methods I-II" and "Teaching Practice-I" courses, can have positive effects. By finding out the extent prospective teachers can reflect their professional skills in the courses they teach in practice schools within the scope of the Teaching Practice course, the contribution of such micro-reflective practices to pre-service teachers' professional skills development can be determined more conclusively. In addition, by conducting in-depth studies with narrower focus, for each of the subject matter mastery, planning, communication, classroom management, evaluation and teaching process skills of pre-service teachers, micro-reflective teaching practices can be evaluated for the level of improvement.

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The First Steps of Distance Learning in Italy: From Radio to Television and E-Learning

Delio DE MARTINO
Università di Foggia, Italy
delio.demartino@unifg.it
ORCID ID: 0000-0003-3107-1816

Ezio DEL GOTTARDO
Università di Foggia, Italy
ezio.delgottardo@unifg.it
ORCID ID: 0000-0002-5214-7755

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ABSTRACT
In the history of distance learning in Italy a crucial time is represented by the pre-history. After the mail-based learning an excursus relative to the second phase of distance learning in Italy corresponds to the development of radio and television and their pedagogical use to defeat the invasive illiteracy.

Radio rurale, the first experiment of distance learning promoted by fascism (1920), *Non è mai troppo tardi* (1960), the first Tv program for adult learning and the birth of Raitre (1979), the first mainstream cultural channel with the *Dipartimento Scuola Educazione*, are a milestone that prepares the ground for the birth of the actual e-learning. Afterwards, the transition from Tv-based distance learning to e-learning is embodied by consortium Uninettuno (1990), the first televisual and telematic University in Europe.

Even nowadays the radio and tv distance learning experience with its cultural heritage represents a model for the modern e-learning and could be a key for its future evolution.

FROM RADIO TO TELEVISION AND E-LEARNING
Italy has been the first Country in 2020, namely the second after China, that was compelled to adopt distance learning (Dad) as an emergency measure due to the pandemic coronavirus, thus being the first to drastically subvert its teaching models. Moreover, this kind of forced distance learning took place in educational contexts such as schools and Universities where the cultural tradition of lecturing was, and still is, very strong. In this unique phase of e-learning in Italy and in the entire world, when the health emergency has urged to the widest e-learning experiment ever made, it can be useful looking at the past in order to retrace the first steps of Fad (distance learning) history in the Bel Paese. This history sees technological improvements joining new pedagogical models and the cultural and social politics in a nation that gave birth to many of the most ancient Academic Institutions in Europe. The first step of distance learning was learning by mail. This is a type of education where learning objects were sent by mail to the learner, that then had to prove to have understood the lesson by passing a test sent by mail. Thus, the learner passed the valuation test and got the attestation, as certification of minimum quality. This was a unidirectional modality of transmission of knowledge from teacher to learner, different from that one from many-to-many in the pedagogical communicational models of actual third generation of distance learning, i. e. of e-learning mediated by computer and ICT.

The postal distance learning was diffused since the '800 and continued until all the entire '900 and exists nowadays as educational modality.

Due to the material corruptibility, there are not many evidences of these trainings.
There is that one on stenography by mail of Isaac Pitman of the of early '800, followed by the first languages course by mail of Charles Toussaint and Gustav Langenscheid in Germany and the advanced course by mail of Illinois Wesleyan University (Bontempelli, n. d., p. 2).

THE SECOND STEP OF DISTANCE LEARNING
Between the end of '800 and early '900 the new technological progresses revolutionized the educational setting and opened new opportunities for distance learning through the invention of telephone, radio and television (Galliani, 2015).
In particular these two last media, an absolute novelty at that time, enabled new ways of distance learning in Italy too, in accordance with the one-to-many model reaching lots of localities left behind by formal education because

of their remoteness from the big centres. This way they opened the second step of distance learning, based on audio and audio-visual technologies, before the digital revolution of the last century.
In the radiophonic sector we could cite among the first international cases the integrative lessons, that began in early '900, and the lessons for farmers of Radio Canada as well as the telephonic courses for disables of University of Iowa.
From the Anglo-American area and the North of Europe this educational way gradually spread in the rest of Europe and in some cases in a much later time. An example is Radio ECCA, the first Spanish educational radio for adults, that started its broadcasting in 1965 (González Pérez, 2013).

RADIO RURALE

In Italy, the Uri (Unione Radiofonica Italiana), the first radiophonic company, began broadcasting on the 26th of October 1926 with a high pedagogical vocation. The radio was considered a medium for the cultural and moral listeners' elevation. Fascism early understood the big potential of this medium for obtaining social control.
In the educational sector, the most important project was the Ente Nazionale Radio Rurale. This organism was founded in 1933 by the Communication Ministry with the partnership of Ministry of National Education and Agriculture (Ortoleva & Scaramucci, 2003, p. 279, s.v. "Ente Radio Rurale", p. 279; Cannistraro, 1972). It was aimed radio for teaching purposes in particular for the population living in the most faraway places of Italy where the new medium was hardly spreading due to technological and economic problems. It was a fascist organism handled by Achille Starace and headed by Enrico Marchesi that, as the time passed, became more and more a politic tool. The audience was represented by the most vulnerable members of society: children and adult population of rural areas in Italy (Figure 1). Pedagogy was involved by the ruralisation policy of fascism (Monteleone, 2005, p. 60; Biondi, 2007, pp. 41-42).

The law that, on 15th June 1933 established the Ente Radio Rurale, claimed the interweaving between pedagogy and politics as first aim of the new institution: "educare la nuova generazione fin dalla più tenera infanzia secondo i dettami della dottrina fascista, completare e illustrare le lezioni impartite dall'insegnante e far partecipare i fanciulli, anche quelli dei più remoti villaggi, alla vita della Nazione".
The broadcasting started on 10th March 1934 with the program *Il duce e i bimbi*, where all the myths of the "fascist pedagogy" were allegorically illustrated (Ortoleva & Scaramucci, 2003).

The institution also funded the schools so that they could buy a specific cheap radiophonic device. In addition to the radio there were support materials for students such as vinyl records for sing learning. Radio Rurale operated till 1940 (Scalfaro, 2008).

Figure 1. Image from Radiorurale.it

TELESCUOLA

Later, high profile pedagogical programs comparable to those of Ente Radio Rurale were developed with the birth a new medium that would dominate the mediatic panorama until late century: the television. The television allowed for the first time a higher involvement thanks to moving images and the chance to show at distance the teaching staff (a fundamental element as testified by the embodiment theories) but also boards, schemes and images, creating a first type of multimedia teaching ante litteram.

Italian broadcasting of Rai (Radiotelevisione italiana) began in Italy on the 3rd of January 1954. The television too, as the Radio before, was born with an explicit pedagogical vocation and was perceived by the State the Italian citizen's moral and cultural elevation. So, no wonder that in 1958, only 4 years after the regular Tv broadcast started, the most ambitious pedagogical tv program took place: Telescuola.

The name of the program of the new-born Italian Radiotelevisione claimed the intention of realizing a distance schooling project using the tv medium. *Telescuola* began on the 25th of November 1968, two years before *Non è mai troppo tardi* (cfr. below) and lasted 8 years. The transmission covers the entire "scuola media professionale" (Mid school and vocational school) time and was designed for peripheric areas without educational institutions such as villages, far from big centres, and little islands. It was an audio-visual evolution of Radio Rurale that, besides having the innovative characteristic of moving pictures was also not controlled by fascist party; on the contrary, it was the result of a democratic vision on education as a source of development for the country. *Telescuola* represents an Italian model of distance learning because it was the first tele-didactic course that allowed to get a Mid- school certification (diploma di scuola media). The students who attended *Telescuola* in isolation and were able to get the desired certification were more than 5000, despite the difficulties of individual learning and audience, a remarkable result to which the support of scholastic manuals published by the Rai and written by the video-teacher as well the correction of the homework contributed. Moreover, we must add other 12000 students spread over the entire peninsula who had followed the lessons grouped in PAT (Punti di ascolto di Telescuola) and were able to get the degree.

Telescuola was preceded by a tv inquiry titled *Un domani per i nostri figli* from which emerged the lack of schools in little mountain villages and in cities with less of 3000 residents, which constituted a reason for many students' dropouts. They organized all over the Italy 1646 PAT, each one with a coordinator, equivalent to the actual tutor in telematic universities. At the end of the course it was possible to get the degree, a sort of certification of the new learning method, in this case also a type of quality assessment.

Although, to avoid confusion, the sophisticated technical tools of television were not adopted, the simple fact of learning by the tv screen made automatically spectacular the tele-lessons at the time.
The concern of mitigating the novelty of distance learning and the difference from traditional school, suggested to assimilate as much as possible the new lessons to those of normal school. From 1961 to 1963 the courses of the new Scuola Media Unificata took place from 8.30 am to 2.45 pm, a very similar time to that one of a traditional course and with the help of a textbook meant for target classes but at the same time useful for educating teachers in a lifelong learning modern perspective.

Morevover, it is in this period that the prejudice regarding distance education as makeshift solution for those who can't take a normal course is rooted, a stigma that lasted until the end of the past century. An evidence can be found in a video published by the archive Teche Rai titled *Telescuola anno quinto, un'inchiesta di Ugo Zatterin* (9-10-1963), where it is presented the program Telescuola. In the audiovisual pictures of places far from big centres (as Castelluccio superiore in the Basilicata region) that attended *Telescuola* are introduced and commented while the voice-over presents the distance learning as a solution that not a single student of a big city would take into consideration (http://www.teche.rai.it/2015/03/telescuola-anno-quinto/):

A Roma, a Milano, nelle grandi città, nei centri dove chiunque lo desideri può mandare a scuola senza grandi disagi i propri figli, nessuno penserebbe di seguire assiduamente quei corsi televisivi, di cui forse ha scoperto l'esistenza girando fuori orario la manopola del televisore, ma in quest'isoletta bella e primitiva solo frequentando Telescuola i ragazzi possono andare avanti negli studi e seguire i corsi della più moderna, più attrezzata, dotata e curata scuola media italiana.

By the middle of '900 distance learning became a new tool and was useful in some particular cases but was not considered at the same level of traditional education.
Also, in the academic field the distance learning was an educational way that presented more difficulties. For instance, Maria Grazia Puglisi (1967) noted that both young and adult students that had been away from school had issues learning with a new and medium such as television. That is why they decided to make the lessons as much as possible like the traditional ones instead of focusing on the specific characteristics of the new medium. The tele-teacher of Telescuola used very little new specific television features to avoid confusion.

NON È MAI TROPPO TARDI (IT IS NEVER TOO LATE)
In 1960, two years after the birth of Telescuola, the most reputed distance learning broadcasted program in Italian history was launched: that one most immovable in collective imagination as the icon of adult distance learning "Non è mai troppo tardi" (Grasso 2000[2]; Grasso 2008[3] sub voce "Non è mai troppo tardi"; Farné, 2008, 2011, 2012; Rossi, 2007).

The program was transmitted with some interruptions and recoveries until 1968 and allowed to many Italians to learn to read and write and to get the "licenza elementare" (primary school degree). The protagonist was the famous master Alberto Manzi (Figure 2), pupil of the pedagogist Luigi Volpicelli, that in every chapter lectured for student

that were distant and half-literate using some learning instrument very innovative at that time as the overhead projector (Garavaglia & Rivoltella, p. 262).

The program, edited by Oreste Gasperini, Alberto Manzi and Carlo Piantoni and directed by Gigliola Rosmino, represents a very early example of distance learning of second generation, halfway between the mailing and the actual e-learning.

For the first time in fact the tv medium made it possible to teach trough moving pictures targeting the so called "third age" and "at distance".

It was not – it is true – possible to watch the lessons in asynchronous mode, on demand as feasible nowadays but that's why they were transmitted in early evening time, the time when people would come home from work. But, despite this limit, for that time it was a real revolution, through which the new medium was able to eradicate ignorance and illiteracy at the time still widespread in age groups until then neglected in the normal educational process. Even the strategy of *Non è mai troppo tardi*, as for the cases already mentioned, perfectly matched the paleo-television conception of the early noble television that aimed to the audience education, to cultural and moral elevation, that paid state fee in return of the service they received.

Alberto Manzi died in 1997, but his legacy has never been forgotten. Even after the end of *Non è mai troppo tardi* in 1968, his legacy has been not completely lost. In 1991 an almost parodic program was created on Raitre conducted by Gianni Ippoliti, in which the conductor interrogated a class of Italians of the 90s to verify their literacy level. From the wrong and absurd answers that were given he would start with checking the correct meaning and correct writing.

Subsequently, in 2004, Rai produced the *Non è m@i troppo tardi* Tv series, a program for the digital literacy for disadvantaged classes transmitted through the Rai-educational channel.

Alberto Manzi's proactive experiment in distance learning has also affected the history of cinema because in 2014 a television film was produced by Rai. Its name was just *Non è mai troppo tardi*, directed by Giacomo Campiotti, and retraced his life, an exemplary life, worth of a biographical film, of a biopic as it is called: graduated in Biology and Pedagogy, fighter in the I world war, teacher at the beginning in a juvenile prison, teacher in the Andes and author of the famous novel Orzowey (1955), that was adapted to television series directed by the Frenchman Yves Allégret in 1976. Manzi ended his career with *Insieme* (1990), another program in which he taught Italian to non-EU citizens, an early example of Italian for foreigners, and with a radio broadcast (1996) for Italians living abroad. A whole life dedicated to the 'distant people'.

Manzi's example shows that TV - with its cultural programs and its biopics - can, if well employed, become a 'good teacher'.

Figure 2. Alberto Manzi in *Non è mai troppo tardi* (from Wikipedia Commons)

FROM DSE TO PRESENT TIMES: THE DISTANCE LEARNING RAI CHANNELS

In the television field, a turning point was the birth of the third Italian public tv channel, Raitre, on the 15th of December 1979, also commonly called "terza rete". Raitre was the television version of the radio channel Terzo

programma and had been conceived as the channel specifically dedicated to culture and therefore more closely linked to pedagogy and the didactic use of the television medium.

So, it is not surprising that the same law n. 103 of 1975, which introduced the creation of Raitre, established the birth of the Dipartimento Scuola Educazione (DSE) which operated from 1975 until 1994, that then evolved into Rai Educational. The Dipartimento Scuola Educazione was the specific department of Rai dedicated to cultural divulgation and was meant in particular for scholar programs for adults to be included in the television schedule of radio and tv channels.

Four point constitute the editorial policy:
1) Cultural and scientific divulgation opened to all audience.
2) Teachers' Updating with presentation of didactic and pedagogic issues.
3) Information regarding the working world and guidance on occupation prospective.
4) Professional updating for specific categories.

Among the programs of the Department we can recall: *Lezioni di Astrofisica*, *Un mondo da scoprire*, *Invito a teatro*, *Sport: le regole del gioco*, *Crescere* (medicine for adolescence), *Ambiente vivo*, *Telestoria*, *Il circolo delle 12*, *Campus: filosofia e attualità*, *Passaporto per l'Europa*, *Scuola aperta*, *Caramella* (for children).

Another workhorse of the DSE was the language course (English, French, German, Spanish), together with the *Enciclopedia multimediale delle scienze filosofiche*. That one was "una raccolta di circa 1500 registrazioni televisive di interviste didattiche a filosofi, storici, psicologi, sociologi, antropologi, scienziati curate dalla RAI e riportate integralmente o ascoltabili nella modalità multimediale" (http://www.federica.unina.it/livinglibrary/lettere-e-filosofia/24/), (a record of about 1500 television records of educational interviews with philosophers, historians, psychologists, sociologists, anthropologists, scientists developed by RAI and integrally proposed and audible in multimedia channel).

Just these software were a milestone in the direction of third generation distance learning, i. e. e-learning and testify the continuity between the television and web-based distance learning.

DSE changed its name into Videosapere from 1995 to 1997 and later into Rai educational from 1997 to 2014 and finally into Rai Cultura.

The same law of 1975, as mentioned before, marked the birth of Raitre, the "terza rete" (De Martino, 2009). This was the most didactic channel, a sort of third page of television dedicated to high culture and the audience training. Just on Raitre they were transmitted lots of DSE programs as testify the schedule of that time.

The first day of operations of the new-born Rai channel was, not surprisingly, defined "the first day of school" by the broadcaster, Fabiana Udenio, a very young girl with whom the entire student population of that time could easily identify itself. The third channel was born with the explicit aim of transferring on tv screen the high culture, that one with C capital letter, first the scholastic and academic one.

At this extent regional planning institutions were enhanced very much and became the ranking of scholastic and academic community of the different regions which, until that time, had no space in national office structure of Rai. In Raitre instead, twice a week regional programs produced by different structured situated in capitals of regions were regularly broadcasted.

During the first period of Giuseppe Rossini's direction, the regional programs became a real cultural cross section of different regions. In 1987, after the first surveys of Auditel, it turned out that Raitre did not attract a high number of people and the federal-regional structure was partially weakened. Regional news and some sections lasted but were cancelled regional programs that gave voice to local realities.

Anyways, among the tv three main Rai channels Raitre remains till now the most cultural and pedagogic one. With the multiplication of the tv offers, other channels with pedagogic vocation were subsequently added.

It should be noted that Rai Educational, the Rai group linked to didactic and pedagogical programs first broadcasted by satellite and then arrived on terrestrial digital and on internet.

In 1997 they started Raisat3 Educational, the educational channel on the satellite Tv. Then in 1999 they added RaiEdu Cultura, dedicated to books and Rai Edi Lab on the work world. Raieducational realized programs for the other two Rai Channels.

UNINETTUNO

In the last decades of new millennium Tv technology has been used for distance learning in academic field too. In fact, before the technological development of internet allowed to download video lessons, Tv has been the principal tool to convey professors' lessons in the Universities at a distance.

Uninettuno (NETwork per l'UNiversità Ovunque), born in 1992, is the first televisual and telematic University in Europe and uses the satellite-web for streaming of the video-lessons and the blended way because includes Tv lessons, online practice, support by telephone, fax, email, but also meetings and practice in presence of teachers and tutors.

Between the founding members there are Rai itself, and the telephone company Telecom Italia and between the ordinary members there are some universities of southern Italy, in particular Puglia (Politecnico di Bari and Università di Lecce).

Uninettuno collects the legacy of public television as educational medium in pan-Mediterranean context and merges it with the new digital technologies.

The University Uninettuno embodies the transition between distance learning of second generation to that one of third generation because it is based on "modello di insegnamento e apprendimento per televisione e internet" (Garito, 2012, p. 5) (teaching and learning model for television and internet) and was created starting by the European project Med Net U (Mediterranean Network of University) coordinated by Nettuno Consortium composed of 43 Italian and foreigner Universities and with Maria Amata Garito as founder (Garito, 2012, p. 4).
In 1992 web internet has not yet achieved the sufficient speed to transmit a classic video-lesson and the Tv technology was crucial for the success of this initiative.

In addition to the use of internet it is reported the use of the tv channel from 1997 to 1999 that transmitted academic lessons in different languages such as Arab, English, French, and Italian of a lots of university teachers.

The tv channel changed its name several times -for a short time he had been renamed Rai Sat Nettuno Lezioni Universitarie – and today his name is UniNettuno University Tv and it's transmitted not only by satellite but in steaming on the web.

On the internet website of the WebTV Uninettuno.tv it is expressed the mission of this academic television and more in general of the Uninettuno University:

La televisione può diventare uno strumento utile per sviluppare conoscenza e competenze. Con la televisione satellitare prima e con la web tv di UNINETTUNO Università Telematica Internazionale UNINETTUNO ora, perseguiamo la mission di UNINETTUNO: democratizzare l'accesso al sapere.

In the ambit of Uninettuno diverse partnerships with governments of the Mediterranean area were agreed, that have brought to the development of initiatives for developing countries that remind to the Italian experiences of distance learning as *Non è mai troppo tardi*. An example is the course *Imparo l'arabo, il Tesoro delle Lettere*, a tv videocourse aimed to the learning of reading and writing arab language financed by the foreign Ministry and by the sub-secretary for the fight of illiteracy of the Reign of Morocco.

In the new millennium Uninettuno changed into a telematic university. International telematic university Uninettuno was born in April 2005 as a result of the decree of the 17th of April 2003 of the Ministro dell'Istruzione, dell'Università e della Ricerca Letizia Moratti, that institutionalized telematic universities and was initially based on tv lessons.
Between the universities that used the satellite technology – typical of the tv – for the synchronous communication and the broadcasts of conferences and lessons in Italy should be mentioned the Università del Salento for its Campus Satellitare del Salento, opened in 2006.

FOR.COM

In the academic field in early new millennium it is remarkable the use of tv technology for For.Com.

For.Com (Form.com.it) is a consortium instituted in 1997 by the Università di Roma La Sapienza and by the Bournemouth Polytechnik (UK) to which other foreign universities joined (Liverpool, Malta, Tirana) and above all from Italy: Cassino, Macerata, Salerno, Sassari, Torino, Molise, Udine, Foggia, Bari, Camerino.

As we could read on the website the network began using tools of distance learning of second generation such television and multimedial CD-roms (https://www.forcom.it/it/chi-siamo):

I programmi formativi del FOR.COM. si rivolgono in particolare agli studenti che, per i loro impegni e per la loro situazione (studenti lavoratori, diversamente abili, etc.), hanno difficoltà a seguire le attività formative in presenza presso strutture tradizionali. L'offerta didattica del FOR.COM., articolata in attività di e-learning, in modalità basate soprattutto attraverso rete Internet (Web Based), TV interattiva, Cd multimediali, riguarda programmi di formazione continua e di aggiornamento professionale nei segmenti post-diploma e post-lauream.

CONCLUSIONS: TOWARD THE NEW MILLENNIUM FROM TELEVISION TO THE THIRD GENERATION DISTANCE LEARNING

With the technological development starting at the first decade of new millennium the tv technology and satellite gave way to new models of distance learning based on the streaming via internet.

With the increase of the connection speed, the web was considered the best technology to convey the didactic objects in asynchronous use according to a model more learner centred and letting the learner decide when to study, when to watch the lessons and allowing pause and re-watch the audiovideo stream. A milestone in the Distance learning story is the developing of semantic web at the end of the millennium. This allowed a new personalization of web-based learning and a more flexible and interoperable use of web resources and learning objects to enhance e-learning and e-learners goals (Ouf et al., 2017).

Despite the coming of the third phase of distance learning and the development of online platforms and the trend to the digital convergence, the television remains a teacher, sometimes good other times bad, whose model is fundamental not only for the realization of class videolessons of actual telematic universities and of e-learning but more in general for every form of learning trough an audio visual streaming.

After the radio, the television remains, for the better or the worse, the mother of every educational pattern trough moving picture and the knowledge of his history (in Italy about over 70 years) and of its long tradition could offer a significant contribute nowadays too in the digital time for the design, experimentation and evolution of the pedagogical models.

Moreover, rediscovering the first phase of Fad history in Italy as historical and didactical heritage during the pandemic coronavirus can be useful to support the acceptance of Dad models by the side of those teachers less open to innovation and that consider Dad a novelty too far away from the pedagogical tradition.

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The Relationship between Academic Procrastination, Academic Motivation and Perfectionism: A Study on Teacher Candidates

Emrah SERDAR
Istanbul University-Cerrahpasa, Faculty of Sports Sciences, İstanbul/Turkey
serdar-emrah@hotmail.com https://orcid.org/0000-0003-2438-6748

Duygu HARMANDAR DEMİREL
Necmettin Erbakan University, Ahmet Keleşoğlu Education of Faculty, Konya/Turkey
duyguharmandar@gmail.com https://orcid.org/0000-0003-4090-7929

Mehmet DEMİREL
Necmettin Erbakan University, Tourism of Faculty, Konya/Turkey
mehmetdemirel78@gmail.com https://orcid.org/0000-0003-1454-022X

ABSTRACT
The study aimed to examine the academic procrastination, academic motivation and perfectionism levels of teacher candidates. In this context, the sample group of the study consisted of 209 participants who were studying at Necmettin Erbakan University Physical Education and Sports Department and selected by the purposeful sampling method. In addition to the "Personal Information Form", the "Academic Procrastination Scale (APS)" the "Academic Motivation Scale (AMS)", and "Multidimensional Perfectionism Scale (MPS)" were used as data collection tools. In analyzing the data, independent t-test, ANOVA, MANOVA and Pearson Correlation analysis were used. According to the analysis results, gender variable the main effect on AMS was significant and it was found to be significant only in the "Self-Transcendence" sub-dimension at the sub-dimensions level. According to the academic achievement status, the main effect on AMS was significant, and it was only significant in the "Using Knowledge" sub-dimension at the level of sub-dimensions. APS and AMS only positively and lowly correlated with the "Self-Transcendence" sub-dimension, and a statistically significant difference between APS and MPS was found. Between APS and MPS sub-dimensions found low level and positive relationship. As a result, according to socia demographic data it was found diffred that the academic procrastination, motivation and perfectionism. Moreover, while there was no relationship between APS and MPS, there was a low-level and positive relationship was found between APS and AMS, and AMS and MPS here to enter text.
Keywords: Academic Procrastination, Academic Motivation, Perfectionism

INTRODUCTION
In order for prospective teachers to be actively involved in the learning process, they must be willing, in other words, motivated to participate in this process. The motive, the force that drives behaviour and energy, activates the organism for a purpose. The success of school learning depends to a large extent on both the teaching process and the qualifications of the learner involved in this process. Although the objectives are appropriate to the pre-service level and the techniques used in the learning-teaching process, pre-service teachers' reluctance to learn may cause the process to fail. Therefore, it is possible to say that one of the most important factors affecting the learning-teaching process is motivation (Kelecioğlu, 1992). The concept of motivation has a very important status in education since learning perform by motivating students to learn. According to Morgan (1982), motive comes from the Latin word meaning motiv (to act), and it is the power that drives the organism and gives energy and direction to behaviour. Motivation, which is called a general concept that includes desires and wishes, needs, impulses and interests in human nature, can be defined as an internal power that pushes the individual to act in order to concentrate and reach a goal, stimulates, strengthens, activates and manages the behaviour of the individual (Mowen et al., 2007). Concept of motivation is used in more than one sense. Although a complete and definitive definition cannot be made, it can be expressed as “the internal state that causes the emergence of human behaviours and directs behaviours” (Lumsden, 1994; Dilts, 1998; Balaban Salı, 2006). Pintrich and Schunk (2002) have expressed motivation as the effort, persistence and skill management of an individual in performing a job (Bozanoğlu, 2004).

Motivation determines the amount of energy devoted to cognitive and behavioural activities required for success. An individual with a high level of motivation can be more successful while performing the necessary duties throughout his/her life (Akbay & Gizir, 2010), and he/she can perform more successful process while fulfilling the necessary responsibilities (preparing for the exam, realizing a project, preparing homework and reading

homework, etc.). When lack of academic motivation occurs, incompatible academic behaviours such as giving up immediately, impatience, insistence, and not enjoying the work can emerge in the face of difficulties (Colangelo, 1997). Incompatible academic behaviour raises the problem we call academic procrastination in motivation. In literature, it is common to find research results that procrastination behaviour is an anti-motivation phenomenon and that the more the individual's motivation decreases, the more he/she tends to procrastinate (Balkıs et al., 2006; Bond and Feather, 1988; Klassen et al., 2008; Lee, 2005; Lekich, 2006; Orpen, 1998; Senecal et al., 1995).

There are many duties and responsibilities to be fulfilled in university life where students have many responsibilities and one of his most important responsibilities is academic. However, probable procrastination in academic studies is one of the most important problems faced by university students (Özer, 2005). Procrastination behaviour is defined as postponing tasks to the last minute, leaving tasks or leaving decisions and responsibilities to the last minute (Haycock et al., 1998). In a different definition, academic procrastination has defined as "the tendency to leave academic tasks to a later time due to irrational reasons" (Senecal et al., 2003). Grecco (1984) stated that an important job that an individual can do and previously decided to do can be defined as procrastination without a rational justification. Academic procrastination, which leads to negative consequences such as failing in a course, low academic average or being dismissed from the school, is increasing among students (Solomon and Rothblum, 1984; Steel, 2007). In the research conducted by Rothblum et al. (1986), it has found that more than 40% of the students had a high procrastination level. According to the studies on the causes of procrastination behaviour, it is seen that the main reason is the individual's inability to manage his/her time (McCown et al., 1987).

Another cause for procrastination behaviour is difficulty in focusing on a task or feeling a low-sense of duty. The third reason for procrastination behaviour is the anxiety and fear associated with the negative perception that the individual will constantly fail in his/her work. Having a sense of procrastination is seen as another reason for procrastination behaviour. Another reason for procrastination behaviour is unrealistic expectations, faulty cognitive attributes and perfectionism tendency of the individual about himself/herself and his/her performance (Yaakub, 2000). In meta-analysis studies, procrastination has negative with responsibility, self-efficacy, achievement motive and academic average, avoidance of work has found to be positively associated with fear of failure and perfectionism (Van Eerde, 2003; Steel, 2007). Perfectionism is the individual's self-determination of very challenging standards and effort to achieve them, although it causes problems (Shafran et al., 2017). Bums (1980) has stated that perfectionism is a negative feature and perfectionists are people who set unattainable goals for themselves, make great efforts to achieve these goals and determine their value according to the resulting product. Mitchelson (2009) has expressed perfectionism as an effort to reach high standards.

The most emphasized point in the definitions of perfectionism is setting extremely high standards on the performance and behaviour of the individual. However, the psychological effects of high standards are not always harmful. In this context, when defining perfectionism, it is seen that high standards are integrated with concepts such as regularity, cleanliness and regulation (Slaney et al., 2001). "All or nothing thinking style" is the most common cognitive distortion in individuals with perfectionist traits. It can be said that individuals with this cognitive distortion have high standards and set extremely difficult or unusual goals (Antony & Swinson, 2000). Hamachek (1978) has also examined perfectionism in two parts as normal and neurotic. According to Hamachek (1978), while normal perfectionists try to achieve a satisfactory result by putting a lot of effort into it, neurotic perfectionists are never satisfied with what they do because they think their work is not good enough. Hewitt and Flett (1991) have developed a multidimensional perfectionism scale by considering perfectionism as a pathological phenomenon and examined it in three dimensions as self-oriented perfectionism other-oriented and socially prescribed. Hamachek (1978) has stated that there are six symptoms of perfectionism as depression, feeling guilty, compulsive thinking, trying to save the situation, self-humiliation and procrastination. Frost et al. (1990) has stated that there are six dimensions of perfectionism as personal standards, family expectations, parental criticism, excessive interest in mistakes, suspicion of behaviour, and order. It is stated that perfectionism causes psychological symptoms related to maladjustment such as depression, eating disorders, self-esteem and loneliness in university students (Hibbard & Davies, 2011). The study aimed to determine the relationship between teacher candidates' academic motivation, academic procrastination and perfectionism levels.

METHOD

Research Model

The relational screening model was used in the research (Gürbüz & Şahin, 2016).

Research Sample

The research group consisted of 209 people (108 females and 101 males), who were studying at Necmettin Erbakan University, Department of Physical Education and Sports, and selected by with aim sampling method.

38.7% of the participating in the research were studying in the "2nd grade", the welfare status of 47.8% was "Normal", and 26.8% had an academic success between "2.51 and 3.00".

Data Collection Tools

Personal Information Form: The form consisted of questions such as gender, age, class, well-being and academic success to gather information about the individuals who participated in the study and the form prepared by the researcher.

Academic Procrastination Scale (APS): The "Academic Procrastination Scale" developed by Çakıcı (2003) was used to determine the academic procrastination of the participants. The scale consists of 19 items, 12 of them were negative and 7 were positive. The items in the scale were answered as (1) "Does Not Reflect Me at all", (5) "Reflect Me Completely". The reliability of original scale 0.92. In this study, the reliability coefficient was determined as 0.81.

Academic Motivation Scale (AMS): "Academic Motivation Scale" developed by Bozanoğlu (2004) was used to determine the academic motivation levels of the participants. The scale sub-dimensions were (1) "Self-transcendence", (2) "Using Knowledge" and (3) "Discovery". Items in the scale were answered as (1) "Absolutely Not Suitable", (5) "Absolutely Suitable". The reliability coefficient of the scale was determined as 0.87, and the internal consistency coefficients were 0.76 for the "Self-Transcendence" sub-dimension, 0.72 for the "Using Knowledge" sub-dimension and 0.73 for the "Discovery" sub-dimension. In this study, the reliability coefficient was determined as 0.74, and the internal consistency coefficients were 0.75 for the "Self-Transcendence" sub-dimension, 0.75 for the "Using Knowledge" sub-dimension, and 0.75 for the "Discovery" sub-dimension.

Multidimensional Perfectionism Scale (MPS): "Multidimensional Perfectionism Scale" developed by Hewitt and Flett (1991) and adapted to Turkish by Oral (1999) was used to determine the perfectionism levels of the participants. The scale consisted of 44 items and 3 sub-dimensions. The sub-dimensions were (1) "Perfectionism Towards Themselves", (2) "Perfectionism Towards Others" and (3) "Socially Determined Perfectionism". Items in the scale were answered as (1) "Absolutely Disagree", (7) "Completely Agree". The reliability coefficient of the scale was determined to be 0.91, the internal consistency coefficients were 0.91 for the (1) "Perfectionism Towards Themselves" sub-dimension, 0.73 for the (2) "Perfectionism towards Others" sub-dimension, and 0.80 for the (3)" Socially Determined Perfectionism" (Asan, 2011). The reliability coefficient was determined as for this study 0.75, the internal consistency coefficients were 0.76 for the (1) "Perfectionism Towards Themselves" sub-dimension, 0.81 for the (2) "Perfectionism Towards Others" sub-dimension, and 0.78 for the (3)" Socially Determined Perfectionism" sub-dimension.

Data Analysis

Skewness and kurtosis tests were used to determine the distribution of the data. It was determined that the data had a normal distribution. MANOVA, Independent T-Test, ANOVA. For the reliability Cronbach Alpha coefficients were calculated.

FINDINGS

Table 1. Distribution of Scale Scores

	Scale Sub-Dimensions	Number of Items	n	Mean	Sd.	Skewness	Kurtosis
APS	**Academic Procrastination**	19	209	3.45	1.30	1.09	1.37
AMS	**Self-Transcendence**	7	209	3.60	0.79	-0.66	0.81
	Using Knowledge	6	209	2.72	0.88	0.46	-0.29
	Discovery	7	209	3.38	0.75	-0.27	0.10
MPS	**Self-oriented**	19	209	4.78	1.17	-0.76	0.30
	Other-oriented	10	209	3.83	1.12	0.09	-0.81
	Socially prescribed	15	209	4.20	1.17	0.18	0.33

The mean score of the Academic Procrastination Scale was determined as (3.45). The highest mean in the sub-dimensions of AMS was in the "Self-Transcendence" (3.60) sub-dimension, and the lowest average was in the "Using Knowledge" (2.72) sub-dimension. Moreover, at the level of sub-dimensions of MPS, it was determined that the highest mean was in the "self-oriented perfectionism" (4.78) sub-dimension, and the lowest mean was in the " Other-oriented perfectionism " (3.83) sub-dimension.

Table 2. Results of APS-AMS-MPS Scores According to Gender of Participants

	Female (n=108)		*Male (n=101)*	
Scales	**Mean.**	**Sd.**	**Mean**	**Sd.**
APS				
Academic Procrastination	3.52	1.45	3.38	1.12
AMS				
Self-Transcendence	3.73	0.73	3.47	0.83
Using Knowledge	2.74	0.89	2.70	0.86
Discovery	3.42	0.68	3.34	0.82
MPS				
Self-oriented	4.77	1.26	4.78	1.08
Other-oriented	3.81	1.16	3.86	1.08
Socially prescribed	4.20	1.23	4.21	1.10

According to the gender of the participants in the study. There were no significant differences between gender and APS and MPS scores (p>.05). MANOVA analysis results showed that the gender of the participants had a significant effect on sub-dimensions of AMS [λ= 0.964, $F_{(3,205)}$=2.585; p<0.05]. At the level of sub-dimensions, a statistically significant difference was found only in the "Self-Transcendence" sub-dimension [$F_{(1-207)}$ = 5.561; p <0.05].

Table 3. Results of APS-AMS-MPS Scores According to Participants School Grades

	1.Grade (n=73)		*2. Grade (n=84)*		*3. Grade (n=52)*	
Scales	**Mean**	**Sd.**	**Mean**	**Sd.**	**Mean**	**Sd.**
APS						
Academic Procrastination	3.52	1.31	3.41	1.43	3.42	1.08
AMS						
Self-Transcendence	3.39	0.90	3.68	0.70	3.78	0.71
Using knowedge	2.68	0.82	2.76	0.88	2.73	0.95
Discovery	3.17	0.76	3.46	0.74	3.55	0.71
MPS						
Self-oriented	4.77	1.19	4.71	1.21	4.88	1.09
Other-oriented	3.95	1.10	3.77	1.14	3.78	1.11
Socially prescribed	4.30	1.13	4.08	1.15	4.28	1.24

According to school grades of the participants in the study. There were no significant differences between participants school grade and APS and MPS scores (p>.05). The results of the MANOVA analysis showed that the main effect of the classes in which the participants were educated on the sub-dimensions of AMS was not significant [λ = 0.947, $F_{(6,408)}$ = 1.861; p> 0.05]. At the sub-dimension level, in the “Self-Transcendence” sub-dimension [$F_{(2-206)}$ = 4.408; p <0.05] and in the "Discovery" sub-dimension [$F_{(2-206)}$ = 4.860; p <0.05] significant difference was found

Table 4. Results of the APS-AMS-MPS Scores According to Academic Achievement Status

	2.00 and below (n=63)		*2.01-2.50 (n=54)*		*2.51-3.00 (n=56)*		*3.00 and above (n=36)*	
Scales	**Mean.**	**Sd.**	**Mean**	**Sd.**	**Mean**	**Sd.**	**Mean**	**Sd.**
APS								
Academic Procrastination	3.79	1.80	3.60	1.29	3.04	0.71	3.27	0.71
AMS								
Self-Transcendence	3.47	0.87	3.55	0.75	3.66	0.64	3.82	0.88
Using knowledge	2.51	0.85	2.55	0.82	2.91	0.86	3.06	0.90
Discovery	3.30	0.76	3.24	0.76	3.47	0.70	3.59	0.77
MPS								
Self-oriented	4.82	1.11	4.79	1.07	4.71	1.16	4.79	1.47
Other-oriented	3.80	1.01	3.76	0.82	3.75	1.18	4.15	1.51
Socially prescribed	4.08	0.90	4.01	0.97	4.32	1.18	4.53	1.68

According to academic achievement status of the participants in the study. There were no significant differences between participants academic achievement status and APS and MPS scores (p>.05). The results of MANOVA analysis showed that the main effect of the participants' academic achievement on the sub-dimensions of AMS

was significant [$\lambda = 0.886$, $F_{(9,494)} = 2.793$; $p < 0.05$]. At the level of sub-dimensions, a statistically significant difference was found only in the "Using Knowledge" sub-dimension [$F_{(3-205)} = 4.779$; $p < 0.05$]

Table 5. Analysis Results Between APS, AMS and MPS Scores

	F1	F2	F3	F4	F5	F6	F7
F1	1						
F2	.061*	1					
F3	.160	.765**	1				
F4	.067	.745**	-.096	1			
F5	-.025	.317**	.077	.246**	1		
F6	-.024	.179**	.247**	.110	.608**	1	
F7	-.020	.196**	.315**	.664**	.664**	.726**	1

*(P<0.01)** (p<0.05)* F1 = Academic Procrastination, F2 = Self-Transcendence, F3 = Using Knowledge, F4 = Discovery, F5 = Self-oriented, F6 = Other-oriented, F7 = Socially prescribed*

Pearson Correlation analysis performed to determine the relationship between the sub-dimensions of APS, AMS and MPS were given. According to the analysis results, a positive and low-level relationship was found between APS and only the "Self-Transcendence" sub-dimension of AMS, and a statistically significant difference was not found between APS and MPS. Moreover, it was determined that there was a positive and low-level relationship between the sub-dimension of AMS and the sub-dimensions of MPS.

DISCUSSION and CONCLUSION

This study aimed to determine the relationship between teacher candidates' academic procrastination, academic motivation, and perfectionism levels. Results obtained for this purpose were discussed and interpreted in this section.

APS scores of individuals did not differ significantly according to their gender. The results of the research seemed to be in parallel with some research results (Saracaloğlu et al., 2020; Sula Ataş and Kumcağız, 2019; Çeri et al., 2015; Kınık, 2015; Ulukaya and Bilge, 2014; Motie et al., 2012; Yiğit and Dilmaç, 2011; Ekşi and Dilmaç, 2010; Kandemir, 2010; Akbay, 2009; Alexander and Onwuegbuzie, 2007; Çakıcı, 2003; Gülebağlan, 2003; Watson, 2001; Ferrari, 2001; Hess et al., 2000; Johnson and Bloom, 1995; Solomon and Rothblum, 1984). On the other hand, while it was observed that academic procrastination was more common among female students (Mişe & Hançer, 2019; Şeker and Saygı, 2013; Washington, 2004; Dolye and Paludi, 1998) in some of the studies that determined academic procrastination gender differences, in other studies on gender differences in academic procrastination, it was more common in male students (Vural and Gündüz, 2019; Saracaloğlu et al., 2018; Gür et al., 2018; Şirin and Duman, 2018; Bulut and Ocak, 2017; Terzi et al., 2017; Yaycı and Düşmez, 2016; Kutlu et al., 2015; Çelikkaleli and Akbay, 2013; Aydoğan and Özbay, 2012; Uzun-Özer and Saçkes, 2011; Akbay and Gizir, 2010; Çetin, 2009; Tufan and Gök, 2009; Aydoğan, 2008; Balkıs et al., 2006; Çakıcı, 2003). It was determined that the gender of the participants had a significant effect on the sub-dimensions of AMS. It was determined that there were studies that supporting the result of the study in the literature (Alemdağ et al., 2014; Gömleksiz and Serhatoğlu, 2013). On the other hand, it was seen that some studies concluded that AMS did not make a significant difference according to gender (Saracaloğlu et al., 2020; Makhabbat et al., 2018; Şeker, 2017; Terzi et al., 2017; Şahin ve Çakar, 2011 and Saracaloğlu et al., 2009). In the study conducted by Büyükbayraktar (2011), it was found that male student's sub-dimension of social perfection was significantly higher than female students. According to the class variable, there was no significant difference between the APS scores of the individuals. This result was parallel with the results of studies conducted by Saracaloğlu et al. (2020); Sula Ataş and Kumcağız (2019); Kutlu et al., (2015). On the other hand, it was concluded that the APS scores differed significantly according to the classes in the studies conducted by Terzi et al., (2017); Şeker and Saygı (2013); Çelikkaleli and Akbay (2013) and Ekşi and Dilmaç (2010). It was determined that the main effect of the classes of the participants on the sub-dimensions of APS significantly differed in the "Self-Transcendence" sub-dimension and the "Discovery" sub-dimension. On the other hand, the studies conducted by Şeker (2017); Uluışık et al., (2016), and Güldü (2015) it was seen that the academic motivation scores of the participants did not differ significantly depending on their grade levels. In the studies conducted by Saracaloğlu et al. (2020); Terzi et al., (2017); Gömleksiz and Serhatoğlu (2013), and Demir (2008), it was found that students' academic motivation levels showed a statistically significant difference according to the class variable, these results were parallel to the results of this study. The main effect of the classes in which the individuals were educated on the sub-dimensions of MPS was not significant, and there were no differences found in the sub-dimensions. On the other hand, in the study conducted by Büyükbayraktar (2011), it was observed that there was a statically significant relationship between grade level and perfectionism sub-dimension. It was determined that the APS

scores of the participants did not differ significantly according to their academic achievement. On the other hand, in the studies conducted by Balkıs et al., (2006); Fritzsche et al., (2003); Orpen (1998); Tice and Baumeister (1997), and Beswick et al., (1988), it was concluded that there was a negative relationship between academic procrastination and academic achievement. According to the analysis results, it was determined that the main effect of the academic achievement of the participants on the sub-dimensions of AMS was significant. It was determined that there was no significant relationship between the main effect of the academic achievement of individuals and the sub-dimensions of the MPS, and there was no statistically significant difference at the level of sub-dimensions. In the study conducted by Altun and Yazıcı (2010), it was found that there was a positive significant relationship between students' positive perfectionism and their academic achievement. Similarly, Saracaloğlu et al. (2016) were stated that there was a positive and low level of relationship between academic mean and perfectionism. In the result of the study, there was no relationship found between APS and AMS. In their study, Akbay and Gizir (2010) concluded that while the academic motivation of university students increased, their academic procrastination behaviour decreased. Similar results were obtained in other studies on the subject (Kağan, 2009; Klassen et al., 2008; Balkıs et al. 2006; Balkıs, 2006; Lee, 2005; Senecal et al., 2003; Steel, 2007; Watson, 2001; Ferrari and Scher, 2000; Brownlow and Reasinger, 2000; Cohen et al., 2008; Senecal et al, 1995; Tuckman, 1998; Tuckman and Sexton, 1992), and they found that academic motivation was a significant predictor of academic procrastination. Putri and Siregar (2019) stated that the higher the motivation for success, the lower the student's academic procrastination tendency, on the contrary, the lower the motivation for success, the higher the student's academic procrastination tendency. According to the analysis results, a positive and low-level correlation was found between APS and only the "Self-Transcendence" sub-dimension of AMS. The results of the study conducted by Azar (2013) showed that there was a significant negative correlation between academic procrastination and academic motivation, and also multiple regression, in contrast to procrastination, was an important predictor of academic studies. In the studies conducted by Doğan (2015); Kandemir (2014); Cerino (2014); Şirin (2011), and Rakes and Dunn (2010), it was concluded that there was a non-significant inverse relationship between academic procrastination and academic motivation. It was found that there was a positive and low-level relationship between sub-dimensions of AMS and sub-dimensions of MPS. As a result of the research, it was seen that there was no significant relationship between APS and MPS. Studies (Burnam et al., 2014; Çakıcı, 2003; Flett et al., 1995; Uzun-Özer et al., 2014) determined that sub-dimensions of perfectionism negatively predict academic procrastination behaviour. According to the analysis results, it was determined that there was a positive and low-level relationship between AMS and MPS. According to the results of the study, the APS score means of the participants (56.59) showed that academic procrastination behaviours were means were medium-level. Bulut and Ocak (2017) stated that it can be said that the academic procrastination behaviour demonstrated by teacher candidates was partly due to academic perfectionism. Wu and Fan (2017) stated that students with a low belief in their academic abilities were more likely to postpone academic tasks. The study conducted by Vural and Gündüz (2019), it was found that teacher candidates showed "medium-level" academic procrastination.

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The Relationship between Learner Autonomy and Motivation

Assoc. Prof. Nuray OKUMUS CEYLAN
Bulent Ecevit University, Department of English Language& Literature, Zonguldak, Turkey
nurayokumus@yahoo.com

ABSTRACT
This study attempts to find out the relationship between learner autonomy and motivation in a state university prep school in Turkey in a non-native context. The findings indicate a moderate positive correlation between motivational beliefs (task value, perceived self-confidence, learning and performance goal-orientation) except performance goal-orientation and sections of autonomy (readiness, ability, responsibility, use of English). Thus, this study also suggests and supports that "intrinsic motivation makes learners 'more willing to take responsibility for the outcome' and that giving students more autonomy yields intrinsic motivation" (Scharle and Szabó, 2000: 7).

INTRODUCTION

Motivation is a highly complex and multifaceted issue in learning. The issue becomes even more complex when the target of learning is the mastery of a second language (Dörnyei, 2001b). The value learners place on tasks, their perceptions of self-efficacy, and the goals they set during their learning processes may contribute to the level of their motivation. Brophy (1999) and Wigfield and Eccles (1994) emphasize the value of the actual process of learning in their research: the more learners value the task, the more motivated they are. Deci and his colleagues (1991) state that when the learner chooses the tasks himself, this choice will provide fully self-determined behavior. The task will be important and valuable to the learner since he chose it himself. Williams and Burden (1997) state that decisions that determine action, the amount of effort to be spent, and the degree of perseverance are the key factors in motivation. Dörnyei (1994) defines motivation as a multi-level construct and classified L2 motivation into three levels: the language level, the learner level and the learning situation level. The language level is composed of various items such as culture, community, pragmatic values, etc. This level is an answer to the question why and for what intention a learner chooses a given language. The learner level includes two items; need for achievement and self-confidence. Dörnyei (2001) clarifies this level as the individual characteristics that the learner brings to the learning process. The learning situation level constitutes three components: course-specific motivational components (interest, expectancy, satisfaction etc.), teacher-specific motivational components (affiliative motive, authority type, task presentation, feedback etc.), and group-specific motivational components (goal-orientedness, reward system, group cohesiveness). The model Dörnyei developed contains motivational components aspect of classroom language learning in foreign and second language learning situations.

According to Dickinson (1995), success in learning and enhanced motivation will occur when a learner has more control of his/her own learning process. Related research indicates that enhanced motivation is dependent on learners taking charge of their own learning (Lamb 2001; da Silva 2002; Sakui 2002; Takagi 2003; Ushioda 2003, 2006). As Benson states, "Learner control of the cognitive processes involved in language learning is a crucial factor in what is learned." Since as Nunan (1996) states, "learners tend to follow their own agendas rather than those of their teachers" (195b: 135). Dakin (1973: 16) supports this statement with his following argument, "though the teacher may control the experiences the learner is exposed to, it is the learner who selects what is learnt from them". Dickinson (1995) 'Success in learning appears to lead to greater motivation only for those students who accept responsibility for their own learning success' (p. 171).

Holec (1981: 3) defines learner autonomy as follows: "to take charge of one's own learning is to have, and to hold, the responsibility for all the decisions concerning the objectives, the contents and progressions, methods and techniques to be used, monitoring the procedure of acquisition, and its evaluation. Benson (2001) states that autonomy requires that the learner self directs his/ her metacognitive and cognitive processes which also requires taking decisions on the content to be learned.

Although there are controversial views on whether motivation is the result of autonomy or it fosters it, or it is the opposite, the related research have indicated that motivation is enhanced when learners take more control over their learning, and autonomy is strongly associated with metacognitive strategies which engross thinking about the learning process, preparation for learning, monitoring the learning task, and self-evaluating (Lamb 2001; da Silva 2002; Sakui 2002; Takagi 2003; Ushioda 2003, 2006). Dornyei and Csizer (1998) record learner autonomy as one

of 'ten commandments' for motivating learners. Various studies on learner autonomy have also given enough proof that motivation is enhanced when learners take more control over their learning (Lamb, 2001; Sakui, 2002, Ushioda, 2003, 2007). Roth et al. (2007) empirical study shows that teachers who were more autonomously motivated for teaching had students who perceived them to be more autonomy supportive. In contrast, teachers who felt intruded in their classrooms were more dominating by students. Further, students add that agentic engagement is a constructive aspect of learner engagement that allows educators to value how students really connect themselves in learning tasks, as they not only try to learn and develop skill, but they also try to create a more motivationally supportive learning situation for themselves. Several studies have shown that autonomy leads to motivation (e.g., Dörnyei and Csiz´er, 1998; Noels, Cle´ment, and Pelletier, 1999; Noels et al, 2000; Noels, 2001; and Wu, 2003), and others (e.g., Ushioda, 1996 and 2003; Garcia and Pintrich, 1991) have revealed that autonomy fosters motivation. Although there are controversial views on whether motivation is the result of autonomy or it fosters it, or it is the opposite, various studies on learner autonomy have indicated that motivation is enhanced when learners take more control over their learning (Lamb, 2002; Sakui, 2002; Ushioda, 2003, 2007). Thus, as Ushioda (2007) defines, we might identify autonomous learners also as motivated learners. This study attempts to find out the relationship between learner autonomy and motivation.

THE STUDY

This study was conducted to find out the relationship between motivational beliefs (task value, perceived self-confidence, and learning and performance goal-orientation) and sections of autonomy (readiness, ability, responsibility, use of English). The participants were randomly chosen 100 A1 level students in a state university prep school in Turkey in a non-native context. The motivational beliefs questionnaire was adapted from the Patterns of Adaptive Learning Survey (PALS) (Midgley, et al., 1996), a widely used in research related to motivation. The Learner Autonomy questionnaire items were adapted from a questionnaire developed by Chan et al. (2002) and were evaluated by experts in terms of content validity and face validity; Cronbach Alpha coefficient for the questionnaire used was .888 for the whole questionnaire. The questionnaires were piloted with 30 A1 level students randomly chosen, then, necessary changes were made, and they were conducted to the participants at the beginning of the first semester in 2017-2018 education year. The data gathered was analyzed using SPSS, frequency tests and correlation tests.

FINDINGS

A. Students' Motivational Beliefs

Frequency tests were run to determine the strength of the students' motivational beliefs. Frequency test results associated with the concept of task value (items 3, 7, 11, 15), that is, the value students attach to classroom tasks and activities, indicate that students value classroom tasks and activities, and believe that the activities and tasks are beneficial for improving their language skills. Moreover, they find activities and tasks interesting or enjoyable. The majority of participants (90 %) stated that the questionnaire item "I think classroom activities are important because they will improve my language skills" was either true or very true. The majority of participants (84%) stated that the item "I believe classroom activities are useful for me" was either true or very true of them. The majority of participants (86%) stated that the item "I believe doing the activities is beneficial to me" was either true or very true of them. A certain group of the participants (66%) stated that the item "I enjoy doing activities very much because they are very interesting and fun" was either partially true or not true at all for them. Results can be seen in Table 1.

Table 1: Frequency Percentages of Task Value Items

No	Task Value Items	Very True/ True	Undecided	Partially True/ Not True at All
		1/2	3	4/5
3	I think classroom activities are important because they will improve my language skills.	90	9	1
7	I believe classroom activities are useful for me.	84	10	6
11	I believe doing the activities is beneficial to me.	86	8	6
15	I enjoy doing the activities very much because they are very interesting and fun.	66	23	11

Note: Percentages are rounded off.

Frequency results of questionnaire items related to perceived self-efficacy (items 1, 5, 9, 13) indicate that students are self-efficacious; that is, they aim to learn a lot of skills and they are certain that they can accomplish their goals. They are certain that they can master all the skills taught, and they believe that they can complete all class work. To illustrate, 78% of the participants stated that the item "I am certain that I can gain the skills taught in English class this year" was either true or very true for them. Almost all participants (96%) stated that it was important to

learn a lot of skills. In terms of even the most difficult class work, a certain number of the participants (42%) stated the item was either true or very true for them while similar number of participants (40%) was undecided. Most of the participants (88%) stated that the item "I am certain that I can accomplish my goals" characterized their attitudes toward their perceptions of self-efficacy. See Table 2 for a summary of percentages.

Table 2: Frequency Percentages of Perceived Self-Efficacy Items

No	Perceived Self-Efficacy Items	Very True/ True	Undecided	Partially True/ Not True at All
	Percentages	1/2	3	4/5
1	I am certain that I can gain the skills taught in English class this year.	78	5	13
5	It is important to me that I learn a lot of skills this year.	96	2	2
9	I am certain I can do even the most difficult class work.	42	40	18
13	I am certain that I can accomplish my goals.	88	12	0

Note: Percentages are rounded off.

Frequency test results of questionnaire items related to learning goal orientation (items 2, 6, 10, 14) suggest that the students are generally learning-goal oriented, that is, they aim to learn as much as they can, acquire new skills, improve their skills, and focus on thorough comprehension. The details of these results are provided to explain the learning goal orientation concept. Almost all participants (97%) stated that one of their goals in English class is to learn as much as they can. The majority of the participants (94%) also stated that one of their goals is to acquire a lot of new skills and improve their skills. The great majority of participants (92%) stated that it is important to understand their class work thoroughly. Although not as large, 74% of the participants stated that they can learn the work even if the work is hard. Frequency percentages are given in Table 3.

Table 3: Frequency Percentages of Learning Goal-Orientation Items

No	Learning Goal-Orientation Items	Very True/ True	Undecided	Partially True/ Not True at All
	Percentages	1/2	3	4/5
2	One of my goals in class is to learn as much as I can.	97	3	0
6	One of my goals is to master a lot of skills this year.	94	4	2
10	It is important to me that I thoroughly understand my class work.	92	4	4
14	Even if the work is hard, I can learn it.	74	22	4

Note: Percentages are rounded off.

Frequency test results of questionnaire items related to performance goal orientation (items 4, 8, 12, 16), as opposed to learning goal-orientation, reveal contradictions among students; generally, students want to receive good grades and show that they are good learners to others. However, they do not study solely to earn good grades; this result suggests that students are interested in improving their skills and acquiring new skills, as indicated earlier in discussions of items related to learning goal orientation. Less than half of the participants (40%) stated that one of their goals is to show others that they were good at their class work. Only half of participants (52%) stated, in positive terms, that they choose class work that they know they can do, rather than work that they have not done before. A large group of participants (66%) stated that receiving good grades is their main goal in their English class. Forty one percent of the participants stated that they do their work just because their work is graded. See Table 4 for a summary of frequency percentages.

Table 4: Frequency Percentages of Performance Goal-Orientation Items

No	Performance Goal-Orientation Items	Very True/ True	Undecided	Partially True/ Not True at All
	Percentages	1/2	3	4/5
4	One of my goals is to show others that I am good at my class work.	40	24	36
8	If given choice, I would choose class work I knew I could do, rather than work I have not done before.	52	26	22
12	In our class, getting good grades is my main goal.	66	23	11

16	The main reason I do my work is because we get grades for our work.	41	27	32

Note: Percentages are rounded off.

B. Learner Autonomy

In the first section of the autonomy questionnaire, the participants were asked 13 questions, and they rated the answers on a five-point Likert scale ranging from „1" representing *only authority* to „5" representing *facilitator*. The results in Table 5 show that the mean score falls within the range of a score of „3" on the Likert scale. That is, the control groups considered their teachers to be neither the only authority nor the facilitator in the class but falling somewhere in between.

Table 5: Frequency Percentages of the Role of the Teacher

	Sole authority				Facilitator		
Answer	1	2	3	4	5	X	SD
N	6.7	11.1	25.2	29.6	27.4	3.60	1.192

The results in Table 5 show that the mean score falls within the range of a score of „3" on the Likert scale. That is, the students considered their teachers to be the facilitator in the class rather than the only authority.

Table 6: Frequency Percentages of Learner Autonomy

	Dependent on the teacher				Autonomous		
Answer	1	2	3	4	5	X	SD
N	5.9	7.4	30.4	37.0	19.3	3.56	1.069

The results in Table 6 show that the mean score falls within the range of a score of „3" on the Likert scale. They consider themselves autonomous rather than teacher- dependent.

B. 1. Readiness for Autonomy

Table 7: Frequency percentages of About High School Education

Throughout your high school education, …	Never/ Rarely	Sometimes	Frequently/ Always
	1/2	3	4/5
9. How often were you asked to participate in group/pair work activities?	22	28	50
10. How often were you asked to evaluate your own work?	36	30	34
11. How often were you asked to evaluate your peers" work?	45	32	23
12. How often were you asked to choose your partner to work with?	20	24	56
13. How often were you asked to participate in a project work?	28	32	40
14. How often did your teachers ask you to choose what activities to use in your lessons?	26	31	43
15. How often did your teachers ask you to choose what materials to use in your lessons?	30	28	42
16. How often were you asked to set your own learning goals?	14	18	58
17. How often were you asked to evaluate your course?	33	28	39
18. How often were you asked to decide what you should learn next?	38	28	34
19. How often were you asked to prepare portfolios?	51	18	31

The overall results show that the students had mid-level of readiness for learner autonomy. As shown by the data, in this section, there were no items which were clustered in the „frequently" category of the scale. The items that attained the highest percentages were "*participating in group/pair work activities*" (item 9), "*choosing partners to work with*" (item 12), "*setting learning goals*" (item 16) and "*preparing portfolios*" (item 19) which were „sometimes" carried out by the participants in their high schools with percentages 50, 56, 58, and 51 respectively. The items that had the lowest mean scores were, and "evaluate your peers' work" (item 12) with percentage 21. Frequency counts show that more than half of the respondents were „rarely" asked to engage in these activities.

B. 2. Responsibilities

In the next part, participants were asked to indicate their perceptions of their teachers' and their own responsibilities while learning English. There were 13 items related to perceptions of responsibility, and the respondents ranked their answers on a three-point Likert scale that ranged from *completely the teacher's* to *completely mine.* Table 8 shows the percentages, frequencies, means and standard deviations of each item. As shown by the data, for items 21 and 31, the participants gave more responsibility to themselves. These items include the responsibilities for "*making sure they make progress outside class*" (item 20) and "*evaluating their course*" (item 31) with mean scores 2.73 and 2.49. In these items, the majority of the participants chose "completely mine" option. In particular, the results of items 20 and 31 show that more than 70% of the participants tended to take more control for the responsibilities taken outside the class.

Table 8: Frequency Percentages of Responsibilities

Frequency Percentages (%)					
Items	Completely the teachers	Half mine, half the teacher's	Completely mine	X	SD
	1	2	3		
20.Make sure you make progress during lesson	12.6	74.8	12.6	2.00	.504
21.Make sure you make progress outside class	4.41	17.8	77.8	2.73	.535
22.Stimulate your interest in learning English	37	39.3	23.7	1.87	.771
23.Identify your weaknesses in English	20.7	60	19.3	1.99	.635
24.Make you work harder	13.3	44.4	42.2	2.29	.690
25.Decide the objectives of the English course	14.1	42.2	43.7	2.30	.703
26.Decide what you should learn next	50.4	37	12.6	1.62	.700
27.Choose what activities to use in your English lessons	49.6	43.7	6.7	1.57	.617
28.Decide how long to spend on each activity	59.3	28.9	11.1	1.53	.721
29.Choose what materials to use in your English lessons	58.5	35.6	5.9	1.47	.609
30.Evaluate your learning	45.9	45.2	8.9	1.63	.643
31.Evaluate your course	8.9	34.8	55.6	2.49	.690
32.Decide what you learn outside the class	27.4	54.1	17.8	1.92	.692

The participants gave the responsibility in the items 28 and 29 to the teacher including "*deciding how long to spend on each activity*" and "*choosing the materials to be used in the class*" with mean scores of 1.53 and 1.47. The participants stated that they shared the responsibility for the items "making sure you make progress during lesson" (item 20), "identifying your weaknesses in English" (item 23) and "*deciding what you learn outside the class*" (item 32) with the teacher with mean scores 2.00, 1.99 and 1.92. For the items "making you work harder" (item24) and "*deciding on the objectives of the English course*" (item 25), while nearly half of the students shared the responsibility with the teacher, the other half took the responsibility themselves. For the items "*choosing the activities to be used in the class*" (item 27), "*evaluating the course*" (item 31), while nearly half of the students agreed to share the responsibility with the teacher, the other half gave the responsibility to the teacher.

B. 3. Abilities

In the next part of the questionnaire, the respondents were asked 6 questions about their perceptions of their decision-making abilities in a range of activities/ responsibilities included in the first part. In other words, they were asked to indicate how successful they would be if they were given the opportunity to make decisions about their own learning. They ranked their answers on a five-point Likert scale ranging from *very poor* to *very good*.

Table 9: Frequency Percentages of Abilities

If you have the opportunity, how good do you think you would be at:	Very poor/ Poor	OK	Good/ Very good
	1/2	3	4/5
33. choosing learning activities in class?	5	39	56
34. choosing learning activities outside class?	10	27	64
35. choosing learning objectives in the class?	6	32	62
36. choosing learning objectives outside the class?	10	27	63

37. choosing learning materials in the class?	20	34	46
38. choosing learning materials outside the class?	14	36	50

Table 9 shows the percentages of the responses of the participants given to the individual items. As shown by the data, most of the responses are clustered under the „*OK*" category of the scale. The activities that the participants rated themselves as "*good/ very good*" at managing were mostly in-class activities: "*choosing learning activities in the class*" (item 33), "*choosing learning activities outside class*" (item 34), "*choosing learning objectives in the class*" (item 35) and "*choosing learning objectives outside the class*" (item 36). The data also shows that the percentages of the participants who chose „*poor/very poor*" categories were generally quite low as compared to the percentages in the other categories.

B. 4. Use of English

Table 10 presents the frequencies, percentages, means and standard deviations of each activity engaged in outside the class. The activities that attained the highest percentage in the "always" and „often" categories were "*trying to learn new words*" (item 41) and "*watched English TV programs and films* (item 43). Additionally, less than half of the participants said that they "always" or "often"" listened to English songs" (item 46).

Table 10: Frequency Percentages of Use of English

In the last academic term, without having been assigned to do so, how often did you …	Always/ Often	Sometimes	Rarely/ Never
	5/4	3	2/1
39.do grammar activities on your own	21	39	40
40.do optional homework	23	36	40
41.try to learn new words	66	22	12
42.use English on the internet (chat, search, etc.)	22	29	29
43.watch English programs or films	59	22	19
44.read materials written in English	8	34	38
45.speak English with native speakers	18	27	33
46.listen to English songs	**42**	19	10

C. The results of the Correlation Tests

Table 11: The Relationship between Motivational Beliefs

	Self-Efficacy	Learning Goal-Orientation	Performance Goal-Orientation
	n= 135	n= 135	n= 135
	r p	r p	r p
Task Value	.494**.000	.584** .000	.180* .036
Self-Efficacy	----------	.659**.000	.214* .013
Learning Goal-Orientation	----------	----------	.188* .029

Note: ** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The results of Pearson product-moment correlations among motivational beliefs indicate a moderate positive correlation of .494 between task value and perceived self-efficacy. Results suggest also a slightly stronger moderate positive correlation of .584 between task value and learning goal-orientation, indicating that students who regard classroom tasks and activities as beneficial and useful reported having goals to learn as much as they can, acquire new skills, improve their skills, and emphasize comprehension. Perceived self-efficacy and learning goal-orientation is strongly correlated (.659) indicating that students who were certain of their abilities and capabilities to learn all the skills taught in English class were more likely to report setting learning-oriented goals for themselves. Such students aim to acquire new skills and improve their skills. They emphasize thorough comprehension and like challenging and hard work.

Table 12. The Relationship between Motivational Beliefs and Autonomy

	Readiness	Responsibility	Ability	Use of English
	n= 135	n= 135	n= 135	n= 135
	r p	r p	r p	r p
Task Value	.275** .001	.048 .579	.344** .000	.268** .002
Learning Goal-Orientation	.258** .003	.095 .272	.350** .000	.401 .000
Self-Efficacy	----------	-.101 .243	.331* .000	.152 .078
Performance Goal-Orientation	----------	----------	.132 .126	.026 .766

Note: ** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The results of Pearson product-moment correlations between motivational beliefs and sections of autonomy indicate a moderate positive correlation of .344 between task value and ability; thus, we may conclude that students who value classroom tasks and activities, and believe that the activities and tasks are beneficial for improving their language skills are good/ very good" at managing in-class activities such as "choosing learning activities in the class", "choosing learning activities outside class", "choosing learning objectives in the class" and "choosing learning objectives outside the class". Moreover, task value is correlated with readiness with .275 indicating that students who value classroom tasks and activities and believe that the activities and tasks are beneficial for improving their language skills have mid-level of readiness for learner autonomy. There is a moderate correlation of .268 between task value and use of English. Thus, students for whom the tasks and activities in the classroom are important and useful to develop their language proficiency try to new words, watch TV programs and listen to English songs.

There is a moderate correlation of .401 between learning goal-orientation and use of English, .258 between readiness and .350 between ability. We may conclude that students who are more likely to report setting learning-oriented goals for themselves activity have mid-level of readiness for learner autonomy, can choose learning activities and objectives in and outside the class and engage in trying to learn new words, watching English TV programs and films and listening to English songs outside the class.

The results indicate a moderate positive correlation of .331 between self-efficacy and ability; that's, students who are certain that they can master all the skills taught and complete all class work are able to select learning activities and objectives in and outside the class.

CONCLUSIONS

Taking into consideration the findings of the questionnaire on motivational beliefs covered in the study, the students taking part in the study might be considered motivated as they value classroom tasks and activities and believe that the activities and tasks are beneficial for improving their language skills. Moreover, they find activities and tasks interesting or enjoyable. They tend to aim learning for the sake of learning as much as they can and gain a lot of skills focusing on thorough comprehension. They have self-confidence as they reported certainty in mastering all the skills taught showing strong beliefs in themselves in accomplishing their goals.

The fact that autonomy is a continuum, not an exact steady level, teachers, students themselves and their readiness to take control over their learning are effective in developing or hindering autonomy. These students considered their teachers to be the facilitator in the class rather than the only authority. We might suggest that teachers' behavior is significant in learners' applying autonomous behaviors allowing students freedom and flexibility as they decide to be facilitators rather than authorities. They consider themselves autonomous rather than teacher-dependent; although, this result must be confirmed at least with teacher observations, it seems that they are able to control their own learning process. Finally, they had mid-level of readiness for learner autonomy which is a prerequisite to develop their autonomy level. Most of the participants tended to take more control for the responsibilities taken outside the class. They rated themselves as good in choosing learning activities and objectives in and outside the class. The students tried to learn new words and watched English TV programs and films.

As the findings suggest, there is moderate positive correlation motivational beliefs and sections of autonomy. To begin with, students who value classroom tasks and activities, and believe that the activities and tasks are beneficial for improving their language skills are good/ very good" at managing in-class activities such as "choosing learning activities in the class", "choosing learning activities outside class", "choosing learning objectives in the class" and

"choosing learning objectives outside the class". Moreover, students who value classroom tasks and activities, and believe that the activities and tasks are beneficial for improving their language skills have mid-level of readiness for learner autonomy. The students emphasizing the tasks and activities in the classroom to develop their language proficiency try to new words, watch TV programs, and listen to English songs.

The students who are more likely to report setting learning-oriented goals for themselves have mid-level of readiness for learner autonomy, can choose learning activities and objectives in and outside the class and engage in trying to learn new words, watching English TV programs and films, and listening to English songs outside the class. Moreover, students who are certain that they can master all the skills taught and complete all class work are able to select learning activities and objectives in and outside the class. The students who were more likely to report setting learning-oriented goals for themselves activity engaged in trying to learn new words, watching English TV programs and films and listening to English songs outside the class.

As the overall findings suggest motivational beliefs except performance goal-orientation are correlated with learner autonomy as Garcia and Pintrich (1991) also put forward. The students who regard classroom tasks and activities valuable and useful for improving their language skills have mid-level of readiness for learner autonomy. This result supports the fact that "motivation is a key factor that influences the extent to which learners are ready to learn autonomously, as Spratt et al (2002) have shown.The fact that students who are more likely to report setting learning-oriented goals for themselves can choose learning activities and objectives in and outside the class supports the idea that intrinsically motivated learners are more efficient learners because the locus of control is internalized as Dörnyei (1998) put forward. The findings indicate a moderate positive correlation between motivational beliefs and sections of autonomy. This study also suggests and supports that "intrinsic motivation makes learners 'more willing to take responsibility for the outcome' and that giving students more autonomy yields intrinsic motivation" (Scharle and Szabó, 2000: 7).

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Transcultural Elements in Connectivist Massive Open Online Courses

Nazife Sen Ersoy
School of Foreign Languages, Dumlupınar University, Turkey
sen.nazife@gmail.com

Evrim Genc Kumtepe
Open Education Faculty, Anadolu University, Turkey
egkumtepe@anadolu.edu.tr

Abstract
This study was conducted to explore the transcultural elements in connectivist massive open online courses (cMOOC). It was designed as a holistic single-case study that consists of a cMOOC which took place in the Summer term of 2016 and it was the 4th cycle of the course up to that year. It was completely online utilizing solely open and distributed environments including course website, Twitter, Google+, Blogs, and Facebook.

Data of the study were obtained via different methods and tools such as observation, semi-structured interviews, open-ended questionnaires, and document analysis. Four of the course tutors/facilitators and 10 of the active learners in the course were the primary participants of the study. Data were analyzed using the content analysis technique by means of Nvivo qualitative analysis software. Results reveal that there is some sort of transculture formed in this course. Accordingly, there is an authentic community with a participatory culture based on acceptance, sharing, openness, collaboration, kindness, and trust. However, the course itself lacks structure unlike traditional online courses, and in turn, didn't support teaching and cognitive presence for certain learners. It was challenging and confusing for some learners who were not self-regulated and didn't have enough digital literacies to learn effectively in a connectivist course since it adopted and encouraged a distributed learning approach.
Keywords: Connectivist Massive Open Online Courses, Connectivism, Transculture.

Introduction
With the rapid development of technology and especially the introduction of computers into our lives, the way individuals access, share and produce information have been through a process of transformation which makes it possible to access information at any time and share it with people anywhere around the world. And thanks to the advancements in information and communication technologies, spatial boundaries between countries have become more permeable. As a consequence, cross-border communication has become possible for many people from different geographies and the world has now turned into “a global village” as McLuhan (1964) stated. An individual from any country or nation has an opportunity to communicate, exchange information and data with a person from a different country or nation. Meanwhile, the interaction of different cultures has become highly possible. Especially with the widespread use of the Internet, web-based online courses have also become widespread over time. In such courses, there is a heterogeneous student population with diverse individual characteristics from all over the world who have had the opportunity to take the same course that provides a basis for multicultural encounters and intercultural interaction. Owing to these interactions and diversities, the formation of a new, hybrid culture called “transculture” becomes highly possible as well. Massive open online courses in this sense ensure a great atmosphere for unifying people with diverse characteristics thanks to being free and open to anyone with a suitable device and internet connection.

Theoretical and Conceptual Framework
Connectivism and Connectivist Massive Open Online Courses
Massive open online courses (MOOCs) are unique in the sense that, unlike a typical online course, they provide open and mostly free access to anyone who has access to the internet regardless of their age, education, gender, location, socio-economic status, etc. There are two main types of MOOCs; connectivist massive open online courses (cMOOC) and extended massive open online courses (xMOOC).

cMOOCs are based on the principles of a relatively new learning theory “Connectivism”, proposed by George Siemens (2005) and Stephen Downes (2005). This learning theory suggests that the process of learning is facilitated by and rests within the connections between people over a digital network. Connectivist learning doesn’t dwell on the transfer of knowledge from an educator to learners. Instead, it involves the active engagement of learners with resources in communication with others. In addition, learning is distributed across the Web especially on online peer networks, such as social media, blogs, and forums (Royster, 2018; Kop, 2011).

Here are the principles of connectivism (Siemens, 2005).
· Learning and knowledge rest in diversity of opinions.
· Learning is a process of connecting specialized nodes or information sources.

· Learning may reside in non-human appliances.
· Capacity to know more is more critical than what is currently known
· Nurturing and maintaining connections is needed to facilitate continual learning.
· Ability to see connections between fields, ideas, and concepts is a core skill.
· Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
· Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality.

On the other hand, cMOOCs are learner-centered courses with a non-rigid and dynamic course structure that emphasize creativity, cooperation, autonomy, and social connections within the learning community (Siemens, 2005; Downes, 2010). Bates (2014) stated in his blog that a cMOOC is "a loosely organized online community of learners focused on a shared interest in a content area, using various social media and personal interaction to both learn from and share with the participants' collective knowledge." An essential feature of a cMOOC is the use of a variety of connectivist tools tailored to the needs of the student such as a learning management system, knowledge networks, personal learning environments, and social media (Royster, 2018). In line with this, there are several distinctive design characteristics of this type of MOOC (Bates, 2014);

- Social media use is essential,
- Content is driven by participants themselves.
- Communication is distributed through the network.
- There is no formal assessment.

Transculture

Culture is a loaded word and it is in every part of our lives. Especially in educational settings, thanks to the internet and communication technologies, it is much easier for learners with diverse cultural characteristics to come together and learn from each other. And if certain prerequisites such as structure, sense of community, interaction, and social, cognitive, and teaching presences (Sen-Ersoy, 2021) are fulfilled, the formation of transculture is highly possible. In the simplest terms, transculture can be defined as a new hybrid culture that is formed owing to the interactions between people from different cultures. During these cultural exchanges, some cultural features change, some disappear and some stay the same which results in a new, hybrid culture (Welsch, 1999; Murray, 2010). Especially in online learning environments, the interactions between different learners and different cultures have a greater tendency to create a transculture. To this end, Möhrer et al. (2015)'s definition of transculture complies best with this research's context, "the behavioral proficiency to effectively establish a common working culture based on shared local experiences that fosters the efficient proceeding of intercultural transactions within a multicultural context".

Online learning has a high potential to be transcultural beyond being multicultural or intercultural, as it enables various learners with different cultures and characteristics to interact, exchange information, and produce and share knowledge (Salvadori, 1997). However, it can be said that the majority of the studies on culture in online learning in the literature are mostly carried out in local contexts or formal courses with limited cultural diversity. Also, such studies are mostly "intercultural". because; they are basically based on comparing cultures in terms of similarities and differences. But transculture is much more than these comparisons, it is more about different kinds of interactions that result in new and hybrid transformations. In this respect, there is a need to investigate the phenomenon of transculture in online environments in order to examine these hybrid transformations and to identify new identities and cultures created jointly. In this respect, cMOOCs provide an ideal environment to look for the formation of transculture since they promise greater diversity in terms of participants due to being free and open with no prerequisites.

Methodology

Research Model

This study is conducted to explore the transcultural elements in connectivist massive open online courses (cMOOC). It requires the investigation of transcultural elements in their real and natural context without any manipulation. Therefore, qualitative research methodology is mainly adopted. It is designed as a case study since it provides the researcher with the opportunity to examine and understand the phenomena in depth (Bogdan & Biklen, 2007; Creswell, 2008) while allowing the researcher to investigate events, people, and situations in their natural environment (Denzin & Lincoln, 1994). Case studies vary according to the type, the purpose of the analysis, and the limitation of the case (Stake, 2005; Merriam, 2009; Creswell, 2014). To this end, a holistic single case study design was employed in order to examine the phenomenon of transculture in a cMOOC context in depth.

Context

The case of the present study comprises a cMOOC which took place in the Summer term of 2016 starting in July. By the time of the study, it was the 4th cycle of the course up to that year. It was a completely online course utilizing solely open and distributed environments including course website, Blogs, Facebook, newsletters, and primarily Google+ and Twitter. It was a free and open initiative of a group of people who conducted the first three cycles of this MOOC as a part of a national project which was then canceled. It was a four-week course with a one-week purposeful break to provide the participants with the opportunity to reflect on their experiences in the course so far.

Participants

Four members of the course team (facilitators/tutors) and 10 of the active participants of the course were the primary participants of the study. Their demographics are as follows:

Table 1. Demographics of Course Team Members

	Role	Gender	Age	Level of Education	Country	Occupation
1	Facilitator	F	52	PhD	Scotland	Learning Technologist
2	Make cycle leader	F	66	Masters	USA	Teacher
3	Assistant facilitator	F	58	Bachelors	USA	Project-based Learning Coach
4	Participant/facilitator	M	50	Masters	USA	Teacher

Table 2. Demographics of Course Participants

	Gender	Age	Education	Country	Occupation	Number of MOOC Experience
1	M	72	Masters	USA	Teaching Artist	5
2	M	44	Masters	USA	Instructional Coach	5-6
3	M	60	Masters	USA	Librarian	5
4	F	52	Masters	USA	Middle School Teacher	60+
5	M	70	Masters	USA	Retired Educator	3
6	M	56	Masters	Netherlands	Educationalist	16
7	M	61	Masters	USA	Instructor at a University	12+
8	M	41	MBA	USA	Informatics Manager	2
9	F	58	Masters	USA	Teacher	1
10	F	58	Bachelor	USA	Project Manager	8-10

Data Collection and Analysis

In case studies, it is considered important to diversify the data in terms of ensuring validity and reliability (Bogdan & Biklen, 1998). Data of the study were obtained from various sources. A semi-structured interview form comprising of six questions for course team members and an open-ended questionnaire with seven questions for the participants were created to examine their experiences and opinions regarding the transcultural elements within the course. Besides, participant observation and document analysis were the other primary data collection techniques employed.

All the permissions for data collection were granted from the course administrators before the course started and an informed consent form was used with all of the individual participants. In addition, both data collection tools got approval from the human subject committee of the researchers' institution before the data collection procedure started. Data were analyzed using the content analysis technique by means of Nvivo qualitative analysis software. Two of the distinctive themes, community, and structure, in Sen-Ersoy (2021)'s research were used as the main framework regarding the formation of transculture and in reporting the findings.

Findings

This study addressed the phenomena of transculture from three different perspectives within a connectivist massive open online course; tutor experiences, learner experiences, and course structure. Based on Sen-Ersoy (2021)'s research, there are two main aspects signaling the formation of transculture which are community and structure.

According to a comprehensive literature review conducted based on these two aspects, shared interests and shared culture are two main elements of a community from a transcultural stance.

a. Tutor/Facilitator Experiences

Four tutors shared their views and experiences in this cMOOC. According to the results, what motivated them to administer and take part in such a MOOC project was basically a sense of belonging, friendship, and responsibility to sustain the community. Here are two examples from tutors' interviews supporting this finding:

"I did this cMOOC last year because I knew some of the folk from other cMOOCs. I wanted it to happen this year too, so when I found out that it was not funded anymore this year I was keen to help make it happen anyway." (Tutor 1*)*

"The people/participants and facilitators of past cycles feel like online friends and colleagues with whom I feel a deep connection...keeping the community going seemed a good thing to do for everyone." (Tutor 3)

Tutors are of the opinion that, unlike a traditional cMOOC, this cMOOC was unique in the sense that it was more of a community and experience than a course. Accordingly, the distinctive characteristics of this course were openness, a sense of community, creativity, collaboration, support, and lifelong learning. Tutor 2 and Tutor 3's these explanations support this finding;

"Its creativity, generosity, and openness (in that we are open to others' ways of thinking and being, and suggestions) ... I think it is similar to DS106 in that both of them are communities. I think it differs from MOOCs by, say, Futurelearn that are full of content written by experts for learners to consume. " (Tutor 3)

"The distinctive characteristics are 1) inviting - honoring any participation and to jump in (or not) at any time 2) considerate - thoughtful, respectful, clarifying responses that invite further responses 3) supportive - sharing how-to and asking questions or offering guidance -- any support needed 4) relevant and deep thinkers - analyzing tools and thoughts/ideas for replication and relevance in education 5) resilient - willing to struggle, fail, and try again with new tasks, connections, analysis, etc. and knowing there is support 6) real - use of any tool, digital or not, to learn and connect" (Tutor 4)

Another tutor explained in detail what made this course particularly different from other courses he had experienced or administered from a connectivist learning perspective putting an emphasis on community, sharing, building connections, and dialogue.

"Its main goal is to live connected learning principles. That means honoring all participation [or not] and all paths to the learning the participants take, connecting people first and content next -- creating conversations on ideas for living, not just for an educational institution or situation. It is lifelong learning in bursts, turns, twists, and rests that fit the learners' needs...and in the community of learners, as they share, reflect, converse, remix, and publish, everyone learns. Everyone learns in a personalized way. The 'adjacent possible' creates depth and surprises, and innovation results from openness, collaboration, conversation, and reflection. The connected community is a social symphony - our individual contributions promote, invite, encourage a harmonious epiphany of what the world could be, each making the world better for each other." (Tutor 1)

Shared values - principles mutually agreed on for good conduct of interaction and collaborative learning- are critical in order for a community to be formed and sustain. According to the tutors, what determined the shared values in this course were its participatory nature and being open to anyone to be a part of this community along with sharing the joy of this journey with others not with judgment but in collaboration. Here are some examples that support these findings:

"Ability to drop in, drop out, lurk...respecting different perspectives, in other words, no judgments, much encouragement." (Tutor 2)

"It is very fluid, the framework is loosely defined, encourages veering off in new directions. Not full of 'assignments' and 'grades', but self-directed experimentation and growth with the guidance of others." (Tutor 1)

"…the playfulness, the openness of multiple entry points and the sense of collaboration and connectedness." (Tutor 4)

On the other hand, Tutor 3 expressed both her appreciation and criticism of the openness of some of the course's social media accounts to anyone interested. She stated her opinions as;

"*I appreciate that the Google Plus community continues and is open/public for others to view or join the journey. That is important if such communities are to flourish. The walled community of Facebook prevents the possibility of others joining or building a similar opportunity. I think the Facebook community needs to be opened. Otherwise, it's just a gated and elite community...”*

b. Learner Experiences

Results revealed that the shared interests in bringing the learners together under the roof of this course are somewhat similar to tutors'. Some of them were participants of the previous cycles of the course and built friendships that lasted until then, while the others were in the course out of curiosity, creativity, collaboration, flexible and stress-free learning, and a sense of community. Here are some examples supporting these findings:

"I have been involved since the start, I knew it would help me find good reads and good tools, I knew I would learn and experience new things.” (P4)

"Joy of collaborating with smart, talented, positive people" (P7)

"The creative 'play' and the no stress and flexible schedule..." (P10)

Learners have diverse opinions regarding the distinctive characteristics of the course. Openness, collaboration, sense of connectedness, reciprocation, sharing, acceptance, being small scale, and supportive.

"This MOOC is built on the foundation of Connected Learning, but what makes it special is the playfulness, the openness of multiple entry points, and the sense of collaboration and connectedness. The open doors to emergent ideas - the unexpected that sparks collaboration - this is really the key element (and difficult to plan for)." (P2)

"The powerful bonds of social capital shared, both bonding and bridging. Reciprocation is powerful and is always trying to reach from virtual to real and back again." (P5)

"The 'assignments' are instead 'makes' calling creativity into the mix, and everything is optional, do as you like, when you like.” (P6)

"The Community, the trust, the risk-taking; mutual respect across differences in age, experience, and culture, curiosity, inventiveness, kindness and compassion...” (P9)

"More focus on connections, generosity, and willingness to continue connections over time…” (P10)

In terms of the participants' opinions regarding the shared culture –an amalgam of common ways of doing things and learning, ethics, norms, rules- within the course, there were various opinions mostly in line with the distinctive characteristics of the course. The most prominent opinions about the shared culture of this course are as follows: culture of collaboration, acceptance, trust, creativity, openness, inclusion, peer support, and mutual respect. These quotes exemplify the findings above:

"Mutual respect across differences in age, experience, and culture...curiosity, inventiveness, kindness, compassion" (P1)

"Openness and lack of self-focus, more willingness to validate others, more motivation to encourage and include.” (P3)

"There is, at least, a shared enthusiasm to encourage others to engage in tasks. Participants support each other's expanding efforts with positive suggestions/feedback, intentionally building shared 'products'." (P4)

“…maybe a shared ethos about collaboration and celebration of people doing what they are doing, in whatever form and in whatever way they feel comfortable doing it” (P6)

What participants thought about the shared values bringing and keeping them together within this community were more or less aligned with their opinions regarding the shared culture in the course. Some of them even seemed to be confused which is probably because these are interrelated and abstract terms that are not easily put into words.

To this end, the most common ideas about the shared values can be listed as sharing, openness, collaboration, acceptance, participatory culture, supportive and learner-driven. Here are some quotations from the learners supporting these findings:

"Make Cycles encourage making, playing, tinkering, and sharing. The underlying principles of Connected Learning create opportunities for exploring and sharing passions. The collaborative nature, most of all, is a welcome sign for anyone to join in." (P9)

"Acceptance is one of the shared values. Connected learning principles and values are at its core as well. Willingness to reciprocate, first. Second, a deep capacity to observe, understand, and then judge if need." (P8)

"The framework of the course, and the types of individuals it appeals to independent thinkers with a desire to create and expand their current knowledge and understanding." (P4)

c. Structure

The cMOOC of this study was completely online utilizing solely open and distributed environments. The main platforms used throughout the course were Twitter, Google+, and YouTube along with self-organized spaces such as Blogs, Facebook, and some applications. According to the course organizers, unlike what the "C" in the acronym cMOOC stands for, the "C" in this one represents "collaboration" not course. The MOOC itself was based on building connections and forming a community. In this regard, there wasn't a course syllabus or content since the course mainly revolved around "make cycles" which set the framework of what would be done or learned during each week. So the content was participant-driven, or in other words created by the participants collectively. Within the relatively fixated framework, participants could move freely. For instance; the first task of the 1st Cycle was "Introductions". For this task, participants were free to prepare and share their introduction in whichever way or platform they wanted. Some shared a photo, poem, cartoons, and drawings while others preferred blog posts, sticky notes, and songs for the same purpose. For each main task in every Make cycle, there were three different sub-tasks starting from easier to more challenging ones and participants were free to choose themselves. In this sense, it could be claimed that the course provided the opportunity for individualization since learners with different individual needs or styles could choose whatever fits best for their interests and competencies. There were also instructions, examples, and sample activities or ideas provided for each of them. They were provided in a detailed order and for those who were not familiar with the tasks, applications, or concepts, links including examples for each of them were also available. In terms of testing and evaluation, there wasn't any formal grading, assignments, or tests. Attendance, all kinds of participation, and contribution were optional and voluntary.

The course was administered by "facilitators, coaches, make cycle leaders/organizers, assistant facilitators, and facilitator for Twitter chats" as described by the participants of the study. The whole course team were very inclusive and encouraging and providing immediate feedback to make sure that participants felt safe to share and contribute. Therefore, based on the interactions during the course span–messages, posts, chats, etc.- it could be said that sharing, building connections, and community were encouraged and were within the heart of the course. Since this was the 4th cycle of the course, all course organizers, tutors and facilitators, and the majority of the participants/learners knew each other from previous cycles. It was apparent that they developed a sense of belonging and comradeship towards the members of the course community which was also stated by two of the tutors along with six of the participants. These words from P4, P7, and Tutor 4 support these findings: "*I participated before and have always found it and people here exhilarating*.", *"All my good old friends were here"* I did this cMOOC last year and I knew some of the folk from Rhizo14 and Rhizo15". For all these design and organization elements and facilitation processes, although lacking structure in some areas, it could be said that the course had a certain level of teaching presence in its own way. However, since cMOOCs differ from more traditionalist online courses and MOOCs in that they offer less structure, less instructor intervention, more learner control, higher level of flexibility and choice, they require learners to be more autonomous and self-regulated. In line with this, it was challenging and confusing for some learners in this study who were not self-regulated and didn't have enough digital literacies to learn effectively in a connectivist course since it adopted and encouraged a distributed learning approach.

Lastly, unlike what connected learning presupposes, the course didn't accommodate diverse participants. Since the course didn't rely on an LMS or structured environment, the number of course participants was unknown. However, it was believed that there were more lurkers than the active participants. Data and observations revealed that all tutors and the majority of participants of this cMOOC were from the USA which was according to course facilitators because it was "a US-based initiative".

Conclusion

The present study was conducted to examine transcultural elements in a connectivist massive open online course. The phenomena of transculture were explored from three dimensions; structure, and tutor and learner experiences. Based on Sen-Ersoy (2021)'s study on transcultural aspects in online and massive open online courses, community and structure are the two primary elements for the formation of transculture. For these two aspects, shared culture, shared values, and interests along with social, cognitive and teaching presences are components to support the creation of hybrid cultures. Results reveal that there is an authentic community with a participatory culture based on acceptance, sharing, openness, collaboration, kindness, and trust. Similarly, sharing, building connections, and community were prominent shared values and were at the heart of the course. There was also a high level of social presence since the tutors and participants of the course developed a sense of belonging and comradeship towards the members of the course community.

The course itself provided opportunity and flexibility for individualization since learners with different individual needs or styles could choose whatever fit best for their interests and competencies. However, it doesn't accommodate learners of all types to meet diversity and openness criteria in connectivist learning (Downes, 2009). Although the exact number and demographics of the whole course participants are not exactly known, data revealed that it had predominantly US participants and tutors/facilitators. This prevented the multicultural encounters and, thus, intercultural interactions which could normally create an ideal basis for the formation of transculture. The course seemed to be challenging for some learners who were not self-regulated and didn't have enough digital literacies to learn effectively in such a connectivist course since it adopted and encouraged a distributed learning approach. In this sense, it could be considered that the course didn't support cognitive presence sufficiently.

With the increasing demand for online courses especially during the Covid-19 emergency remote education and after, designing culturally sensitive courses has gained more importance since online courses have a greater tendency and potential to have learners with diverse characteristics. To this end, transculture is a relatively new concept in the field of open and distance learning and there are only few studies present on new, hybrid cultures created in online learning environments. More studies are needed to explore the phenomena of transculture within different contexts, with different research methodologies and populations. Also, studies focusing on the factors and design elements supporting the formation of transculture might also be studied to understand what contributes to the occurrence of hybrid cultures in online settings.

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