RESEARCH & REVIEWS IN EDUCATIONAL SCIENCES

EDITORS

DOÇ. DR. ONUR ZAHAL
DR. ÖMER YAHŞİ

Research & Reviews in Educational Sciences

Editors

DOÇ. DR. ONUR ZAHAL

DR. ÖMER YAHŞİ

CONTENTS

Chapter 1

EVALUATION OF AN ENGLISH SPEAKING SKILLS PROGRAM OF A PREP-SCHOOL VIA CIPP MODEL[1]

Ayse Yilmaz Virlan [2]
Dilara Demirbulak[3]

Introduction

English has become a language that has established itself as the world language of research and publication as well as the language of instruction in many countries in the world. Considering the status of English, the need for English in such fields has grown rapidly resulting in remarkable changes in instruction in English. Nunan (1996) posits that although there are "many diverse and sometimes contradictory views on the nature of language and language learning", curriculum developers and instructors need to consider and respond to data coming from learners, teachers, evaluation specialists and so. This is especially important in countries where the curricula changes are too frequent and denies the challenges of the prior (Fer, 2005; Yüksel, 2003; Sönmez, 1991; Varış, 1976, as cited in Demirbulak, 2013). The second motive is the limited or no emphasis on speaking skills at the curriculum of English language preparatory schools (ELPS). This issue carries vital importance in countries where the native language is not English yet its use as the medium of instruction is widely practiced especially at tertiary educational institutes. This, then, means that learners need to have high-level English proficiency since it is the language of learning. These universities usually have ELPS`s designed to help students acquire language skills and proficiency in English. The curricula of these schools are structure-reading oriented with the speaking skill being the most neglected and thus problematic skill.

Curriculum evaluation has become one of the crucial aspects and has gone through many changes and revolutions. To answer the question of whether or not the implemented curricula are satisfactory for the learners and teachers has been the most important prerequisites of delivering effective and quality language education nowadays, in this rapidly changing world. According to DeKeyser (2007), each of the language skills require equal attention in curriculum design to make sure that these unique features are learned (as cited in Nation & Newton, 2009). For this reason, to communicate effectively speaking skills should also be included in the curriculum to achieve the learning goals of a language course as opposed to general tendencies (Nation & Newton, 2009). Students think that being able to talk fluently with others is more important than reading, writing, or comprehending spoken language (Genc, 2007). This being the case, it becomes even more important to have a closer look to see what is being done in the classrooms as a reflection of the curricula. At this point, the evaluation models and methods come into play.

Curriculum Evaluation

There are many different definitions as to what evaluation is. Some researchers relate evaluation with measurement, while others define it as assessment. Evaluation can be conducted for various reasons. When

it comes to education, the main purpose of the evaluation is to gather information about student and teacher performance and to find out the strengths and weaknesses of a particular program (Richards, 2005). As Ornstein and Hunkins (2004) claim, evaluation can also be considered as a process that is executed to receive data about the changes, modifications, and eliminations.

Curriculum evaluation, on the other hand, is defined as a process that help us understand the "value and effectiveness of any particular piece of an educational activity" (Lynch, 2003). The two common goals of program evaluation, as stated by Lynch (1996) are evaluating a program's effectiveness in absolute terms and/or assessing its quality against that of comparable programs. Considering these, curriculum evaluation not only provides useful information to educators on how the current work can be improved but also offers accountability to administrators.

Different Models of Evaluation

Evaluation is often considered to be the end to the program development, but as Brown (1995) states, "it is the heart of the systematic approach to language curriculum design, and the part of the model that includes, connects, and gives meaning to all other elements" (p. 217).

Using different evaluation models, educators frequently attempt to renew courses with new methods to make the teaching and learning process more operative and pleasant. Yet, faculties of universities do not have a systematic curriculum most of the time. Which leads to the revision and design of the curricula many times. In such a process, evaluation aims to discover whether the designed curriculum can yield to anticipated results. Therefore it is a better idea to define the strengths and the weaknesses of the curriculum before its implementation through evaluation (Ornstein and Hunkins, 2004). Thus, a systematic and continuous evaluation of the curriculum becomes even more important for its improvement that finally leads to the need for curriculum evaluation. However, because of different theories in curriculum development, it is difficult to advocate a particular model for curriculum evaluation. As Nunan (1992) states, there are several "different and sometimes contradictory views on the nature of language and language learning so that curriculum developers need to consider and respond to data coming from learners, teachers, evaluation specialists while determining their evaluation model for the curriculum".

So, researchers can decide on the most proper model for their aims and conditions or develop a model promoting these models. Some highly accepted evaluation approaches are implemented in the quest of the most suitable evaluation model. Worthern, et. al. (1997) for example, classify evaluation approaches into six groups, namely, "objectives-oriented",

"management-oriented", "consumer-oriented", "expertise-oriented", "adversary-oriented" and "participant-oriented" approaches. Among these, the management-oriented evaluation is believed to be the most important approach especially for managers. Stufflebeam has been the pioneer of management-oriented evaluation approach by developing his evaluation approach, known as CIPP (Context, Input, Process and Product Evaluation Model). Since 1965, the CIPP evaluation model has been extensively developed and widely implemented.

Among many evaluation models classified by Fitzpatrick, et.al. (2004), management-oriented evaluation becomes one of the most important approaches in evaluating programs in many fields. Being the pioneer of this approach, Stufflebeam developed a model called Context, Input, Process and Product (CIPP) model which has been broadly developed and executed not only in management but also in education.

Context, Input, Process, Product (CIPP) Model

The CIPP Model emphasizes that "*evaluation's most important purpose is not to prove, but to improve*" (Stufflebeam, 1983). By "helping stop unneeded, corrupt, or hopelessly flawed efforts", Stufflebeam (1983) claims, evaluations serve "an improvement function through assisting organizations to free resources and time for worthy enterprises". Consistent with its improvement focus, the CIPP Model places a priority on guiding the planning and implementation of development efforts and intends to supply evaluation (Stufflebeam, 1983).

Robinson (2002) states that the CIPP evaluation model was developed to link evaluation with program decision-making. It aims "to provide an analytic and rational basis for program decision-making, based on a cycle of planning, structuring, implementing and reviewing and revising decisions, each examined through a different aspect of evaluation".

CIPP Evaluation Model is a comprehensive framework for guiding evaluations of programs, through its four components. It tries to identify what needs to be done, how it should be done, and if it succeeds (Stufflebeam, 2007). All four components have an important role in the process (Zhang, et.al., 2011) as they are useful in helping evaluators to investigate important aspects of curricula during the evaluation process. The components of the model are context, input, process, and product, which are explained further below.

Context

The first component of the model is the context evaluation, which involves studying the environment. Stufflebeam (1971) defines the context as "serving planning decisions by identifying unmet needs,

unused opportunities and underlying problems that prevent the meeting of needs or the use of opportunities". Context evaluation also serves as needs assessment which asks, "What needs to be done?" and helps assess problems, and create opportunities during the process (Stufflebeam, 2007).

Context evaluation is also situational. This diagnosis stage of evaluation continues to "furnish baseline information regarding the operations and accomplishments of the total system" (Ornstein and Hunkins, 2004). When the evaluators define the needs of the program it is thought that objectives of the program are also defined (Worthern, Sanders and Fitzpatrick, 1997).

Input

The second component is the input evaluation. It is designed to provide information and determine how to use resources to meet program goals. Stufflebeam asserts (1971) that input evaluation serves to structure decisions "by projecting and analyzing alternative procedural designs". Moreover, input evaluates specific aspects and specific components of the curriculum to help consider alternatives in terms of their particular needs and circumstances and to help develop a workable plan for them (Stufflebeam, 2007). Input evaluation also helps evaluators identify the needs. It asks, "How should it be done?" and identifies procedural designs and educational strategies that will most likely achieve the desired results (Stufflebeam, 2007).

Process

The third stage is the process evaluation which focuses on the administration of a program or a strategy. As for Stufflebeam (1971), process evaluation monitors the implementation of the curricula. Process evaluation provides "feedback about needed modification if the implementation is inadequate" (Stufflebeam, 2007). Besides, "process evaluation should provide a comparison of the actual implementation with the intended program, the costs of the implementation, and participants' judgments of the quality of the effort" (Stufflebeam & Shinkfield, 2007. p. 175). Process evaluation monitors the project implementation process. It asks, "Is it being done?" and provides an ongoing check on the project's implementation process.

Process evaluation includes identifying problems and unanticipated defects, by offering adjustments and additional information for changes, documenting the curriculum implementation process, and regularly interacting with and observing the activities of the stakeholders (Stufflebeam & Shinkfield, 2007). Process evaluation methods includes observation, participant interviews, rating scales, questionnaires, records analysis, as well as case studies, focus groups, and self-reflection sessions (Zhang, et.al., 2011).

Product

The last stage - product evaluation deals with how "to measure, interpret, and judge the attainments of a program" (Stufflebeam and Shinkfield, 2007). Product evaluation decides which needs were met, and identifies broad effects of the program and serves recycling decisions by determining the degree to which objectives have been achieved and by determining the cause of the obtained results (Stufflebeam, 1971). The product evaluation is used to ascertain whether a program should be continued, repeated and/or extended to other settings (Stufflebeam & Shinkfeld, 2007).

Stufflebeam (2007) explains that product evaluation identifies and assesses project outcomes and asks, "Did the project succeed?" Its main purpose is to determine the extent to which the needs of all the participants were met (Stufflebeam, 2007). So, in short, as Nicholson (1989) summarizes, context evaluation is used to choose the goal. Input evaluation is used to revise the plan. Process evaluation is used to guide the implementation of the plan. Product evaluation is used to provide the inspection determination. Table 1 also reveals an outline for the four components of the CIPP model.

Methodology

The CIPP evaluation developed by Stufflebeam in 1971 was used as the basis of the study. CIPP is an evaluation model based on planning and decision-making. As it was aimed to make decisions in relation to the improvement of the speaking program, CIPP model was used within the framework of this mixed-methodology design.

Participants of the Study

In this research, a total of 300 subjects were used. Of the participants, 287 were students and 23 of them were the instructors at the prep school. The target population is the students and instructors of A1 level classes at the School of Foreign Languages in a public university. The first sample was composed of 287 students from 25 classes from A1 levels.

The second group of participants was instructors teaching in A1 level in the prep school. There were 23 teachers in this sample, all of whom were asked to fill in the teacher-questionnaire to gather necessary data.

Data Collection Instruments

A mixed-method design was used in the study to evaluate the speaking program of the prep school within the framework of CIPP model and to study the data from more than one standpoint. The quantitative data came from student and teacher questionnaires while the qualitative data was obtained through interviews, observations and document analysis.

A 36-item questionnaire was designed by the advisor of the thesis, piloted and adapted by the researcher according to Stufflebeam's evaluation model principles. It was used to identify the learners' socio-demographic characteristics such as age, gender, and English background and their perceptions of the students on the speaking program. The reliability coefficients for the 36 items in the student-questionnaire were at acceptable levels ($\alpha =, 627$).

A 14-itemed questionnaire designed by the advisor of the thesis and adapted by the researcher in relation to the evaluation model principles was used to identify instructors' opinions about the curriculum of the prep school. The reliability coefficients of the teacher questionnaire was at acceptable levels ($\alpha =, 734$). Also, an interview schedule was used to get in-depth data about the students and instructors' perceptions on the ongoing program that was being implemented at prep school.

Design of the Study

The study was carried out in five stages. At the first stage, a pilot study for the questionnaires and interviews was conducted with ten students and two instructors to remove irrelevant and vague questions. The second stage was the administration of the student-questionnaire was to A1 level student at the prep school of the university. The third stage was the administration of the teacher questionnaire while the fourth stage was classroom observations. The researcher observed two classes to better understand the surroundings. The fifth stage of the study was the student interview where volunteering students were asked four main questions about the speaking program of the prep school.

Data Analysis

This project utilized both quantitative and qualitative data collection tools. The data collected through the student and teacher questionnaires were processed using a statistical package to analyse descriptive statistics, reliability estimates, and correlation and regression analyses. Descriptive analyses were made for all responses to close-ended items, and entered for computer analysis. As for the qualitative perspective of the study, the data collected through interviews were analysed by hand-coding qualitative research techniques as well as a computer software package for qualitative data analysis to organize and analyse non-numerical data to reach inter-coder reliability.

The observations were carried out in order to comprehend the students' attitudes towards the speaking skills. Data obtained in the observation through note-taking method was compared to what the speaking syllabus suggested for that lesson. Moreover, student behaviours and attitudes

towards the speaking lesson were classified and interpreted accordingly. Written documents such as the syllabus and exam results were also examined in order to gather more meaningful data from the observations.

Results & Discussion

The main research question of the study is "what aspects of the speaking curriculum need to be added, removed, strengthened, or maintained". These aspects have been discussed for each of the four elements of the CIPP evaluation model and reported accordingly.

Context Evaluation

The context dimension of the CIPP model aimed to analyse the existing objectives of the program, to define the needs assessment and to describe the context implementation (surroundings and background) of the program. The aim of gathering data in the context stage of this study was to identify the perceptions of the participants about the aims, goals, and objectives of the speaking curriculum, language needs of the students, course contents and course materials.

Written documents on goals and the objectives of the institution were also examined in order to obtain necessary data. The results indicated that the objectives of the speaking program of preparatory school were stated clearly but not in a detailed way. For example, one of the objectives of the program stated that the students were supposed to actively participate in classroom discussions and activities, however, the steps to achieve these goals were not identified in the objectives of the program. Stating only the general objectives cannot contribute to the achievement, and there should be detailed information related to each and every skill specifically in order to reach satisfactory levels of comprehending the curriculum. For this reason, it is concluded that the program was deficient in objective dimension since the speaking dimension of the curriculum was not stated in detail.

The perceptions of the students related to their overall status are also important in understanding their needs related to the language. Table 1 presents the results of students' perceptions on their current status with regards to four language skills.

Table 1: Descriptive statistics for the students' perceptions on their current status

	n	M	Std. Dev.
Reading	287	3,31	,66
Listening	286	3,36	,68
Writing	286	2,19	,67
Speaking	287	1,66	,57
Grammar	287	2,06	,71
Vocab	287	2,12	,70
Total	285		

According to Table 1, students see themselves less competent in the speaking skill with a mean score of 1,66, (SD=,57). Yet, they consider themselves competent especially in listening and reading skills with a mean score of 3,36 and 3,31 successively.

The course contents materials were also examined to further evaluate the context dimension of the speaking program. The syllabus revealed that a course book with its workbook and some additional materials were used in the lessons. However, there was no specific material regarding speaking stated in the curriculum. As a result, the program lacked sufficient focus on the speaking skill.

To conclude, the speaking program's objectives and aims should be specifically stated and well defined while the overall objectives of the prep school program should be maintained with relevant steps to guide the teachers. A new dimension to the teaching methods should be added by increasing the variety of the course materials.

Input Evaluation

Input evaluation aimed to obtain information and determine how to use resources to meet program goals. According to literature, the speaking skill mostly relied on the course-book and dictionary usage, and projectors, although they are available in the classes, were not used because of technical problems. Therefore, problems may arise mostly through intensive use of course-book that consists of language practice activities focusing on specific grammar points, information-gap activities or discussions on an assigned topic. As Nation & Newton (2009) emphasizes, too, none of these activities teaches patterns of real interaction and so diversity in the usage of the visual aids are needed to be included in the speaking program.

The findings showed that the students perceived the speaking skill as the most important. Table 2 shows that students attributed much importance at their speaking abilities when compared to the results of Table 1 and they aimed to be good at speaking with a mean score of 3,91 (SD=, 40).

Table 2: Descriptive statistics for the students' perceptions on the importance of skills

	n	M	Std. Dev.
Reading	287	3,86	,42
Listening	286	3,88	,34
Writing	286	3,38	,64
Speaking	287	3,91	,40
Grammar	287	3,90	,31
Vocab	287	3,34	,67
Total	285		

Considering the results of Table 2, it is not surprising that the participating students wanted to improve this skill as well as the remaining skills and regarded it as the most important. As Khamkhien (2010) also acknowledges, "speaking, as a productive skill, seems the most important of all the four language skills because it can distinctly show the correctness and language errors that a language learner makes".

Apart from these, students were also asked about their overall perceptions on learning English to better evaluate the program in line with the input aspect of the CIPP model. The data obtained from the questionnaire is presented below in Table 3.

Table 3: Descriptive statistics for student perceptions on learning English

	n	M	Std. Dev
studying makes me relaxed	286	3,62	1,04
happy to have less topics	285	4,18	,54
happy to have less hours	287	1,62	,59
pleasure to work in free time	286	3,55	1,08
afraid of English	285	3,06	1,27
prefer another language	286	1,93	,71
study because I have to	286	2,70	,92
knowing English is respected	287	4,83	,38
important in finding a job	287	4,59	,66
want to learn very well	286	4,72	,53
medium of English is helpful	285	4,52	,63
instead of medium, teaching effectively is important	286	4,22	,65
Turkish medium & effective English program	287	2,79	1,13
limits creativity	286	4,30	,62
choosing related topics helps speaking	287	3,90	,80
native teachers should teach	287	3,74	1,11
Turkish teachers should teach	285	2,45	,74
Turkish culture should take place	287	3,35	,71
familiar topics should be chosen	287	4,66	,62
English culture should take place	287	4,63	,58
different cultures should take place	285	2,74	,79
Total	269		

Table 3 indicated that students consider knowing the English language very important with a mean score of 4, 83. However, about the medium of instruction, they seem to be confused because the number of students who believe that the medium of instruction should be English is almost the same with the ones who stated that medium of instruction was not important. There were also some students who were satisfied with the Turkish medium of instruction. Also, students mostly preferred familiar topics (M=4,66) and native teachers (M=3,74) as compared with cultural topics (M=3,35) and Turkish teachers (M=2,45). The debate about who is going to teach the skill, a native speaker or a non-native speaker, cannot be decided easily as suggested in the literature. According to Nation & Newton (2009), this creates the problem of embedding the speaking skill to the program in an effective and efficient way, as it can be seen in this study. Therefore, a clear-cut decision should be made while designing the speaking program, and all the classes should be assigned a teacher accordingly in order to have the same opportunity in their speaking classes, and to prevent inequality between the classes with a native teacher and classes with a non-native teacher.

As a result it was found out that the speaking skill was considered the most difficult skill, at the same time. Speaking skill is seen as the most important skill to be able to use the learnt language; therefore, this aspect should be strengthened by the addition of various materials and resources to meet the program goals. Therefore, it can be concluded that speaking skill should be encouraged more in the curriculum.

Process Evaluation

According to Stufflebeam (2007), main purpose of the process evaluation is "to provide feedback about needed modification if the implementation is inadequate". For this reason, data were also collected through the teacher questionnaire to define the teachers' perceptions on the implementation of the speaking program. According to the results, teachers almost all the teachers (n=21) held the opinion that course materials were insufficient agreeing upon the importance of different teaching aids in the classes.

In the same way, almost half of the instructors (n=11) expressed that they had institutional problems about the implication of the program. Instructors claimed that the materials and the course books they were given to use in the speaking courses did not help preparing the students for their department courses. In other words, instructors thought that the materials were helpful only for the proficiency exam of the prep program. According to the instructors, the contribution of the audio-visual materials was insufficient when compared with what the curriculum suggested.

Instructors reported that most of the time they had to skip the parts in the course book and materials as the teaching aids did not work properly. It was neither fun nor educative having to learn a foreign language in such an environment. Therefore, the student participation was lower than it was supposed to be.

Stufflebeam (1971) acknowledges that "process evaluation should provide a comparison of the actual implementation with the intended program". This was also supported by the data coming from the observations. Teachers believe that facilities for the teaching of speaking skill should be improved in the classrooms (n=15), too. Last but not least important problem was to allocate less time to the speaking course in comparison with time allocated to the other skills. There is a wide gap between not only the official curriculum and the classroom curriculum but also among the classroom curricula even within the same school and this conflict should be overcome for the best of the students (Author, 2013).

Observations were also carried out in order to evaluate this aspect of the process evaluation. It was observed that students did not want to participate in the lessons and seemed unwilling while the teachers were trying to encourage them to speak. The time that was devoted for the speaking part was considerably shorter than what the curriculum suggested for those activities. For this reason the teachers preferred to skip some activities in the speaking part and seemed to be satisfied with only a few student responses. However, majority of the instructors agreed that (n=19) the overall speaking program was satisfactory. Nevertheless, some changes regarding the speaking program should be taken into consideration, immediately.

To sum up, regarding the process element of the main research question, we can conclude that the medium of instruction should be maintained however, some aspects of the speaking program should be strengthened. For instance, the infrastructure of the facilities and the materials should be supported before a curriculum is implemented. It should be made sure that the physical conditions should be restored and equipment should be made to work properly. Besides, new dimensions such as having conversation clubs, drama activities and games should be added to the program; social platforms might be prepared in order to gather international students and prep school students; and time concerns should be removed. Considering all these additions adaptations and changes, the speaking program can be implemented in the classroom as it is planned in the written curriculum, thus, avoiding institutional and behavioral problems.

Product Evaluation

Stufflebeam (2007) explains that "product evaluation identifies and assesses project outcomes and asks, if the project succeeded." According to results speaking lessons were inadequate in terms of helping the students in their undergraduate studies. The results of the teacher questionnaire arises the same comment about the speaking lessons being insufficient in enabling the students to follow the departmental courses in English. Moreover, to take the research to a further step, the students were asked which aspects of the speaking course were considered as most useful and that should be maintained for their department courses during the interview phase of the study. Looking at the results of the data obtained from the interviews, most of the students believe that some improvements should be made and the program should be strengthened. The main concern of the students is to be able to understand the undergraduate courses better with the English taught in the prep class. However, two students said the program should be maintained because there were enough activities and the education was enough for them to follow their undergraduate studies. In addition, the most useful aspect of the program was "the opportunity given to the students to learn how to express themselves through pair-work activities and dialogues". In this way, the students could "interact in a foreign language and have the chance of increasing their self-confidence".

To conclude, students feel that classroom-based speaking practice does not prepare them for the real world. This is because speaking classes consist of activities focusing on specific grammar points, information-gap activities or discussions on an assigned topic (Genc, 2007). None of these activities teach patterns of real interaction. So before the speaking program is prepared the main concern should be about what we can do to be more helpful for the students in the classroom and to prepare them for real interaction. The time allocated for the speaking classes, the teaching aids and technological equipment should be taken into consideration in a more detailed way. As was suggested in the literature, objectives and aims of the program should be clearly defined and speaking skill should be equally weighted regarding all four skills. Materials and topics of discussions should be chosen in a way to encourage the students and attract their attraction. In such a technological world, the speaking classes should not be centered only on the course books and written material, but the use of communicative activities should be replaced in the curriculum, as well.

Conclusion

It is believed that the findings of this study yields to an understanding of the situation especially related to the speaking curriculum of prep schools in a non-English speaking country, Turkey. This issue carries

vital importance in Turkey where the native language is not English, yet its use as the medium of instruction is widely practiced especially at tertiary educational institutes. The curricula of these schools are structure-reading oriented with the speaking skill being the most neglected and thus problematic skill. The findings in this study showed that the dissatisfaction with the some of the features of the speaking curriculum is natural since development of curriculum with equal emphasis on all four skills was a new process for all parties involved.

No solution to a problem in education can be effective and efficient without the consent and approval of teachers since they are the ones who decide what goes on in a classroom. They are not only the informed and reflective practitioners in the classrooms so they have the best insight about the perceptions of the learners. The teachers and students have the first-hand knowledge about the direct influence of the classroom features on different learning aspects. Gaining knowledge about their experiences would contribute to the improvement or adjustment of the learning environment. Especially at setting where the spotlight of accountability is focused so intensely on standardized examinations can yield dividends in student achievement. It is therefore crucial to identify the value of the curriculum and make the necessary adjustments to enhance the value via making immediate and practical use of findings. The findings in this study showed that the dissatisfaction with the some of the features of the speaking curriculum is natural since development of curriculum with equal emphasis on all four skills was a new process for all parties involved. It is hoped that the study serves as a platform for use of evaluation for curriculum improvement.

References:

Brown, J.D., (1995). The Elements of Language Curriculum A Systematic Approach to Program Development, Boston, Massachusetts, USA: Heinle & Heinle Publishers

Dekeyser, R. (2007). Skill acquisition theory. In B. VanPatten & J. Williams (Eds.), Theories in second language acquisition: An introduction (pp. 97-113). New Jersey: Lawrence Erlbaum Associates, Inc

Demirbulak, D., (2013). A case study in Istanbul: Exploring the deliberation in English as a foreign language teaching units at state schools, ELT Research Journal, 2013, 1(4), 230-239

Genç,B. (2007). An Analysis of Communication Strategies Employed byTurkish Speakers of English, Unpublished Doctoral Dissertation, Çukurova University, Adana

Khamkhien, A., (2010). Teaching English Speaking and English Speaking Tests in the Thai Context: A Reflection from Thai Perspective, English Language Teaching, Vol.3, No. 1. p. 184-190

Lynch, Brian K., (1996). Language Program Evaluation Theory and Practice, Cambridge: Cambridge University Press

Lynch, Brian K., (2003). Language Assessment and Program Evaluation, Edinburgh University Press Ltd.

Nicholson, T., (1989). Using the CIPP Model to Evaluate Reading Instruction. Journal of Reading, 32, 4, 312-318.

Nation, I. S. P. & Newton, J., (2009). Teaching ESL/EFL Listening and Speaking. New York: Routledge/Taylor and Francis.

Nunan, D., (1996). The Learner-Centred Curriculum, Cambridge: Cambridge University Press

Ornstein, A. C., & Hunkins, F. P., (2004). Curriculum: Foundations, Principles and Issues. Englawood Cliffs, NJ, Prentice Hall.

Richards, Jack C., (2005). *Curriculum Development in Language Teaching*, Cambridge University Press

Robinson, B., (2002). The CIPP approach to evaluation COLLIT Project: A Background Note from Bernadette Robinson, Collit, May, 2002

Stufflebeam, D. L. (1971). The Use of Experimental Design in Educational Evaluation. Journal of Educational Measurement, 8(4), 267-274.

Stufflebeam, D.L., (1983). The CIPP Model for Program Evaluation. In: Madaus, G., Scriven, M. and Stufflebeam, D.(Eds), Evaluation Models: Viewpoints on Educational and Human Services Evaluation. Boston, MA: Kluwer-Nijhoff Publishing, 117-141

Stufflebeam, D. L., (2007). Cipp Evaluation Model Checklist, Second Edition; A Tool For Applying The Cipp ModelTo Assess Long-Term Enterprises Evaluation Checklists

Stufflebeam, D. L. & Shinkfield, A. J.,(2007). Evaluation Theory, Models & Applications, San Francisco USA: Jossey-Bass Project www.wmich.edu/evalctr/checklists

Worthern, B. R., Sanders J. R., & Fitzpatrick J. L., (1997), Program evaluation – Alternative approaches and practical guidelines. New York: Longman, Inc.

Zhang G., Zeller, N., Griffith, R., et.al, (2011), Using the Context, Input, Process, and Product Evaluation Model (CIPP) as a Comprehensive Framework to Guide the Planning, Implementation, and Assessment of Service-learning Programs, Journal of Higher Education Outreach and Engagement, Volume 15, Number 4, p. 57, (2011)

Chapter 2

THE EFFECT OF ORIENTEERING EDUCATION ON CONCEPT DEVELOPMENT OF 60-71 MONTHS CHILDREN[1]
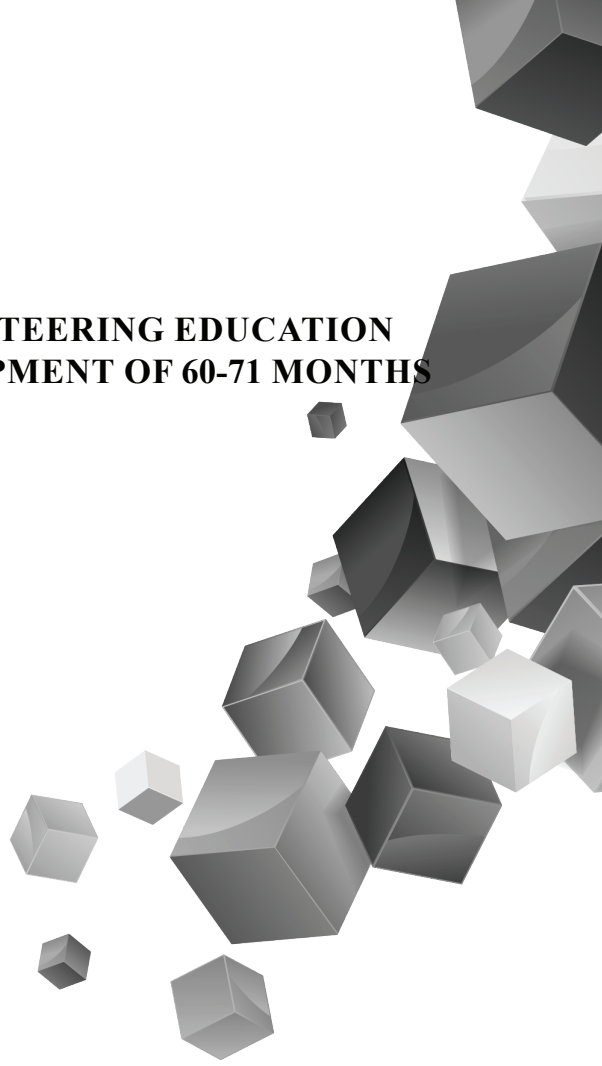
Beyza KARA[2]
Duriye Esra ANGIN [3]

2 Preschool teacher, İzmir/Turkey. E-mail: beyzaomuzubozlu@gmail.com
3 Aydın Adnan Menderes University/Department of Elemantary Education, Aydın/Turkey. E-mail: esra.angin@adu.edu.tr

1. Introduction

The preschool period, which corresponds to the first six years of human life, covers the years in which development progresses rapidly, and in which knowledge and skills, many behaviours and habits are gained to a large extent. This period, in which the human personality is largely formed, should be seen as the period in which human life should be focused on the most (Şen, 2007).

During the preschool period, development generally takes place in three areas: the social-emotional, the physical and the cognitive development. The cognitive development area; includes all mental activities such as problem solving, comprehension, language and memory activities (Bayhan and Artan, 2004). The cognitive skills of the child develop through various experiences and socialization (Oktay, 2007). Behaviours gained through concrete experiences form the basis of learning. During this period, the development of cognitive skills depends on the correct acquisition and use of basic concepts by the child (Ayhan and Aral, 2007).

Concept; according to the Turkish Language Association (TDK), is defined as the abstract and general design, meaning and content of an object, emotion or thought in the mind (TDK, 2009). The formation process of concepts for children is a process that begins with the birth and continues with interactions and experiences with the environment. The settlement of the concepts that were formed and continued their development during this period has a very decisive importance on the future life and academic achievements of the child (Çamlıbel Çakmak, 2012).

The concept development in children gives us important clues about cognitive development. For this reason, monitoring concept development is very important in terms of evaluating and tracking cognitive development. Although children's learning a concept takes place on the axis of observation and experience, the concept learning process constitutes an important part of the school program (Markle, 1975; as cited in Uyanık Balat, 2009). Concept learning is very effective in realizing new learning. The success of preschool education is related to the use of basic concepts in the classroom and in daily life (Bracken, 1998). Basic concepts are common words to describe both objects and people (short, beautiful, large, etc.) or to describe direction/position concepts (below, above, outside, etc.) used to express the current position within an area or to express time (after-before) or quantity (such as a little, a lot, some) (Uyanık Balat, 2009).

Spatial information (below, above, next to it, etc.) used in daily conversations are direction/position concepts. Direction/position expressions that preschool children also use by easily distinguishing the shapes and sizes of objects such as open-closed, inside-outside, separate-

combined, far-near, below-above (Bütün Ayhan, 2006), are used to define the position of objects against each other, the distance relationship with each other and the position of the individual's body. Many actions such as finding the way and place, placing objects, packing luggage require this information to be processed (Hegarty and Waller, 2005; as cited in Özdemir 2014).

The spatial perception, which is expressed as the understanding of the person's location and how to move around the world according to his own position, begins to develop in children before the age of four (Piaget and Inhelder, 1967; Güven, 2005). In early childhood, children are able to find practical directions, can use and create simple maps and can begin to form mental representations of spatial environments (Blaut and Stea, 1974).

The direction/position concepts, one of the concepts used throughout our lives, are especially important in the modern world. As the living spaces and cities developed, the need for maps in daily life increased even more. There are routine activities such as "going to the market", "going to school from home", "going to the movies" that are repeated and needed continuously; there may be also trips such as "visiting a place for the first time", "going to another country", "going on a world tour" due to the desire to explore different countries as intercontinental transportation becomes easier today. People with map knowledge and skills can easily go where they want to go in a different country. Groups of people such as tourists, scouts, and soldiers need more mapping knowledge. Everyone wants to find answers to the questions of "where are we", "where do we want to go" and "how can we go" (Sönmez, 2010). Although maps have been replaced by navigations used in smartphones and tablets with the developing technology, map knowledge and skills are still required to use such applications.

The ability to use maps is a skill that requires knowledge of spatial concepts for all age groups. Children need to know spatial concepts and should be able to make mental animations at the same time to understand maps. It is very important that preschool children acquire the basic concepts of direction/position for the development of their position in spatial perception (Peter, Glück and Beiglböck, 2010; as cited in Angın, 2017).

The sport of orienteering which has become prominent in Turkey recently, has high gains in developing map knowledge and skills (Güler, 2009). It is a nature sport that requires mental and physical capacity, based on finding the control points on the map of a defined area in the fastest order (Kjellstrom, 1994). It contributes to the mental development of the individual by increasing their problem solving, overcoming difficulties and independent thinking skills. In orienteering, the athlete determines the

fastest and most accurate route he/she can reach while going to another goal (control point) (Bektaş et al., 2019).

Orienteering, which can be easily applied in the early childhood, is a newly included activity in preschool education institutions. These activities have a great impact on spatial perception and attention (Zach et al., 2015). Preschool children can learn about their environment by examining the maps (Uttal and Wellman, 1989).

When the studies on orienteering and the position in space perception were examined in the literature, Özcan (2007) investigated how orienteering activities affect social-individual behaviours and mathematical-logical intelligence development of children aged 7-10. As a result of this research, it was found that orienteering sports contributed positively to children's social-individual behaviour and mathematical-logical intelligence development. In their research, Zach et al. (2015) examined the effect of physical activity (orienteering and dancing) on spatial perception and attention in the early childhood. As a result of the research, positive changes were observed in the spatial abilities of the intervention group. It is concluded that the integration of physical and cognitive skills is needed to achieve success in spatial abilities. Catela et al. (2017) conducted orienteering with preschool children by using realistic map (coloured aerial view) photographs in their projects. As a result, it has been observed that as age increases, the ability to use maps increases and that preschool children can perform orienteering with photographic maps. Şengör (2018) investigated the effect of eight-week orienteering training on spatial visualization and spatial anxiety in students aged 11-13. When the pre-test and post-test results of the children who received orienteering education were examined, it was seen that their spatial anxiety was lower and their spatial visualization skills were higher against children who did not receive orienteering education. Uzuner (2019) investigated the effect of orienteering in the development of primary school students' mathematical problem-solving skills. As a result of the research, it has been observed that orienteering has different effects on the development of mathematical problem-solving skills of primary school students. In the research of Kaya (2020), the application process of the orienteering activities used in education was examined within the scope of different courses by trainers and branch teachers. It has been concluded that the use of orienteering as a tool in education increases the quality of education, improves physical activity and increases students' motivation for lessons. In the research conducted by Yiğit (2020), the effect of orienteering practices on the spatial thinking skills of students in social studies course was investigated. As a result of the research, it was concluded that orienteering practices are effective in gaining students' spatial thinking skills. Studies regarding the position in space perception conducted by

Sarıtaş (2010), Adak Özdemir (2011), Toran (2011) and Karadeniz (2014); the effect of intervention programs applied on children's development of position in space perception was examined. As a result of the studies, it has been concluded that the programs implemented are effective programs on children's development of the position in space perception. Kol (2010) developed an achievement test to measure the concepts of time and space gained in the preschool period. According to the results of the achievement test, it was observed that children who have completed preschool education are more successful in the acquisition of time and space concepts than children who continue their preschool education. Özözen Danacı (2017) examined the effect of the concept education program on the visual-spatial perception of 48–60-month-old children. As a result of this research, it was seen that the concept education program improved the visual perception skills of children positively. Angın (2017) investigated the effect of Dora the Explorer cartoon on the spatial concept acquisition and spatial skills of preschool children of 60-71 months. In the research carried out for this purpose, the Bracken Basic Concept Scale: Receptive Form: The III direction/position subtest and the Spatial Skill Games developed by the researcher were used as measurement tools. As a result of the findings, it was determined that the cartoon Dora the Explorer has a positive effect on the spatial concept acquisition and the development of spatial skills.

As a result of the literature review, when both domestic and foreign literature are examined it is determined that the orienteering sport, which is developing in the world, has not been adequately addressed in terms of the preschool period when a rapid progress is observed in all areas of development although orienteering training is provided in non-governmental organizations (British Orienteering, Orienteering Academy etc.), federations (USOF) and schools. However, there is no research examining the effects of orienteering sport on the development of the direction/position concept of preschool children among the studies conducted on both orienteering and the position in space perception. Accordingly, the effect of the prepared Orienteering Education Program on the development of the direction/position concepts of preschool children of 60-71 months was examined in the research.

2. Purpose of the Research

This research was conducted to examine whether the Orienteering Education Program has an effect on the development of the direction/position concept of 60 – 71 month old children. For this purpose, the answers to the following questions were sought:

1. Is there a significant difference between the Bracken Basic Concept Scale-III: Receptive Form (BBCS-III: Receptive Form) pre-test scores of

the direction/position subtest of the children in the experimental group and the children in the control group?

2. Is there a significant difference between the pre-test and post-test scores of the BBCS-III: Receptive Form direction/position subtest of the children in the experimental group?

3. Is there a significant difference between the pre-test and post-test scores of the BBCS-III: Receptive Form direction/position subtest of the children in the control group?

4. Is there a significant difference between the post-test scores of the BBCS-III: Receptive Form direction/position subtest of the children in the experimental group and the children in the control group?

3. Method

3.1. Research Model
In this research, the "pre-test-post-test control group quasi-experimental design", which is one of the experimental research designs, was used to examine the effect of the Orienteering Education Program on the development of the direction/position concept of 60 –71 month old children.

The quasi-experimental design is a research design that is used when all variables from the environment cannot be prevented (Karasar, 2016). Especially in educational surveys, it is an experimental pattern that is frequently used, especially in educational surveys, when it is impossible to prevent all variables (Cohen, Manion and Marrison, 2000).

3.2. Research Group
The research group of the research consists of 40 children, 20 of them form the experimental group and 20 of them form the control group, of 60 –71 month old children attending kindergartens in a primary school affiliated to the Ministry of National Education (MONE) in the Aegean region, İzmir sub-region.

3.3. Data Collection Tools

The Bracken Basic Concept Scale-III: Receptive Form (BBCS-III: R) direction/position subtest:
In the research, the Bracken Basic Concept Scale-III: Receptive Form (BBCS-III: R) direction/position subtest, developed by Bruce A. Bracken in 1984, was used as the data collection tool. The BBCS-III: R form, which was checked for the third time in 2006, was prepared to determine the basic conceptual achievements of 36-71 months old children. The scale consists

of 10 subtests and 282 items. The subtests in the form BBCS-III: R were determined as numbers/counting, letters, color, shape, quantity, direction/position, time order, individual/social awareness, dimension/comparison and structure/material. And the direction/position subtest consists of 62 items. It includes an object's attributes (open, closed, and upside down) and the direction of the object (right, left, corner, and center) that define the positions of objects relative to each other (e.g., next to, behind, in front of).

There are four answer options in the direction/position subtest of the BBCS-III: Receptive Form. The child starting from the first item of this subtest continues up to the 62nd item, but the test is terminated when three consecutive incorrect answers are given. In the evaluation form, items are recorded as correct, incorrect and no answer, while the correct answer is scored as one and the incorrect answer and no answer options are scored as zero. The total score the child receives constitutes the number of correct answers given to the test items (Angın, Arı, Deniz and Hamarta, 2016).

3.4. Orienteering Training Program (OTP)

The Orienteering Training Program (OTP) is a program based on orienteering sports to support the development of direction/position concepts of 60 – 71 month old children. Before the program was prepared, the development of direction/position concepts and the literature on orienteering sports was scanned and based on the book Start Orienteering 1: With 6 – 8 Year Olds Children prepared by McNeill and Renfrew (1990), the OTP was prepared in line with the age and developmental characteristics of 60 – 71 month old children. In the preparation of the OTP, the concepts and stages of the orienteering in the direction/position subtest of the BBCS-III: Receptive Form are listed based on the principles from simple to complex, from easy to difficult and from concrete to abstract. The achievements and indicators of the activities prepared within the OTP were determined in line with the MONE Preschool Education Program (2013). In line with the determined orienteering stages, the direction/position concepts and the preschool education program learning outcome and indicators, 35 activities have been brought together to form the OTP. The prepared OTP activities were created as child-centered practices, taking into account the types of activities (play, movement, art, Turkish, reading and writing preparation activities, etc.) addressed under the heading of planning and implementation of preschool education in the MONE Preschool Education Program (2013). It was emphasized that the working methods of the activities were formed by large group, small group and individual activities. The activities that took place in the program started on a table as tabletop planning, shapes and associations through models, and continued with classroom activities and outdoor activities. The activities prepared within

the scope of OTP were presented to the views of three academics working in the field of preschool education. Experts were asked to evaluate the OTP by considering criteria such as the appropriateness of the objectives and the objectives of the program with the indicators, the adequacy of the activity plans in providing direction/position concepts, the suitability and adequacy of the materials, the age and development characteristics of 60 – 71 month old children, the adequacy and comprehensibility of the learning processes. The activities were rearranged and the training program was finalized in line with the received feedback.

3.5. Data Collection

A nine-week study was carried out to collect the data of the research. In the first week, the pre-test was implemented on all children in the research group. The environment in which the scale will be applied was prepared by the researcher in order to apply the pre-test. Before starting the application, the children were informed by the researcher with simple and brief information about the application in order to let them understand easily. The time taken for each child in the implementation of the scale varied between approximately 10-15 minutes. After the pre-test application, the experimental and control groups were determined randomly by the lot method.

In the second week of the research, the OTP was started to be applied to the experimental group. For the control group, the daily education flow of the MEB Preschool Education Program was continued to be implemented by the classroom teacher. The concepts to be acquired in the OTP consist of the concepts included in the direction/position subtest of the BBCS-III: Receptive Form. The OEP was administered by the researcher between one and a half hours a day, five days a week and for a total of seven weeks.

After the application of the OTP, the BBCS-III: Receptive Form direction/position subtest was applied by the researcher as a post-test to the experiment and the control group children in the last week of the research.

3.6. Data Analysis

In order to determine the tests to be applied, the data obtained from the direction/position subtest of the BBCS-III: Receptive Form to determine the direction/position concept development of the experimental and control groups, were analysed using the Normality of the Distribution of Variables Shapiro-Wilk Normality Test and Skewness and Kurtosis Coefficient. Non-parametric tests were applied in the research, since the variables were not found to show a normal distribution according to the results of Shapiro-Wilk and the skewness coefficient. In order to determine the difference between the groups, the *Mann Whitney U-Test* was used for

unrelated measurements and the *Wilcoxon Signed-Ranks Test* was used for related samples to determine the difference between pre-test and post-test of the same group.

4.Findings

In this section, the findings related to the Bracken Basic Concept Scale-III: Receptive Form direction/position subtest of the OTP, which was prepared to support the direction/position concept development of 60–71 month old children attending kindergarten, are included. The findings are presented in line with the determined sub-objectives of this research.

The results of the *Mann Whitney-U Test* regarding the pre-test mean scores of the direction/position subtest of BBCS-III: Receptive Form applied to the children of the experimental and control groups are given in Table 1.

Table 1 The Results Regarding the Experimental and Control Group Children's Direction/Position Subtest Pre-test Scores

	n	$\bar{x}$	Ss	Average Rank	Sum of Ranks	U-Value	Z-Value	p-Value
Experiment Pre-Test	20	14,15	22,302	21,18	423,50	186,500	-0,480	0,631*
Control Pre-Test	20	10,20	20,998	19,83	396,50			

*p>.05

There was no significant difference found between the pre-test scores of the children in the experimental and control groups in the direction/position subtest of the BBCS-III: Receptive Form (z=-0, 480, p> 0,05). From here, it can be seen that the experimental group and control group children are groups with similar characteristics.

In order to evaluate whether there is a difference between the pre-test-post-test scores of the experimental group children's BBCS-III: Receptive Form direction/position subtest, the experimental group's BBCS-III: Receptive Form direction/position subtest pre-test-post-test scores were compared with the Wilcoxon Signed Ranks Test. The findings obtained as a result of this comparison are given in Table 2.

Table 2 The Wilcoxon Test Results Related to the Experimental Group Children's Direction/Position Subtest Pre-test and Post-test Scores.

	n	Average Rank	Sum of Ranks	Z-Value	P-Value
Negative Rank	0	0,00	0,00	-3,728*	0,000
Positive Rank	18	9,50	171,00		
Equality	2				
Total	20				

* Based on negative ranks

**p<0,05

When the findings in Table 2 are examined, it is seen that there is a significant difference between the pre-test and post-test scores of the children in the experimental group in the direction/position subtest of the BBCS-III: Receptive Form (z=-3,728, p <0,05). Looking at the sum of the ranks of the difference scores and the total ranks, the observed difference was determined to be in favour of the positive ranks (post-test score) according to these results.

The pre-test and post-test scores of the BBCS-III: Receptive Form direction/position subtest of the control group were compared using the *Wilcoxon Signed Ranks Test*, in order to measure whether there is a difference between the pre-test and post-test scores of the BBCS-III: Receptive Form direction/position subtest of the children in the control group. The findings obtained as a result of the comparison are given in Table 3.

Table 3 The Wilcoxon Test Results related to the Control Group Children's Direction/Position Subtest Pre-test and Post-test Scores.

	n	Average Rank	Sum of Ranks	Z-Value	P-Value
Negative Rank	2	3,25	6,50	-2,360*	0,018
Positive Rank	9	6,61	59,50		
Equality	9				
Total	20				

*Based on negative ranks

**p<0,05

As it can be understood from Table 3, there is a significant difference between the pre-test and post-test scores of the control group children's BBCS-III: Receptive Form direction/position subtest, but the score is quite low (z = -2,360, p <0,05). When the mean rank of the difference scores and the sum of the ranks were examined, it was seen that the post-test scores of 10% of the control group decreased compared to the pre-test scores. At the same time, it was observed that the pre-test and post-test scores of 45% of the control group were equal, while 45% of the post-test scores were higher than the pre-test scores. The mean scores of 45% of the control group, which was seen to be successful, increased approximately one and a half times.

The *Mann Whitney-U Test* results regarding the post-test scores of the direction/position subtest of BBCS-III: Receptive Form, which were applied to the children of the experimental and control groups after the application, are given in Table 4.

Table 4 The Mann Whitney U Test Results Related to the Post-test Scores of the Experimental and Control Groups' Direction/Position Subtest

	n	$\bar{x}$	Ss	Average Rank	Sum of Ranks	U-Value	Z-Value	p-Value
Experiment Post-Test	20	51,30	17,610	28,60	572,00	38,000	-4,454	0,000
Control Post-Test	20	25,65	26,422	12,40	248,00			

*p<0,05

In Table 4, it was found that there was a significant difference in favour of the experimental group between the post-test scores of the BBCS-III: Receptive Form direction/position subtest of the children in the experimental and control groups (z=-4,454, p <0,05). From the obtained findings, it is understood that the direction/position concept scores of the children in the experimental group are higher than the children in the control group and therefore the applied OTP is effective on the development of the direction/position concept of the children.

5. Discussion and Result

Based on the findings obtained in line with the question *"Is there a significant difference between the experimental group children's BBCS-III: Receptive Form direction/position subtest pre-test and post-test scores?"* and when the pre-test and post-test scores of the children in the experimental group were compared, it was determined that the average post-test rank was significantly higher (p<0,05) than the average pre-test rank, in the research carried out by the OTP to support the direction/position concept development of 60–71 month old children attending kindergarten. Based on this result, it was assumed that the OTP applied to the children in the experimental group was effective in the development of the direction/position concepts of the children. It was found that 90% of the children in the experimental group got higher scores from the post-test than the pre-test scores. However, it was observed that 10% of the children in the experimental group had equal pre-test and post-test scores. It is thought that the individual differences between the children may be the reason for this.

Looking at the findings obtained in line with the question *"Is there a significant difference between the pre-test and post-test scores of the control group children's BBCS-III: Receptive Form direction/position subtest?"*, it was observed that there was a significant difference, but that the score values were low (p <0,05) when the BBCS-III: Receptive Form direction/position subtest post-test mean scores of children in the control

group were compared. Looking at the result, it is seen that the current preschool education program that children in the control group receive also has an effect on the direction/position concept development.

In line with the question *"Is there a significant difference between the post-test scores of the experimental and control group children's BBCS-III: Receptive Form direction/position subtest?"*, it was determined that there was a significant difference ($p < 0,05$) when the average scores of the BBCS-III: Receptive Form direction/position subtest post-test of the children in the experimental and control groups were compared. When the average scores of the children in the experimental and control groups were compared, it was seen that the average scores of the children in the experimental group increased more than three times, while the average score of the children in the control group increased approximately one and a half times. In line with the findings obtained, the effectiveness of the applied OTP in developing direction/position concepts has been revealed.

Orienteering is an activity that can be easily learned with activities appropriate to the levels of early childhood children, that can be included in preschool education institutions and that can be used to diversify activity programs. These orienteering activities are highly effective in spatial perception and attention skills (Zach et al., 2015). Also, orienteering has positive effects on improving people's social skills as well as improving physical characteristics; participation in groups, strengthening self-confidence, independent decision-making, communication skills, systematic thinking, cooperative and logical thinking; is a sport that has positive effects on the development of problem-solving skills and direction/position skills (Bektaş, et al., 2019).

Spatial perception or position in space; is based on the principle of describing the directional relations between distance, position and objects, using the concepts of direction/position and perceiving space as it is. The concept of spatial perception includes the relationship between objects, the distance between objects, the position and direction of the person. After the age of four, gain depictions such as open and closed, positions such as inside and outside and spatial relations such as below, above, in front, behind, besides, between, far and near through concrete experiences (Avcı and Dere, 2002). For this reason, the concepts of direction/position included in the content of spatial relations should be tried to be gained through concrete experiences such as orienteering activities.

As a result of their meta-analysis research, Baenninger and Newcombe (1989) stated that participating in spatial activities is effective on the children's spatial skills and that children's spatial skill levels can increase with education. Spatial skills begin to develop during the early childhood

and continue to develop during the middle childhood. This situation attributes importance to educational programs to develop this skill in the preschool period (Newcombe and Frick, 2010). This research emphasizes the importance of activities involving spatial concepts for the acquisition of direction/position concepts. The OTP supports the meaningful differentiation seen in the direction/position concept development of the activities implemented by ensuring that children learn through their own experiences and their active participation in activities. Yiğit (2020) has analysed the effect of orienteering practices in the social studies course of primary school students on spatial thinking skills. It is supported by the findings that orienteering practices are effective in providing students with spatial thinking skills. At the same time, it is a very effective method to be used in education because it is an effective application in subjects such as learning by doing, experiencing, multi-faceted thinking and problem solving.

Uzuner (2019) used orienteering as an educational tool in order to improve the mathematical problem-solving skills of elementary school students. As a result of this research, it is supported that orienteering can be used as a tool in education. In the research of Şengör (2018), it was found that orienteering training contributed positively to spatial visualization and also reduced spatial anxiety. This result supports the positive contribution of OTP to the development of direction/position concept, which are issues similar to spatial perception.

The research of Özdemir (2011) shows that the Spatial Skills Training Program has a positive effect on the spatial abilities (direction/position concept development, spatial perception) of preschool children. With these results, it is seen that the OTP applied in the research is an effective program for children to gain direction/position concepts by ensuring their active participation with the applied activities, by having fun and by exploring. Orienteering activities have increased the interest and curiosity of children with both individual and group work and made them willing to participate in the activities. For this reason, it is seen that the prepared OTP has a positive effect on the development of the direction/position concept of children. Other research results also support the result.

In Özcan's (2007) research to examine how orienteering education applied to primary school students is reflected in children's social individual behaviours and mathematical-logical intelligence development, it was found that orienteering education contributed positively to the social, individual and mathematical-logical intelligence development of his students. This result supports the finding in this research that OTP positively affects the development of direction/position concepts that come into the field of mathematical-logical intelligence.

In this research, the effect of OTP on the direction/position concept development of 60–71 month old children was examined. As a result, 90% of the experimental group to which OTP was applied showed success in terms of direction/position concept acquisition.

Comparing the post-test scores of the BBCS-III: Receptive Form direction/position subtest of the experimental group children who completed the OTP in addition to the preschool education according to the MONE curriculum, it was determined that the direction/position concept scores of children in the experimental group were higher than the children in the control group.

In line with these results, it is seen that OTP is very effective in supporting the direction/position concept development of children.

6. Suggestions

- With the OTP implemented within the scope of the research, the development of the direction / position concept of children has increased by 90%. However, it is recommended to check whether the gained direction/position concepts are permanent in the future.

- Educators can be informed about orienteering sports, which is not very common in our country, orienteering events can be organized among teachers and their participation in these activities can be ensured.

- Studies can be conducted to determine whether orienteering training affects different developmental areas of children.

- The effectiveness of different training approaches in acquiring direction/position concepts can be compared.

7. Limitations

The fact that the permanence test was not applied in this research conducted with a semi-experimental design is among the limitations of the research. In addition, when the literature is examined, it is seen that the spatial perception differs according to gender and that the position in space perception of men is more developed compared to women. It is thought that addressing the gender variable in the studies to be conducted will contribute to the literature.

References

Adak Özdemir, A. (2011). *Mekânsal beceri eğitim programının okul öncesi dönem çocuklarının mekânsal becerilerine etkisi.* Doktora tezi, Marmara Üniversitesi, İstanbul.

Adak Özdemir, A. (2014). The effect of the spatial skills education program on the spatial skills of preschool children. *International Journal on New Trends in Education and Their Implications October,5* (4), *1309-6249.*

Angın, D. E., Arı, R., Deniz, E. ve Hamarta E. (2016). Bracken temel kavram ölçeği-III: alıcı formu (BTKÖ-III: A)'nun 60-71 aylık çocuklar için geçerlik ve güvenirlik çalışması. *Adnan Menderes Üniversitesi Eğitim Fakültesi, Eğitim Bilimleri Dergisi,, 7*(2), *73-83.*

Angın, D. E. (2017). The effects of dora the explorer on preschool children's spatial concept acquisition and spatial ability. *European Scientific Journal, 13*(1), 39.

Avcı, N. ve Dere, H. (2002). Okul öncesi çocuğu ve matematik. *ODTÜ 5. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi Bildiri Kitabı*, 262-263.

Baenninger, M. and Newcombe, N. (1998). Environmental input to the development of sexrelated differences in spatial and mathematical ability. *Learning and Individual Differences,7*, 363–379. http://www.temple.edu/psychology/newcombe/documents/BaenningerNewcombe1998 Environmentalinputtothedev ofsex-relateddifferences.pdf adresinden erişilmiştir.

Bayhan, S.P. ve Artan, İ. (2004). *Çocuk gelişimi ve eğitimi*. İstanbul: Morpa Kültür Yayınları.

Bektaş, F., Kaya, S., Karademir, E., Kalın, C., Şeker, T., Kurtoğlu, E. ve Oymak, Ö., (2019). *Oryantiring eğitimi*. Ankara: Milli Eğitim Bakanlığı.

Blaut, J.M. and Stea, D. (1974). Mapping at the age of three. *Journal of Geography, 73*(7), 5–9.

Bracken, B. A., (1998). *Bracken basic concept scale-revised, examiner's manual*. The Psychological Corporation, San Antoinio: Harcourt Brace and Company.

Bütün Ayhan, A. (2006). *Anaokuluna devam eden altı yaş grubundaki çocukların kavram gelişiminde bilgisayar destekli öğretimin etkisinin incelenmesi.* Bilimsel Araştırma Projesi, Ankara Üniversitesi.

Bütün Ayhan, A. ve Aral, N. (2007). Bracken temel kavram ölçeği gözden geçirilmiş formunun altı yaş çocukları için uyarlama çalışması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 32*(32), 42-51.

Catela, D., Barosso, M., Seabra, A., P., Figueiredo, R. and Franco, R. (2017). *Orienteering using realistic map (cloured aerial photography) with kindergarten children.* Revista da UIIPS – Unidade de Investigação do Instituto Politécnico de Santarém.

Cohen, L., Manion, L. and Morrison, K. (2000). *Research methods in education.* New York: Routledge.

Çamlıbel Çakmak, Ö. (2012). *Okul öncesi eğitim kurumuna devam eden 60-71 aylık çocuklara temel kavramların kazandırılmasında kavram eğitimi programının etkisinin incelenmesi.* Doktora Tezi, Selçuk Üniversitesi, Sosyal Bilimler Enstitüsü, Konya.

Filippaki, N. and Papamichael, Y. (1997). Tutoring conjunctions and construction of geometry concepts in the early childhood education: the case of the angle. *European Journal of Psychology of Education,* 12(3), 235–247.

Frank, R. E. (1987). The emergence of route map reading skills in young children. *Baltimore: Society for Research in Child Development.* (*ERIC Document Reproduction Service No. ED 288 785*)

Güler, V. (2009). *Orienteering ve çocuklar için orienteering eğitimi.* Ankara: T.C. Başbakanlık Gençlik ve Spor Genel Müdürlüğü Türkiye Dağcılık Federasyonu Yayınları.

Güven, Y. (2005). *Erken çocuklukta matematiksel düşünme ve matematiği öğrenme.* İstanbul: Küçük Adımlar Eğitim.

Karasar, N. (2016). *Bilimsel araştırma yöntemi kavramlar ilkeler teknikler.* Ankara: Nobel.

Kaya, S., (2020). *Eğitimde kullanılan oryantiring etkinliklerinin eğiticiler ve branş öğretmenleri tarafından farklı dersler kapsamında uygulanma sürecinin incelenmesi.* Yüksek Lisans Tezi, Trabzon Üniversitesi, Lisans Üstü Eğitim Enstitüsü, Trabzon.

Kjellstrom, B. (1994). *Be expert with map & compass: the complete orienteering handbook.* Newyork: 1994.

McNeill, C. and Renfrew, T. (1990). *Start orienteering.* British Orienteering Federation.

Newcombe, N.S. and Frick, A. (2010). Early education for spatial intelligence: Why, what, and how. *Mind, Brain, and Education, 4 (3),* 102-111.

Oktay, A. (2007). *Okul öncesi eğitimden ilköğretime geçiş projesi.* Türkiye Özel Okullar Birliği Derneği, Okul Öncesi Eğitimi, Öğretmen Eğitimi, Antalya, 01 Şubat 2007. İstanbul: Neta.

Özcan, F. (2007). *Oryantiring sporunun ilköğretim öğrencilerinin sosyal bireysel davranışları ile matematik-mantıksal zeka gelişimleri üzerindeki etkisinin incelenmesi.* Yüksek Lisans Tezi, Dumlupınar Üniversitesi, Sosyal Bilimler Enstitüsü, Kütahya.

Özdemir, A. A., (2011). *Mekansal beceri eğitim programının okul öncesi dönem çocuklarının mekansal becerilerine etkisi.* Doktora Tezi, Marmara Üniversitesi, Eğitim Bilimleri Enstitüsü, İstanbul.

Piaget, J. and Inhelder, B. (1967). *The child's conception of space*. New York: W. W. Norton.

Sarıtaş, R. (2010). *Milli eğitim bakanlığı okul öncesi eğitim programına uyarlanmış GEMS fen ve matematik programının anaokuluna devam eden altı yaş grubu çocukların kavram edinimleri ve okula hazır bulunuşluk düzeyleri üzerindeki etkisinin incelenmesi.* Yüksek Lisans Tezi, Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.

Sönmez, Ö. F. (2010). *İlköğretim sosyal bilgiler öğretiminde harita becerileri.* Doktora Tezi, Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.

Şen, S. (2007). *Okul öncesi eğitime giriş*. Ankara: Anı Yayıncılık.

Şengör, Ç. (2018). *11-13 yaş grubu öğrencilerinde oryantiring eğitiminin uzamsal görselleştirme ve uzamsal kaygıya etkisinin incelenmesi.* Yüksek Lisans Tezi, Muğla Sıtkı Koçman Üniversitesi, Sağlık Bilimleri Enstitüsü, Muğla.

Turaşlı, N. (2007). *Okul öncesi eğitime giriş*. Ankara: Anı Yayıncılık.

Türk Dil Kurumu (TDK). (2009). *Yazım kılavuzu.* Ankara: TDK Yayınları.

Uttal, D. H. and Wellman, H. M. (1989). Young children's representation of spatial information acquired from maps. *Developmental Psychology, 25*, 128–138.

Uyanık Balat, G. (2009). Anasınıfına devam eden çocukların cinsiyetlerine göre temel ilişkisel kavram bilgilerinin incelenmesi. *Eğitim ve Bilim, 34* (153), 117-126.

Uzuner, F.G., (2019). *İlkokul öğrencilerinin matematiksel problem çözme becerilerinin geliştirilmesinde oryantiring etkisinin incelenmesi.* Doktora Tezi, Trabzon Üniversitesi, Lisansüstü Eğitim Enstitüsü, Trabzon.

Yiğit, T., (2020). *Sosyal bilgiler dersinde öğrencilerin mekansal düşünme becerilerine oryantiring uygulamalarının etkisi.* Yüksek Lisans Tezi, Kastamonu Üniversitesi, Sosyal Bilimler Enstitüsü, Kastamonu.

Zach, S., Inglis, V., Fox, O., Berger, I. and Stahl, A. (2015). The effect of physical activity on spatial perception andattention in early childhood. *Cognitive Development,* 31-39.

Zembat, R. (2005). Okul öncesi eğitimde nitelik. *Okul Öncesi Eğitimde Güncel Konular, 25-44. İstanbul: Morpa Kültür.*

Chapter 3

FOSTERING CREATIVITY OF GIFTED STUDENTS

Nisa Gökden KAYA[1]

1 Assist. Prof. Dr. , Hitit University, Faculty of Health Sciences, Department of Child Development email:nisakay@gmail.com, https://orcid.org/0000-0002-6969-371X

Giftedness and Creativity

Giftedness and creativity are popular research areas in both psychology and education, especially in the last century. Although many researchers study different aspects of these two concepts, there are not consensuses on their definitions (Csikszentmihalyi, 1996; Guilford, 1967; Gardner, 1997; Hollingworth, 1942; Renzulli, 1986; Terman, 1925; Torrance, 1995). The first large-scale longitudinal study on above-average intelligent people caused Terman (1925) to be named as the "father of gifted education". However, today he is criticized for over emphasis on intelligence quotient (IQ) scores (Warne, 2019). Also, Hollingworth (1942) one of the pioneers of gifted research, defined gifted as able to get a very high score on the individual intelligence test. Nowadays, since intelligence tests failed to assess talent and creativity, definitions of giftedness depending on intelligence are found narrow and monolithic. Contemporary researchers such as Gardner (1997) emphasized different dimensions of intelligence by his multiple intelligence theory. Renzulli (1986), who is another contemporary researcher studying on giftedness, defined giftedness using 'Three Ring Model'. According to Renzulli (1986) gifted individuals are defined as those who have above-average ability, creativity, and task commitment (motivation) and combine these three traits and apply these to one or more domains. In this manner, giftedness and creativity are interrelated concepts. The inventions and products of the gifted individuals are results of their creativity. Thus, in order to create a new product, different and divergent thinking skills are needed. There are studies in many environments such as industry, work, school and psychology to improve the creativity; because in the developing world, creative people are needed in every area of life.

Since creativity is a complex phenomenon, various approaches defined creativity in different ways (Keleşoğlu and Kalaycı, 2017). Kaufman (2016) mentioned that most of the researchers widely agreed that creativity is characterized by two determinants: originality and usefulness. Creativity is simply defined as thinking in a different, original, flexible, fluid, and unusual way (Senemoğlu, 1999). Guilford (1959), who is a pioneer in creativity research, mentioned convergent thinking equated with intelligence while divergent thinking equated with evaluating the alternatives which are created from information. Also, Csikszentmihalyi (1977) mentioned that people have a varied creative curve and the curve is not homogeneous. In addition, Sungur (1997) mentioned that everybody is more or less creative, unless they are hindered or restricted. In case of restriction to creativity, people need long or short-term training.

There is no doubt that gifted people are precious treasures of the community as they compose 2% of the community. Moreover, many

researchers emphasized the importance of education of gifted individuals and fostering their creativity through education (Ataman, 1993; Marland, 1972; Renzulli, 1986; VanTassel-Baska and Stambaugh, 2006). In the Marland Report, prepared by Sidney Marland (1972) to determine the government's policy on gifted students, separate curricula were created to develop creativity while there was an indication of 'creative and productive thinking' for gifted students. Creative teaching skills and strategies play an important role in the education of gifted children and in teaching the importance of time and effort. An education program based on the creativity model should be created, which enables students to learn more about their knowledge passively, and build their own knowledge and productivity (VanTassel-Baska and Stambaugh, 2006).

Myths about Creativity

Myth can be defined as a belief that is not supported by confirmed fact or scientific evidence. According to Burkus (2013), cultures develop myths unless they explain a something with existing knowledge. Torrance (1988) who is a well-known researcher on creativity, defines the psychological components of creativity as "unseen" and possibly largely "unconscious". Although creativity has been a significant research area for decades, it is still a complex phenomenon and because of this there are still some myths that are unrealistic opinions about creativity.

Cropley (2016) mentioned that modern creativity debates are also based on at least six myths inherited greatly from the past. Commonly creativity is believed as a 'Heaven-sent' divine gift having aesthetic/ spiritual domains. Believing that creativity is a divine inspiration, linking creativity with personality, thinking that creative people like to take risk and believing that there is a positive relationship between intelligence and creativity are some examples to the common myths about creativity.

The myths about creativity can be summarized as ineffability, ineluctability and inscrutability (Cropley, 2018). Ineffability means that creativity cannot be defined. Ineluctability refers that creativity cannot be controlled while inscrutability infers that creativity cannot be understood. The myths such as creativity is innate, genetic or divine; bring along a common and wrong view that creativity cannot be taught and developed. On the other hand, people tend to view the creative people as strange, unusual and different. In their opinions, being unusual causes being excluded from the society. They think that creative people are living alone, in their inner world and taking risks. The myths and misconceptions about creativity are seen in many forms and may manifest as implicit beliefs or explicit misconceptions. In literature, it is mentioned that these myths about creativity are still common among people. It is important to identify

and address these myths in order to facilitate the development of creativity (Benson, 2004). In other words, these myths are barriers for developing creativity by education.

In literature, there are some researches that indicate that teachers and parents have mythic thoughts about creativity. Sevinç and Kanlı (2019) conducted a study in order to reveal the teachers' myths and views about creativity. The participants were 211 teachers from the various provinces of Turkey 2016 - 2017 academic year. Data was collected by a 33- item questionnaire developed by the researchers. According to the results, it can be said that teachers have some different views and myths about creativity. Similarly, Kaya (2020) conducted a qualitative research in order to determine the myths of parents of gifted students about creativity. The data was collected by semi-structured interviews with 12 volunteer parents of gifted students. In order to analyze the qualitative data obtained from the interviews, content analysis was conducted. In the content analysis, data similar to each other are organized by bringing together under themes and data is interpreted. After analyzing the content codes, four themes emerged as: (1) definition of creativity; (2) characteristics of creative people; (3) thinking patterns of creative people; (4) motivation of creative people. The results reveal that myths about creativity are common among parents of gifted students.

According to Cropley and Patston (2019) in order to develop a more differentiated and dynamic approach to teacher training and development in creativity, addressing and correcting myths and misconceptions are necessary. Thus, it is essential to teach the facts about creativity to people instead of these myths. When teachers understand the nature of creativity, they become better equipped to avoid negative myths and patterns (Beghetto & Kaufman, 2010). This will also remove the danger of creativity being commodified in schools. For this purpose, it will be useful to develop training programs for parents and teachers of gifted students. In other words, by enriching students' learning experiences, it is possible to teach people become capable of solving problems effectively in a creative way.

Critical Age for Creativity

Curiosity and imagination which are essential qualities for creativity are at the forefront in early childhood period. Preschool period is characterized by imagination and magic. According to Ataman (1993) creativity emerges between 3-5 years old and the most critical age range is between 5-6 years old. Thus, optimal time to foster creativity is early ages by giving chance for self-expressing at a younger age. However, the creativity levels of children start to decrease by starting school and getting

to know the authority. By time, some figures become more important in children's life such as; the peer groups play important roles between 8-10 years; in adolescence period, relationships with the opposite sex become important and then career choice becomes significant. Thus, focusing on different targets after preschool period, affects the creativity level of children negatively.

Vygotsky (1990) is an important researcher in child development area who attracted attention to imagination and creativity in childhood. Thus, the most critical age zone in the development of creativity is between the ages of 5-6. In other words, creativity level reaches its peak before the age of six. After starting school and recognizing authority and rules, children drive towards conformity. However, supporting the child's creativity in preschool sets the stage to foster its continued development in the years beyond. According to Vygotsky (1990) children's play and inner speech are important in fostering creativity. Similarly, Russ (2003) stated that cognitive and affective processes in play are related to divergent thinking in children. In this context, play can be used as an adaptive resource in order to develop cognitive and affective processes in creative problem solving. The openness to new experiences is key to curiosity and imagination which lead creativity. Thus, parents and teachers should find ways of helping children to develop these skills at home and at school.

In this context, Cremin, Burnard, and Craft (2006) identified the pedagogical principles of foster children's possibility thinking are useful to describe how teachers create a supportive environment through effective strategies that prioritize children's autonomy. These principles are, creating time and space, standing back, and profiling learner agency. Teachers using these, help to encourage the children's questioning and active engagement in learning by passing the decision making and the responsibility for learning back to the child (Lin, 2011). Teachers should be sensitive to the strengths of talented students in their class, developing them and directing them to these areas. In this way, teachers can promote the children's creative thinking capacities.

Fostering Creativity and Education

John Dewey (1938), one of the most prominent philosophers on education, states that the role of teachers is to create "educative" environments that relate to and bring out the student's interests. In that sense, education systems should involve essential knowledge, *skills*, values, beliefs, and habits that people use in their lives. Creativity is one of the most important skills that has to be developed in educational settings. However, many studies have shown that creativity shows an inverted U function in relation to formal education; as the level of education increases,

the level of creativity increases to an optimum point and then decreases the line of further formal success, and the turning point is observed during secondary education and high school or in the transition to higher education (Sungur, 1997). This means if education system depends on rote learning, the creativity levels of individuals decrease by time.

This situation is told in a very humorous way in the 1940s, by George H. Reavis, who is inspector of Cincinnati Public Schools. He criticizes American education system through his tale named "School of Animals" which takes place in the forest. Once upon a time, animals decided to do something important to find a solution to the problems of this "new world". And they arranged a school. They have created a curriculum focused on running, climbing, swimming and flying. All animals took the same lessons in order to facilitate the implementation of the curriculum. Therefore, the duck had to learn to run, the rabbit to swim, the eagle to climb and the squirrel to fly. But this was not so easy. At the end of the year, some abnormal water snakes, which can swim quite well and can also run, climb and fly, have reached the highest average and made a speech as the top of the class. As the prairie dogs were out of school, they had to grapple with school fees because the administration did not add digging and hollowing to the curriculum. They gave their offspring next to a badger as an apprentice. They then joined the marmot and squirrels and attempted to open a private school (Reavis, 2007).

Although this tale was written in 1940s, still remains valid. Education system insists on compulsory courses for everybody despite the fact that this approach does not fit all the students. Thus, individual differences, talents and creativity fade away. Instead, an environment that brings the unknown into the agenda is more suitable for creative individuals to be raised. Esquivel (1995) defines creativity is a unique and integral aspect of human experience and an important educational goal. In other words, creativity is considered to be an educational goal for 21st century.

Environment that Foster Creativity

Many researchers agree that creativity can be developed and encouraged by a supporting education system. Thus, creativity is an innate ability that can be stimulated, regenerated, and developed by special programs and within life experiences, even if it is restricted. In other words, each person has the chance to be creative. Also, educators agree that creativity is an essential skill for 21st century; thus, creativity should be fostered in schools as a key educational goal (Chan and Yuen, 2014, Robinson, 2011, Wagner, 2010). The education system which fosters creativity of people involves diverse thinking skills. Unlike traditional education approach, a creative fostering education system puts the student at the center of the learning

process. The education system which fosters creativity of gifted students is essential in order to benefit from the potentials of gifted individuals. Furthermore, the role of parents and teachers cannot be denied in this process. The attitudes of parents and teachers towards divergent thinking play important roles in encouraging creativity in children (Deng, Wang & Zhao, 2016).

Cropley (2018) states that in order to implement embedding creativity in the modern curriculum, focus and differentiation are needed. Also, the development of creativity depends on a dynamic approach that accounts for the interaction of key components—the person, the process, and the environment. The extent to which the person is involved in activities reflects the creativity process engagement. Savransky (2000) also discussed the processes through which effective novelty is produced, listing six ways in which this can occur: 1. Improvement of what already exists; 2. Diagnostics (search for and elimination of shortcomings in what already exists); 3. Trimming (reduction of costs associated with existing solutions); 4. Analogy (new use of known processes and systems); 5. Synthesis (generation of new mixtures of existing elements); 6. Genesis (generation of fundamentally new solutions). Many researchers mention that creativity is a process which covers particular steps such as problem identification, information gathering, idea generation and evaluation, and idea implementation (Amabile, 1983; Reiter-Palmon & Illies, 2004; Shalley & Gilson, 2004).

In order to foster creativity of children, some qualifications of the environment are very important. According to Csikszentmihalyi (1996) creativity is a social construct, because it is widely affected by individual constructs of domains which based on the values of the society. Csikszentmihalyi (1977) stated that creative performance is affected by the environment. A well-established environment for creativity is characterized by providing knowledge-based resources, stimulus, comfort, and a carefree surrounding. Furthermore, the environment should offer many choices, allow children to be different and make mistakes without fear (Sternberg, 2007). In that sense, children need a creativity-fostering environment both at home and at school. Soh (2017) mentions that in a creativity fostering classroom ecology, students feel free and psychologically safe to try out their creative ideas, and only the teachers able to create such classroom ecology. Furthermore, Houtz (1990) reviewed the literature about the environments that support creative thinking and states that environment that foster creativity is democratic and has an atmosphere of safety to experiment with ideas. In addition, the instructional approaches they implement are effective in creating a democratic atmosphere. In this context, teachers play important roles in the emergence of the creativity.

Creativity Fostering Teacher

Mills (2003) determined that the personality types of teachers who are effective in the education of gifted children are similar in many respects to gifted students. Torrance (1995) suggests teachers to respect unusual questions and ideas from children, make the child feel that what he says is important and valuable, provide children with opportunities to learn on their own and reward them, let children learn by practicing and provide an environment in which children cannot trust the right or wrong answer.

İlhan (1994) listed the teacher features of that foster creativity as flexible, intellectual, open to new ideas, democratic, interested in literary and artistic, innovative collaborative, and experiential as well as eager to develop and enhance their knowledge. In addition, they should value and respect their students. A study which examined the relationship between the discipline styles used by teachers and teacher behaviors that support creativity, determined that the discipline styles used by teachers predict the behaviors that support creativity in a meaningful and positive way (İlhan, 2016). After all, dogmatic and strict teachers who do not give opportunity to discuss, prevent creativity (Sungur, 1997). In that sense, teachers who support creativity of their students prefer cooperative learning activities and nondirective teaching methods. Also, they are responsive to individual needs of students and interact with them openly.

Cropley (1997) reviewed the creativity literature extensively in order to determine the teacher behaviors that foster student creativity. These teacher behaviors include independence, integration, motivation, judgment, flexibility, evaluation, question, opportunities and frustration. In other words, teachers who foster creativity, not only encourage independent learning of students, but also facilitate socially integrative teaching. They motivate divergent thinking and postpone judgment on students' ideas. Also, they promoting flexible thinking and encourage students' self-evaluation. Finally, teachers who create opportunities for students with varied conditions and materials, considering seriously students' suggestions and helping students to cope with failure frustration in a safety environment, foster student creativity. Soh (2000) developed "Creativity Fostering Teacher Behaviour Index" to measure the teachers' creativity fostering behavior based on Cropley's study. Dikici (2013) adapted this index to Turkish.

Kaya (2018) conducted a descriptive survey study in the second term of 2017-2018 academic year, in order to investigate the creativity fostering levels of 52 teachers working in Science and Art Centers that are the most widespread institution for gifted students in Turkey. Quantitative data was collected using "Creativity Fostering Teacher Behaviour Index" which is

developed by Soh (2000) and adapted to Turkish by Dikici (2013). The results revealed that the average of total scores that the teachers gathered from the scale was found 149,53. The teachers' creativity fostering levels can be evaluated as high when it is considered that the maximum score that can be gathered from the scale is 165. The results of this study show that teachers of gifted students are behaving in a way that foster the creativity of students. Further research on parents, teachers and educational settings in terms of fostering creativity is needed in order to make necessary changes.

In a recent study, Şahin (2021) determined the effects of personality traits of teachers on the development of creative–thinking abilities among students. The study was conducted at the primary school level and Adjective–Based Personality Scale, an in–class observation form, and a creativity task were used to collect data. The results revealed that the teachers with high levels of the openness to experience personality trait exhibited significantly higher levels of behavior supportive of in–class creativity and that the creativity scores of the students in their classes were significantly high. No significant differentiation was found in comparisons related to the personality traits of agreeableness and neuroticism.

Creativity Fostering Parents

Another important factor that influences creativity is the family environment. Torrance (1965) stated the importance of the family environment and the role of parents in the development of their creative potential. According to Ömeroğlu and Turla (2001) creativity manifests itself in the child's play in the first years of life, especially during games where the mother plays with her baby. Thus, the relationship of the baby with the mother or the caregiver has the most important role in the emergence and development of creative behavior. Many researchers drew attention to the benefits that children acquire through play; such as developing creativity and imaginativeness (Bergen, 1998). Furthermore, Aydoğan (2006) stated that parents who provide enrichment stimuli in the home environment support cognitive, physical, social and psychological development of their children as well as fostering their creative and productive behavior. Also, in literature, there are research findings that supported the notion that the family environment does foster creativity especially an environment that is not characterized by an authoritarian style of parenting (Kemple & Nissenberg, 2000; Miller & Gerard, 1979).

In order to foster creativity in preschool period at home, it is crucial creating opportunities for the gifted children's unique skills and talents. Since gifted children enjoy talking with older people and adults, parents should share their thoughts, dreams and company them though learning process. These activities increase the children's self-esteem and thus they

can freely express their divergent thoughts. According to their interests, interactive reading activities, observations, science experiments and brainteasers are some examples for supportive extra-curricular activities for gifted preschool children. Gifted preschoolers need parents who can combine independence, discipline, opportunities and guidance in daily routine. This kind of parenting style will lead to a self-confident, creative and satisfied child.

Parental attitudes and behaviors play important roles in development of creativity in children especially in early childhood (Khosrowjerdi, 2006). The results of an exploratory study on the childhood period of highly creative people show the influence of the family (Gute, Gute, Nakamura & Csikszentmihalyi, 2008). According to the findings of this study parents of highly creative people are found to be less authoritarian and more open to opportunities to nurture and develop their children's creative and critical thinking abilities. Also, the highly creative people stated that their parents tolerate children's failure, and set examples of copying strategies for children. In other words, parents that create a safe and free environment for their children develop children's creativity.

Mehrinejad, Rajabimoghadam and Tarsafi (2015) conducted a study in order to investigate the relationship between parenting styles and creativity and the predictability of creativity by parenting styles. The data was collected Abedi Creativity Questionnaire and Baumrind Parenting Styles Inventory from a sample consisted of 400 students randomly selected. The results indicated a significant positive relationship between authoritative parenting style and creativity, while there was a significant negative relationship between authoritarian parenting style and creativity. No significant relationship was found between permissive style of parenting and creativity.

Conclusion

In the contemporary world, education systems emphasize the importance of creativity (Beghetto & Kaufman, 2010). Creativity is identified as a major aim of modern education. Yalçın (2018) states that creativity is among the learning and innovation skills among the 21st century skills that education aims to gain. It is necessary to raise creative individuals in order to keep up with the developing world (Memduhoğlu, Uçar & Uçar, 2017). According to Zhao (2012) globalization and progress in digital technology affect people now live, work, think, communicate and create. Therefore, it is necessary to make the students to produce information by making connections rather than uploading information to students (Öztürk, 2001). In this context, the most important question to be

asked is: "Does the education in our schools prepare our students for 21st century conditions?".

Wagner (2010) listed necessary survival skills for students in 21st century as;

- Critical thinking and problem solving,

- Collaboration and leadership,

- Agility and adaptability,

- Initiative and entrepreneurialism,

- Effective oral and written communication,

- Accessing and analyzing information,

- Curiosity and imagination.

Wagner (2010) argues that even best schools do not teach the new essential survival skills to students, basing on several interviews with business, non-profit and education leaders. As a result, he defines this situation as "global achievement gap". Lin (2011) presented the framework of fostering students' creativity in the classroom as the combination of three elements: teaching for creativity, which refers to identifying and encouraging student creativity and providing students opportunities to be creative; teaching creatively, that is using imaginative approaches to make learning more interesting and effective, and learning creatively, which denotes learning that stimulates creativity. The results of Torrance's (1982) longitudinal study of creative individuals revealed that having a mentor who value the creativity in early childhood is critical. The mentors who teach the gifted children how to use creativity, can be the teachers or parents of them. Also, Piirto (2011) mentioned that personality attributes, cognitive ability, talent, environmental factors, motivation, and knowledge of the field are necessary in developing one's creativity.

Additionally, Cramond (2005) stated that teachers firstly should examine the classroom climate whether they want to foster creativity. In other words, environmental conditions in educational settings have a significant role in encouraging creativity. Both physical environment and psychosocial environment affect creativity. Flexible use of space, flexibility and free movement around the space, and the availability and incorporation of a wide range of materials and tools are qualities of creativity-supportive physical environment. Psychosocial environment that fosters creativity include relationships based on mutual trust and respect among students and teachers as well as the incorporation of collaborative activities. Shortly, gifted children need an environment which grows the curiosity and imagination. For this purpose, exciting learning activities, authentic

and realistic tasks, game-like and playful approaches, ensuring idea time are examples of activities that can be used to foster creativity.

Finally, in order to adapt social, economic and global changes of 21st century, people need to be creative. If we want to follow the change in the world, we have to realize that the education system should be updated. We have to change our education system as including creativity-supportive curriculum, in order to keep up with the development in the world and not to fall behind.

References

Amabile, T. M. (1983). *The social psychology of creativity.* New York: Springer Verlag.

Ataman, A. (1993). *Yaratıcılık ve Eğitim. [Creativity and Education].* Ankara: Türk Eğitim Derneği Yayınları, No:17, Şafak.

Aydoğan, Y. (2006). Ev ortamının çocuğun gelişimine göre düzenlenmesi [Organizing the home environment according to the development of the child]. *Sosyal Politika Çalışmaları Dergisi*, *10* (10), 27-33.

Beghetto, R. A., & Kaufman, J. C. (2010). Broadening conceptions of creativity in the classroom. In *Nurturing creativity in the classroom* (pp. 191-205). Cambridge University Press.

Benson, C. (2004). Professor John Eggleston Memorial Lecture 2004-Creativity: Caught or Taught? *Journal of Design & Technology Education,* 9(3), 138-144.

Bergen, D. (1998). Readings from... Play as a Medium for Learning and Development. Association for Childhood Education International, 17904 Georgia Avenue, Suite 215, Olney, MD 20832.

Burkus, D. (2013). *The myths of creativity: The truth about how innovative companies and people generate great ideas*. John Wiley & Sons.

Chan, S., Yuen, M. (2014). **Personal and environmental factors affecting teachers' creativity-fostering practices in Hong Kong.** *Thinking Skills and Creativity,* 12, 69- 77.

Cramond, B. (2005). *Fostering creativity in gifted students*. Prufrock Press Inc.

Cremin, T., Burnard, P., & Craft, A. (2006). Pedagogy and possibility thinking in the early years. *Thinking skills and creativity*, *1*(2), 108-119.

Cropley, A. J. (1997). Fostering creativity in the classroom: General principles. *The creativity research handbook*, *1*(84-114).

Cropley, A. (2016). The Myths of Heaven-Sent Creativity: Toward a Perhaps Less Democratic but More Down-to-Earth Understanding, *Creativity Research Journal*, 28:3, 238-246.

Cropley, A. (2018). *Bringing creativity down to earth: A long labor lost?* In R. J. Sternberg & J. C. Kaufman (Eds.), *The nature of human creativity* (p. 47–62). Cambridge University Press.

Cropley, D. H. and Patston, T. (2019). Supporting Creative Teaching and Learning in the Classroom: Myths, Models, and Measures, In C. Mullen (Ed.), *Creativity Under Duress in Education? Resistive Theories, Practices, and Actions,* Chapter 15 (pp. 267-288). London, UK: Springer.

Csikszentmihalyi, M. (1977). *Beyond Boredom and Anxiety, second printing.* San Francisco: Jossey-Bass.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York: Harper Collins.

Deng, L., Wang, L. & Zhao, Y. (2016). How Creativity Was Affected by Environmental Factors and Individual Characteristics: A Cross-cultural Comparison Perspective, *Creativity Research Journal,* 28:3, 357-366, DOI: 10.1080/10400419.2016.1195615

Dewey, J. (1938). *Experience and education (Vol. no. 10).* New York: The Macmillan company.

Dikici, A. (2013). The adaptation of creativity fostering primary teachers index scale into Turkish. *Educational Sciences: Theory & Practice,* 13(1), 307-324.

Esquivel, G. B. (1995). Teacher behaviors that foster creativity. *Educational psychology review*, *7*(2), 185-202.

Gardner, H. (1997). Multiple Intelligences as a Partner in School Improvement, *Educational Leadership,* 55, (1), 20-21.

Guilford, J. P. (1959). Three faces of intellect. *American psychologist*, *14*(8), 469.

Guilford, J. P. (1967). Creativity: yesterday, today and tomorrow. *The Journal of Creative Behavior*, 1 (1), 3-14.

Gute, G., Gute, D. S., Nakamura, J., & Csikszentmihályi, M. (2008). The Early Lives of Highly Creative Persons: The Influence of the Complex Family., *Creativity Research Journal,* 20:4, 343-357, DOI: 10.1080/10400410802391207.

Hollingworth, L. S. (1942). *Children above IQ 180: origin and development.* New York.

Houtz, J. C. (1990). Environments that support creative thinking. In Hedley, C., Houtz, J.& Baratta, A. (Eds.), *Cognition, Curriculum and Literacy,* (pp. 61–76). Ablex, Norwood NJ.

İlhan, A. Ç. (1994). Çocuk kitaplarındaki resimlerin çocuğun yaratıcılığına etkisi. [The effect of pictures in children's books on the creativity of the child]. *Yaşadıkça Eğitim,* 36, 27-29.

İlhan, Z. (2016). *Öğretmenlerin kullandıkları disiplin stilleri ile yaratıcılığı destekleyen öğretmen davranışları arasındaki ilişkinin incelenmesi. [An Investigation of relationship between teacher' discipline styles and teachers behaviours fostering creativity].* Unpublished master's thesis. Niğde University, Niğde.

Kaufman, J. C. (2016). *Creativity 101*. Springer publishing company.

Kaya, N. G. (2018). Üstün Yetenekli Öğrencilerin Öğretmenlerinin Yaratıcılığı Destekleme Düzeylerinin Belirlenmesi [Determination of Creativity Fostering Levels of Teachers of Gifted Students]. *The Journal of Turkish Educational Sciences,* 16 (2), 157-175.

Kaya, N. G. (2020). Myths about creativity: A qualitative study on gifted students' parents. *Journal of Gifted Education and Creativity,* 7(2), 93-98.

Keleşoğlu, S., & Kalaycı, N. (2017). Dördüncü sanayi devriminin eşiğinde yaratıcılık, inovasyon ve eğitim ilişkisi. [On the Threshold of the Fourth Industrial Revolution, Innovation and Education Relationship]. *Yaratıcı Drama Dergisi (Creative Drama Journal),* 12(1), 69-86.

Kemple, K. M., & Nissenberg, S. A. (2000). Nurturing creativity in early childhood education: Families are part of it. *Early Childhood Education Journal,* 28, 67–71.

Khosrojerdi, Z. (2006). Creativity and Teaching Methods. *Journal of Growth,* 15, 10-15.

Lin, Y. S. (2011). Fostering creativity through education–a conceptual framework of creative pedagogy. *Creative education*, *2*(03), 149-155.

Marland, S. P. (1972). *Education of Gifted and Talented*. W D.C.: US Office of Education.

Mehrinejad, S. A., Rajabimoghadam, S., & Tarsafi, M. (2015). The relationship between parenting styles and creativity and the predictability of creativity by parenting styles. *Procedia-social and behavioral sciences*, *205*, 56-60.

Memduhoğlu, H. B., Uçar, R., & Uçar, İ. H. (2017). *Örnek uygulamalarla eğitimde yaratıcılık yaratıcı okul yaratıcı öğretmen. [Creativity in education with sample applications creative school creative teacher]*. Ankara: Pegem.

Miller, B. C., & Gerard, D. (1979). Family influences on the development of creativity in children: An integrative review. *Family Coordinator*, 28, 295–312.

Mills, C. J. (2003). Characteristics of Effective Teachers of Gifted Students: Teacher Background and Personality Styles of Students. *Gifted Child Quarterly,* 47 (4), 272-281.

Ömeroğlu, E. & Turla, A. (2001). Okulöncesi Dönemde Yaratıcılık Eğitimi ve Desteklenmesi [Creativity Education and Support in Preschool Period], *Milli Eğitim Dergisi (Journal of National Education),* 151: 48-52.

Öztürk, E. (2001). Yaratıcılık ve Eğitim [Creativity and Education]. *Sakarya University Journal of Education Faculty*, (1), 158-164.

Piirto, J. (2011). Creativity for 21st century skills. In *Creativity for 21st Century Skills* (pp. 1-12). Sense Publishers.

Reavis, G. H. (2007). The animal school. *The Agricultural Education Magazine*, *80*(2), 21.

Reiter-Palmon, R., & Illies, J. J. (2004). Leadership and creativity: Understanding leadership from a creative problem-solving perspective. *The Leadership Quarterly*, *15*(1), 55-77.

Renzulli, J. S. (1986). *The three ring conception of giftedness: A developmental model for creative productivity.* Cambridge: University of Cambridge.

Robinson, K. (2011). *Out of our minds.* Capstone Publishing, West Sussex.

Russ, S. W. (2003). Play and creativity: Developmental issues. *Scandinavian journal of educational research*, *47*(3), 291-303.

Savransky, S. D. (2000). *Engineering of creativity.* Boca Raton, FL: CRC Press.

Senemoğlu, N. (1999). *İlköğretimde Etkili Öğretme ve Öğrenme El Kitabı: Öğrenme Ürünleri ve Öğretimi. [Effective Teaching and Learning Handbook in Primary Education: Learning Products and Teaching].* Burdur.

Sevinç, N., & Kanlı, E. (2019). Teachers' Myths and Views about Creativity. *Journal of Gifted Education and Creativity,* 6(2), 103-122.

Shalley, C. E. & Gilson, L. L. (2004). What leaders need to know: A review of social and contextual factors that can foster or hinder creativity. *The leadership quarterly*, *15*(1), 33-53.

Soh, K. (2000). Indexing creativity fostering teacher behavior: A preliminary validation study. *Journal of Creative Behavior,* 34 (2), 118-134.

Soh, K. (2017). Fostering student creativity through teacher behaviors. *Thinking skills and creativity*, *23*, 58-66.

Sternberg, R. J. (2007). Creativity as a habit. In A.-G. Tan (Ed.), *Creativity: A handbook for teachers* (pp. 3–25). Singapore: World Scientific.

Sungur, N., (1997). *Yaratıcı Düşünce [Creative Thinking].* İstanbul: Evrim.

Şahin, F. (2021). The effects of personality traits of teachers on the development of student creativity, *Education and Science,* 46 (205), 191-205.

Terman, L. M. (1925). *Genetic studies of genius: Vol. 1. Mental and physical traits of a thousand gifted children.* Stanford, CA: Stanford University Press.

Torrance, E. P. (1965). *Rewarding creative behavior.* Englewood Cliffs, NJ: Prentice-Hall.

Torrance, E. P. (1982). Hemisphericity and creative functioning. *Journal of Research & Development in Education*.

Torrance, E. P. (1988). The nature of creativity as manifest in its testing. In R. J. Sternberg (Ed.), The nature of creativity (pp. 43–75). Cambridge, MA: Cambridge University Press.

Torrance, E. P. (1995). *Why fly?* Greenwood Publishing Group.

VanTassel-Baska, J., & Stambaugh, T. (2006). *Instructional management strategies for effective curriculum implementation. Comprehensive curriculum for gifted learners.* Denver, Colorado: Pearson Education Inc.

Vygotsky, L. S. (1990). Imagination and creativity in childhood, *Soviet Psychology*, 28(1), 84-96, DOI: 10.2753/RPO1061-0405280184

Wagner, T. (2010). *The global achievement gap: Why even our best schools don't teach the new survival skills our children need–and what we can do about it.* Basic Books, New York.

Warne, R. T. (2019). An evaluation (and vindication?) of Lewis Terman: What the father of gifted education can teach the 21st century. *Gifted Child Quarterly*, *63*(1), 3-21.

Yalçın, S. (2018). 21. Yüzyıl becerileri ve bu becerilerin ölçülmesinde kullanılan araçlar ve yaklaşımlar. [21st Century Skills and Tools and Approaches That Are Used to Measure These Skills.]. *Ankara University Journal of Faculty of Educational Sciences,* 51 (1), 183-201. DOI: 10.30964/auebfd.405860.

Zhao, Y. (2012). Flunking innovation and creativity. *Phi Delta Kappan*, *94*(1), 56-61.

Chapter 4

LEARNING PROBLEMS EXPERIENCED BY PRE-SERVICE SCIENCE TEACHERS IN BIOLOGY LESSONS

Emre YILDIZ[1]

1 Dr., Atatürk Universiry, Kazım Karabekir Education Faculty, Department of Science Education, Erzurum/Turkey, emre.yildiz@atauni.edu.tr, 0000-0001-6396-9183

Introduction

Science appears in all areas of our lives. Many situations that we encounter in daily life such as rain, dough leavening, seed germination are within the scope of science. However, the abstract level of the concepts in science makes it difficult to understand. For this reason, many problems are encountered during science education. It can be said that learning difficulties, low motivation, increased anxiety and problems experienced in the learning environment are the main problems of learning.

The learning problems that students experience during learning cause wrong structuring in their minds and therefore, wrong learning occurs. Buyruk and Korkmaz (2016) determined that students misconfigured concepts in their minds and attribute different meanings to concepts in their own right, and concluded that this situation may lead to a weak foundation of the subjects to be learned in the following years and to misconfigure new concepts and cause problems in embedding the concept into their daily lives. As a result of students' false beliefs and experiences, misconceptions can be observed (Baki, 1999).

Bacanak, Küçük and Çepni (2004) determined in their study that 5th and 8th grade students studying in Trabzon have misconceptions about photosynthesis and respiration. Şensoy, Aydoğdu, Yıldırım, Uşak, and Hançer (2005) found that 6th, 7th and 8th grade students have misconceptions about photosynthesis. The research conducted by Tekkaya and Balcı (2003) revealed that high school 1st and 3rd grade students have misconceptions about photosynthesis and respiration. Kırılmazkaya and Kırbağ Zengin (2016) found that pre-service science teachers had misconceptions about photosynthesis using the Vee diagram technique.

Koray, Özdemir, and Tatar (2005) found that 6th, 7th, and 8th grade students had misconceptions despite learning the concepts of weight and mass in the fourth grade. Similarly, high school students also have misconceptions about force (Hise, 1988; Kuru & Güneş, 2005; Sadanand & Kess, 1990). Atasoy and Akdeniz (2007) found that pre-service science teachers had misconceptions about Newton's Laws of Motion, while Eryılmaz and Tatlı (2000) found that first grade students have misconceptions about introducing mechanics.

Buluş Kırıkkaya and Güllü (2008) found that fifth grade students have many misconceptions about heat, temprature, evaporation and boiling. Again, many studies on this subject revealed that students have many misconceptions about heat and temperature (Ericson & Tiberghien, 1985; Gönen & Akgün, 2005; Kesidou & Duit, 1993). In the study conducted by Aydoğan, Güneş, and Gülçiçek (2003), it was determined that high school and university students had misconceptions about heat and heat,

and it was emphasized that when students' misleading at early ages were not corrected, they continued to be mistaken in later academic life.

In addition to these studies, it has been stated that students have learning deficiencies and misconceptions in many subjects such as digestive system, respiratory, excretory, enzymes, circulatory system, substance transport, population, cell division, classification of living things, DNA, genes and genetics and ecology (Atılboz & Gökben, 2004; Selvi & Yakışan, 2004; Tekkaya, 2002; Temelli, 2006; Yeşilyurt & Gül, 2012).

As seen in the studies given above, students' misleading in lower grades causes misconceptions to be settled in upper grades. In the studies given, it is seen that misconceptions are not in a single issue, and there are misconceptions in different subjects. This situation shows that students learn wrongly in different subjects. The common point of these studies is that the learning problems that students experience during learning cause the wrong learning they have. It is due to the reasons that the problem situations encountered during learning are not eliminated, the teaching is teacher-centered, the learning is based on memorization rather than the constructivist approach, and the teachers have similar misconceptions in the determined subjects (Aykurt & Akaydın, 2009; Yakışan & Selvi, 2004; Yıldız, 2019).

This study was carried out to determine the subjects that pre-service science teachers have learning problems in biology I and II lessons, the reasons for having problems in these subjects and their suggestions for the solution of these problems. The problem of the research was determined as: "What are the subjects that pre-service science teachers have learning problems in biology I and II lessons, the reasons for having problems and their suggestions for the solution of these problems?". Based on this problem, the research questions given below were tried to be answered:

1.   What are the subjects that pre-service science teachers experience learning difficulties in biology I and II lessons, which cause a decrease in learning motivation, cause an increase in learning anxiety and are lack of permanent knowledge?

2.   What are the reasons for science pre-service teachers to have learning difficulties in biology I and II lessons, decrease in learning motivation, increase in learning anxiety and lack of permanent knowledge on these subjects?

3.   What are the suggestions of science pre-service teachers for solving the problems of learning difficulties, decreasing in learning motivation, increasing in learning anxiety and lack of permanent knowledge in biology I and II lessons?

Method

Research Design

Convergent parallel pattern from mixed method designs was adopted in the study. The quantitative and qualitative data collection process was followed simultaneously, and the data obtained were combined in general interpretation (Creswell & Plano-Clark, 2011).

To increase the generalizability of quantitative data in research; instead of collecting data from a single group at a time, the data were collected from pre-service teachers from different universities in the region, the sample size to represent the universe was determined and the number of individuals included in the sample was increased to increase the power of representation, the data were collected similarly in all groups with the same data collection tool, the purpose of the study was explained, it was pointed out that sincere answers are important, and those who did not want to participate were not included in the sample, care was taken to ensure that the data collection environment has a similar structure for all groups where the data are collected and interaction between participants was tried to be prevented as much as possible. To increase the validity of the results obtained from qualitative data; During the data collection and analysis, not to have any expectations, not to act with prejudice, and regular refereeing from a field expert regarding the analysis and its results, the data were analyzed by two different researchers and the results were supported with direct quotations. To increase the validity of the results obtained from qualitative data; no expectation was attempted and tried not to be prejudiced during data collection and analysis, regular review was received from a field expert regarding the analyzes and results, the data were analyzed by two different researchers and the results were supported by direct quotations.

Population and Sample

The population of the research consists of pre-service science teachers who took biology I and II lessons at universities in the Eastern Anatolia Region between 2016-2020. The stratified purposeful sampling method was used to determine the sample group. The number of pre-service teachers who took biology I and II lessons in each academic year from 2016 to 2020 was determined, and the percentage distribution of those who took the lesson in the population by years was calculated. Percentage distributions of pre-service teachers included in the sample were determined to represent percent units in the population. The distribution of pre-service teachers in the population and sample is given in Table 1.

Table 1. Distribution of Pre-service Teachers in the Population and Sample

Academic Year	N	%	n[*]	%
2019-2020 (new curriculum)	167	11.17	136	11.17
2018-2019 (new curriculum)	147	9.83	120	9.83
2018-2019 (old curriculum)	375	25.08	306	25.08
2017-2018 (old curriculum)	395	26.42	323	26.42
2016-2017 (old curriculum)	411	27.50	336	27.50
Total	1495	100	1221	100

[*] The values calculated by the G-Power program were taken as basis, but more individuals were taken in order to increase the representation power of the population.

Data Collection Tool

The data were collected with the Biology I and II Lessons Learning Problem Determination Questionnaires prepared by the researcher. These questionnaires were prepared with the aim of determining the topics that the pre-service teachers experienced learning difficulties, low motivation, increased learning anxiety and permanent inability to obtain information learning problems, the reasons why they had learning problems in these subjects, and their suggestions on how to solve the problems they experienced in Biology I and II lessons. The questionnaires were first presented to the opinion of 3 field experts who conduct biology lessons in the Science Education Department. In line with the opinions of the experts, it was determined that there is no need to change the content of the questionnaire and the areas reserved for answers should be increased. After the arrangements made in the questionnaire, a pilot study was conducted with 360 science pre-service teachers studying at universities in the Eastern Anatolia Region. As a result of the analysis of the data obtained from the pilot application, it was determined that there were no expressions in the questionnaire items that would cause different understanding, and the items were perceived in the same way by the pre-service teachers. The questionnaire consists of two parts, in which the demographic characteristics of the participants are asked and questions about learning problems are included. The pre-service teachers first chose the subjects they experienced learning problems from the subjects presented to them. In this section, the right to choose as many as they want is given and the other option was added for different situations they want to specify. In the next question, they were asked to explain the reasons for their learning problems in selected subjects. In the last question, his/her suggestions on how a biology lesson that will solve this learning problem should be.

Analysis of Data

Frequency and percentage values from descriptive statistics were used in the analysis of quantitative data obtained from the questionnaires.

Content analysis method was used in the analysis of qualitative data. In the analysis phase, firstly, the written form of the data was created. Written forms were transferred to NVivo 12 Pro program and structural codes were created by repeated reading on these written forms. The determined codes are assigned to the relevant sections and combined under similar categories. In the last stage, themes were created and codes were presented under the relevant themes. The data were analyzed at two different times by the researcher and the percentage of agreement between the analyzes was calculated as 83%. Similarly, the data were analyzed independently from the first researcher by another researcher included in the process, and the percentage of agreement with the first researcher was calculated as 74%. It has been stated that if the compliance percentage is 70% and above, the reliability is provided (Miles & Huberman, 1994).

Findings

Findings Regarding the Identification of the Issues that Pre-Service Teachers Have Learning Problems

It is given in Table 2 the distribution of the subjects that the pre-service teachers experienced the problems of learning difficulty, decrease in learning motivation, increase in learning anxiety and lack of permanent knowledge in Biology I lesson.

Table 2. The Distribution of the Subjects that Pre-Service Teachers Have Learning Problems in Biology I Lesson

Subjects	Learning Difficulty		Decrease in Learning Motivation		Increase in Learning Anxiety		Lack of Permanent Knowledge	
	f	%	f	%	f	%	f	%
Biology and Scientific Method	244	4.03	192	3.26	127	2.15	138	2.17
Diversity and Classification of Living Beings	216	3.57	176	2.99	261	4.43	274	4.31
Viruses	421	6.96	384	6.51	429	7.73	510	8.03
Bacteria	390	6.44	411	6.97	366	6.59	439	6.91
Prokaryote And Eukaryote	179	2.96	205	3.48	150	2.70	237	3.73
Fungi	215	3.55	218	3.70	162	2.92	203	3.19
Ecology	158	2.61	97	1.65	104	1.87	188	2.96
Substance Handling	386	6.38	419	7.11	396	7.13	402	6.33
Proteins	219	3.62	211	3.58	180	3.24	216	3.40
Carbohydrates	128	2.11	177	3.00	162	2.92	179	2.82
Lipids	361	5.97	394	6.68	308	5.55	275	4.33
Enzymes	330	5.45	351	5.95	395	7.12	421	6.62
Cell and Cell Structure	244	4.03	236	4.00	268	4.83	290	4.56
Nucleic Acids	482	7.97	497	8.43	433	7.80	443	6.97
Cell division	571	9.44	596	10.11	531	9.57	601	9.46
Plant Diversity	264	4.36	275	4.66	237	4.27	245	3.86

Plant Tissues	374	6.18	288	4.89	220	3.96	346	5.44
Vegetative Organs and Structures	116	1.92	128	2.17	184	3.31	205	3.23
Reproduction in Plants	295	4.88	273	4.63	244	4.40	320	5.04
Metabolic Events in Plants	336	5.55	269	4.56	278	5.01	249	3.92
Animal Diversity	122	2.02	98	1.66	116	2.09	174	2.74
Total*	6051	100	5895	100	5551	100	6355	100

* The pre-service teachers made more than one choice.

According to the results of the analysis given in Table 2, the pre-service teachers have learning difficulties in cell division (f =571, %=9.44) mostly, secondly in nucleic acids (f=482, %=7.97), and vegetative organs and structures (f=116, %=1.92) least in biology I lesson. Pre-service teachers experience the problem of low motivation during learning mostly in cell division (f=596, %=10.11), and at least in ecology (f=97, %=1.65) and animal diversity (f=98, %=1.66). The subject that causes the highest is cell division (f=531, %=9.57) and the least effective subject is ecology (f=104, %=1.87) increase in learning anxiety of pre-service teachers. It was determined that the subjects with the least persistence of knowledge for pre-service teachers are cell division (f=601, %=9.46), and viruses (f=510, %=8.03), and the subjects in which the persistence rate of information is higher than others are biology and scientific method (f=138, %=2.17), animal diversity(f=174, %=2.74), carbohydrates (f=179, %=2.82) and ecology (f=188, %=2.96).

Table 3 shows the distribution of the subjects that the pre-service teachers experienced the problems of learning difficulty, decrease in learning motivation, increase in learning anxiety and lack of permanent knowledge in Biology II lesson.

Table 3. The Distribution of the Subjects that Pre-Service Teachers Have Learning Problems in Biology II Lesson

Subjects	Learning Difficulty		Decrease in Learning Motivation		Increase in Learning Anxiety		Lack of Permanent Knowledge	
	f	%	f	%	f	%	f	%
Cell Respiration and Fermentation	651	14.53	595	15.28	599	15.68	673	17.44
Photosynthesis	664	14.82	603	15.49	586	15.34	609	15.78
Epithelial Tissue	498	11.11	387	9.94	455	11.91	431	11.17
Connective Support Tissue	275	6.14	150	3.85	107	2.8	153	3.96
Cartilage Tissue	78	1.74	109	2.8	82	2.15	105	2.72
Bone Tissue	86	1.92	94	2.41	79	2.07	83	2.15
Nerve Tissue	122	2.72	135	3.47	113	2.96	98	2.54

Muscle Tissue	95	2.12	98	2.52	77	2.02	85	2.20
Blood Tissue	183	4.08	137	3.52	129	3.38	140	3.63
Reproductive and Reproductive System	105	2.34	90	2.31	88	2.30	84	2.18
Digestive System	141	3.15	129	3.31	155	4.06	102	2.64
Circulatory System	174	3.88	128	3.29	113	2.96	96	2.49
Support and Movement	352	7.86	239	6.14	234	6.13	200	5.18
Respiratory System	116	2.59	101	2.59	105	2.75	126	3.26
Nervous System	328	7.32	324	8.32	348	9.11	308	7.98
Endocrine System	550	12.27	507	13.02	498	13.04	525	13.60
Animal Behavior	63	1.41	68	1.75	51	1.34	42	1.09
Total*	4481	100	3894	100	3819	100	3860	100

* The pre-service teachers made more than one choice.

According to the results of the analysis given in Table 3, while the pre-service teachers have the most learning difficulties in photosynthesis (f=664, %=14.82) and cell respiration and fermentation (f=651, %=14.53), they have the least difficulty in learning about animal behavior (f=63, %=1.41), cartilage tissue (f=78, %=1.74), bone tissue (f=86, %=1.92) and muscle tissue (f=95, %=2.12). Pre-service teachers experience the decrease motivation in photosynthesis (f=603, %=15.49) and cell respiration and fermentation (f=595, %=15.28) mostly, and the least low learning motivation problems in animal behavior (f=68, %=1.75), reproductive and reproductive system (f=90, %=2.31), bone tissue (f=94, %=2.41) and muscle tissue (f=98, %=2.52). The subjects that cause the highest increase in learning anxiety of pre-service teachers are cell respiration and fermentation (f=599, %=15.68) and photosynthesis (f=586, %=15.34), and the subjects that cause the least increase are animal behavior (f=51, %=1.34). It was determined that the subjects with the least persistence of knowledge for pre-service teachers are cell respiration and fermentation (f=673, %=17.44) and photosynthesis (f=609, %=15.78), and the subjects with a higher persistence of knowledge for pre-service teachers than other subjects is animal behavior (f=42, %=1.09).

Findings Regarding the Reasons for Pre-service Teachers to Have Problems in the Specified Subjects

The results of the content analysis of the reasons why pre-service teachers have learning difficulties in the subjects determined in Biology I and II lessons are given in Table 4.

Table 4. Content Analysis Results Regarding the Reasons of Having Learning Difficulties

Theme	Code	Biology I		Biology II	
		f	%	f	%
Conceptual Problems	excess	432	15,07	563	26.90
	confusing	651	22,71	387	18.49
	unfamiliar	54	1,88	249	11.90
	difficult	116	4,05	76	3.63
	miss the point	225	7,85		
	lack of prior knowledge	207	7,22	105	5.02
Instructional Problems	rote teaching	311	10,85	211	10.08
	not enough time	109	3,80	72	3.44
	traditional teaching			144	6.88
Problems Arising from Working Habits	lack of study	158	5,51		
	not studying in detail	75	2,62		
Motivation Problems	nonstriking	276	9,63		
	boring	101	3,52		
	dislike	151	5,27	286	13.66
Total*		2866	100	2093	100

*The pre-service teachers stated more than one opinion.

According to the results of the analysis given in Table 4, pre-service teachers often have learning difficulties in the biology I lesson due to the excess of concepts, confusion of concepts and teaching based on rote learning. The problem of learning difficulty experienced in the Biology II lesson is mostly due to the excess, confusion and being unfamiliar of concepts, teaching based on rote and dislike the subject. Examples of the opinions expressed by the pre-service teachers are given below:

PT-117: ... There are too many concepts in the subject. It is really intense in terms of content. Therefore, there is a lot of information that we are expected to learn in a lesson. ...

PT-490: ... We have been seeing these issues for almost ten years. However, when one cannot learn the subject well at first, it cannot be learned firmly in the upper classes. We have such difficulties when we are expected to learn high-level information before we can learn the most basic information.

The results of the content analysis of the reasons why the pre-service teachers have the problem of decreasing their learning motivation in the subjects determined in Biology I and II lessons are given in Table 5.

Table 5. The Results of Content Analysis Regarding the Reasons of Having the Problem of Decreasing Learning Motivation

Theme	Code	Biology I		Biology II	
		f	%	f	%
Conceptual Problems	excess	336	13.05	147	7.55
	confusing	420	16.31	245	12.59
	unfamiliar	378	14.68	343	17.63
	difficult			104	5.34
	lack of prior knowledge	168	6.52	58	2.98
	miss the point			539	27.70
Instructional Problems	rote teaching	86	3.34		
Motivation Problems	nonstriking	673	26.14	51	2.62
	boring	259	10.06	102	5.24
	dislike	255	9.90	114	5.86
Anxiety Problems	test anxiety			97	4.98
	prejudice			146	7.50
Total[*]		2575	100	1946	100

[*]The pre-service teachers stated more than one opinion.

When the analysis results given in Table 5 were examined, it was determined that the problem of low motivation experienced in the biology I lesson was mostly due to the fact that the subject is nonstriking or not presented in a remarkable way, and the other reasons for this situation were the excess, confusion and difficulty of concepts. It was determined that the problem of low motivation experienced in the Biology II lesson is mostly due to miss the point and other reasons are the confusion and difficulty of concepts. Examples of the opinions expressed by the pre-service teachers are given below:

PT-232: ... The lesson is based entirely on memorization. I just memorize and pass. No meaningful learning takes place at all. My desire decreases when I constantly memorize.

ÖA-863: ... No matter how hard I study the subject, I do not understand. It doesn't get in my mind. So my motivation is decreasing. Because I know I will never understand.

The results of the content analysis of the reasons for the pre-service teachers to have the problem of increasing learning anxiety in the subjects determined in Biology I and II lessons are given in Table 6.

Table 6. The Results of Content Analysis Regarding the Reasons of Having the Problem of Increasing Learning Anxiety

Theme	Code	Biology I		Biology II	
		f	%	f	%
Conceptual Problems	excess	113	2.91	203	9.51
	confusing	294	7.58	335	15.69
	miss the point	686	17.68	338	15.83
	difficult	738	19.03	607	28.43
Instructional Problems	rote teaching	245	6.32	130	6.09
Motivation Problems	nonstriking	239	6.16		
	boring	196	5.05	145	6.79
	dislike	241	6.21		
Anxiety Problems	failure anxiety	637	16.42	96	4.50
	test anxiety	490	12.63	153	7.17
	prejudice			128	6.00
	Total*	3879	100	2135	100

*The pre-service teachers stated more than one opinion.

When the analysis results given in Table 6 were examined, it was determined that the reasons for the increase of learning anxiety experienced in biology I lesson are the difficulty of concepts, miss the point, failure anxiety, and test anxiety. It was determined that the problem of increasing learning anxiety is experienced in Biology II due to the confusion and difficulty of concepts, and miss the point. Examples of the opinions expressed by the pre-service teachers are given below:

PT-745: ... No matter how hard I work, I struggle. I know I can't find out that I can't. ...

PT-1126: ... I've always had a low in exams before. When I entered the university, the lowest score in the exam was from biology. The same has always happened in the Biology I course. I studied but got low on exams. I am very worried that I will get low again in the exam.

The results of content analysis related to the reasons why pre-service teachers have the problem of lack of permanent knowledge in the subjects determined in Biology I and II lessons are given in Table 7.

Table 7. Content Analysis Results Regarding The Reasons Of Experiencing The Problem of Lack of Permanent Knowledge

Theme	Code	Biology I		Biology II	
		f	%	f	%
Conceptual Problems	excess	364	18.14	616	26.71
	confusing	328	16.34	462	20.03
	unfamiliar			231	10.02
	miss the point	79	3.94	77	3.34
	difficult	216	10.76	154	6.68
Instructional Problems	rote teaching	579	28.85	539	23.37
	traditional teaching			83	3.60
Motivation Problems	nonstriking	183	9.12	79	3.43
	dislike	177	8.82		
Problems Caused by Lack of Review Habits	lack of review	81	4.04	65	2.82
Total[*]		2007	100	2306	100

[*]The pre-service teachers stated more than one opinion.

According to the results of the analysis given in Table 7, the problem of lack of permanent knowledge experienced in the biology I lesson is mostly due to rote teaching and the other reasons of this situation are the excess, confusion and difficulty of the concepts. It was determined that the problem of lack of permanent knowledge experienced in the Biology II is mostly due to the excess and confusion of the concepts, and teaching based on rote. Examples of the opinions expressed by the pre-service teachers are given below:

PT-14: All of the concepts in the subject I mentioned were foreign. There is no problem while listening to the lesson. But then it's hard to remember what the concepts are. Especially when time passes, it becomes impossible to remember concepts. ...

PT-381: ... We are always the listeners in class. The course is handled entirely with traditional teaching. There is no activity we would be active in. The more senses used, the more permanent learning will be. But we only actively participate in listening. In this case, how much can the permanence be?

Findings Regarding Pre-service Teachers' Suggestions for Solving Problems

The content analysis results of the pre-service teachers' suggestions for the solution of the learning difficulty problem experienced in Biology I and II lessons are given in Table 8.

Table 8. Content Analysis Results of Suggestions for Solution of Learning Difficulty Problem

Theme	Code	Biology I		Biology II	
		f	%	f	%
Suggestions for the Planning of Materials and Activities	materiel	595	22.23	488	22.72
	worksheet	41	1.53	68	3.17
	concept map	46	1.72	66	3.07
	game	79	2.95	119	5.54
Suggestions for Planning the Learning Process	active learning	420	15.69	275	12.8
	various method-technique	493	18.42	599	27.89
	simplification	325	12.14	172	8.01
	enough time	216	8.07	101	4.7
Suggestions for Providing Motivation	making subject interesting	318	11.88	73	3.4
	enjoyable	144	5.38	187	8.71
Total*		2677	100	2148	100

*The pre-service teachers stated more than one opinion.

According to the results of the analysis given in Table 8, pre-service teachers suggested that materials should be used, active learning should be provided and different methods-techniques should be used as a solution to the learning difficulty problem experienced in biology I lesson. It was determined that it is suggested that active learning should be provided and materials should be used to solve the learning difficulties experienced in Biology II lesson. Examples of the opinions expressed by the pre-service teachers are given below:

PT-530: Colorful materials that explain the subject with brief information can be used. Maybe information booklets can be prepared. Color images can be used in these booklets. ...

PT-1206: Use this method when you teach us, they suggest that this method has many benefits. I am sure it would be beneficial for us if they also use these methods and techniques in our lessons. For this, different methods-techniques can be used, which we will be more active.

The content analysis results of the pre-service teachers' suggestions for the solution of the problem of decreasing learning motivation experienced in biology I and II lessons are given in Table 9.

Table 9. Content Analysis Results of Suggestions for the Solution of the Problem of Decreasing Learning Motivation

Theme	Code	Biology I		Biology II	
		f	%	f	%
Suggestions for the Planning of Materials and Activities	materiel	420	18.49	117	5.70
	worksheet			46	2.24
	game			94	4.58
	video	247	10.88		
	analogy	53	2.33		
	visual			245	11.93
Suggestions for Planning the Learning Process	active learning	566	24.92	603	29.36
	various method-technique			208	10.13
	simplification	140	6.16	105	5.11
	application	82	3.61	140	6.82
Suggestions for Providing Motivation	making subject interesting	315	13.87	54	2.63
	motivate	158	6.96	33	1.61
	enjoyable	290	12.77	409	19.91
Total*		2271	100	2054	100

*The pre-service teachers stated more than one opinion.

According to the results of the analysis given in Table 9, pre-service teachers mostly stated that active learning should be provided, materials should be used, the subject should be made interesting and the lessons should be fun to solve the problem of decreasing the motivation to learn in the biology I lesson. In order to solve the problem of decreasing motivation for learning in the Biology II lesson, it was determined that the pre-service teachers mostly expressed their views on ensuring active learning and making the lessons fun. Examples of the opinions expressed by the pre-service teachers are given below:

PT-442: ... You can make interesting and interesting short videos. The videos are both interesting and instructive. ...

PT-1058: ... We are having problems as the subject is difficult anyway. It may be helpful to simplify the matter a little bit. ...

The content analysis results of the pre-service teachers' suggestions for the solution of the problem of increasing learning anxiety experienced in Biology I and II lessons are given in Table 10.

Table 10. Content Analysis Results of Suggestions for the Solution of the Problem of Increasing of Learning Anxiety

Theme	Code	Biology I		Biology II	
		f	%	f	%
Suggestions for the Planning of Materials and Activities	material	175	8.25	289	13.85
	game	94	4.43	81	3.88
	visual			192	9.2
Suggestions for Planning the Learning Process	active learning	409	19.29	515	24.68
	simplification	590	27.83	346	16.58
	application	278	13.11	105	5.03
Suggestions for Providing Motivation	making subject interesting	96	4.53	158	7.57
	motivate	67	3.16		
	enjoyable	411	19.39	401	19.21
	Total[*]	2120	100	2087	100

[*]The pre-service teachers stated more than one opinion.

When the analysis results given in Table 10 are examined, it is seen that pre-service teachers mostly suggest simplifying the subject, making the lessons fun, providing active learning and making applications for the solution of the problem of increasing learning anxiety experienced in the biology I lesson. It was determined that pre-service teachers mostly suggested providing active learning, having fun lessons and simplifying the subject to solve the problem of increasing learning anxiety experienced in Biology II lesson. Examples of the opinions expressed by the pre-service teachers are given below:

PT-93: ... Games reduce stress and anxiety. For this, a game suitable for the subject can be prepared and this game can be used in lessons.

PT-180: ... We can do activities and experiments in which we will be active. ...

The content analysis results of the pre-service teachers' suggestions for the solution of the problem of lack of permanent knowledge in biology I and II lessons are given in Table 11.

Table 11. Content Analysis Results of Suggestions for Solving the Problem of Lack of Permanent Knowledge

Theme	Code	Biology I		Biology II	
		f	%	f	%
Suggestions for the Planning of Materials and Activities	material	210	9.87	233	11,32
	game	182	8.55	135	6,56

Suggestions for Planning the Learning Process	active learning	490	23.03	538	26,13
	various method-technique	513	24.11	484	23,51
	application	118	5.55	83	4,03
	associate with daily life	241	11.33	96	4,66
Suggestions for Providing Motivation	making subject interesting	85	3.99	169	8,21
	enjoyable	162	7.61	246	11,95
Regular Review Habits	review habit	127	5.97	75	3,64
Total*		2128	100	2059	100

*The pre-service teachers stated more than one opinion.

When the analysis results given in Table 11 are examined, it is seen that the pre-service teachers mostly suggest that active learning should be provided and different methods-techniques should be used in order to solve the problem of lack of permanent knowledge experienced in biology I lesson. It was determined that in order to solve the problem of lack of permanent knowledge experienced in Biology II lesson, pre-service teachers mostly suggested providing active learning and using different methods and techniques. Examples of the opinions expressed by the pre-service teachers are given below:

PT-742: Instead of discussing the topics, we can focus on where it will be useful, how we use this information. Examples of situations we may encounter in our lives can be given and their connections with this information can be shown. ...

PT-1165: I think I should do more reviews. I have to create a regular review program and review what we learned at regular intervals. ...

Conclusion and Discussion

It was determined that the pre-service teachers had learning difficulties in the subjects of cell division, nucleic acids in the biology I lesson, photosynthesis and cell respiration and fermentation in the biology II lesson. It was determined that pre-service teachers had learning difficulties mostly because of the excessive concepts, being confused with each other, being unfamiliar, teaching based on rote and dislike. It was determined that pre-service teachers suggested the use of materials, providing active learning, and using different methods and techniques as a solution to the learning difficulty problem. It was determined that the learning candidates had low motivation to learn about cell division in biology I lesson,

photosynthesis and cell respiration and fermentation in biology II. It was determined that the motivation of learning of the pre-service teachers mostly decreased because the subject was not noticeable or not presented particularly, the concepts were too many, they were confused, difficult, and not understanding. It was determined that pre-service teachers suggested providing active learning as a solution to the problem of decreasing motivation for learning, using materials, making the subject interesting, and making the lessons fun. It was determined that the pre-service teachers' learning anxiety about cell division in biology I lesson, cell respiration in biology II, and fermentation and photosynthesis issues increased. It was determined that the pre-service teachers had the problem of increasing learning anxiety due to the difficulties of the concepts, confusion, not understanding, fear of failure, and fear of exams. It was determined that pre-service teachers made suggestions to simplify the subject, to make the lessons fun, to ensure active learning, and to practice to solve the problem of increasing learning anxiety. It was determined that the pre-service teachers have the problem of lack of permanent knowledge on the subject of cell division in biology I, cell respiration in biology II, and fermentation and photosynthesis. It was determined that the pre-service teachers had the problem of not being permanent because of the reasons of rote learning, too many concepts, being confused and difficult. It was determined that the pre-service teachers made suggestions to ensure active learning and to use different methods and techniques to solve the problem of lack of permanent knowledge.

In many studies in the literature, it has been stated that students and pre-service teachers have misconceptions about cell division (Alkan, Akkaya & Köksal, 2016; Alparslan, Tekkaya & Geban, 2003; Atılboz & Gökben, 2004; Aydın & Balım, 2013; Cakir & Crawford, 2001; Mann & Treagust, 2010; Tekkaya, Çapa & Yılmaz, 2000; Yakışan, Selvi & Yürük, 2007; Williams, Debarger, Montgomery, Zhou &Tate, 2011), and respiration, fermentation and photosynthesis (Adıgüzel & Yılmaz, 2020; Bacanak, Küçük & Çepni, 2004; Kırbaşlar, Barış & Ünal, 2009; Kırılmazkaya & Kırbağ Zengin, 2016; Şensoy, Aydoğdu, Yıldırım, Uşak & Hançer; 2005; Tekkaya & Balcı, 2003; Yürük & Çakır, 2000). The results obtained from this study are consistent with the results of the studies in which misconceptions are stated in the literature. It is stated in the literature that misleading and structuring the information in wrong ways during learning cause misconceptions (Ecevit & Özdemir Şimşek, 2017). This situation is caused by the problems experienced during learning.

It has been determined that traditional teaching is not sufficient to overcome learning problems and misconceptions and active learning and various methods and techniques should be used to solve them. The

opinions of the pre-service teachers are consistent with the results of the studies conducted in the literature that the use of active learning is effective in solving these problems (Hodson, 2014; Krajcik & Czerniak, 2014; Larrabee, Stein & Barman, 2006; Martinez Borreguero, Perez-Rodriguez, Suero-Lopez & Pardo-Fernandez, 2013; Rankhumise & Imenda, 2014; Stein & Galili, 2015).

Colorful and interesting study materials related to the subject can be prepared to solve the problems experienced by pre-service teachers. Study cards containing important information on the subject can be created. Worksheets can be prepared to reinforce pre-service teachers' learning. Subjects can be presented with different active learning methods and techniques that support pre-service teachers' learning by doing and experiencing. Various games can be developed to increase the level of entertainment.

References

Adıgüzel, M., & Yılmaz, M. (2020). Action research on ıdentifying and correcting pre-service biology teachers' misconceptions. *Theory and Practice in Education, 16*(1), 69-82.

Alkan, İ., Akkaya, G., & Köksal, M. (2016). Determining misconceptions of prospective science teachers by using modeling approach as a data collection way. *Ondokuz Mayis University Journal of Education Facul*ty, 35(2), 121-135.

Alparslan, C., Tekkaya C., & Geban, Ö. (2003). Using the conceptualchange instructionto improvelearning. *Journal of Biological Education, 37*(3), 133-137.

Atasoy, Ş., & Akdeniz, A. R. (2007). Development and implementation of a test to determine misconceptions about Newton's Laws of Motion. *Journal of Turkish Science Education, 4*(1), 45-59.

Atılboz, G., & Gökben, N. (2004). 9th grade students' understanding levels and misconceptions about mitosis and meiosis. *Gazi University Journal of Gazi Educational Faculty, 24*(3), 147-157.

Aydın, G., & Balım, G. A. (2013). Students' mısconceptıons related to subjects of "Cell Dıvısıon and Heredıty". *Journal of Research in Education and Teaching, 2*(1), 338–348.

Aydoğan, S., Güneş, B., & Gülçiçek, Ç. (2003). Misconceptions about heat and temperature. *Gazi University Journal of Gazi Educational Faculty, 23*(2), 111–124.

Aykurt, C. & Akaydın, G. (2009). Misconceptions of biology pre-service teachers regarding substance transport in plants. *Kastamonu Education Journal*, *17*(1), 103-110.

Bacanak, A., Küçük, M., & Çepni, S. (2004). Prımary school students mısconceptıons about photosynthesıs and respıratıon subjects: a case for Trabzon. *Ondokuz Mayis University Journal of Education Faculty, 17*(1), 75-88.

Baki, A. (1999). Evaluating the operation errors related to algebraIII. Science Education Symposium Proceedings in (pp. 46-55). Trabzon: Karadeniz Teknik University.

Buluş-Kırıkkaya, E., & Güllü, D. (2008). Fifth grade students' misconceptions about heat-temperature and evaporation-boiling. *Elementary Education Online, 7*(1), 15-27.

Cakir, M., & Crawford, B. (2001, January). Prospectivebiologyteachers' understanding of geneticsconcepts. Paperpresented at the Annual Meeting of the Associationfor the Education of Teachers in Science, Costa Mesa, CA.

Creswell, J., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd edition). London: Sage Publications Ltd.

Ecevit, T., & Özdemir Şimşek, P. (2017). The evaluation of teachers' science concept teaching and their action to diagnose and eliminate misconceptions. *Elementary Education Online, 16*(1), 129-150.

Ericson, G. & Tiberghien, A. (1985). *Heat and Temperature*. In R. Driver, E. Guesne, & A *Tiberghien(Eds.), Children's ideas in science*. Philadelphia, PA: Open University Press.

Eryılmaz, T., & Tatlı, A. (2000). METU students on mechanics misconceptions. *Hacettepe University Journal of Education, 18*, 93-98.

Gönen, S., & Akgün, A. (2005). The ınvestıgatıon of applıcabılıty of worksheet was developed about relatıonshıp between heat and temperature concepts. *Electronic Journal of Social Sciences, 3*(11), 92-106.

Hise, Y. A. V. (1988). Student misconceptions in mechanics: an ınternational problem?. *The Physics Teacher*, 498-502.

Hodson, D. (2014). Learning science, learning about science, doing science: Different goals demand different learning methods, *International Journal of Science Education, 36*(15), 2534-2553.

Kesidou, S. & Duit, R. (1993). Students' conceptions of the second law of thermodynamics- an interpretive study. *Journal of Research in Science Teaching, 30*(1), 85-106.

Kırbaşlar, F. G., Çıngıl Barış, Ç., & Ünal, M. (2009). A study to investigate the erroneous learning of science pre-service teachers about fermentation. *Hacettepe University Journal of Education*, 36, 158-168.

Kırılmazkaya, G., & Kırbağ Zengin, F. (2016). Determination of photosynthesis misconceptions' through vee diyagrams and preservice teachers' views towards these tools. *Erzincan University Journal of Education Faculty, 18*(2), 1537-1563.

Koray, Ö., Özdemir M. & Tatar, N. (2005). Primary school student's misconceptions about "Units": Example of Mass and Weight. *Elementary Education Online, 4*(2), 24-31.

Korkmaz, Ö., & Buyruk, B. (2016). Students' associating the concepts of science lesson with daily life. *Ondokuz Mayis University Journal of Education Faculty, 35* (1), 159-172.

Krajcik, J. S. & Czerniak, C. M. (2014). *Teaching science in elementary and middle school: A project-based approach*. Routledge.

Kuru, İ., & Güneş, B. (2005). Misconceptions of grade-10 students about force. *Gazi University Journal of Gazi Educational Faculty, 25*(2), 1-17.

Larrabee, T. G., Stein, M. & Barman, C. (2006). A computer-based instrument that identifies common science misconceptions. *Contemporary Issues in Technology and Teacher Education, 6*(3), 306-312.

Mann M., & Treagust D.F. (2010). Students' conceptions about energy and the human body. *Science Education International, 21*(3), 144-159.

Martinez-Borreguero, G., Perez-Rodriguez A.L., Suero-Lopez, M.I. & Pardo-Fernandez, P.J. (2013). Detection of misconceptions about colour and an experimentally tested proposal to combat them. *International Journal of Science Education*, *35*(8) ,1299-1324.

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: an expande sourcebook* (2nd edition). Thousand Oaks, CA: Sage.

Rankhumise, M. P. & Imenda, S. N. (2014). Using a bicycle analogy to alleviate students' alternative conceptions and conceptual difficulties in electric circuits. *Mediterranean Journal of Social Sciences, 5*(15), 297-302.

Sadanand, N. & Kess J. (1990). Concepts in Force and Motion. *The Physics Teacher*, 530-533. San Fransisco: Jossey Bass.

Selvi, M., & Yakışan, M. (2004). Misconceptions about Enzymes in university students. *Gazi University Journal of Gazi Educational Faculty*, *24*(2), 173-182.

Stein, H. & Galili, I. (2015). The impact of an operational definition of the weight concept on students' understanding. *International Journal of Science and Mathematics Education, 13,* 1487–1515.

Şensoy, Ö., Aydoğdu, M., Yıldırım, H.İ., Uşak, M. & Hançer, A. H. (2005). A research on the detection of misconceptions about photosynthesis of primary school students (6th, 7th and 8th grades). *Journal of National Education, 33*(166), 213-223.

Tekkaya, C. (2002). Mısconceptıons as barrıer to understandıng bıologv. *Hacettepe University Journal of Education, 23, 259-266.*

Tekkaya, C., & Balcı, S. (2003). Determination of students' misconceptions concerning photosynthesis and respiration in plants. *Hacettepe University Journal of Education,24*, 101-107.

Tekkaya, C., Çapa, Y., & Yılmaz, Ö. (2000). The misconceptions of pre-service biology teachers in general biology subjects. *Hacettepe University Journal of Education*, *18*(18), 140-147.

Temelli, A. (2006). Determinatıon of misconceptions concerning genetic subjects of high school students. *Kastamonu Education Journal*, *14*(1), 73-82.

Williams, M., Debarger, A. H., Montgomery, B. L., Zhou, X., & Tate, E. (2011). Exploring middle school students' conceptions of the relationship between genetic inheritance and celldivision. *Science Education, 96*, 78-103.

Yakışan, M., Selvi, M., & Yürük, N. (2007). Alternative concepts of biology pre-service teachers about seed plants. *Journal of Turkısh Scıence Educatıon, 4*(1), 60-79.

Yeşilyurt, S. & Gül, Ş. (2012). Secondary school students' misconceptions about the "Transportation and Circulatory Systems" unit. *Journal of Theoretical Educational Science*, *5*(1), 17-48.

Yıldız, E. (2019). *Determination the Effects of Educational Game, Reading-Writing-Game and Reading-Writing-Application Methods in the Elimination of the Learning Problems in 5th, 6th and 7th Grades Science Lesson.* (Unpublished doctoral dissertation). Atatürk University, Erzurum, Turkey.

Yürük, N., & Çakır, Ö. S. (2000). Identifying misconceptions about oxygen and non-oxygen breathing in high school students. *Hacettepe University Journal of Education*, *18*(18), 1-5.

Chapter 5

THE EFFECT OF AUGMENTED REALITY ON PRESERVICE SCIENCE TEACHERS' PERCEPTIONS AND METACOGNITIVE AWARENESS

Nesrin ÜRÜN ARICI[1]
Emre YILDIZ[2]

1 PhD Student, Kazım Karabekir Education Faculty, Department of Science Education, Erzurum/Turkey, nurunarici@gmail.com , 0000-0003-3394-4860
2 Dr., Atatürk Universiry, Kazım Karabekir Education Faculty, Department of Science Education, Erzurum/Turkey, emre.yildiz@atauni.edu.tr, 0000-0001-6396-9183

Introduction

Today, since students are surrounded a digital environment, they can be informed about the working techniques in this digital environment (AlNajdi, Alrashidi & Almohamadi, 2020). For this reason, the educational priorities are to teach various technological tools or applications. Because the aim of education is provide a structured learning experience for educational purposes. Learning can be made more effective by activating more senses at the point of presenting information and correctly integrating technological tools in education (Aksoğan & Özek, 2020). One of these technological tools is AR technology (Cabero & Roig, 2019). AR considered as a technology is a technological-perceptual idea that includes perceptual, technological and information aspects in a broader context (Jeřábek, Rambousek & Prokýšek, 2013). This technological innovation offers several benefits in teaching and learning (López-Belmonte, Moreno-Guerrero, López-Núñez & Hinojo-Lucena, 2020). It has been demonstrated that AR technology is encouraging, useful, and has effects on variables such as attitude and motivation (Cai, Wang & Chiang, 2014; Chiu, DeJaegher & Chao, 2015; AlNajdi, Alrashidi & Almohamadi, 2018; Garzón, Acevedo, Pavón & Baldiris, 2020; Lai, Chen & Lee, 2019; Chang, Chung & Huang, 2016). Due to the positive features mentioned, it is estimated that this new technology can attract the attention of both teachers and students when used in education (Yılmaz & Göktaş, 2018).

It is impossible to observe many scientific phenomena, such as the magnetic field, atoms or galaxies, with the naked eye or to perceive them with the senses.

In general, using of digital applications, such as AR, in science learning is also emphasized in the research literature on communication and information technology in science education by making visible processes that are not observed with naked eyes like these scientific concepts (Krajcik ve Mun, 2014).

There is a call to learn more about the using of AR properly created in education (Radu, 2014). Today, because many students can increase access to AR applications by bringing smartphones to school. Elements highlighted in research-based science education can be included in AR applications (Nielsen, Brandt & Swensen, 2016). Besides AR appeals to senses, , visualization of abstract concepts, visualization of complex scientific concepts and phenomena visual reinforcement can contribute to learning. Moreover, AR allows users to immerse into simulations, easily collaborate while discussing complex 3D events that are difficult to understand in other environments (Nielsen, Brandt & Swensen, 2016).

Especially in recent times, the ways of obtaining this information have been emphasized rather than the information that individuals acquire during the learning process (Taş & Sırmacı, 2017).

In addition to examining knowledge and strategies related to the field, students should be aware of the learning processes and learn how to evaluate, monitor, plan, and organize them. It is known as being aware of metacognitive learning processes, that is, to know "what I know" and "what I don't know" and to reflect on "how do I learn" (Pihlainen-Bednarik, & Keinonen, 2011).

As metacognitive is important in learning, metacognitive activity and development can be examined to make students aware of how to apply their cognitive resources (Livingston, 2003). It is thought that the regulation of both cognitive knowledge and cognitive skills is within the abilities of students and metacognition has a versatile structure (Pihlainen-Bednarik, & Keinonen, 2011In addition, the metacognitive to being an important subject in itself, for example, it acts as a bridge between learning and motivation, learning and cognitive development, decision making and memory (Nelson & Narens, 1994). Metacognitive awareness, metacognitive beliefs, metacognitive knowledge, metacognitive experiences, sense of knowing, learning judgment, theory of mind, metacognitive skills metamemory, executive skills, higher level skills, meta components, comprehension tracking, heuristic strategies learning strategies, and self-regulation, usually metacognition are just a few of the concepts we associate with (Veenman, Van Hout-Wolters & Afflerbach, 2006).

Metacognition

Metacognitive refers to the awareness and thoughts about one's own thoughts or cognition (Flavel, 1979: Livingston, 2003; Perfect & Schwartz, 2002). Metacognitive actions are widely used in daily life. Understanding the limits of your own memory is also a metacognitive form because it is related to your beliefs and knowledge about memory (Dunlosky & Metcalfe, 2008). In the studies that have been done generally, the relationship between the achievements, reading comprehension, grade level, gender and the development of metacognitive skills of preschool, primary and secondary school students were examined (Annevirta, Laakkonen, Kinnunen & Vauras, 2007; Koç & Arslan, 2017; Sperling, Howard, Miller, & Murphy, 2004). As a result of the these studies, a significant difference was revealed between these variables and metacognitive skills. Unlike these studies, there are studies in the literature that examine the relationship between teacher candidates' grade level, attitudes, emotional intelligence competencies, epistemological beliefs and academic achievements and metacognitive awareness levels (İflazoğlu, Saban & Saban, 2009; Özsoy

& Günindi, 2011; Sapancı, 2012; Selçioğlu Demirsöz, 2010). As a result of these studies, it was found that there is a significant difference between these variables and metacognitive awareness (Sapancı, 2012). In addition, it was revealed that there is a positive and significant relationship between preservise teachers' metacognitive level and their academic achievement.

Bozkurt, (2013), as a result of the study examining the relationship between pre-service teachers' metacognitive levels, learning styles and academic achievement, showed that there is a significant positive relationship between preservice teachers' success and learning styles, but a negative relationship between success and passive learning style.

Opinions of science teachers were taken on the attempt to gain a new understanding of the integration of cognition into science education, and at the end of the study, they expressed their desire to continue their professional development to expand their ability to integrate the cognition as an integral component of the science curriculum (Ben-David & Orion, 2013). Within the framework of the reviewed literature, it is thought that AR applications and metacognitive awareness are not encountered anywhere else and this study will contribute to the literature.

Metacognition and Augmented Reality

The metacognitive is an important part of the adoption of technology that is common today as it is necessary for effective learning. It is important in facilitating a complex process such as the adoption of metacognitive technology (Straub, 2009). The use of augmented reality applications in education, which is one of these technological developments, mostly lies in the consideration of the cognition involved in the adoption of AR application in order to understand the learning process of this technological application effectively. In other words, it can contribute to pre-service teachers' learning AR applications with metacognitive approaches. It can be examined how to teach metacognitive strategies effectively in these AR application-based environments for prospective teachers and how AR applications support cognition. Metacognition is thought to help individuals decide whether they have the knowledge and abilities necessary for a cognitive goal, such as learning technological applications, where to focus attention and to adjust their efforts. Thinking and decision making are among the metacognitive processes that generally appear in adopting a technology that aims to make a person environmentally beneficial (Gurbin, 2015).

Personal factors, the characteristics of innovation, and the effects of the individual's context will shape the final decision and permanence with a technology (Straub, 2009). Therefore, the use of AR applications in education can contribute to their adoption and learning with metacognitive

awareness. One of the goals in the field of teaching and learning is to enable students to learn well with the help of effective teaching by teachers. Metacognitive is very important in the professional development of teachers. In addition, teachers' metacognitive awareness can facilitate student learning (Jiang, Ma & Gao, 2016). In addition, teachers' metacognitive awareness can facilitate student learning (Jiang, Ma & Gao, 2016). A growing research and theory community emphasizes teachers' use of metacognitive knowledge and skills before, during and after teaching (Hartman, 2001). It expresses the common desire of teachers to continue their professional development in order to improve their ability to make metacognition an integrated part of the curriculum (Ben-David & Orion, 2013). Accordingly, if teachers want to teach students to think in a metacognitive way, they must first of all have high-level thinking and be clearly aware of their metacognitive levels and characteristics (Jiang, Ma & Gao, 2016). Therefore, in this study, it was aimed to work with preservice teachers.

It is aimed to teach pre-service teachers a lot of information such as the necessity of application, awareness, learning and transfer of AR technology in the learning of AR applications used in science education. Therefore, it is thought that AR applications can also increase metacognitive awareness. Researchers also suggested that it should be looked at how technology changes individuals' views on technology (Straub, 2009). The effect of using AR applications in teaching a subject that is not visible to the eye on pre-service teachers' metacognitive awareness and their perceptions about AR applications can be examined.

The aim of this study is to evaluate the effects of using augmented reality applications on metacognitive awareness and perceptions of pre-service science teachers who use augmented reality applications in topic of chemical compounds.

The problem sentence for the purpose of the study: "What is the effect of AR application on pre-service science teachers' metacognitive awareness levels and their perceptions towards AR application?"

1. Does AR applications have an effect on pre-service science teachers' metacognitive awareness?

2. What are the perceptions of pre-service science teachers about AR applications?

Method
This research was carried out with a single group pre-test-post-test experimental model. It is the type of model in which the most accurate results are obtained among scientific methods. Because the researcher

applies comparable operations and then examines their effects, it is expected that the results of such research will lead the researcher to the most definitive interpretations (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2017). In this study, this method was chosen because the comparison between pre-service teachers' AR applications on a topic and their metacognitive awareness was examined.

Participant Group

The study group of the research consists of 20 pre-service teachers studying at the education faculty of a state university in east Turkey in the fall semester of the 2020-2021 academic year. Also, Also, it were interviewed to reveal the perceptions of 7 pre-service teachers. These pre-service teachers were included in the study according to the criterion sampling method, one of the purposeful sampling types. The basic idea in this samling method is to investigate all of situations which predetermined criteria (Yıldırım & Şimşek, 2016). Therefore, it was studied with pre-service teachers whose opinions about AR were not taken and AR applications on chemistry had never been used before.

Data Collection Tools

Metacognitive awareness inventory and semi-structured interview were used as data collection tools.

Metacognitive Awareness Inventory

The Metacognitive Awareness Inventory developed by Schraw and Dennison (1994) was used to measure the metacognitive awareness of the participants in the study. This inventory has a rating of (1) never (2) rarely (3) often (4) generally and (5) always. The inventory consists of two main dimensions; it is the knowledge of cognition and the regulation of cognition. In the dimension of knowledge of cognition, it is aimed to measure the knowledge of the individual on both himself/herself and what strategies to use in a learning process, which strategy will be more effective in which situation, while in the dimension of organizing cognition, the individual should plan the learning process, use strategies appropriate to the learning situation, monitor learning, see his/her mistakes and evaluate his/her own learning. It aims to measure information about; these two main dimensions are divided into various factors among themselves. Under the dimension of knowledge of cognition; there are three factors: declarative information, procedural information, and conditional information. In the regulation of cognition, which is the second main dimension; there are five factors including planning, monitoring, evaluation, debugging, and information management. The original form of the scale consists of 52 items. The Turkish adaptation and validity-reliability study of the

scale was conducted by Akın, Abacı & Çetin (2007) with 607 university students. In the study, the construct validity of the exploratory factor analysis and the concordance validity, the internal consistency for the reliability, and the test-retest coefficients were examined, and it was shown that the relationship between the original and adapted form scores of the scale was 93. The fit validity study revealed that there was .95 correlation between the two scales. As a result of the item analysis, it was seen that the item-test correlations of the subscales varied between .35 and .65. They found the internal consistency and test-retest reliability coefficients of the inventory to be .95. Based on these findings, it is stated that BFE is a valid and reliable measurement tool that can be used in the field of education. Cronbach Alpha reliability coefficient was found 0.88 for this study.

Semi-Structured Interview

A semi-structured interview was prepared by the researcher to determine the opinions of the pre-service teachers about AR applications. In this interview, there are questions about the use of AR applications, the effects of AR applications on their success, and affective dimensions towards the lesson. The prepared questions were expressed more understandably, and the final form was given in the direction of the feedback received after the opinions of two experts who received science education were obtained. The interview questions were piloted with three pre-service science teachers. The data obtained was analyzed and it was examined whether it reflected the purpose of the study. Interviews were made by recording through an online application. Before the interview, the content of the interview was mentioned to the pre-service teachers by the researcher, and interviews were made with the pre-service teachers who wanted to participate voluntarily. After the interview started, a short conversation was held with the pre-service teachers to make them feel comfortable. Questions were asked to the pre-service teachers, and probe questions were asked according to their answers at the end of that question. The aim is to gather in-depth information about the topic. The interviews lasted 30 minutes on average. Interviews are written down as recorded. Written versions of the interviews were shown to the pre-service teachers, and feedbacks were received from the pre-service teachers in case of missing or misunderstood sentences in what they said.

Analysis of Data

For the data taken from the metacognitive awareness inventory, normality distributions were first examined.

Table 1. Normality Values of Data

Subscales	Measurement	Shapiro-Wilk[*]
S1	Pretest	.569
	Posttest	.275
S2	Pretest	.569
	Posttest	.275
S3	Pretest	.569
	Posttest	.275
S4	Pretest	.210
	Posttest	.419
S5	Pretest	.223
	Posttest	.820
S6	Pretest	.204
	Posttest	.864
S7	Pretest	.569
	Posttest	.275
S8	Pretest	.210
	Posttest	.078
Total	Pretest	.450
	Posttest	.846

[*]p>.05

As can be seen from the analysis results given in Table 1, the data obtained provide the assumptions of normality distribution. Dependent groups t-test was used to analyze quantitative data.

The data obtained from the interviews were analyzed with content analysis. Content analysis was analyzed by the same researcher at two different times, and the percentage of agreement between the analyzes was calculated using Miles and Huberman method. The agreement between the analyzes was calculated by the Miles Huberman method. Accordingly, the agreement between the analyzes was calculated as 74%. It is stated that if the fit is 70% and above, reliability is achieved (Miles & Huberman, 1994).

Application

In the study, pre-service teachers applied AR applications for a total of 6 lesson hours for 3 weeks in the teaching of chemical compounds. The study was conducted online via Zoom. In the study group, the metacognitive awareness inventory scale was applied before proceeding with the topic of chemical compounds. Before starting to teach with AR applications in the study group, augmented reality was clearly shared on the computer screen with different examples and explained to the students. First of all, the AR APK file and AR Cards were sent to the students via e-mail. After the pre-service teachers downloaded the APK file to their android phones, they were shown how to use the cards and AR application, and the students'

questions about the application were answered by pre-application for two lesson hours. In the following weeks, each molecule was explained online with the pre-service teachers and the students made observations with the AR applications related to that molecule during the lesson. After the AR application, the researcher received feedback from the students about their experiences. After the course was completed, the metacognitive awareness inventory was applied again. Then, semi-structured interviews were made with 7 pre-service teachers from the study group about AR applications. The visual of the activities performed with the AR application is given in *Figure 1*.
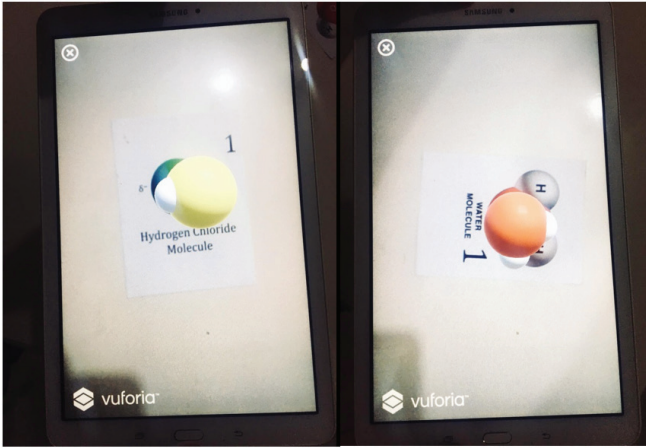

Figure 1. Visual of AR application during process of learning

Findings

Findings of the first research question

The dependent groups t-test analysis results made in order to determine the effect of AR applications on the metacognitive awareness of pre-service science teachers are given in Table 2.

Table 2. Analysis Results of Pre-service teachers' Metacognitive Awareness

Subscales	Measurement	N	X	Ss	df	t	p*
S1	Pretest	20	18.64	5.77			
	Posttest	20	31.58	6.80	19	-11.671	.000
S2	Pretest	20	9.32	2.88		-11.671	
	Posttest	20	15.79	3.40	19		0.000
S3	Pretest	20	11.65	3.61		-11.671	
	Posttest	20	19.74	4.25	19		.000

S4	Pretest	20	21.70	5.11	19	-3.667	.002
	Posttest	20	25.06	4.16			
S5	Pretest	20	25.94	3.65	19	-8.732	.000
	Posttest	20	30.40	3.89			
S6	Pretest	20	18.22	4.60	19	-4.958	.000
	Posttest	20	22.20	3.91			
S7	Pretest	20	11.65	3.61	19	-11.671	.000
	Posttest	20	19.74	4.25			
S8	Pretest	20	21.70	5.11	19	-13.695	.000
	Posttest	20	37.95	3.27			
Total	Pretest	20	138.83	11.89	19	-11.671	.000
	Posttest	20	202.47	13.37			

[*]p<.05

As can be seen from the analysis results given in Table 2, pre-service teachers' descriptive information ($t_{(19)}$= -11.671, p<.05, η^2=.88), procedural knowledge ($t_{(19)}$= -11.671, p<.05, η^2=.88), situational information ($t_{(19)}$= -11.671, p<.05, η^2=.88), planning ($t_{(19)}$= -3.667, p<.05, η^2=.41), monitoring ($t_{(19)}$= -8.732, p<.05, η^2=.80), evaluation ($t_{(19)}$= -4.958, p<.05, η^2=.56), debugging ($t_{(19)}$= -11.671, p<.05, η^2=.88) and knowledge management ($t_{(19)}$= -13.695, p<.05, η^2=.91), it was determined that there is a statistically significant difference between the scores of the pre and post application. The metacognitive awareness levels of the pre-service teachers after the application are statistically significantly higher than the pre-cognitive awareness levels; ($t_{(19)}$=-11.671, p<.05, η^2=.88). Calculated eta-square effect size values are classified as very large effect by Cohen (1988). According to this, the difference between pre-application and post-application scores of pre-service teachers was 88% in descriptive information, procedural knowledge, situational information and debugging sub-dimensions, 41% in planning sub-dimension, 80% in monitoring sub-dimension, 56% in evaluation sub-dimension and 88% in general. It can be said that it is caused by the AR application performed.

Findings of the second research question

The results of the content analysis conducted to determine the perceptions of science pre-service teachers about AR applications are given in Table 3.

Table 3. Analysis Results of Preservice Teachers' Perceptions on AR Applications

Theme	Code	f*
Terms expressing AR	Virtual life	1
	Technological products	2
Benefits of AR	Effect on learning	2
	Embody abstract concepts	1
	To be clear	13
	Effect on permanence	6
	To be efficient	1
	Appealing to the senses	1
	Intriguing	4
	Striking	8
	To be fun	11
	Increasing the desire to participate	3
	Creativity	2
	Awareness	1
	Collaborative Working	1
	Sharing ideas	1
The Effect of Features of AR on Individual Traits	To be easy	12
	To help enliven the topic	4
	Having 3D Models	7
	Be an app	1
	Having visuality	5
	Technological innovation	1
	Can be used in education	1
	Teachers can use	3
	Biology	3
	Physics	4
	Chemistry	5
	Astronomy	4
	Geometry	2
Courses Where AR Can Be Used	Meeting for the first time	7
	Have used before	0
Encounter with AR AR Questions	How did it apply to education?	1
	How it happened	1
	Composition of infrastructure	1
	Use of	1
	Application in different subjects	1
	No question	4
Answering Questions About AR	Not answered	4
	Answered	3
Problems Encountered in Using AR	Connection problem	2

* The pre-service teachers expressed more than one opinion.

According to the results of the analysis given in Table 3, pre-service teachers' AR applications make the subject understandable, increase the permanence of the information, are remarkable, intriguing, and fun, easy to apply, provide animation, create 3D models of difficult to observe situations in micro and macro dimensions. It can be used in physics, chemistry, and astronomy lessons. It was determined that most of the pre-service teachers encountered AR applications for the first time, half of them did not have questions about the applications and could not find answers to the questions of those who had questions. Examples of pre-service teachers' answers are given below.

PT7: … "In my opinion, there are content of more molecular and abstract subjects and it is difficult to understand these issues and to focus our attention, but augmented reality is easier to understand. In my opinion, it is an application that facilitates invisible abstract issues. "

PT1: … "I think it was easier than usual because I had a hard time understanding these subjects while preparing for the university exam, even I could not even understand, even when I had this lesson with us, I had difficulty understanding some places. But later, as a person with a strong visual memory; transferring it to me in this way made it easier to stay in mind. "

PT1: … "If we had directly made the three-dimensional form, it might become boring with our own models, but the augmented reality attracted my attention more and I liked it more. Visually it appealed to me more. "

PT2: … "It was fun to be colorful and to see its movement directly."

PT3: … "Absolutely. It would have been better if we had the opportunity to have face-to-face training, but even this state was very fun. As a presentation, I think it is much more fun than direct narration and two-dimensional narration. "

PT6: … "Seeing this way and supporting it with drawings has contributed a lot to me. I worked with my friends, observed, received their opinions, asked you questions, which made the process more efficient for me. I understood better. My awareness has occurred. When I become a teacher, I want to make these kinds of activities for my students, so it contributed a lot. "

PT1: … "For example, like this; In some lessons, for example, we solve the question in physics lesson, but we see it with the teacher's drawing. But I think that if that question is directly conveyed through augmented reality, it will remain visually better in the student's memory and comprehend more easily. Or biology, where are models, skeletons, I think they are left behind. In education life, such technological studies should be focused on,

I think, they are both remarkable and easier to keep in mind because we live in the age of technology. "

PT6: … "Of course it is more remarkable. If I do such practices when I attend the first lesson, it will attract a lot of attention and interest. But of course there may be a little disruption to the lesson. If discipline is not provided well, lesson efficiency may decrease. I was distracted at some points, but it was generally noticeable. "

Conclusion and Discussion

This study was carried out to evaluate the effects of using AR applications on metacognitive awareness levels and perceptions of pre-service science teachers. For this purpose, a study was conducted with 20 pre-service science teachers. By applying AR application in topic of chemical compounds, the effect of pre-cognitive awareness of preservice teachers before and after the study and perceptions of pre-service teachers about AR were examined.

As a result of the study, it was revealed that the metacognitive awareness levels of pre-service science teachers using augmented reality applications were statistically significantly higher than the metacognitive awareness levels before the application. This result was similar to the study of Baltacı & Akpınar (2011). In their study, they found a significant difference in favor of the post-test between the pre-test and post-test metacognitive scores of the students of web-based teaching (WBT). Additionally, the contribution of the WBT prepared for the experimental group in their research to the metacognitive awareness of the students can be explained by the students' learning and using metacognitive strategies in this process.

It has been revealed 88% that the factors *of* declarative *information, procedural information, situational information and debugging* in the metacognitive awareness inventory originate due to use of AR application. For example, the items belonging to declarative *information* which is the first factor of the knowledge of cognition factors, include the beliefs of individuals about the structures of learning tasks, their associative goals and personal abilities.

One of the items belonging to this factor is "*I'm good at remembering information*." that has been highly effective. At the same time, it can be said that the majority of the pre-service teachers expressed their opinions that AR application has an effect on permanence in terms of the benefits of learning, which supports this item. Items belonging to procedural knowledge, which is the second factor of knowledge of cognition, evaluate the knowledge about strategies to be used during a problem solving and the level of using and regulating the knowledge and skills of the individual. One

of the items belonging to this factor is *"I use helpful teaching techniques automatically"* that has been highly effective. At the same time, most of pre-service teachers expressed that using of AR application they were willing to participate due to increasing their motivation.

The items include about situational information, which is the third factor of knowledge of cognition, measure when and why an individual will use exploratory and procedural information. One of the items of this factor is "*When I don't understand something, I want from others for help*" that has been highly effective. At the same time, it can be said that most of preservice teachers' expressing their the opinions that AR application is working together and sharing ideas about the effect of AR on individual characteristics supports this item. The fourth factor of the cognition regulation factors is planning. The items collected in this factor include choosing the appropriate learning strategies and using their cognitive resources for effective performance. It can be said that the planning Parallel to this item, pre-service teachers thought about how occurs the 3D models and the formation of infra structure, usage of AR application in different subjects and how this AR application was applied to education. This factor affects 41% on pre service teachers by using AR application. This result is similar to study of Duman & Semerci (2019), when the pre-and post-test results of the experimental group in which metacognitive-based teaching was applied, were examined, the factors of planning, awareness, and questioning showed a significant increase in favor of the post-test. One of the items belonging to this factor is *I ask questions to learn before starting to work about the material which I use."*. Parallel to this item, pre-service teachers thought about how occurs the 3D models and the formation of infra structure, usage of AR application in different subjects and how this AR application was applied to education. The fourth factor of cognition regulation is information management. The items belongs to this factor include skills such as organizing, elaborating, and summarizing in order to process information more efficiently. These items are *"I carefully focus on the important information", "I focus on the meaning and importance of new information".* These items may have affected by using of AR application. Because the preservice teachers expressed that the AR application was remarkable.

In addition to these conculions, in this study, prospective teachers stated that AR application is virtual life and technological products. AR application on individual features; They expressed that AR application has affected their individual features such as creativity, awareness, working together and sharing ideas. It can be stated that there is strong evidence that there is a significant improvement in students' learning, social and creative skills (Papanastasiou, et al., 2019). Preservice teachers expressed

that AR application can be used in abstract, difficult to visualize subjects such as biology, physics, chemistry, astronomy and geometry. In addition, they stated that AR application has effects on learning such as concretizing abstract concepts, being understandable, effective on permanence, efficient and appealing to the senses and effects on motivations such as being intriguing, attention, grabbing, enjoyable, entertaining and arousing the desire to participate. Likewise, Ibáñez, Portillo, Cabada & Barrón (2020) revealed in their study in geometry lesson that by using AR application increased students' learning and motivation. Furthermore, Chen, Wang, Zou, Lin, Xie & Tsai (2020) found in their study that students had positive motivation when using by contextualized learning developed with AR in the English course. AR technology can add excitement and fun to activities of learning, therefore, increase participants' motivation (Owen, Owen, Barajas & Trifonova 2011). AR application has increased permanency in learning by making teaching tools more interesting and enjoyable (Uluyol & Eryılmaz, 2012). The preservice teachers expressed their opinions on that AR has the easy features, helping to stimulate the subject, having 3D models, visuality, being usable in education and being able to teachers use. This result is similar to the results of Sural (2018) that the pre-service teachers in the computer department showed that AR application was attractive, useful, improved learning motivation, and learning materials supported.

The following recommendations have been developed based on the analysis of findings of the data obtained from the this study:

Technological innovations such as computer-child interactions developed are almost in everywhere, due to increasing of the science required to inform media creators, parents, and educators about the possible effects of these processes, any research which about these processes can be important.. National Ministry of Education and universities can conduct studies that indicate the relationship between the AR applications and variables such as metacognitive awareness. It may be beneficial to carry out these studies in the Ministry of Education and universities.

Studies can make significant contributions to the literature by examining the relationships between AR application, different methods and the metacognitive awareness levels of students according to theories such as the constructivist approach based on existing curriculum.

It is recommended that carried out that applications based on metacognition by including all departments and levels in education faculties. Therefore, it may be useful to observe the development of preservice teachers through long-term experimental studies. Additionally, richer data can be obtained by using together as both qualitative and quantitative research methods in next studies.

Resources

AlNajdi, S. M., Alrashidi, M. Q., & Almohamadi, K. S. (2020). The effectiveness of using augmented reality (AR) on assembling and exploring educational mobile robots in pedagogical virtual machines (PVM). *Interactive Learning Environments*, *28*(8), 964-990.

Aksoğan, M., & Özek, M. B. (2020). The relationship between pre-service teachers' technology competencies and technology perspectives. *Gümüşhane University Institute of Social Sciences Electronic Journal*, *11*(2), 301-311.

Akın, A., Abacı, R., & Çetin, B. (2007). The validity and reliability of the turkish version of the metacognitive awareness ınventory. *Educational Sciences: Theory & Practice,7(2),* 655-680.

Annevirta, T., Laakkonen, E., Kinnunen, R., & Vauras, M. (2007). Developmental dynamics of metacognitive knowledge and text comprehension skill in the first primary school years. *Metacognition and Learning*, *2*(1), 21-39.

Baltacı, M., & Akpınar, B. (2011). The Effect of WEB based ınstruction on the metacognition awareness levels of learners. *Mustafa Kemal University Journal of Social Sciences Institute*, *8*(16), 319-333.

Baltacı, M., & Akpınar, B. (2011). The effect of web based instruction on the metacognition awareness levels of learners. *Mustafa Kemal University Journal of Social Sciences Institute 8*(16), 319-333.

Ben-David, A., & Orion, N. (2013). Teachers' voices on integrating metacognition into science education. *International Journal of Science Education*, *35(18),* 3161-3193.

Bozkurt, N. (2013). An examination of the links between pre-service teacher's metacognitive level, learning styles and their achievement of history class. *Procedia-Social and Behavioral Sciences*, *93*, 1634-1640.

Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2017). *Scientific research methods.* Ankara: Pegem A.

Cabero, J., & Roig, R. (2019). The motivation of technological scenarios in augmented reality (AR): Results of different experiments. *Applied Sciences*, *9(14),* 1–16. https://doi.org/10.3390/app9142907.

Cai, S., Wang, X., & Chiang, F. K. (2014). A case study of Augmented Reality simulation system application in a chemistry course. *Computers in human behavior*, *37*, 31-40.

Chang, R. C., Chung, L. Y., & Huang, Y. M. (2016). Developing an interactive augmented reality system as a complement to plant education and comparing its effectiveness with video learning. *Interactive Learning Environments*, *24*(6), 1245-1264.

Chen, M. P., Wang, L. C., Zou, D., Lin, S. Y., Xie, H., & Tsai, C. C. (2020). Effects of captions and English proficiency on learning effectiveness, motivation

and attitude in augmented-reality-enhanced theme-based contextualized EFL learning. *Computer Assisted Language Learning*, 1-31.

Chiu, J. L., DeJaegher, C. J., & Chao, J. (2015). The effects of augmented virtual science laboratories on middle school students' understanding of gas properties. *Computers & Education*, *85*, 59-73.

Creswell, J. W. (2016). Creswell, J. W. (2013). Qualitative research methods-qualitative research and research design according to five approaches. *Trans. Ed., M. Bütün and SB Demir)*. Ankara: Siyasal Yayın Dağıtım.

Duman, B., & Semerci, Ç. (2019). The Effect of a metacognition-based ınstructional practice on the metacognitive awareness of the prospective teachers. *Universal Journal of Educational Research*, *7*(3), 720-728.

Dunlosky, J., & Metcalfe, J. (2008). *Metacognition*. Sage Publications. United States.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new area of cognitivedevelopmental inquiry. *American Psychologist*, 30(10), 906–911. https://doi.org/ 10.1037/0003-066X.34.10.906.

Garzón, J., Acevedo, J., Pavón, J., & Baldiris, S. (2020). Promoting eco-agritourism using an augmented reality-based educational resource: a case study of aquaponics. *Interactive Learning Environments*, 1-15.

Gurbin, T. (2015). Metacognition and technology adoption: exploring influences. *Procedia-Social and Behavioral Sciences*, *191*, 1576-1582.

Hartman, H. J. (2001). Teaching metacognitively. In *Metacognition in learning and instruction* (pp. 149-172). Springer, Dordrecht.

Lai, A. F., Chen, C. H., & Lee, G. Y. (2019). An augmented reality-based learning approach to enhancing students' science reading performances from the perspective of the cognitive load theory. *British Journal of Educational Technology*, *50*(1), 232-247.

Livingston, J. A. (2003). Metacognition: An Overview. ERIC.

López-Belmonte, J., Moreno-Guerrero, A. J., López-Núñez, J. A., & Hinojo-Lucena, F. J. (2020). Augmented reality in education. A scientific mapping in Web of Science. *Interactive Learning Environments*, 1-15.

Ibáñez, M. B., Portillo, A. U., Cabada, R. Z., & Barrón, M. L. (2020). Impact of augmented reality technology on academic achievement and motivation of students from public and private Mexican schools. A case study in a middle-school geometry course. *Computers & Education*, *145*, 103734.

İflazoğlu-Saban, A., & Saban, A. (2009). Investigation of the relationship between cognitive awareness levels, democratic attitudes and authoritarian attitudes of primary education students. I. International European Union, Democracy, Citizenship and Citizenship Education Symposium, Uşak, 97-105.

Jeřábek, T., Rambousek, V., & Prokýšek, M. (2013). Parameters of augmented reality and its use in education. *Journal on Efficiency and Responsibility in Education and Science*, *6*(4), 232-244.

Jiang, Y., Ma, L., & Gao, L. (2016). Assessing teachers' metacognition in teaching: The teacher metacognition inventory. *Teaching and Teacher Education*, *59*, 403-413.

Krajcik, J.S. & Mun, K. (2014). Promises and challenges of using learning technology to promote student learning of science. In N. Lederman and S. Abell (eds.). Handbook of Research in Science Education, Vol II, pp. 337-360. New York: Routledge.

Koç, C., & Arslan, A. (2017). Academic Self-efficacy perceptions and metacognitive awareness of reading strategies of secondary school students. *YYU Journal Of Education Faculty,* 14(1), 745-778.

Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis: an expande sourcebook* (2nd edition). Thousand Oaks, CA: Sage.

Nelson, T. O., & Narens, L. (1994). Why investigate metacognition. *Metacognition: Knowing about knowing*, *13*, 1-25.

Nielsen, B. L., Brandt, H., & Swensen, H. (2016). Augmented Reality in science education–affordances for student learning. *NorDiNa*, *12*(2), 157-174.

Perfect, T. J., & Schwartz, B. L. (Eds.). (2002). *Applied metacognition*. Cambridge University Press.

Pihlainen-Bednarik, K., & Keinonen, T. (2011). sixth graders' understanding of their own learning: a case study in environmental education course. *International Journal of Environmental and Science Education*, *6*(1), 59-78.

Radu, I. (2014). Augmented reality in education: a meta-review and cross-media analysis. Personal and Ubiquitous Computing, 18(6), 1533–1543.

Sapancı, A. (2012). The relationship of student teachers' epistemological beliefs and metacognitive levels with their academic achievement. *Celal Bayar University Journal of Social Sciences, 10*(01), 311-331.

Selçioğlu Demirsöz, E. (2010). *The effects of the creatıve drama on the democratıc attıtudes, metacognıtıve awareness and emotıonal ıntellıgence abılıtıes of the teacher traınees.* (Doctoral dissertation, DEU Institute of Educational Sciences).

Schraw, G., & Sperling-Dennison, R. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology,* 19, 460-470.

Sperling, R. A., Howard, B. C., Staley, R., & DuBois, N. (2004). Metacognition and self-regulated learning constructs. *Educational research and evaluation*, *10*(2), 117-139.

Straub, E. T. (2009). Understanding technology adoption: Theory and future directions for informal learning. *Review of Educational Research*, *79*(2), 625-649.

Sural, I. (2018). Augmented Reality Experience: Initial Perceptions of Higher Education Students. *International Journal of Instruction*, *11*(4), 565-576.

Taş, F., & Sırmacı, N. (2017). The effect of differentiated ınstructional design on students' metacognitive skills and mathematics academic achievements. *Erzincan University Journal of Education Faculty, 20(2),* 336- 351.

Yıldız, G. (2010). The relatıonshıps between mıddle school seventh grade students' mathematıcs achıevement, metacognıtıve strategıes, thınkıng styles and mathematıcs self concept. (Doctoral dissertation, Yıldız Technical University, Institute of Social Sciences, Department of Educational Sciences).

Yılmaz, R. M., & Göktaş, Y. (2018). Using augmented reality technology in education. *Çukurova University Journal of Education Faculty, 7*(2), 510-537.

Chapter 6

TEACHING POSITIVE PSYCHOLOGY: AN EXAMINATION OF THE EFFECTIVENESS OF A POSITIVE PSYCHOLOGY COURSE FOR TRAINEE COUNSELORS
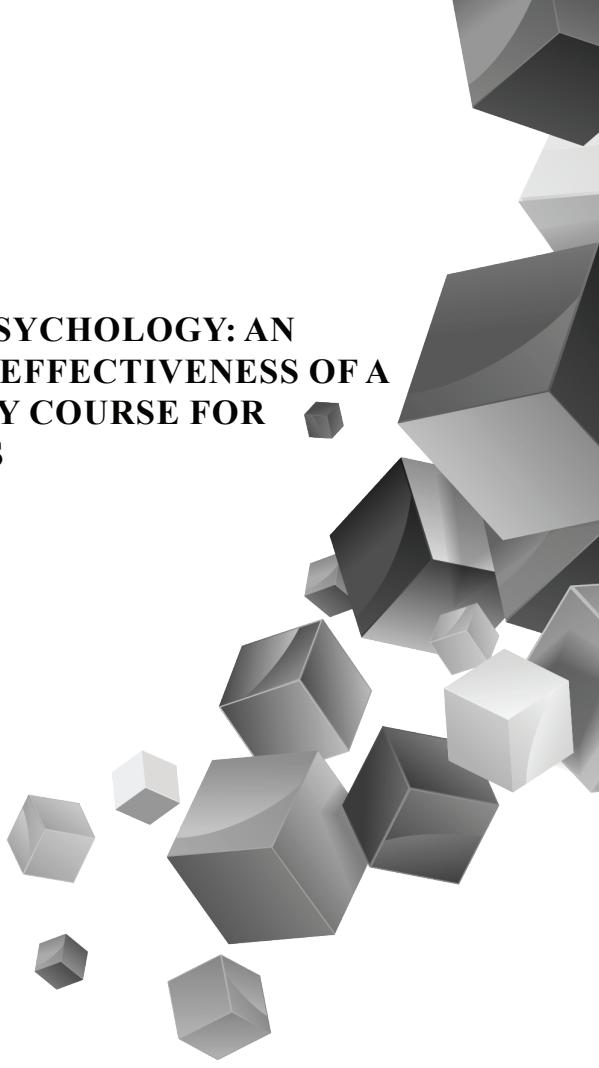
Zeynep CİHANGİR ÇANKAYA[1]

Fatma KOCAAYAN[2]

1 Doç. Dr., Ege Üniversitesi Eğitim Fakültesi, zeynepcihangircankaya@gmail.com, ORCID: 0000-0001-7120-931X

2 Arş. Gör., Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi, fatmaisleyen@gmail.com, ORCİD: 0000-0002-6150-9391

INTRODUCTION

Positive psychology is a field that focuses on strengths and building competency, rather than on weaknesses and pathology (Seligman & Csikszentmihalyi, 2000). Several studies have shown that positive psychology interventions (PPI) improve individuals' positive characteristics such as well-being, positive affect, gratitude, optimism, life satisfaction while decreasing anxiety and depression levels (e.g., Emmons & McCullough, 2003; Froh, Sefick, & Emmons, 2008; Hendriks et al., 2018; Seligman, Steen, Park, & Peterson, 2005). Results obtained from such studies are aligned with the typical aims of the psychological counseling process (i.e., increasing the client's well-being, helping the client become aware of character strengths, reducing negative affect levels, etc.). In this respect, this perspective of focusing on individuals' strengths is a part of both the positive psychology movement and the field of psychological counseling in general (Smith, 2006). Helping the individual become aware of personal strengths and improving functioning through the psychological counseling process is compatible with the positive psychology movement (Harris, Thoresen, & Lopez, 2007). For this reason, it seems purposeful to integrate positive psychology interventions into the psychological counseling process.

As stated by Seligman, Rashid, and Parks (2006), it is possible to identify and amplify clients' positive resources (positive emotions, character strengths, meaning generation, etc.) within the psychological counseling process. In a study conducted with 500 mental health professionals (Seligman et al., 2006), one-hour of theoretical training of positive psychology exercises was given during 24 weeks and then the participants were assigned one exercise to carry out both in their personal lives and in their counseling sessions. The feedback received showed that the interventions were effective, particularly in clients suffering from depression (Seligman et al., 2006). Positive intervention has been shown to make important contributions to clients' mental health in other studies as well (e.g., Senf & Liau, 2012; Sin & Lyubomirsky, 2009). Positive psychology has also been promoted for psychological counselors working in educational institutions. Seligman, Ernst, Gillham, Reivich, and Linkins (2009) stated that well-being should be taught at schools and that school-based positive psychology programs can lead to positive improvements in students' well-being levels.

In order for positive psychology interventions (PPI) to be used effectively within the counseling processes, counselors can benefit from acknowledging and enhancing their own positive characteristics and develop their understanding of the concepts and interventions of positive psychology. As highlighted by Lopez et al. (2006), counselor training

should include dealing with the past positively, focusing on strengths and optimal human development, and improving positive characteristics. These intentions can be pursued by including positive psychology inputs into counselor training. One study conducted by Georges and Tomlinson-Clarke (2015) recommended including positive psychology into the counselor training curriculum and presented an integration of this approach with the key counselor competencies. Integrating positive psychology and counseling psychology increases counselors' familiarity with positive psychology interventions, and maximizes counselors' ability to promote empirically based positive psychology interventions designed to assist individuals, communities, and organizations in achieving positive life outcomes.

Positive psychology inputs typically include attention to positive emotions and character strengths, along with the establishment of positive institutional environments, as well as undertaking positive psychology exercises (PPE) intended to increase individuals' well-being levels (Diener, Suh, Lucas, & Smith, 1999; Emmons & McCullough, 2003; Seligman et al., 2005). There are studies revealing that positive psychology courses enhance students' well-being levels (Goodmon, Middleditch, Childs, & Pietrasiuk, 2016; Maybury, 2013; Lefevor, Jensen, Jones, Janis, & Hsieh, 2018).

In Turkey, some universities offer 'Positive Psychology' courses at both undergraduate and graduate levels in psychology and counseling and guidance programs. However, studies examining the effectiveness of such courses are limited in number (Koydemir & Kahraman, 2015; Uz Baş, 2015; Ünübol et al., 2018). One of these studies (Koydemir & Kahraman, 2015) found that an elective course covering the concepts of positive psychology increased students' life satisfaction, life engagement, and hope levels. Of these studies conducted on the effectiveness of positive psychology courses, only one was carried out with counseling students (Uz Baş, 2015). That study demonstrated that the Positive Psychology course was effective for increasing life satisfaction scores of counselor candidates and students said that by that course they had learned to focus on the strengths of the clients. There is a need for further studies that would look into the effects of positive psychology courses on counseling students' personal and professional development. In addition, another question to be addressed is to do with the effects of positive psychology courses/interventions on positive psychological structures and moods, with these being important for counselors in relation to the challenges of counselling others.

In this regard, the present study aimed to 1) examine the effectiveness of a positive psychology course on trainee counselors' happiness, positive/

negative emotions and hope levels, and 2) to obtain trainee counselors' opinions on the course. The results of the study are expected to be important in regard to counselor training for developing their understanding of the positive characteristics and positive concepts. It is also believed to provide data concerning the efficiency of positive psychology exercises in trainee counselors' personal lives.

METHODS

Research Design

The study employed an embedded mixed-methods design. Embedded design is a mixed method design where the researcher combines qualitative or quantitative research designs and analyzes qualitative and quantitative data (Cresswell, 2003). It includes situations where a data set provides a supportive secondary function within the study (Cresswell and Plano Clark, 2011). In this study, it was aimed to support the effectiveness of the experiment by getting the opinions of the participants about the experimental process. In the quantitative part, a quasi-experimental design involving pre-test/post-test data, and without a control group, was used. In line with the second aim of the study, the opinions of the students who took the positive psychology course were explored with qualitative methods. At the last stage, the quantitative and qualitative data obtained were integrated and interpreted.

Participants

The study was conducted with final-year students at a university in the West of Turkey in the 2016-2017 academic year. All of the participants were attending the Guidance and Psychological Counseling Undergraduate Program which trains counselors at the undergraduate level and aims to gain students basic theoretical knowledge, skills and attitudes of counseling profession. The quantitative data of the study were collected from 35 students (29 females, 6 males), a whole group enrolled in an elective positive psychology course. As for the qualitative part of the study, a focus group interview was conducted with 7 students (5 females, 2 males), who had a maximum absence of 1 day in the course and voluntarily agreed to be involved. The mean age of the participants overall was 23 years.

Data Collection Tools

The 'Positive-Negative Affect Schedule', the 'Dispositional Hope Scale', the 'Oxford Happiness Questionnaire' and an interview form were used to gather data in the study. The instruments were selected in accordance with positive psychology understanding. The relevant information for each instrument is presented below.

Positive-Negative Affect Schedule

The Positive-Negative Affect Schedule (PANAS) was developed by Watson et al. (1988) and was adapted to Turkish by Gençöz (2000). The PANAS, which is used to measure positive and negative affect, is a 20-item scale of a 5-point Likert type (1:very slightly or not at all - 5:extremely). In the adaptation study of the scale (Gençöz, 2000), Cronbach's Alpha (α) coefficient of internal consistency was found as .83 for Negative Affect and .86 for Positive Affect. According to the repeated test reliability calculation, similar to the original scale, correlation coefficients obtained for Negative affect and Positive affect were .40 and .54 respectively, since a variable dimension such as affect was measured with an interval of three weeks (Gençöz, 2000). Within the scope of the present study, internal consistency coefficients were .85 for positive affect and .84 for negative affect in the pre-test and .84 for positive affect, and .83 for negative affect in the post-test.

Dispositional Hope Scale

The Dispositional Hope Scale is used to measure individuals' hope levels and was originally developed by Snyder et al. (1991) and was adapted into Turkish by Tarhan and Bacanlı (2015). The scale is a 12-item scale of a 8-point Likert type (1:absolutely true – 8:absolutely wrong). In the adaptation study of the scale (Tarhan & Bacanlı, 2015), the exploratory factor analysis showed that 61% of the total variance was explained and the items were gathered under two factors as actuating thinking and alternative ways thinking. Fit indices were seen to be within the acceptable range as a result of the confirmatory factor analysis. The internal consistency coefficient was found as 0.84 and the test re-test reliability was as 0.81 for Actuating Thinking Dimension, 0.78 for Alternative Ways Thinking Dimension and 0.86 for the total scale (Tarhan & Bacanlı, 2015). In this present context, the internal consistency coefficients for the overall scale was calculated as .88 for the pre-test and .89 for the post-test.

Oxford Happiness Questionnaire

The Oxford Happiness Questionnaire (OHQ) used as a measure of individuals' happiness levels was devised by Hills and Argyle (2002) and the Turkish adaptation study was conducted by Doğan and Sapmaz (2012). The scale comprises 29 items presented in an 6-point Likert type (1: strongly disagree- 6: Strongly agree). In the adaptation study by Doğan and Sapmaz (2012), the explanatory factor analysis found that 29.84% of the total variance was explained. The values obtained from the confirmatory factor analysis showed that the single-factor structure of the scale was retained on the sample consisting of Turkish university students. The internal consistency coefficient of the OHQ was calculated as 0.91, and

the test half-life reliability coefficient as 0.86. The composite reliability coefficient of the scale was determined as 0.91 (Doğan & Sapmaz, 2012). Within the present study, the internal consistency coefficient was calculated as .92 for both the pre-test and the post-test.

Interview Form

The interview form for the focus group interview was developed by the researchers so as to obtain trainee counselors' opinions about the effectiveness of the Positive Psychology course. When designing the form, expertise was drawn from two researchers experienced in the field of qualitative research and in line with the feedback, questions have been made more understandable. The form consisted of six questions that investigate the gains of the students (What were your professional achievements in this course?) and include the evaluation of the course (How do you evaluate the topics and related activities in this course?). The form was piloted with one student to check the understandability of the questions and then the actual implementation was performed.

Procedure

At the beginning of the semester, students were informed that a positive psychology course will be opened as an elective course and a research will be carried out during this course. In the first week the lecturer introduced the structure of the course as mentioned below. Informed consent was obtained from the students after introducing the course. The quantitative pre-test data of the study were collected in the first week of the course in the classroom before the lesson and the post-test data were collected in the final course week. The focus group interview involving the qualitative data was held after the course was completed. All the students filled in the scales on a voluntary basis. The students who participated in the focus group interview were informed of the process prior to the session. The focus group interview was managed by an experienced professor except researchers in the field of qualitative research. The procedure of the study is presented in Table 1.

Table 1: *Procedure of the Study*

Group	Pre-test	Intervention	Post-test	Collection of qualitative data
Experimental	PANAS* DHS** OHQ***	Positive Psychology Course	PANAS* DHS** OHQ***	Focus group meeting (Interview form)

* PANAS: Positive and Negative Affect Schedule, ** DHS: Dispositional Hope Scale, *** Oxford Happiness Questionnare

Positive Psychology Course

The Positive Psychology course was offered as an elective course. The course was delivered once a week in 3 class-hours over 12 weeks by a professor and a research assistant. The course content was structured on the basis of the positive psychology literature and included positive psychology interventions and exercises. The content of each class consisted of 5 stages: (1) talking about the assignment of the previous class (excluding the first week), (2) giving theoretical information on the topic, (3) discussing how the concept of positive psychology dealt with in the course could be integrated into counseling and guidance services, (4) undertaking PPEs on the concept (writing tasks, small group work, etc.), which involved active engagement from the students, and (5) assigning related homework. The course outline is shown in Table 2.

Table 2: *Course Outline*

Week	Content	Process
1	Course introduction	Lecture, Class discussion
2	Positive psychology movement, aim and scope	Lecture, Class discussion
3	Happiness and subjective well-being	Homework discussion, Lecture, Class discussion, Experiential activities, Homework setting
4	Gratitude	Homework discussion, Lecture, Class discussion, Experiential activities, Writing exercises, Homework setting
5	Hope	Homework discussion, Lecture, Class discussion, Experiential activities, Writing exercises, Homework setting
6	Meaning of life	Homework discussion, Lecture, Class discussion, Experiential activities, Writing exercises, Homework setting
7	Emotional awareness	Homework discussion, Lecture, Class discussion, Experiential activities, Homework setting
8	Character Strengths	Homework discussion, Lecture, Class discussion, Experiential activities, Homework setting
9	Psychological needs	Homework discussion, Lecture, Class discussion, Experiential activities, Homework setting
10	Self-compassion	Homework discussion, Lecture, Class discussion, Experiential activities, Homework setting

11	Resilience	Homework discussion, Lecture, Class discussion, Experiential activities, Homework setting
12	Self-acceptance	Homework discussion, Lecture, Class discussion, Experiential activities

Data Analysis

The quantitative data were analyzed using paired samples t-test statistics. Analyses were performed using SPSS 15. The qualitative data obtained from the focus group interview were analyzed with content analysis. First, the focus group interview was turned into written documents. These documents were then read by both researchers independently, who generated codes related to commonalities and oriented to the aims of the study. The data were coded by the two researchers separately, and then the researchers' codes were integrated. Later themes and categories were obtained from the codes. These themes and categories were named and structured according to the related literature. Quotations of the participants that explain and illustrate the specified categories, themes and codes, whilst also showing the diversity of opinions are presented.

RESULTS

Quantitative Results

Table 3 shows the results of the paired samples t-test, which was conducted to determine any significant differences between the pre-test and post-test scores of the trainee counselors in terms of happiness, hope, and positive and negative affect indicators.

Table 3: *Pre- and Post-course Assessments of the PANAS, DHS, OHQ Scores*

Positive Psychology Course					
Assesments	Pre-course, M (SD)	Post-course, M (SD)	t(34)	p	d
Positive Affect	32.77 (7.58)	36.37 (6.68)	-2.73	.01*	.46
Negative Affect	21.66 (7.03)	20.02 (6.53)	1.33	.19	.23
Hope	50.09 (7.07)	52.74 (6.81)	-2.43	.02*	.57
Happiness	125.34 (18.82)	131.94 (18.32)	-2.43	.02*	.63

*p<.05

It was seen that the trainee counselors' post-test mean scores in positive affect, hope and happiness increased in comparison with their pre-test mean scores, and a statistically significant difference was found (Positive affect t=-2.73, p<.05; Hope t=-2.43, p<.05; Happiness t=-2.43, p<.05). Trainee counselors' negative affect scores were observed to decrease in the post-test, but not to a statistically significant degree.

Qualitative Results: Trainee Counselors' Opinions on the Positive Psychology Course

Codes, themes and categories were generated on the basis of the findings obtained from the analysis of the qualitative data received from the focus group interview (n=7). The content analysis produced three main categories titled as (1) Course Quality, (2) Contributions, (3) Recommendations. These three categories, and their various themes and codes are presented in Table 4.

Table 4: *Categories, Themes and Codes*

Categories	Themes	Codes	n
Course Quality	Structure	Number of students	7
		Teaching style	5
		Concepts	5
		Active participation	5
		Lecture course	5
		Lessons length	2
		Seating order	1
	Exercises	Writing tasks	7
		Meditation exercises	6
		Group work	6
		Creative art exercises	5
		Homework	2
		Diversity in exercises	1

Contributions	Professional	Learning the concepts	5
		Developing psychological counseling skills	4
		Learning how to apply PPE	3
		Associating positive concepts	3
		Developing positive characteristics	3
		Learning PPE	2
	Personal	Awareness of self-compassion	7
		Awareness of psychological needs	6
		Satisfaction of psychological needs	5
		Normalization of making mistakes	5
		Self-acceptance	5
		Focusing on emotions	5
		Expressing emotions	5
		Increase of happiness	4
		Awareness of happy moments	4
		Increase of gratitude	4
		Being present	3
		Increase of hope	3
		Perception of happiness	2
		The meaning of life	2
		Controlling anxiety	2
		Character strengths	2
Recommendations	Structure	Seating order	5
		Semester/year the course was offered	5
		Structuring the course	4
		Subjects	2
		Number of students	2
		Lesson length	1
	Exercises	Performing all the PPEs	4
		Station technique	2
		Out-door activities	1
		Activities involving movement	1

Category 1: Course Quality

In the focus group interview, the students were asked to describe the positive psychology course with a metaphor. Trainee counselors created their metaphors based on their perceptions of the course content and quality. Table 5 shows trainee counselors' metaphors reflecting the meaning of the positive psychology course to them.

Table 5: *Trainee Counselors' Metaphors For The Positive Psychology Course*

Participant	Metaphor	
K1	Mother	I first thought of my own mother because actually, in my life, she was the one to teach me positive emotions all the time, everything we learnt in positive psychology. Because she is a person with very high subjective well-being, psychological strength, hope, gratitude; particularly gratitude.
K2	Mirror	I thought about its reflective property. I mean, my writing pieces reflected me, the things I made with play-dough, things we talked about, feedback given to me from my friends in our mutual relationships were all things that reflected me and so the mirror directly appeared. Perhaps the mirror had broken parts when I first started the course, but in the end, I almost started not to see these broken parts.
K3	Play-dough	I had already noticed that most concepts we saw could be learnt, they actually existed in us and we just needed to uncover them…its changeable and transformative nature, flexibility, softness, evolvability made me think that I could describe it as play-dough.
K4	The Little Prince	…because we express ourselves with more ease as children. We also returned to our childhood memories and came back holding our own hands. From this point of view, if the Little Prince had been taken into the course or if we always carried the Little Prince within ourselves, kept this search for meaning and valuing ourselves and others all the time.
K5	Orange	…because orange as a color always gives me such energy. It represents being livelier. Oranges also have healing properties, I thought we eat them when we are sick. You know positive psychology also has such an effect. That is, in fact, it has a meaning like healing, pushing forward.

K6	Mirror	I considered it as a rough mirror with dust on the surface. I wiped away some of this dust every week when I came to class. And, finally, I thought of such a pure, clear mirror because I noticed something different in each week's class and worked on it. It was a course which reflected us, helped us see ourselves when we looked.
K7	Balloon	…one of those large hot air balloons you know. There is too much weight, we get rid of this weight with the course and rise up together…. Our happiness level increases as we get rid of those burdens, the things that stereotype us.

Trainee counselors' opinions they expressed during the focus group interview indicated the structure and exercise themes under the course quality category. Both themes have aspects that are evaluated as being effective and ineffective by the trainee counselors.

Structure

Under the positive psychology course structure theme, trainee counselors' opinions were coded as the number of students (n=7), teaching style (n=5), concepts (n=5), active participation (n=5), lecturing style (n=5), lesson length (n=2), seating order (n=1).

All the trainee counselors pointed out that the *high number of students in the course* limited interaction and sharing. One trainee counselor expressed this as follows:

… sometimes I had to hold myself back when I wanted to say something, but because [the] class group was large... . It made me question how right it would be to say that at that very moment, there, in that environment, among that many people very often. (K3)

The effect of the exercises performed following the theoretical instruction, which was coded as *the teaching style* in the qualitative findings, was expressed by one trainee counselor as "the exercise thing after the theory was great... after receiving that information, it was good to perform such an activity accordingly (K6).

Stating that the concepts dealt with in the course useful, one trainee counselor said "I loved the subjects of this course. Therefore, I would not make any changes in the course subjects" (K6). The positive concepts of the course were instructed in a way that would enable students' active participation. The effect of *active participation* was expressed by one trainee counselor as "it was great to be together, lively all the time, active, engaged

in activities and to open up ourselves"(K5). The professor's *lecturing style* came out as an important factor in understanding the concepts. One trainee counselor said "as for the lecturing style...the professor, in the first place, I mean, has good expression. The lecturer teaches with a soft tone of voice, I mean, what the lecturer teaches gets into my head" (K1).

Few trainee counselors expressed opinions concerning the lesson length and seating order. About finding the *lesson length* too short, one trainee counselor said "It would have been more effective if everyone had been given enough time to express their opinions" (K1). As for the *seating order*, one student said "if the seating order had been arranged in a way that everyone could see…" (K7).

Exercises

Within the scope of the exercises performed as part of the course, student opinions were coded as writing tasks (n=7), creative art exercises (n=5), meditation exercises (n=6), group work (n=6), diversity in exercises (n=1) and homework (n=2).

It was seen that most trainee counselors found the writing tasks and creative art exercises effective. One trainee counselor who considered the *writing tasks* as being effective said "to me, [the] writing tasks were definitely very good" (K4). Another trainee counselor, who did not find the writing tasks effective, on the other hand, expressed "I sometimes feel bored of writing because, I mean, I can't focus completely" (K5). One trainee counselor stated the following about the *creative art exercises* as follows:

Use of waste products, use of various materials ignites creativity you know. With them, I can suddenly create something that would never come to my mind. I can attribute a meaning to it there. And that was good for me. (K2)

It was found that some trainee counselors thought the *meditation exercises* undertaken as part of the course were effective, while some others considered them ineffective. One trainee counselor, thinking they were beneficial, said "…stopping there and being in that present moment even if it was short... That made me a little comfortable, relaxed or I felt better there. Meditation about the concepts was better, I was internalizing them" (K7). Trainee counselors who found the exercises ineffective stated that they could not concentrate on the activity. One trainee counselor having difficulty concentrating said "I couldn't feel absorbed in the meditation exercises performed" (K3).

In some of the PPEs, trainee counselors worked in groups of 3-4. *Working in groups* was not found to be effective by some students. Trainee

counselors who considered group work ineffective were seen to have difficulty in sharing that they were not sufficiently familiar with their experiences. In this regard, one trainee counselor said "telling someone else about what I did sometimes bothered me. I did not want to express or sometimes we were matched with people we had to but not those we wanted to be matched [with]" (K1). Another student who found group work effective said that "it was also comfortable in groups of two or three as everyone was with their group of friends again" (K6).

One trainee counselor who thought the use of *diversity in exercises* in the course was effective expressed "...in fact, it seemed to me that there were exercises suitable for all personal characteristics, like being introverts, extroverts or having or lacking abilities" (K5).

Few trainee counselors found homework *ineffective*, while no trainee counselor expressed that they thought the assignments were useful. One trainee counselor thinking homework was ineffective said " ...I tried to do [it] for one or two days but I couldn't go on after a while. I couldn't continue, so it wasn't as effective as the exercises we did in class" (K2).

Category 2: Contributions

Professional Contributions

Professional contributions in the positive psychology course were coded as, learning the concepts of positive psychology (n=5), developing psychological counseling skills (n=4), learning how to apply PPE (n=3), associating positive concepts (n=3), developing positive characteristics, (n=3) and learning PPE (n=2).

A majority of the trainee counselors stated that they learnt in detail the concepts of positive psychology taught in the course. K5 said that "I realized that we actually had insufficient information [about the concepts] and therefore they became clear in our minds in fact". In relation to the fact that *the course content improved psychological counseling skills*, one trainee counselor (K2) said "I did not see myself at a very high point emotionally as a psychological counselor, I mean I don't know emotions well. I looked at the list of emotions, I researched them..." A trainee counselor (K2) stating that *learnt how to apply* PPE in the institutions they would work in, told "If I go and work at a school right now or work at some other place, working on issues like happiness, gratitude and so on seemed very distant to me. But at the end of the course, I realized that they were in fact very simple and understandable things".

The trainee counselors stated that they learnt the relationships between positive concepts in the course. About *associating positive concepts*, one trainee counselor said "since I don't stay present, I neither feel happiness

nor can I hope anything or feel gratitude" (K2). One topic of awareness developed by the students in relation to positive concepts was *learning how to improve their positive characteristics*. One of the trainee counselors' experience as follows;

When I first came to class, well, something happened. I used to think some concepts could not be enhanced or so. Like happiness, like hope. I used to think that they increased or fell in parallel with what we experience in life. But in this course, I learnt they can be learnt, how to change them and to increase this level. (K6)

Personal Contributions

Personal contributions of the positive psychology course were coded as self-compassion (n=7), awareness of basic psychological needs (n=6), satisfaction of basic psychological needs (n=5), normalization of making mistakes (n=5), self-acceptance (n=5), focusing on emotions (n=5), expressing emotions (n=5), increasing happiness (n=4), awareness of happy moments (n=4), gratitude (n=4), being present (here and now) (n=3), hope (n=3), perception of happiness (2), the meaning of life (n=2), controlling anxiety (n=2), character strengths (n=2).

It was observed that one of the topics that influenced trainee counselors most was self-compassion and all of them indicated gaining awareness about *self-compassion*. One trainee counselor's experience in this regard as "I decided in that course that I had compassion, great compassion for those I love. I asked myself if I deserved this compassion. I thought I should not deprive my own self of this compassion, I had to show compassion to myself, too" (K1).

The trainee counselors were seen not to have contemplated their *psychological needs* before, but they developed awareness about this in the course and started to take action to satisfy their needs. About psychological needs a trainee counselor said "well, there were lots of moments when I asked myself the question 'which psychological need of mine is not met right now and I am bothered?'" (K3). One of the trainee counselors who had taken action to *satisfy basic psychological needs* said "[in the course] I remembered my own psychological needs, my own characteristics. I remembered myself and thought about how I could meet my own needs if others around me are not doing it for me. At this point, I arranged my relationships, I tried to express my needs more easily to others" (K4).

It was seen that for most trainee counselors, the level of accepting themselves and their mistakes increased through self-acceptance and self-compassion exercises. A trainee counselor who realized that *making mistakes was normal*, said "I saw that my mistakes are not just because

of me, there are environmental factors, too. I can make mistakes, I can treat myself well after making mistakes" (K6). One trainee counselor said that about increasing *self-acceptance* level of students, "in self-acceptance, particularly, I always regretted my past mistakes. Actually I am not regretful over the mistakes I have made. I said [to myself] I am here today because I made them back then. I started to think in a more self-directed way. I accepted myself" (K2).

Through emotional awareness exercises, the trainee counselors were observed to focus more on their emotions and to begin to express them. One of the trainee counselors told about *focusing on emotions* and said "it improved my understanding of the importance of emotions... I didn't use to attach much importance [to emotions], I would care more about thoughts. I saw that emotions are important in our life. I worked on it inside myself …" (K6). Another trainee counselor emphasized *expressing emotions*, explained it as "now I express more my own emotions and I also encourage others around me [to] express [theirs]..." (K1).

The trainee counselors stated that they students felt happier, better realized the moments/situations when they were happy and their perceptions of happiness changed with the course. One trainee counselor explained that the course *increased their happiness* levels saying, "the course was our journey. It helped us remember these emotions, these positive emotions more" (K4). Another trainee counselor who admitted *remembering happy moments more* said, "when I thought about the things that make me feel happy, times when I couldn't pay attention in the past, when I thought about the moments when I wasn't in the moment, I saw that I was actually happy" (K3). Stating that their *perceptions of happiness changed*, one trainee counselor said " I saw that happiness does not come to us. It is something that can be learnt and I realized that we have to go after it. I mean, we need to do something...I need to make an effort" (K7).

Exercises on gratitude and hope done in the scope of the course were seen by the trainee counselors to increase their levels of gratitude and hope. Concerning *gratitude*, one trainee counselor said "I thanked my family, my friends more. I'm glad...I started to thank people around me, events happening in my life, the life I am leading" (K3). Another trainee counselor explained that their hope levels increased by saying "Hope is, well, inside life. And I maintain it personally. I look at the future more hopefully" (K7).

Some trainee counselors mentioned raising awareness about the meaning of life and character strengths dealt with in the course. Concerning their awareness of the *meaning of life*, one trainee counselor said "It was also good to see that the meaning of life is also 'here', because being on the

way in front of you...enjoying being on that way, enjoying the way itself... And I realized that going on that journey is precious as well" (K3). One trainee counselor emphasized *character strengths*, saying "... there was a week we tested our character weaknesses...seeing the things that we cannot claim to be this or that there, and thinking on them...It felt good to examine them in detail...In this aspect, it was good to see my character strengths" (K5).

Activities performed in relation with being present in the moment helped some trainee counselors realize that they normally failed to be present. One trainee counselor admitted *failing to be present*, explained the situation as follows "well, being present as it influenced me, as it remained in my mind was something I couldn't succeed [with], but I wasn't aware that I couldn't succeed [in] it" (K2).

Regarding the anxieties about not being present, one trainee counselor explained about *controlling anxieties*, and said "I am an anxious person too... I suffer from headaches because I am very fussy. I had no headaches in this period" (K4).

Category 3: Recommendations

Structure
The trainee counselors made recommendations for structuring the positive psychology course physically and in terms of content. Student recommendations were coded as seating order (n=5), semester/year the course was offered (n=5), structuring the course (n=4), subjects (n=2), number of students (n=2), lesson length (n=1).

Concerning the arrangement of the physical conditions of the course, most trainee counselors recommended that the *seating order* be changed so that they could see each other. In this regard, one trainee counselor said "the seating order, as we mentioned, could be arranged in a U shape, in a way that everyone can see each other" (K2).

Some trainee counselors made recommendations on *the semester/ year when the course was offered.* Recommending that the course be given early in the undergraduate program a trainee counselor said "...it was a course that raised individual awareness for me. Well, actually, I thought for my personal life like if I had gained this awareness at the second grade, I would be like this, if it was given earlier..." (K3). Contrary to this, though, some trainee counselors suggested keeping the course at the same time. One trainee counselor suggested that "I think it was good that the course was this semester because, by our age, now we question ourselves, what are we going to do, what are we going to be, who am I?; in fact, perhaps we couldn't have been able to question very much before. We couldn't be

this aware, also we are already in a continuous pace this year and it was a course we came to for relaxation" (K5).

As for the content of the course, many trainee counselors recommended that course *structuring* be more clear. This recommendation is related to the positive psychology course being different from other theoretical courses in it being interaction-based. One trainee counselor recommended as follows:

There will be interaction, well, how much sharing will there be? How much privacy will it provide? I feel that I would put more emphasis on privacy; well, because in order for the activities to be effective, because there will be an interaction group. I would emphasize it more, I mean, for those who may drop the course to drop it, I would make the limits clear at the beginning. I mean. I think it would be good for [it] to be more effective, for everyone to feel free, to share, for the effectiveness of the course. (K7)

The trainee counselors made recommendations about the *subjects* within the course. Recommending that forgiveness and optimism could be included as course subjects, one trainee counselor said "the concept [forgiving] is really important because we can sometimes perceive forgiving as tolerating. I would add an exercise on optimism, too...because it is also a topic of contradiction" (K4).

Under the category of course quality, the trainee counselors stated that the high number of students involved negatively affected the interaction and sharing possible. One trainee counselor recommended that the *number of students* taking the course *should be reduced* and that the course should be given in two separate classes, saying "I think we were a little high in number. For example, if the class had been divided in[to] two groups, if it had been in groups of ten to fifteen, it would have been easier to express ourselves" (K1). As another way of increasing the interaction and sharing in the course, one trainee counselor suggested extending the *lesson length* and expressed "I think the time was limited. I would extend the lesson length. It would enable sharing for a longer time, learning more things, to my mind" (K7).

Exercises

The trainee counselors who took the positive psychology course also made some recommendations on the PPEs undertaken as part of the course. Student recommendations were in regard to all the PPEs undertaken in the course, the station technique, outdoor activities and activities involving movement.

One trainee counselor recommended that all the positive concepts taught in the course but not practiced *should be performed in class, saying* "…for

instance, we could have practiced that 'good thinks' box in class ourselves. We would put a box in the classroom...That box would come to the classroom before we started the lesson" (K2). One of the trainee counselors suggested using the *'station technique'* in order to increase students' interaction with each other during the exercises by saying "I guess it was the station technique. I mean, after completing the exercise, everyone could have talked about the exercise by changing places in turns in the group…" (K2).

In some exercises undertaken in the course, students moved around the classroom. One trainee counselor recommended increasing these *activities involving movement* stating the following: "Performing them more could be effective. We are sitting all the time after all. We are anchored to those seats, we are like fixed into those desks" (K7). Another recommendation involving *outdoor activities* was that the exercises done in the class could sometimes be practiced outside as well. In this context, one trainee counselor said "for instance, yes, they could have been done in the garden when the weather was good" (K2).

DISCUSSION AND CONCLUSIONS

The aim of the present study was to examine the effectiveness of the positive psychology course made available to trainee counselors addressing levels of happiness, positive-negative affects and hope, and to obtain trainee counselors' opinions on the course. The quantitative findings of the study showed that the positive psychology course increased trainee counselors' happiness, positive affect and hope levels, while having no significant impact on negative affects. The qualitative findings revealed that a majority of the trainee counselors found the concepts taught in the positive psychology course, the teaching style and the active participation in the class particularly effective. In addition, the trainee counselors were observed to gain awareness about and develop in self-compassion, psychological needs, self-acceptance, happiness, gratitude and hope. As for the professional contributions, learning the concepts of positive psychology in detail and improving psychological counseling skills were noticeable. Student recommendations focused largely on ensuring the practice in class of all the PPEs presented in the course, arranging the seating so that everyone could see each other, and that the course was based on interaction and sharing and that needed to be structured into its operations.

The quantitative dimension of the study found that trainee counselors' levels of happiness, positive affect and hope were changed in a positive direction by the conclusion of the positive psychology course. These findings were also supported by the qualitative findings of the study, with the trainee counselors concerned expressing that they had made changes in a positive direction during the course period. Most of the focus group

students stated that the course affected their moods positively. In this regard, they said that they were more active about satisfying their psychological needs, they realized making mistakes was normal, they increased their self-acceptance, self-compassion and gratitude levels, and they focused more on their emotions and started to express these more readily.

Previous studies associated with positive psychology have also impacted on satisfaction of psychological needs (Sheldon & Elliot, 1999), gratitude (Singh, Salve, & Shejwal, 2017), emotional awareness (Hafen, Singh, & Laursen, 2011), self-acceptance (Cross, Gore, & Morris, 2003) and self-compassion (Neff, 2003). The metaphors used by the focus group students to capture a sense of what they learnt and experienced within the positive psychology course suggested their personal gains. The metaphors were positive in themselves as personal representations of the learnings and experiences that were obtained through taking the course.

The findings of the study are consistent with some other studies examining the effectiveness of positive psychology courses (Emmons & McCullough, 2003; Goodmon et al., 2016; Koydemir & Kahraman, 2015; Maybury, 2013; Uz Baş, 2015, Ünübol et al., 2018). In one of these studies (Maybury, 2013), students' levels of subjective well-being, happiness, conscious awareness and hope increased after a 14-week positive psychology course including PPEs. Similar results were obtained from experimental studies looking into the effectiveness of positive psychology interventions (Emmons & McCullough, 2003; Lambert, Passmore, & Joshanloo, 2019; Otake, Shimai, Tanaka-Matsumi, Otsui, & Fredrickson, 2006; Seligman et al., 2005; Sin & Lyubomirsky, 2009; Mongrain, & Anselmo-Matthews, 2012). In a meta-analysis study conducted by Bolier et al. (2013), positive interventions were found to increase subjective and psychological well-being at significant levels and reduced symptoms of depression. In another meta-analysis study on the use of positive interventions in non-Western societies, it was seen that there was an increase in the number of positive psychology studies that used such interventions and that the interventions concerned brought about significant positive effects on the levels of subjective well-being, psychological well-being, anxiety and depression (Hendriks et al., 2018). The findings obtained from the present study also revealed that positive psychology exercises yielded positive and significant results in Turkey which has communitarian cultural characteristics. In the qualitative findings of the study, the trainee counselors concerned suggested that they had better control over their anxiety feelings with the positive psychology course. In some other studies conducted previously, positive psychology interventions or positive psychology courses were found to bring about a reduction in anxiety and depression levels (Bolier et al., 2013; Hendriks et al., 2018).

The limited effect of the positive psychology course on the reduction of negative affects is perhaps related to some findings obtained from the qualitative study. The first one is that the high number of students was regarded as preventing trainee counselors from expressing themselves sufficiently in the course. Their inability to express negative experiences and emotions is thought to have hindered the students from working on them. Again in relation with the number of students, not allocating enough time for the students to express themselves came out as a disadvantage for the course which was taught based on creative and experiential techniques. As a solution to this problem, the PPEs performed as part of the course were practiced in small groups. In parallel with the students' recommendations, the course can be given in two separate classes with smaller groups in future studies.

The students assessed the inclusion of exercises related to the theoretical information and the creation of an interaction-based learning environment as being positive; but they assessed the high number of students involved and the seating arrangements as being negative. In this regard, it could be asserted that it would be more effective to implement the course with a smaller group of students and to re-arrange the seating arrangements into a U shape. As for the exercises practiced during the course, most trainee counselors found creative art and writing tasks effective whereas homework and meditation exercises were considered ineffective by some others. It was remarkable that the trainee counselors said they found these activities ineffective because they were not suitable for their personal characteristics. In this respect, it can be recommended to include different PPEs options about the subject into the course content in teaching positive psychology.

The qualitative findings of the study also suggested that the positive psychology course provided trainee counselors with professional gains as well. The trainee counselors in the focus group indicated that they learnt both about the concepts of positive psychology and how they could include them in their counseling processes. Likewise, in the study conducted by Uz Baş (2016), the positive psychology course undertaken was found to provide professional support for trainee counselors. The trainee counselors expressed that they learnt from that course that they could develop their clients' positive characteristics (hope, gratitude, compassion, etc.). These findings are believed to be important in terms of psychological counselor training. The findings obtained here support the opinion that positive psychology courses should be included in the counseling curriculum. The quantitative and qualitative findings of the study are also important in terms of the field of school counseling. Implementing positive psychology studies in an educational environment is typically referred to as positive education (Green, Oades, & Robinson, 2011). Seligman and others (2009) remarked that school is a perfect place to increase individuals' well-being levels and teaching well-being/happiness at schools is important.

There are many studies reporting the effectiveness of positive education practices on the development of students' positive characteristics (e.g., Clonan, Chafouleas, McDougal, & Riley-Tillman, 2004; Froh et al., 2008; Shoshani & Steinmetz, 2013). Therefore, it is clearly useful for counseling students to learn about and to be exposed to PPEs, which they can then implement through psychoeducation offerings at schools.

Limitations

The present study has some limitations. The first is the absence of a control group in the study. An appropriate control group could not be established because of the fact that other courses offered in the same semester as the positive psychology course in the counseling and guidance undergraduate program might have affected trainee counselors' well-being levels as well. Secondly, as the positive psychology course was given as an elective course, the trainee counselors who selected the course might have been highly motivated to learn and develop positive qualities in themselves. On the other hand, this elective quality could also be regarded as desirable, because the related literature suggests that positive psychology interventions work best when the participants are willing and motivated to put in an effort (Lyubomirsky, Dickerhoof, Boehm, & Sheldon, 2011; Sheldon et al., 2010). Seligman claims that positive interventions should be intended for those individuals who want to be happier and thus "the sample might be biased" (Seligman et al., 2005).

Conclusion and Recommendations

According to the findings of the present study, it was seen that the positive psychology course had positive effects on trainee counselors' levels of positive affect, hope and happiness. In addition, it was also suggested that learning about positive concepts and qualities and participating in activities to develop these helped them develop several positive characteristics, such as greater personal acceptance, increased personal compassion, and heightened emotional awareness. Within the standards set for counselor training by CACREP (2016), it is indicated that counselors need to develop self-care strategies appropriately with the role of a counselor, their personal and professional self-evaluation strategies, as well as their counselor characteristics and behaviors that affect the counseling process. The findings from the present study suggest that an appropriate positive psychology course would help counselors to gain these competencies. Further studies could look into the effects of such positive psychology courses or interventions on different psychological structures through experimental designs with control groups and follow-up assessments. The effects of different course structures could also be studied by comparing didactic inputs on positive psychology constructs with courses including experiential inputs.

REFERENCES

Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: A meta-analysis of randomized controlled studies. *BMC Public Health,* 13, 119-139. Doi: 10.1186/1471-2458-13-119

Clonan, S. M., Chafouleas, S. M., McDougal, J. L., & Riley-Tillman, T. C. (2004). Positive psychology goes to school: Are we there yet?. *Psychology in the Schools, 41*(1), 101-110.

Council for Accreditation of Counseling and Related Education Programs (CACREP). (2016). Draft #2 of the 2016 CACREP standards. Alexandria, VA: Author.

Cresswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed method research.* 2nd Sage. Thousand Oaks, CA, 201.

Creswell, J.W. (2003) *Research design: Qualitative, quantitative, and mixed method approaches*. Sage Publications, Thousand Oaks.

Cross, S. E., Gore, J. S., & Morris, M. L. (2003). The relational-interdependent self-construal, self-concept consistency, and well-being. *Journal of Personality and Social Psychology, 85*(5), 933. doi: 10.1037/0022-3514.85.5.933

Diener, E., Suh, E., Lucas, R., & Smith, H. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*(2), 276-302.

Doğan, T., & Sapmaz, F. (2012). Examination of psychometric properties of the Turkish version form of the oxford happiness questionnaire in university students. *Düşünen Adam, 25*(4), 297–304. doi:10.5350/DAJPN2012250401

Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology, 84*(2), 377–389. doi:10.1037/0022-3514.84.2.377.

Froh, J. J., Sefick, W. J., & Emmons, R. A. (2008). Counting blessings in early adolescents: An experimental study of gratitude and subjective well-being. *Journal of School Psychology, 46*(2), 213–233. doi:10.1016/j.jsp.2007.03.005

Gençöz, T. (2000). Positive and negative affect schedule: a study of validity and reliability. *Turkish Journal of Psychology, 15*(46), 19-26.

Georges, C. M., & Tomlinson-Clarke, S. M. (2015). Integrating Positive Psychology Into Counseling Psychology Doctoral Education. *The Counseling Psychologist, 43*(5), 752-788.

Goodmon, L. B., Middleditch, A. M., Childs, B., & Pietrasiuk, S. E. (2016). Positive psychology course and its relationship to well-being, depression, and stress. *Teaching of Psychology, 43*, 232-237. doi: 10.1177/0098628316649482

Green, S., Oades, L. G., & Robinson, P. (2011). Positive education: Creating flourishing students, staff and schools. *In Psych: The Bulletin of the Australian Psychological Society Ltd, 33*(2), 16.

Hafen, C. A., Singh, K., & Laursen, B. (2011). The happy personality in India: The role of emotional intelligence. *Journal of Happiness Studies, 12*, 807–817.

Harris, A. H., Thoresen, C. E., & Lopez, S. J. (2007). Integrating positive psychology into counseling: Why and (when appropriate) how. *Journal of Counseling & Development, 85*(1), 3-13.

Hendriks, T., Schotanus-Dijkstra, M., Hassankhan, A., Graafsma, T., Bohlmeijer, E., & de Jong, J. (2018). The efficacy of positive psychology interventions from non-Western countries: A systematic review and meta-analysis. *International Journal of Wellbeing, 8*(1), 71-98. doi:10.5502/ijw.v8i1.711

Koydemir, S., & Kahraman, H. (2015). Happiness on campus: The effects of an undergraduate wellbeing course on the wellbeing of students. 13th National Congress of Counseling and Guidance, Mersin, Turkey.

Lambert, L., Passmore, H. A., & Joshanloo, M. (2019). A positive psychology intervention program in a culturally-diverse university: Boosting happiness and reducing fear. *Journal of Happiness Studies, 20*(4), 1141-1162.

Lefevor, G. T., Jensen, D. R., Jones, P. J., Janis, R. A., & Hsieh, C. H. (2018). An Undergraduate Positive Psychology Course as Prevention and Outreach. https://doi.org/10.31234/osf.io/r52wg

Lopez, S. J., Magyar-Moe, J. L., Petersen, S. E., Ryder, J. A., Krieshok, T. S., O'Byrne, K. K., & Fry, N. A. (2006). Counseling Psychology's Focus on Positive Aspects of Human Functioning. *The Counseling Psychologist, 34*(2), 205–227. https://doi.org/10.1177/0011000005283393

Lyubomirsky, S., Dickerhoof, R., Boehm, J. K., & Sheldon, K. M. (2011). Becoming happier takes both a will and a proper way: An experimental longitudinal intervention to boost well-being. *Emotion, 11*, 391–402. doi:10.1037/a0022575

Maybury, K. K. (2013). The influence of a positive psychology course on student well-being. *Teaching of Psychology, 40*(1), 62-65. doi:10.1177/0098628312465868

Mongrain, M., & Anselmo-Matthews, T. (2012). Do positive psychology exercises work? A replication of Seligman et al. (2005). *Journal of Clinical Psychology, 68*, 382–389.

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity, 2*(3), 223-250.

Otake, K., Shimai, S., Tanaka-Matsumi, J., Otsui, K., & Fredrickson, B. L. (2006). Happy people become happier through kindness: A counting kindnesses intervention. *Journal of Happiness Studies, 7*(3), 361-375.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology. An introduction. *The American Psychologist, 55*(1), 5–14. doi:10.1037/0003-066X.55.1.5

Seligman, M. E. P., Rashid, T., & Parks, A. C. (2006). Positive psychotherapy. *American Psychologist, 61*(8), 774.

Seligman, M. E. P., Steen, T. A., Park, N., & Peterson, C. (2005). Positive psychology progress: empirical validation of interventions. *American Psychologist, 60*(5), 410–421. doi:10.1037/0003-066X.60.5.410

Seligman, M. E., Ernst, R. M., Gillham, J., Reivich, K., & Linkins, M. (2009). Positive education: positive psychology and classroom interventions. *Oxford Review of Education, 35*(3), 293-311.

Senf, K., & Liau, A. (2012). The effects of positive interventions on happiness and depressive symptoms, with an examination of personality as a moderator. *Journal of Happiness Studies,* 14, 591– 612.

Sheldon, K. M., & Elliot, A. J. (1999). Goal striving, need satisfaction, and longitudinal well-being: the self-concordance model. *Journal of Personality and Social Psychology, 76*(3), 482.

Sheldon, K. M., Abad, N., Ferguson, Y., Gunz, A., Houser-Marko, L., Nichols, C. P., & Lyubomirsky, S. (2010). Persistent pursuit of need-satisfying goals leads to increased happiness: A 6-month experimental longitudinal study. *Motivation and Emotion,* 34, 39–48. doi:10.1007/ s11031-009-9153-1

Shoshani, A., & Steinmetz, S. (2014). Positive psychology at school: A school-based intervention to promote adolescents' mental health and well-being. *Journal of Happiness Studies, 15*(6), 1289-1311.

Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*(5), 467-487.

Singh, B., Salve, S., & Shejwal, B. R. (2017). Role of gratitude, personality, and psychological well-being in happiness among young adults. *Indian Journal of Health & Wellbeing, 8*(6), 432-435.

Smith, E. J. (2006). The strength-based counseling model. *The Counseling Psychologist, 34*(1), 13-79.

Tarhan, S., & Bacanlı, H. (2015). Adaptation of Dispositional Hope Scale into Turkish: Validity and reliability study. *The Journal of Happiness &Well-Being, 3*(1), 1–14.

Uz Baş, A. (2015). Assessment of positive psychology course according to comments and life satisfaction levels of counselor candidates. *Journal of Education and Training Studies, 4*(3), 1–8. doi:10.11114/jets.v4i3.1195

Ünübol, H., Hızlı Sayar, G., Ekşi, K., Avşaroğlu, Z., Barış, B., Günaydın, Ş., Dolu, F. N., Yıldız, E., & Tarhan, N. (2018). Positive psychology course and its effect on well-beıng, social, and emotional intelligence. *The Journal of Neurobehavioral Sciences, 5*(3), 156-164. doi: 10.5455/JNBS.1538465211

Chapter 7

INVESTIGATION OF GREEN COMPUTING AWARENESS OF UNIVERSITY STUDENTS[1]

Can GÜLDÜREN[2]

1 This study was presented at the 1st International Social Sciences Congress of Ufuk University on 08-14 February 2021.
2 Assistant Professor, Ufuk University, Department of Computer Technologies,ORCID: https://orcid.org/0000-0002-9048-1228

1. INTRODUCTION

The Earth currently faces a lot of environmental issues. The environmental problems like pollution (air, water, soil/land, agricultural, light, noise) and climate change, global warming, deforestation, increased carbon footprint, loss of biodiversity, natural disasters, nuclear issues, urban sprawl, littering and landfills and many more affect every living, and society on the globe (Kindal, 2021).

Climate change, increased carbone footprint, and global warming are three of the most critical environmental issues facing humanity today. Today, our world faces the negatory effects of increased carbone footprint, global climate change and warming more intensely. Experts say that our planet will not meet requirements in the medium and long term if humankind consumes natural resources at the same speed today (Gökşen, Damar & Doğan, 2016). That is why implementing the necessary measures, improving our way of doing our work, and minimizing our negatory effects on nature have been essential elements. Information and communication technologies (ICT) emerge as a central element in tackling this crucial issue at this point. Now, ICTs emerge as solution tools against environmental threats as climate change, increased carbon footprint, and global warming,

After the Second World War, green thinking emerged when industrial production and consumption started to increase rapidly. Based on 'green thinking', it came to life as a solution to the global ecological crisis that emerged consequently the rapid economic growth, urbanization, and 'consumption culture' that occurred consequently the use of fossil fuels at an exponentially increasing rate (Şahin, 2017). In the context of green thinking, researchers have been investigating concepts such as green marketing, green supply chain, green production, green management, and green computing more recently in the literature.

Landwehr defines the green computing as '*the study and practice of energy-efficient and environmentally friendly use of computing resources*'. Murugesan (2008) states a broader definition of green computing as '*the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems, such as monitors, printers, storage devices, and networking and communication systems, efficiently and effectively with minimal or no impact on the environment*'. Chakraborty and his colleagues define '*the effective use of computer resources in practice*' as green computing (Chakraborty, Bhattacharyya, Nargiza, & Bedajna, 2009). Shinde and his colleagues define green computing (also used as green technology in the literature) as '*using computers, monitors, printers,*

storage devices, network resources, and other communication tools with the least damage for a sustainable environment' (Shinde, Nalawade & Nalawade, 2013). Recently, various international organizations have been conducting environmental research and reporting, and countries are developing plans on the subject. Worldwide scale companies implement several measures, and individuals who make up the society review their habits and make changes in their behaviors (Doğan, Bulut & Atasağun, 2016; Gökşen, Damar & Doğan, 2016; BTK, 2021).

The negatory effects of ICT development on the environment with an increasing human population are exposed. CO2 emissions are increasing by 6% every year. Researchers estimate that 12% of the amount of CO2 produced in the world in the 2020s will cause by ICT (Belkhir & Elmeligi, 2018; Malmodin & Lunden, 2018; GeSI, 2021). In the SMART 2020 report, researchers rate the rise of ICT as one of the most transformative improvements of recent years. ICT has become an increasingly integral part of the global economy, from smartphones, tablets, computers, and increased use of broadband networks to cloud computing. It has consistently contributed to economic growth and provided a better quality of life for all. Many problems in society, including the threat of carbon footprint, can be solved with ICT (Neves & Krajewski, 2012).

However, although ICT is a threat in this respect, it also offers opportunities along with green information strategies. For this reason, companies that produce ICT with the incentives of increasing energy consumption, greenhouse gas amount, and environmental groups have started to manufacture environmentally friendly green information technologies that consume less energy. In this context, manufacturing companies have developed virtualization technology in order to reduce costs and environmentally friendly systems (Çetin & Akgün, 2015; Aydemir, 2019; Coşar, 2019). In the SMARTer 2030 report, despite the growth in the ICT sector and the increase in greenhouse gas emissions, the global CO2 emission level in 2030 is expected to be 20% less than 2015 values, and global carbon dioxide emission expectation is to be 2.30 % through 2020, while this ratio is 1.97 % through 2030 (GeSI, 2021). Besides, it is stated in the report that with the use of ICT in other sectors, the ICT sector has a 9.7 times CO 2 reduction potential compared to its footprint. The transformative effect of the information sector emerges as an opportunity. The sector can obtain the same quantity of products by consuming less energy and resources by reducing the consumption of limited natural resources (Gökşen, Damar & Doğan, 2016).

It is possible to examine the ICT and environment interaction at three different levels. The primary/direct interaction level refers to making the ICT themselves more environmentally sensitive. The secondary/auxiliary

interaction level refers to the ICT usage in other sectors to reduce the negatory effects of these sectors on the environment. The broadest tertiary/ systemic interaction level includes the changes in human behavior in the long term, the ICT usage in various economic and social areas of life (BTK, 2021).

In this framework, the concept of green informatics is handled in three scales as small (activities for individual behavior and perception towards green computing), medium(corporate strategy and policies), and large (states' policies towards green informatics). This study aims to determine the university students green computing awareness levels and their behavior towards the concept of green computing (BTK, 2021).

2. CONCEPTUAL FRAMEWORK

The studies state that the concept of green computing (green information technology) dates back to the early 1990s, when the USA Environmental Protection Agency initiated the energy star program, the European Union issued a directive on the energy label, and similar activities emerged worldwide (Joumaa & Kadry, 2012). The studies emphasize that the development of green information technologies continues to take shape with many concepts and ideas put forward. The researchers state the highlights of these concepts as green computing, green computer, carbon footprint, carbon-free computing, electronic waste, energy star, energy-saving product, e-peat, TGTP certificates, respectively.

Carbon footprint (carbon profile) is defined as the total greenhouse gas emission caused by the individual, event, organization, or product, expressed by the amount of carbon dioxide (Youmatter, 2021). The electronic waste concept defines the destroyed state of electronic products such as computers, televisions, mobile phones. The concept of e-waste differs chemically and physically from other urban and industrial waste. The e-waste framework covers both valuable and hazardous materials that require special attention, as well as recycling methods to prevent factors that are harmful to human health and cause environmental pollution (Kumar, Holuszko & Espinosa, 2017). The increasing use of developing ICT and the continuous introduction of new electronic products and new models to the market to generate more income by the producers cause a severe environmental problem. Disposal of computers and all kinds of electronic equipment that have expired, outdated, and no longer used without harming the nature is considered a severe difficulty all over the world (Patil & Ramakrishna, 2020).

Experts define energy productivity as a way of managing and curbing the increase in energy consumption. Energy productive products are called energy-efficient products. If something can serve more with less energy

input or the same energy input, it is called energy-efficient (EESI, 2021). The Energy Star Label award is given to the products that manage to reduce energy use while increasing efficiency. The energy star label is suitable for computer monitors, television systems, refrigerators, air conditioners, and other different types of products. The first benefit within the scope of green computing was the stand-by mode that came into play when consumers were not used in electronic devices (Joumaa & Kadry, 2012).

The Electronic Product Environmental Assessment Tool (EPEAT) is a free and reliable environmental production rating resource that facilitates the selection of high-performance electronic devices and supports organizations' information technology and continuity goals(EPEAT, 2021). EPEAT certificate is given in one of the gold, silver, or bronze categories depending on whether many criteria are met, such as product life, whether the product is recyclable, energy consumption efficiency.

There are many studies in the literature regarding these concepts considered within the scope of green information technologies. Some of these studies address the issue in terms of ensuring energy efficiency, reducing the energy consumption of mobile devices, computers, and monitors, sustainable environment, recycling products, or eliminating e-waste and policies developed for this purpose (Çetin & Akgün, 2016; Gökşen, Damar & Doğan, 2016; Damar & Gökşen, 2018) . Other studies on green informatics are mostly related to the knowledge and awareness level and behavior of individuals (Ahmad, Bello & Nordin, 2013; Band, Bose & Saxena, 2015; Doğan, Bulut & atasağun, 2016; Semakula & Samsuri, 2016; Dalvi-Esfahani et al, 2020).

Today, there is no country in the world where ICT is not used to provide high-quality higher education. ICT has continued to improve everyday life, making life easier and more convenient, and making the teaching-learning process more useful through the internet, computers, and other technology-based educational resources. ICT has also made a significant contribution to environmental issues. University students around the world are a vital percentage of ICT user groups. According to the Global Carbon Project Research Group Report 2019, they are members of the crowd responsible for 2% of global carbon emissions from computing activities. In today's higher education environment, ICT shapes almost every aspect of learning and scholarship, and students will spend most of their adult life in a technology-driven world. Therefore, students must be educated and trained to make effective use of ICT in a responsible and ecologically responsible manner. ICT literacy should be complemented with environmental literacy. However, there is little information available to tell us about this concerning ICT use. This study aims to reveal the level of green IT awareness among university students and the relationship between their use of computers and

their impact on the environment. Accordingly, the study aims to discuss the following objectives.

1. What is the level of green computing term and concept knowledge of university students?

2. Does green computing terms and concepts knowledge of university students differ significantly according to gender and study field?

3. What is the level of green computing technology behaviors of university students?

4. Does university students green computing technology behaviors differ significantly according to gender and study field?

3. METHOD

In this section, explanations are given about the model used in the research, the universe and sample of the research, the measurement tools used in the study, the data collection and analysis processes.

3.1. Research Model

The research model (pattern) is the arrangement of the conditions that ensure the answer to the research questions or the testing of the research hypotheses, and the data gathering and analysis economically and following the purpose of the research (Balcı, 2009). Scanning model is a research model based on examining events, facts, and situations as they are and presenting the findings in this direction (Karasar, 2012). In the study, university students' green computing awareness levels were examined and shown as they were.

3.2. Participants

The researcher preferred the criterion method of sampling in this study. Criterion sampling is the sampling of units that have the characteristics determined for the sample subject to research. The participants consist of students from four different departments in a vocational school affiliated with a foundation university. The study group consists of 206 vocational school students enrolled in Computer Technologies, Management Organization, Accounting and Tax Practices, and Foreign Languages and Cultures Departments in the 2019-2020 period.

3.3. Data Collection Instrument

The study utilized a self-developed green computing questionnaire with four sections. First Section contained demographic items requesting details about gender, department, study field (ICT-related or non-ICT related), and computer-usage experience. The second section included eight

(8) Likert-type items that requested students to rate their knowledge levels of the following terms and concepts: green computing, green PC, carbon footprint, carbon-free computing, e-waste, energy star, e-peat, and Turkey green technology policy. The third section contained twenty (20) Likert-type items assessing students' objective knowledge of green computing. The used response categories were one to five (none, low, moderate, quite high, high) for both sections. These questions were prepared by compiling studies identified in the literature (Ahmad, Bello & Nordin, 2013; Doğan, Bulut &Atasağun, 2016). The fourth section contained one (1) open-ended question investigating students thoughts on how technological products harm the environment.

3.4. Data Collection and Anaysis

The researcher obtained research permission from the University Ethics Committee (Meeting No: 2020/2, Decision No: 2020/25) and Vocational School Management to apply the questionnaire to the students through the lecturers on 05.03.2020. The data collection method was the questionnaire technique in the research. The researcher distributed 300 copies of the questionnaire to collect data among the university students. The university students participated in the study voluntarily. The researcher did not include 94 forms in the analysis due to incomplete, incorrect coding, or leaving blank. The researcher carried out analyzes with the data collected from the remaining 206 participants. The data analysis included a combination of descriptive statistics (percentages and frequency counts), Mann-Whitney U tests, and chi-square test each, addressing research objectives, respectively.

4. FINDINGS

In this part of the study, the findings and comments obtained from the research are discussed under the subheadings.

4.1. Descriptive Findings and Comments

In this section, Table 1 presents the data obtained from the gender, field of study, computer usage education (CUE), and CUE competence (relating to green computing) of the university students participating in the research. The gender of 39.32% of the students participating in the study is female (n=81), and the gender of 60.68% is male (n=125). The study field of 48.06% of the students participating in the study is ICT (n=99), and the study field of 51.94% is non-ICT (n=107). 51.46% of the students have computer usage education (n = 106), 48.54% do not have computer use education (n=100). While 48.06% of the students are in the computer technologies department (n=99), the remaining 51.94% are from the other

departments (management organization, accounting & tax practices, foreign languages & cultures).

Table 1. Descriptive Statistics of Students

Variables	Categories	f	%
Gender	Female	81	39,32%
	Male	125	60,68%
Study Field	ICT	99	48,06%
	Non-ICT	107	51,94%
Computer Usage Education (CUE)	Educated	106	51,46%
	Not educated	100	48,54%
Green IT issues in CUE	Sufficient	38	35,85%
	Insufficient	68	64,15%
Department	Computer Technologies (CP, CT, CST)	99	48,06%
	Management Organization (HIM, BM)	40	19,42%
	Accounting & Tax Practices (A&TP)	26	12,62%
	Foreign Languages & Cultures (AE&TS)	41	19,90%
General Total		206	100%

4.2. Findings Related to Knowledge of Green Computing Terms and Concepts

Figure 1 presents students evaluation of their green computing awareness on the five levels indicated (None, Low, Moderate, High Quite, High). According to the students' answers, the percentage that they had no idea about eight environmental computing terms and concepts is too high to be underestimated (the lowest to the highest; E-waste: %38.35, Green computing: %42.72, Turkey green technology policy: %43.20, Carbon footprint: 44.66, Energy star: 45.15, Green PC:46.60, E-PEAT:48.06 and Carbon-free computing:50.00 respectively). Similarly, according to the students' answers, the percentage that they had no idea or low about eight environmental computing terms and concepts is too high to be underestimated (the lowest to the highest; Green computing: %61.17, E-waste:%61.65, Carbon footprint:%61.65, Green PC:%65.53, Energy star: %68.93, E-PEAT: %68.93, Turkey green technology policy: %69.42, and Carbon-free computing: %70.39 respectively). According to the students'

answers, the percentage that they had idea about eight environmental computing terms and concepts is too low to be underestimated (the lowest to the highest; Turkey green technology policy (n=5): %2.43, Carbon-free computing (n=5):%2.43, Green computing (n=6): %2.91, Green PC (n=6): %2.91, E-PEAT (n=6): %2.91, Energy star (n=8): %3.88, E-waste (n=10): %4.85, and Carbon footprint (n=13): %7.28 respectively). The results reveal that the majority of the university students are insufficient in green computing awareness. Since the data were not normally distributed, the researcher used the non-parametric Mann-Whitney U test for independent samples. The responses to the terms and concept items were summed and then analyzed to check for the influences of gender and field of study. Table 2 and Table 3 present the results.

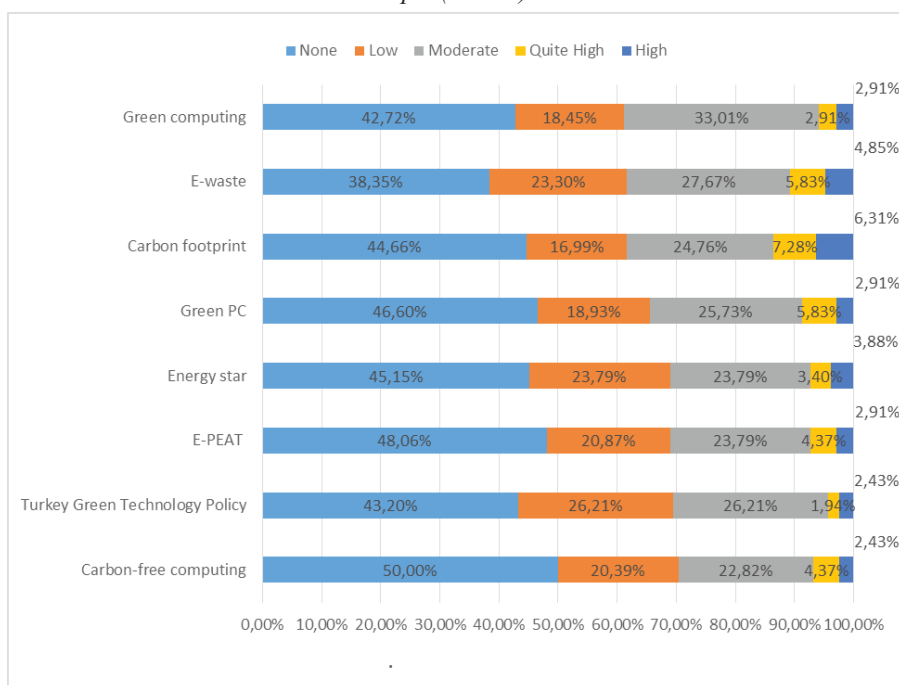*Figure 1. University Students' Knowledge of Green Computing Terms and Concepts (n=206)*

Table 2. Impact of Gender on Students' Knowledge of Green Computing Terms and Concepts: A Summary of Independent Samples Mann-Whitney U Test Results (N = 206)

Variable	Categories	n	Mean Rank	Sum of Ranks	U	p
Green Computing	Female	81	90,87	7360,50	4039.50	**0.009**
	Male	125	111,68	13960,50		

Green PC	Female	81	90,74	7350,00	4029.00	**0.008**
	Male	125	111,77	13971,00		
Carbon footprint	Female	81	89,69	7265,00	3944.00	**0.005**
	Male	125	112,45	14056,00		
Carbon-free computing	Female	81	93,30	7557,50	4236.50	**0.033**
	Male	125	110,11	13763,50		
E-waste	Female	81	97,12	7867,00	4546.00	0.195
	Male	125	107,63	13454,00		
Energy star	Female	81	95,01	7695,50	4374.50	0.079
	Male	125	109,00	13625,50		
E-PEAT	Female	81	94,91	7687,50	4366.50	0.074
	Male	125	109,07	13633,50		
Turkey Green Technology Policy	Female	81	99,51	8060,50	4739.50	0.411
	Male	125	106,08	13260,50		

*significant at $p < 0.05$

According to the gender variable, the analysis results reveal that males have significantly higher knowledge of green computing terms and concepts than females such, as green computing, green PC, carbon footprint, and carbon-free computing. Table 2 reveals the findings obtained for the related terms respectively (Green Computing: =111.68> 90.87, U=4039.50, p>0.009; Green PC: 111.77 > 90.74, U=4029.00, p>0.008; Carbon Footprint: 110.11>93.30, U=3944.00, p> 0.005; Carbon-free Computing: 110.11>89.69, U=4236.50, p>0.033). The differences were statistically significant, but in terms of practical importance, it is considered small at Cohen's effect size of d = 0.18, d=0.18, d=0.20 and d=0.15 respectively, just nearly the threshold of 0.20 for small effect sizes. According to the gender variable, there is no significant difference between other terms and concepts (e-waste, energy star, E-PEAT, and Turkey Green Technology Policy).

Table 3. Impact of Study Field on Knowledge of Green Computing Terms and Concepts: A Summary of Independent Samples Mann-Whitney U Test Results (N = 206)

Variable	Categories	n	Mean Rank	Sum of Ranks	U	p
Green Computing	ICT	99	116,31	11514,50	4028.50	**0.002**
	Non-ICT	107	91,65	9806,50		
Green PC	ICT	99	113,87	11273,00	4270.00	**0.010**
	Non-ICT	107	93,91	10048,00		

|						
Carbon footprint	ICT	99	118,46	11728,00	3815.00	**0.000**
	Non-ICT	107	89,65	9593,00		
Carbon-free computing	ICT	99	110,46	10935,50	4607.50	0.81
	Non-ICT	107	97,06	10385,50		
E-waste	ICT	99	110,50	10939,50	4603.50	0.89
	Non-ICT	107	97,02	10381,50		
Energy star	ICT	99	110,48	10938,00	4605.00	0.85
	Non-ICT	107	97,04	10383,00		
E-PEAT	ICT	99	114,54	11339,50	4203.50	**0.006**
	Non-ICT	107	93,29	9981,50		
Turkey Green Technology Policy	ICT	99	104,59	10354,00	5189.00	0.789
	Non-ICT	107	102,50	10967,00		

*significant at p < 0.05

According to the study field variable, the analysis results reveal that the ICT field students have significantly higher knowledge of green computing terms and concepts than the non-ICT field students such, as green computing, green PC, carbon footprint, and E-PEAT. Table 3 reveals the findings obtained for the related terms respectively (Green Computing: =116.31> 91.65, U=4028.50, p>0.002; Green PC: 113.87 > 93.91, U=4270.00, p>0.010; Carbon Footprint: 118.46>89.65, U=3815.00, p> 0.000; E-PEAT: 114.54>93.29, U=4236.50, p>0.033). According to the gender variable, there is no significant difference between other terms and concepts (carbon-free computing, e-waste, energy star, and Turkey Green Technology Policy).

4.3. Findings Related to Green Computing Technology Behaviors

Figure 2 presents students' evaluation of their green computing technology behaviors on the five levels indicated (None, Low, Moderate, High Quite, High). The %15.89 proportion of students show that they do not know all the questionnaire items in general. These ranged from 1.94% (on the questionnaire item 'I print only when necessary') to 30.58% (on the questionnaire item 'I turn on all peripherals every time the computer boots'). The %32.39 proportion of students state that they know a little bit/none all the questionnaire items in general. These ranged from 14.08% (on the questionnaire item 'I print only when necessary') to 51.94% (on the questionnaire item 'I turn on all peripherals every time the computer

boots'). The %40.11 proportion of students show that they know all the questionnaire items in general. These ranged from 16.99% (on the questionnaire item 'I will purchase it whenever a new computer model is available') to 69.42% (on the questionnaire item 'When I am not using my computer, I turn off its screen'). The results reveal that the majority of university students are sufficient in green computing technology behaviors. Since the data were not normally distributed, the researcher used the non-parametric Mann-Whitney U test for independent samples. The responses to the terms and concept items were summed and then analyzed to check for the influences of gender and field of study. Table 4 and Table 5 present the results.

Figure 2. University Students' Green Computing Technology Behaviors (n=206)
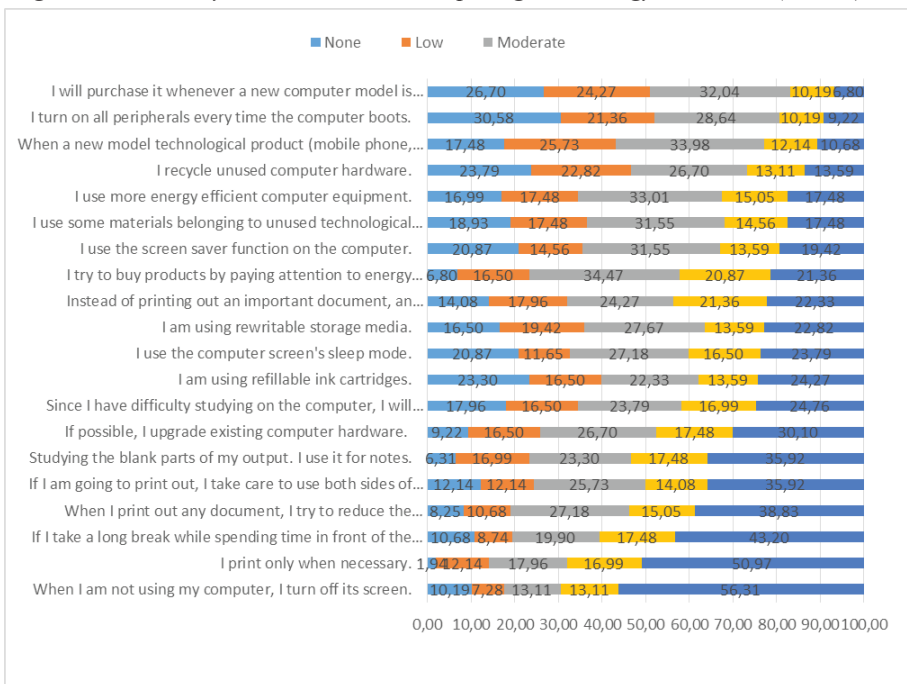
According to the gender variable, the analysis results reveal that males have significantly higher green computing technology behaviors than females. Table 4 reveals the findings obtained for the related behaviors respectively (C04[If I take a long break while spending time in front of the computer, I close it completely]: =108.55> 95.70, U=4253.50, p>0.042; C14[I use some materials belonging to unused technological products for other purposes]: 112.30 > 89.93, U=3963.00, p>0.007; C20[If possible, I upgrade existing computer hardware]: 110.70>92.39, U=4162.50, p>0.027). The differences were statistically significant, but in terms of practical importance, it is considered small at Cohen's effect size of d = 0.14, d=0.19, and d=0.15 respectively, just nearly the threshold of 0.20 for

small effect sizes. According to the gender variable, the analysis results reveal that females have significantly higher green computing technology behaviors than males. Table 4 reveals the findings obtained for the related behaviors respectively (C03[When I am not using my computer, I turn off its screen]: =113.49> 97.03, U=4196.00, p>0.022; C09[Since I have difficulty studying on the computer, I will print the document that I will study]: 116.30 > 95.21, U=4026.00, p>0.011). The differences were statistically significant, but in terms of practical importance, it is considered small at Cohen's effect size of d=0.16, and d=0.18 respectively, just nearly the threshold of 0.20 for small effect sizes. According to the gender variable, there was no significant difference between other behaviors.

Table 4. Impact of Gender on Students' Green Computing Technology Behaviors: A Summary of Independent Samples Mann-Whitney U Test Results (N = 206)

Variable	Categories	n	Mean Rank	Sum of Ranks	U	p
C03	Female	81	113,49	9192,50	4196.00	0.022
	Male	125	97,03	12128,50		
C04	Female	81	95,70	7752,00	4253.50	0.042
	Male	125	108,55	13569,00		
C09	Female	81	116,30	9420,00	4026.00	0.011
	Male	125	95,21	11901,00		
C14	Female	81	89,93	7284,00	3963.00	0.007
	Male	125	112,30	14037,00		
C20	Female	81	92,39	7483,50	4162.50	0.027
	Male	125	110,70	13837,50		

*significant at p < 0.05

C03. When I am not using my computer, I turn off its screen.

C04. If I take a long break while spending time in front of the computer, I close it completely.

C09. Since I have difficulty studying on the computer, I will print the document that I will study.

C14. I use some materials belonging to unused technological products for other purposes.

C20. If possible, I upgrade existing computer hardware.

Table 5. Impact of Study Field on Students' Green Computing Technology Behaviors: A Summary of Independent Samples Mann-Whitney U Test Results (N = 206)

Variable	Categories	n	Mean Rank	Sum of Ranks	U	p
C10	ICT	99	115,26	11410,50	4132.50	0.004
	Non-ICT	107	92,62	9910,50		
C14	ICT	99	118,65	11746,50	3796.50	0.000
	Non-ICT	107	89,48	9574,50		
C19	ICT	99	112,11	11098,50	4444.50	0.041
	Non-ICT	107	95,54	10222,50		
C20	ICT	99	117,74	11656,00	3887.00	0.001
	Non-ICT	107	90,33	9665,00		

*significant at p < 0.05

10. I try to reduce the number of pages of the document when printing any document.

14. I use some materials belonging to unused technological products for other purposes.

19. I recycle unused computer hardware.

20. If possible, I upgrade existing computer hardware.

According to the gender variable, the analysis results reveal that ICT students have significantly higher green computing technology behaviors than non-ICT students. Table 5 reveals the findings obtained for the related behaviors respectively (C10[I try to reduce the number of pages of the document when printing any document]: =115.26> 92.62, U=4132.50, p>0.004; C14[I use some materials belonging to unused technological products for other purposes]: 118.65> 89.48, U=3796.50, p>0.000; C19[I recycle unused computer hardware]: 112.11>95.54, U=4444.50, p>0.041; C20[If possible, I upgrade existing computer hardware]: 117.74>90.33, U=3887.00, p>0.001). The differences were statistically significant, but in terms of practical importance, it is considered small at Cohen's effect size of d = 0.20, d=0.25, d=0.14, and d=0.24, respectively, just nearly the threshold of 0.20 for small effect sizes. According to the study field variable, there is no significant difference between the other behaviors.

Table 6. Relationship between terms and concepts of green computing and behaviors of green computing technology

Behaviors/Terms & Concepts	Green Computing	Green PC	Carbon Footprint	Carbon-free Computing	E-waste	Energy Star	E-PEAT	TGTP
01. I use the screen saver function on the computer.	,021	,051	-,005	-,047	,013	,006	,064	,037
02. I use the computer screen's sleep mode.	-,038	-,003	-,016	,008	,067	-,051	-,011	,073
03. When I am not using my computer, I turn off its screen.	,024	,029	,058	,039	,125	,055	,016	,063
04. If I take a long break while spending time in front of the computer, I close it completely.	**-,138***	**-,142***	-,039	-,071	-,092	-,090	-,108	-,036
05. I turn on all peripherals every time the computer boots.	**,181****	**,219****	**,299****	**,173***	**,218****	**,200****	**,251****	**,252****
06. I print only when necessary.	-,013	-,060	-,006	**-,140***	,026	-,111	-,069	-,032
07. If I am going to print it out, I take care to use both sides of the paper. 08. Instead of printing out an important document, an external disk, etc. I move on devices.	-,003	,011	,037	,008	,083	-,016	-,003	-,018
09. Since I have difficulty studying on the computer, I will print the document that I will study.	,122	,115	**,150***	,129	,122	,101	,080	,045
10. I try to reduce the number of pages of the document when printing any document.	-,040	-,024	-,049	,062	-,004	-,035	,022	-,011

11. I try to buy products by paying attention to energy efficiency in technological products.	-,051	-,075	,017	-,056	-,029	-,100	-,069	-,075
12. Studying the blank parts of my output. I use it for notes.	,107	**,139**[*]	,042	,128	,041	,099	,045	,071
13. When a new model technological product (mobile phone, computer, etc.) comes out, I try to buy it.	,018	,002	,061	-,037	,023	-,019	-,034	-,082
14. I use some materials belonging to unused technological products for other purposes.	,033	,095	,045	**,157**[*]	,010	,114	,073	,126
15. I use more energy-efficient computer equipment.	,136	**,211**[**]	**,202**[**]	**,248**[**]	**,159**[*]	,150[*]	**,154**[*]	,130
16. I am using refillable ink cartridges.	,109	**,138**[*]	,052	,112	,128	**,195**[**]	,096	**,153**[*]
17. I am using rewritable storage media.	,074	,021	,122	,058	,087	,057	,082	,069
18. I will purchase it whenever a new computer model is available.	**,167**[*]	**,173**[*]	**,188**[**]	**,266**[**]	**,175**[*]	**,229**[**]	**,180**[**]	**,166**[*]
19. I recycle unused computer hardware.	**,187**[**]	**,199**[**]	,103	**,256**[**]	**,138**[*]	**,246**[**]	**,178**[*]	**,172**[*]
20. If possible, I upgrade existing computer hardware.	**,148**[*]	**,155**[*]	,122	**,150**[*]	,136	,072	,088	,053

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

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6 shows the correlation between behaviors and terms/concepts. The correlation coefficient of 1.00 indicates a perfect positive relationship; -1.00 indicates a correctly negative relationship, and 0.00 indicates no relationship. Correlation coefficient, as absolute value, between 0.70-1.00, high; Between 0.70-0.30, medium; If it is between 0.30-0.00, it reveals a low-level relationship. Table 6 reports that all relations are positive low-level except fourth behavior.

5. CONCLUSION AND RECOMMENDATIONS

Green computing and individuals' attitudes and behaviors towards green computing have been examined more in the literature in recent years. However, there are few studies targeting university students. The study aimed to investigate the awareness level and behavior of university students about green computing. The researcher investigated the relationship between students' knowledge, gender and awareness about green computing and their behavior towards green information technologies. The analysis results contain remarkable findings about the awareness and students' behavior towards green computing and technologies.

Some interesting findings emerged from the study. It is assumed that young people who use technology intensively and integrate them into their daily life have a high interest and knowledge in green computing. However, the findings indicate that the knowledge and awareness levels of the generation Y about green computing terms and concepts are generally low. Considering that generation Y constitutes the universe of the research, the finding obtained is surprising. The reason may be that students (generation Y) are not ready for sustainable technology management or they are more wasteful about their technological product usage. Simultaneously, although they are educated in technology and its use, they may not have received training on the more sustainable use of information technologies. Simultaneously, although they are educated in technology and its use, they may not have received training on the more sustainable use of information technologies. The low awareness level about green computing terms/concepts parallels the literature (Bandi, Bose & Saxena, 2015; Doğan, Bulut, Atasağun, 2016; Semakula & Samsuri, 2016). The low knowledge level and the low awareness level of the green computing concept is a global problem for students, based on the parallels in the studies conducted in different countries.

The situation is similar in the behaviors associated with green computing. The frequency of the universsity students to display behaviors is low or medium. The all behaviors frequency, except the act of shutting down the computer when not in use or after a long break, is relatively low. This situation indicates that technological products are not used with

the green computing awareness. This finding also supports the lack of education for university students in this area.

Besides, based on the findings, significant gender differences were identified among university students in knowledge level, green computing awareness, and behaviors related to green computing technologies. Men have higher levels of knowledge of some green computing terms and concepts (green computing, green PC, carbon footprint, carbon-free computing) than females. However, this difference partially changes direction in behavior. Based on the findings, while women behave by green computing in two questionnaire items, men behave more fitly for green computing than women in only three questionnaire items. These differences between men and women are consistent with the studies in the literature (Ahmet, Bello & Nordin, 2013; Birchi, 2015; Doğan, Bulut & Atasağun, 2016).

In the literature review, There was not a scale addressing the concept of green computing. In this study, the researcher has investigated some dimensions of green computing. Future studies may need to expand to deal with all aspects of green computing. The lack of scale on the subject is an academic gap that needs to be filled within the scope of green computing. In this context, the study is valuable as it evaluates students' knowledge and awareness levels and behaviors towards green computing.

6. REFERENCES

Ahmed, T. B. T., Bello, A. and Nordin, M. S. (2013). Exploring malaysian university students' awareness of green computing. *GSTF International Journal on Education*, 1 (2), 92-102.

Aydemir, E. (2019). Comparison of the printing areas for commonly used font types: Example of green information. European Journal of Technique, 9 (1), 37-43. DOI: 10.36222/ejt.577182

Balcı, A. (2009). Sosyal bilimlerde araştırma yöntem, teknik ve ilkeler. (7.b.). Ankara: Pegem Akademi.

Bandi, R. K., Bose, A. K. And Saxena, A. (2015). Exploring Green IT awareness and adoption among indian students. *SIGMIS-CPR '15: Proceedings of the 2015 ACM SIGMIS Conference on Computers and People Research,* 87-96. DOI: 10.1145/2751957.2751964

Belkhir, L. and Elmeligi, A. (2018). Assessing ICT global emissions footprint: Trends to 2040 & recommendations. *Journal of Cleaner Production*, 177, 448–463. doi:10.1016/j.jclepro.2017.12.239

Birchi, B. A. (2015). Assessing university students' attitude toward green computing practices. *Proceedings of 2015 International Conference on Future Computational Technologies (ICFCT'2015),* 27-33.

BTK (2021). Yeşil Bilişim Teknolojilerinin Yaygınlaştırılmasının Önemi ve Türkiye İçin Öneriler. Ankara: Bilgi Teknolojileri ve İletişim Kurumu. https://www.btk.gov.tr/arastirma-raporlari

What is a carbon footprint? What should be my carbon footprint? How to reduce my carbon footprint?. (2021 February 20th). Youmatter. https://youmatter.world/en/definition/definitions-carbon-footprint/.

Coşar, M. (2019). Carbon footprint in data center: A case study. Fresenius Environmental Bulletin, 28 (2)

Çetin, H. and Akgün, A. (2015). Yeşil bilişim teknolojileri bağlamında sanallaştırılmış ve klasik sistemlerin karşılaştırılması. Uluslararası Alanya İşletme Fakültesi Dergisi, 7 (2), 131-142.

Chakraborty, P., Bhattacharyya, D., Nargiza, S.Y. and Bedajna, S. (2009). Green computing: Practice of efficient and eco-friendly computing resources. *International Journal of Grid and Distributed Computing*, 2(3):33-38.

Dalvi-Esfahani, M., Alaedini, Z, Nlashi, M, Samad, S., Asadi, S, and Mohammadi, M. (2020). Student' green information technology behavior: Beliefs and personality traits. *Journal of Cleaner Production,* 1-12. DOI: 10.1016/j.jclepro.2020.120406

Damar, M, Gökşen, Y. (2018). Yeşil bilişim yaklaşımıyla kullanıcı ve kurum odaklı enerji yönetim sistemi. *Dokuz Eylül Üniversitesi Mühendislik Fakültesi Fen ve Mühendislik Dergisi,* 20 (58) , 259-274.

Doğan, O., Bulut, Z. A., & Atasağun, H. G. (2016). Türkiye'de Yeşil Bilişim: Y kuşağının yeşil bilişim algısına yönelik bir araştırma. *Uluslararası Sosyal Araştırmalar Dergisi,* 9(47), 798-805.

EESI (2021). Energy efficiency. https://www.eesi.org/topics/energy-efficiency

EPEAT (2021). Overview of the EPEAT Ecolabel. https://www.epeat.net/about-epeat

GeSI, (2021) Smarter, 2030, ICT Solutions for 21st Century Challenges. http://smarter2030.gesi.org

Gökşen, Y., Damar, M. and Doğan, O. (2016). Yeşil Bilişim: Bir kamu kurumu örneği ve politika önerileri. *Ege Akademik Bakış*, 16 (4), 673-686.

Joumaa, C. and Kadry, S. (2012). Green IT: Case studies. Enegy Procedia, 16(b), 1052-1058. DOI: 10.1016/j.egypro.2012.01.168

Karasar N (2012). Bilimsel Araştırma Yöntemi. Ankara: Nobel Akademik Yayıncılık.

Kinhal, V. (2021, February 09). List of 30 top environmental concerns. Lovetoknow. https://greenliving.lovetoknow.com/Top_30_Environmental_Concerns

Kumar, A., Holuszko, M. And Espinosa, D. C. R. (2017). E-waste: An overview on generation, collection, legislation and recyling practicing. Resources, Conversation and Recycling, 122, 32-42. DOI: 10.1016/j.resconrec.2017.01.018

Landwehr, C. E. (2005). Green computing. IEEE Security & Privacy Magazine, 3(6), 3-3. DOI: 10.1109/MSP.2005.148

Malmodin, J., and Lundén, D. (2018). The Energy and Carbon Footprint of the Global ICT and E&M Sectors 2010–2015. *Sustainability*, 10(9), 3027. doi:10.3390/su10093027

Mueen, U., Safiya, O. and Tanzila, S. (2017). Green ICT framework to reduce carbon footprints in universities. *Advances in Enegry Research*, 5 (1), 1-12. DOI: 10.12989/eri.2017.5.1.001

Murugesan, S. (2008). Harnessing green IT: Principles and practices. IT Professional, 10 (1), 24-33. DOI: 10.1109/MITP.2008.10

Neves, L. And Krajewski, J. (2012). GESI SMARTer 2020: The role of ICT in driving a sustanable future. Global Sustainability Insitiative. http://www.gesi.org

Patil, R. A. And Ramakrishna, S. (2020). A comprehensive analysis of e-waste legislation worldwide. *Environmental Science and Pollution Research,* 27, 14412-14431.

Semakula, I. And Samsuri, S. (2016). Green Computing Knowledge among Students in a Ugandan University. *2016 6th International Conference on Information and Communication Technology for The Muslim World (ICT4M), 199-204.* DOI:10.1109/ict4m.2016.049

Shinde, S., Nalawade, S. and Nalawade, A. (2013). Green computing: Go green and save energy. *International Journal of Advanced Research in Computer Science and Software Engineering*, 3(7):1033-1037.

Şahin, Ü. (2017). Sunuş: Yeşil Düşünceden Yeşil Ekonomiye. In A. A. Aşıcı ve Ü. Şahin (Eds.), *Yeşil Ekonomi* 3rd Ed. (pp.3-8). İstanbul: Yeni İnsan Yayınevi.

Chapter 8

THE EFFECTS OF THE PLAY ON THE

DEVELOPMENT OF CHILDREN

Şeyda İNCE SEZER[1]
Nagehan AKGÜL[2]

1 Arş Gör. Dr. Şeyda İNCE SEZER, Harran Üniversitesi, Şanlıurfa, Türkiye, e-mail: seydagul34@gmail.com, ORCİD: 0000-0002-4475-677X
2 Öğr. Gör. Nagehan AKGÜL, Tokat Gaziosmanpaşa Üniversitesi, Tokat Sağlık Hizmetleri MYO, Çocuk Bakımı ve Gençlik Hizmetleri Bölümü, nagehan.akgul@gop.edu.tr., ORCID: 0000-0001-6786-0820

Play Concept

Play is a concept as old as human history. Although there is no exact definition, the child's play is his world. The child's play; It is his occupation where he can drain his energy, find the opportunity to experience the feeling of success and loss, learn to share, corporate, how to act as a group, understand taking responsibility, fulfilling the responsibility he takes, supporting his creativity and development, and having the opportunity to practice real life. From the moment, the baby is born, play enters his life and accompanies him throughout his growth and development. For example, play development starts with imitating sounds turns into a play with songs in direct proportion to the child's language development. In other words, it is parallel with the development of the child. The play of child grows and develops with him. Play can be defined as a laboratory where the child can experience everything he hears, sees and wants to discover (Ünal, 2009). With play, the child also continues his personal development and positive effects of development also on empathy and communication skills (Akgül, 2020).

Many definitions of the game have been made. Some of these definitions are:

• Montaigne stated that it was the child's most real activity.

• Montessori called it "play is the child's practice."

• Piaget emphasized the concept of "harmony" while defining the play.

• Froebel stated the play as the seeds that sprinkled on the future of the child (Ernst, 2017; Koçyiğit, Tuğluk, Kök, 2007; Tuğrul, Ertürk, Özen Altınkaynak, Güneş, 2014).

• According to Lazarus, they are independent activities that are formed by themselves, have no specific purpose, and give happiness to the person (Çakmak & Elibol, 2011).

• According to Pestalozzi, it is the instinct of the human birth. He qualifies all motion actions as a play. He also associates the child's being in motion with play (Poyraz, 2003).

• Freud looks at the play from a psychoanalytic perspective.

He emphasizes that play is a way of dealing with social problems by preventing one's fears and internal conflicts (Öztürk, 2001).

• J.J. Rousseau emphasizes that it is about instinct. It is formed by itself and enables learning. • Plato expressed it is like a guide which exists in the child's life (Aksoy & Çiftçi, 2014).

• According to Ghazali, it is a concept that enhances the latent power of learning by improving the child's memory and relaxes the child (Öncü, 2011).

• Entertainment that improves ability and intelligence, has established rules and ensures good time (TDK, 2011).

It is impossible to make a definition by keeping the developing child separate from the concept of play. There is a spiral link between play and development. The play of the child supports his development (Aynal, 2007). The game has existed since the birth of the child, whose goals and achievements are different in different times and conditions; It is the product of movement, thoughts and emotions that allow one to know himself. (Tuğrul and Metin, 2006). Play is a vital requirement for the child. In addition, it is a tool that allows the child to use his energy. Play is the most effective and effortless way to give the intended gains for the child (Sarı, 2011). A behavior that is planned to be taught in the long term by taking a lesson can be gained in a short time with play (Demiral, 1989).

The game has five important features;

1. Play is an enjoyable and pleasurable activity.

2. The person's inner motives, there is no need for outside intervention.

3. The play is haphazard, and the principle of volunteerism is essential.

4. Play requires active participation.

5. Play has some method of what is a game and what is not (Garvey, 2001).

There are types according to the places where the game is played:

* Outdoor play

* Indoor play

Indoor play Indoor play:

Children choose indoor places to play because of seasonal changes, epidemics, insufficiency of playgrounds, and problems caused by unsafe

environments. Plays in this game type; They are all games played in indoor environments such as home, classroom, playroom. These plays can be games with rules or without rules, can be played in groups or alone, can be played on the table or on the floor. Although, it is a closed area, the child exhausts his energy. However, while the child spends his energy, on the one hand, he loads static electricity in his body in a closed, mostly covered area with plastic items. Indoor spaces are far from clean air as well as the necessary hygiene controls are not carried out, and children play with limited materials in these areas. These places are preferred especially in cold weather and winter seasons. Playing in the classroom or playgrounds limits both the creativity and the movement of children. Children cannot run, jump, or jump as they wish, and cannot perform the movements they want to do. However, since it is a closed environment, the games that the child will play are determined (Aksoy & Dere Çiftçi, 2017). The materials to be played by children and the activities they can do in indoor games are determined. Children cannot develop their creativity in an environment where toys and games they can play are certain. Children who do not go beyond these games, and toys cannot make their own toys in this environment. It has to stick to the indoor games and toys (Morrier & Ziegler, 2018). Furthermore, the family may not be able to provide enough space for the child to play indoors. The child who cannot act as he wishes will have some problems in his mental health and will be angry because he cannot fully discharge his energy. Parents who encounter such a situation may experience problems in the family order, which should be in their families.

Outdoor Play:

When the literature is taken into consideration, one of the important benefits of using the outdoor space is providing a space for children to move freely as they wish. The movement of the child in his play is defined as one of the most natural and strongest situations. As many field writers have stated, children who play outside can build something creatively and explore the world on their own, and gain experiences about natural events such as weather events, seasonal changes, and shadows of objects. When children play outside, they move away from the confrontation with their friends. It provides cooperation and the decrease of disappointment possibility. While the children are inside people expect them to stand quietly without moving. However, when they are outside, they pushed the limits of who they are and what they can do without hesitation to be warned. When children are outside. they might run and make noise (Bilton, 2002; Ouvry, 2003; Rivkin, 1995; Rivkin, 1998). The healthy

development of the child depends on both the family, the school, the community the child lives in, and political and global factors. Recently, these influences have created some important social differences in where and how children spend their time depending on their preferences. For example, arguments have developed that today's children play less outside than their parent's childhood and play more indoors over time. When we look at developed countries, we can see that the screen level times are high. This is proof that most children and young people spend a lot of time indoor. Televisions, phones, computers, tablets, etc. Have started to be more attractive because of technological developments. In addition, parents' concerns about safety of their children are another element that makes the indoor areas more attractive. As such, when the ratio of spending time outdoor decreases and the spending time indoor increases, children and young people remain inactive and the obesity crisis emerges (Tremblay, Gray ,, Babcock, Barnes, Bradstreet, Carr, & Brussoni, 2015). The games that children play outdoors are an important opportunity for them. Because the outer space allows children to move freely and supports their development in many developmental sides positively (Rivkin, 1997). Children use their bodies actively for a long time by playing outside. When children have a chance to play outdoor, they can practice physical movements. In addition, When children are with nature, it contributes spiritual and physical development to them substantially (Charles, 2010). The child gets the opportunity to run by playing outside, which contributes to the development of their motor abilities, on the one hand, and to their health (Galizio, Stoll, & Hutchins, 2009). In addition, it allows the child to socialize, interact and communicate with his environment, express his feelings and explore the world of his peers as well as being healthy (Olsen, Thompson, & Hudson, 2011). Playing games in the open area offered children the opportunity to find solutions to problems by improving their imagination. When the child is given the opportunity to go out of the closed area, he will have the opportunity to collaborate and reconcile with his peers outside the classroom (Pica, 2011; Richardson, 2007).

According to White (2014), children get some opportunities when they play outdoors. These are:

• Providing space for children to be in their natural environment for their emotional structures.

• Providing experience to create, refresh and understand their emotions.

• Provides one-to-one contact with living beings in natural life.

• Providing the opportunity to be innovative by experiencing the feelings of curiosity, discovery and adventure.

• Children have chance to add new experiences to their old experiences, to provide the opportunity to explore, play and speak freely so that they can be understood.

• Providing an environment that attracts children to have more than one senses in the same time.

• Providing activities covering the whole body by positively affecting physical health.

• Providing a positive effect on the development of the brain and nervous system of children as it provides the opportunity for movement.

• Providing the development of self-perception and self-esteem.

• Providing the child's socialization and social development.

• Providing an opportunity for the child to learn how to protect himself and its importance.

• Providing the best learning environment for the child.

• Providing an environment where children can express their thoughts in the best way.

Rather, they are outdoor playgrounds that support children's creativity and allow their adventures (Pehlivan, 2005). Well-organized outdoor play spaces contribute a lot to the child; such as learning to share, waiting their turn, increase in communication skills, meeting emotional needs, socializing (Ünal, 2009). In addition, outdoor playgrounds offer many opportunities for the child to discover the society they live in, to create play spaces by themselves, to adopt a hobby for themselves, and to enjoy physical activities (Clements, 2004). With the industrialized society, outdoor playgrounds have decreased their acessibility and safety for children's plays. With the increase of the population, the need for buildings has increased and most of the open spaces have been converted into buildings to meet the construction needs. So, the use of outdoor playgrounds which near homes of children has also decreased (Louv, 2005; Rivkin, 2012). As a result, children tended to spend more time at home in front of televisions, tablets and phones and started to become screen addicts. Furthermore, in decrease of outdoor playgrounds, increase unsafe environmental conditions and unfavorable weather conditions are

factors that prevent children to playing outdoors. Children have started to grow up as young generations that spend a lot of time on the screen, are prone to obesity. They cannot socialize because they cannot spend time with their peers, do not know how to share and cooperate, and cannot experience natural life.

There is a common fear among parents that; "An accident can happen to my child when he is playing outside." This fear makes children uneasy about play outside, and children are condemned to be held indoors. In fact, the meaning of playing outside is different and special for children. The child outside means more people to participate in the play than what he will play alone at home(Ginsburg, 2007; Clark, 2010). The development benefits of outdoor games can be summarized according to age ranges as follows:

• Children who play with their peers in infancy use their brain cells effectively, thus it improves their memory. During this period, the child's perception level is very high. He makes an effort to explore the world and observes his surroundings. The child hears the sounds of cars around, hears the sounds of airplanes, hears the voices of children playing, and thus his hearing ability improves. It begins to perceive the colors around it, object dimensions. Thanks to his motor skills, he realizes the soil, leaves, nature, in short, his surroundings. In addition, the child gets fresh air thanks to the outside becomes more resistant to germs.

• 10-14-month old children get the opportunity to experience the environment using their sense's outdoors. They gain the ability to overcome their fears, self-confidence, and take decisions. Outdoor games affect the child' overall health positively by increasing the body resistance.

• Children of 14-24 months have the opportunity to make new friendship by expanding their social environment with outdoor games.

• Brain's functions improve and develop between the ages of 2-3 years (Adams, Donnely, Johnson, Payne, Slagle, & Stewart 2016)

Are Outdoor Activities Beneficial for the Child Development?

Play might be described as a made of acting out our experiences of the world. It is a significant piece of the process to construct the knowledge. According to the research result of Stephenson (2003) children's reaching to the outdoor activities was limited because of the concern about risks in the huge society. However, outdoor environments play different important roles in the learning of children (Taylor, Kuo &

Sullivan, 2001). The United Nations approve that play is the essential rights of children. Play contributes to the development of children's problem-solving abilities, self-esteem and social relationship (Rogers & Sawyers, 1988; Caplan & Caplan, 1974). Children run, jump, play, hide, shout, whistle, sing and explore their environment when they are outside. The cognitive and social development consists in play activities throughout preschool ages of children s (Bruner, 1972; Kohlberg, 1968). Outdoor play might improve the social, cognitive and physical development of children. Outdoor play environments offer chances to children's development and growth, but children cannot find these chances in indoor plays s (e.g., Henniger, 1980).

According to Blaut (1971; Blaut and Stea, 1974) children can master 'natural' mapping skills when they have an environment where they can move freely, and they can have freedom to play. Especially thanks to the physical development, children explore the environment, take risks and use their small and particularly gross motors. Thus, children can have basic information what is going on in the world. Briefly, they can learn overall in an effective and active way. When Wardle's study (1996-2003) is taken into consideration, the outdoor activities play important roles for the healthy development of children. In today's world, children spend a lot of time in front of the computer and TV, parents have the intense workload; neighborhoods are unsafe for the play of children and the concern of parents for the academic responsibility of their children. Hence, children cannot have the time for outdoor activities. According to studies, parents, who live in high-rise apartments, do not want to let their children for outdoor activities because they think that they cannot keep their eyes on their children (Bunge and Bordessa, 1975; Bjorklid, 1985).

According to Gallahue (1993) the outdoor playgrounds are significant for the motor development of children. For American children like other children in other countries, comprehensive physical activities are crucial to protect children from the obesity problem. Also, by the virtue of using fine and gross motor activities outside, children can have brain and nerve development and healthy growth. Children may explore their environment, and they learn as having real-life experiences. Children try to find answers to some questions. How can butterflies fly? Why leaves fall down and when? If I touch the snow what I feel? How can I go faster with bicycle? Thanks to outdoor activities children can learn science, mathematics, vocabulary, gardening, farming, ecology, weather condition and others. Maybe children can learn it inside, but when they explore all things effectively the information can be more permanent and

joyful. Children can remember easily what they learnt since experiences were concrete and meaningful for them (Ormrod, 1997).

With the outdoor play, children can learn what kind of capabilities they have, how much they can push themselves to do something and their emotional predispose. Children can explore the environment like insects, plants, animals, smelling of the flowers and shadow of their and how their shadows change with the angle of sun light. Children can spend their over energy with outdoor play. After long passive inside activities, children start to lose their attention for activities. Then they might need to recharge their energy. Thus, the outdoor activities play an important role for children to refresh their energy.

Classrooms are closed areas. For this reason, there can be a lot of dust, bacteria and other things, which can make children sick easily. The outdoor activities get dusty and harmful bacteria away from children. Thanks to outdoor play, children will have a fresh air chance and many moveable areas to make exercise (Aranson, 2002). With outdoor activities, children can meet their basic needs such as freedom, taking risk, having adventure and experimentation to be just a child (Greenman, 1993). Children run, swing, jump, climb, roll, hide, shout, whistle and race outside. In today's world, children can spend a lot of time inside because of some reasons such as living in a small apartment floor, having overworked and tired parents, tense academic instructions and unsafe environment. For this reason, children might need outdoor activities.

Also, children need to explore their environment. For young children, this environment can be unknown, having an adventure and unpredictable. Children may learn many things about nature and animals such as worms come out of solid after raining or the phase of a flower's bloom. Children can learn all of them having experience. Thus, the information will be much more permanent. As a result of a research, constructive play is popular play for preschool children maybe because children can shape and control the play (Ihn, 1998). The constructive play is seen in sandboxes, water and sand places, on flat area and even on the grass (Wardle, 1994).

According to Norwegian research, the children have a tendency to being inactive in their adult ages. Rivkin (1990, 1995) stresses the significance of the outdoor plays, but reaching the routine of outdoor play is disappearing. When children play in a natural environment, it provides the positive effects for children. Thus, they can be more creative for their plays. When the research results are taken into consideration, it

can be said that children's sickness level is low in outdoor kindergarten when the children are compared in traditional kindergarten (Grahn et al., 1997, Södeström, 1998). Much more than a hundred studies about outdoor activities the natural and wild environment provided positive psychological and physical causes for well-being and make the stress less (Lewis, 1996).

When children have early experiences with the environment, it will offer the development of imagination power and the sense of wonder (Cobb, E., 1977). Hence, wonder plays an important role to motivate for lifelong learning (Wilson, 1997). Children have high possibility to get positive feelings for each other and for their environment when they when they play in nature (Moore, Robin, 1996). The outdoor plays might enable to children independence and autonomy. Thus, children can get away from their caretakers to have experiences. Children will have freedom in outdoor activities to do messy things, which do not be let in indoor activities. Thus, children can manipulate the environment how they want. The perspective of adults and children towards natural environment is different. Although adults perceive the environment as backgrounds of their doing children comprehends it as experiential activities and stimulators (Sebba, Rachel, 1991).

Children can shape a play as using plants, soil, rocks, sand and sticks. They can improve their imagination, exploration, wildness, discovery, complex thinking and creativity ability because all materials are not structured. Thus, children can build what they want with diverse natural materials. The outdoor activities cannot change a place with indoor activities since natural materials, and phenomena call children's attention such as the glitter of the sun on leaves, the sound of the animals or wind, flying of butterflies and ant colony or having experience with water (Moore, 1996).

Children can learn through outdoor activities. According to Gardner's (1993) multiple intelligence explanations; kinesthetic and naturalistic intelligence; practitioners believe advantages of the outdoor environment for learning experiences of children. Additionally, in the declaration of UNESCO (Delors, 1996) about lifelong learning, there are four approaches, which are; children learn to know, learn to do, learn to be and learn to live together.

For Kellert's (2002), there are nine values which relevant with nature. Children might have them when they have the opportunity to learn about nature through outdoor activities. These values:

* Aesthetic: The nature grace

* Dominionistic: Nature domination, physical control

* Humanistic: Intense emotional affiliation for nature

* Moralistic: Having ethical attention and spiritual respect to nature

* Naturalistic: Having immediate experience and exploration for nature

* Negativistic: Estrangement and fear from the nature

* Scientific: Construction's and function's study systematically

* Symbolic: To use the nature for language and opinion

* Utilitarian: The nature's material utilization

The Effects of Outdoor Plays on Physical Development, Social Development and Cognitive Development

Preschool children being outside and performing more meaningful activities that are appropriate for their development will contribute to all development areas of children (Bailie, 2010; Harte, 2013). However, this does not show that outdoor activities are better than indoor activities. In both places, there are similar or different contributions that support the child's learning and development. The subject that is desired to be emphasized is that the features of the outdoor space have more components than the indoor space and when activities that support development are offered. They contribute to the development of children in physical, social, cognitive and many other areas (Bilton, 2010).

Contribution to Physical Development

• While the fresh air taken outdoors increase the attention span of the children; sunlight also contributes to bone development and growth. (Bilton, 2010; Mi-Hwa & Riley, 2015).

• It provides the opportunity to do movements such as climbing up and down stairs, running, jumping, pulling, cycling, and playing ball, which supports the development of great muscular skills of the child (Sciarra, Dorsey, & Lynch, 2009; Özer, Gürkan, & Ramazanoğlu. , 2006).

• Increases children's physical activity levels (Cevher Kalburan, 2014).

• Immune system of the child who is in touch with nature increases and becomes more resistant to diseases (Pica, 2003).

• Improves strength, speed, flexibility skills.

• Gains agility (Ellialtıoğlu, 2005; Tuğrul, 2014; Poyraz, 2003).

• Ensures the balance and coordination of the child's organs (Aral, Gürsoy, & Köksal, 2000).

• It is beneficial for muscle, skeleton and whole body (Aral et al., 2000).

• Outdoor games increase vitamin D and oxygen intake (Özer et al., 2006).

• It prevents children from gaining excess weight.

• Playing with natural materials such as mud, stones, twigs, leaves support the development of small muscle skills.

Contribution to Social Development

• Play is a social activity on a voluntary basis. The child perceives its role in society with play. • Understands the sexual role of the child in the social environment.

• Provides respect for the rights and freedom of others.

• It teaches the sense of success and losing (Aral et al., 2000).

• Allows you to explore the environment.

• Learns the natural life (Taşcı, 2010).

• Learns to adapt to social life.

• It provides the opportunity to integrate into the society.

• The child has the opportunity to communicate and interact with peers and other individuals. • Learns social phenomena such as helping each other, using the words of kindness, waiting for their turn, obeying the rules, cooperating, taking responsibility and fulfilling the responsibilities and the opportunity to apply them.

• The child becomes aware of himself / herself.

• Learns society's unique value judgments (Tuğrul, 2014; Durualp, 2009; Avcıoğlu, 2005; Avşar & Öztürk-Kuter, 2007).

• The child gets the opportunity to play games involving risk, race and struggle outside. Risk games teach the child to balance the pleasure of fear and fun, and thus the child learns to overcome his fears and phobias.

• When the child is in risky play, self-confidence, self-awareness, endurance and a sense of independence develop (Sandseter, 2007; Sandseter, 2010; Gleave, 2008; Knight, 2012; Gill, 2010).

Contribution to Cognitive Development

• Analyzes and discovers using the child's senses.

• Decision-making and reasoning skills improve.

• Learns to establish a cause and effect relationship (Aral et al., 2000).

• Using different tools and objects during the game, the child tries to learn their qualities and what they mean. This positively affects the development of intelligence.

• Realizes what is not really in real life with play (Yavuzer, 1984).

• During play, the child's cognitive capacity, ability to make evaluations, and decision-making skills develop.

• In the game life, the child should use language to initiate communication with others and to continue the communication initiated. In this case, the language development of the child is also supported (Aral et al., 2000).

• Children experience seasonal events by living.

• The mental processes of the child in play are active

• Color, shape, quantity, weight, number, etc. during the game. Learn new concepts such as.

• They learn the nature by observing the creatures in nature and the materials in nature without any intermediary.

• Their creativity improves because they use natural materials in children's games, and they do not play under the direction of an adult.

Underlining the role of teachers in this period, Wilson (2008) claimed that children were born with ordinary curiosity to explore around, but they needed an adult who supported, encouraged and guided children in this process without hindering this sense of curiosity. Wilson, therefore, teaches that the teacher should not see the child spending time outdoors as a time of the break, that educators with such a perspective should change their views, and that this time period should be exploring and interacting with vital information such as plants, animals, seasons and weather conditions, He emphasized that it should be considered as

a period during which most of them can be taught. According to Perry (2001), teachers in the outdoors have three main goals: 1. It is necessary to encourage the child to play independent and easy for him peer play. The curiosity and demands of children for outdoor play are not a difficult task to set up and continue outdoor play. But for some children, the situation is not easy. Therefore, when faced with these situations, the guidance and participation of the teacher are necessary. Therefore, in such cases, the involvement and intervention of the teacher may become mandatory. 2. If the child is focused on play, it is necessary to support his play. 3. If the child is focused on the game, it should be ensured that this game continues for a long time. In addition, the outdoor space provides many opportunities for children whom the indoor space does not allow.

These opportunities can be summarized as follows:

• It provides the necessary space to experience things and creates freedom.

• It provides an opportunity to be in motion, to make changes and to transform.

• It offers a dynamic and changeable environment, creating exploration, arousing and awe.

• The child has emotional experiences with his whole body.

• It provides the opportunity to establish relationships between what has been learned.

• Provides plenty of content for exploration, wonder, mystery, and pretend thinking.

• Provides an opportunity to find solutions when there are conflict and conflict with their peers. • It allows to experience different types of games.

• It allows children to develop their ability to be safe and take risks.

• It provides the opportunity to experience and know the natural life (Tovey, 2007).

REFERENCES

Adams, C., Donnely, C., Johnson, K. Payne, B., Slagle, A. & Stewart, S. (2016). The Importance of Outdoor Play and Its Impact on Brain Development in Children. *UMKC School of Education Child and Family Development Center.* Retrieved from: https://dokumen.tips/documents/the- importance-of-outdoor-play-and-its-impact-onbrain-importance-of-outdoor.html

Akgül, M. Ş. (2020). Examining the effects of a selfimprovement instruction on empathetic thinking and communication skills. *African Educational Research Journal, 8*(4): 906-911.

Aksoy, A. B., & Çiftçi, H. D. (2014). *Erken Çocukluk Döneminde Oyun.* Ankara: Pegem Akademi.

Aksoy, A. B., & Çiftçi, H. D. (2017). Oyun Alanı Materyal ve Oyuncaklar. *Okul Öncesi Eğitimde Oyun* (4. Baskı).Ankara: Hedef Yayıncılık.

Aral, N., Gürsoy, F. & Köksal, A. (2000). *Okul Öncesi Eğitiminde Oyun* (1. Baskı). İstanbul: Ya-Pa Yayınları.

Aronson, S.S. (2002). *Healthy young children: A manual for programs* (4th ed.) Washington,DC:NAEYC.

Avcıoğlu, H. (2005). *Etkinliklerle sosyal beceri öğretimi (2. Baskı)*. Ankara: Kök Yayıncılık.

Avşar, Z. & Öztürk-Kuter, F. (2007). Beden eğitimi ve spor bölümü öğrencilerinin sosyal beceri düzeylerinin belirlenmesi (Uludağ Üniversitesi örneği). *Eğitimde Kuram ve Uygulama*, 3 (2); 197-206.

Aynal, Ş. Ö. (2017). *Çocukta Oyun Gelişimi ve Yaratıcılık.* M. E. (Ed) Deniz içinde, Erken Çocukluk Döneminde Gelişim, 340-380. Ankara: Pegem Akademi.

Bilton, H. (2010). *Outdoor Learning in Early Years: Management and Innovation*. New York: Routledge.

Bilton, H. 2002. *Outdoor play in the early years*, London: David Fulton.

Bjorklid, P. (1985). *Children's outdoor environment from the perspective of environmental and developmental psychology*. In Garling, T. and Valsiner, J. (eds) Children within Environments: Toward a Psychology of Accident Prevention. Plenum Press, New York, 91 106.

Blaut, J. M. & Stea, D. (1974). Mapping at the Age of Three. *Journal of Geography*, 73:7, 5 9, DOI: 10.1080/00221347408980311

Bruner, J. S. (1972). The nature and uses of immaturity. *American Psychologist 27,* 687- 708.

Bunge, W., & R. Bordessa. (1975). *The Canadian alternative: Survival, expeditions and urban change*. York University Geographical Monographs, No. 2, York University, Toronto.

Caplan, G. (1974). *Support systems and community mental health: Lectures on concept development.* Behavioral Publications.

Cevher Kalburan, N. (2014). Okul Oncesi Donem Cocuklarının Dıs Mekânda Oyun Fırsatları ve Ebeveyn Goruşleri. *Sosyal Politika Calışmaları Dergisi,* 3 (2), 113-135. ISSN : 2148-9424

Charles, C. (2010). Children's contact with the outdoors and nature: A focus on educators and educational settings. (Annotated Bibliographies). *Children and Nature Network.*

Clark, A. (2010). *Transforming Children's Spaces*: Children's and Adults' Participation in Designing Learning Environments. USA: Routledge.

Clements, R. (2004). An Investigation of the Status of Outdoor Play.*Contemporary Issues in Early Childhood*, 5(1), 68-80.

Cobb, E. M. (1977). *The ecology of imagination in childhood.* Spring Publications.

Çakmak, A., & Elibol, F. (2011). *Çocuk ve Oyun*. Ankara: Vize Yayıncılık.

Delors, J. (1996). Learing: *The treasure within,* Paris: UNESCO.

Demiral, Ö. (1989). *Eğitici Oyuncak Yapımı*. İstanbul: Esin Yayın Evi.

Durualp, E. (2009). *A study on the effects of play-based social skills training on social adaptation and skills of six-year-old preschool children: Sample of Çankiri*. (Doktora Tezi). YÖK Tez Merkezi. (Tez no: 258594)

Durualp, E. (2009). *A study on the effects of play-based social skills training on social adaptation and skills of six-year-old preschool children: Sample of Çankiri*. (Doktora Tezi). YÖK Tez Merkezi. (Tez no: 258594)

Ellialtıoğlu, F. M. (2005). *Okul öncesi dönemde oyun ve oyun örnekleri*. İstanbul: Ya-Pa Yayınları.

Ernst, J. (2017). Exploring Young Children's and Parents' Preferences for Outdoor Play Settings and Affinity toward Nature. *International Journal of Early Childhood Environmental Education, 5*(2): 30.

Galizio, C., Stoll, J., & Hutchins, P. (2009). Exploring the possibilities for learning in natural spaces. *Young Children, 64*(4), 42-48.

Gallahue, D. L. (1993). *Developmental physical education for today's children.* New York: Willey.

Gardner, H. (1993). *Multiple intelligences, the theory in practice*. USA, Harper Collins.

Gill, T. (2010). Putting risk in perspectives. Early Years Update. http://www. teachingexpertise.com/articles/putting-risk-perspective-10522.

Ginsburg, Kenneth. R. (2007). The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds. *Pediatric*, 119(1), 182-191.

Gleave, J. (2008). Risk and play: *A literature review*. London: Play England.

Grahn, P., Martensson, F., Lindblad, B., Nilsson, P., & Ekman, A. (1997). *UTE PA DAGIS*. Stad & Land nr. 45. Alnarp: Movium, Sveriges Lantbruksuniversitet.

Greenman, J. (1993). It ain't easy being green. Beginnings workshop. *Child Care Information Exchange*, 91, 336-37.

Henniger, ML Wilkinson, P (1980). Free play behaviors of nursery school children in an indoor and outdoor environmentEnvironments of play. New York: St. Martin's Press.

Ihn, H. (1998). *Preschool children's play behaviors and equipment choices in an outdoor environment*, Austin: University of Texas. Unpublished research report.

Kellert, S. R. (2002). Experiring Nature: *Psychologica, Sociocultıral, Evlutionary Investigations*. Washington, D. C.: Island Press.

Knight, S. (2012). Why adventure and why risk in the early years?. *ChildLinks*, 3, 15-18.

Koçyiğit, S., Tuğluk, M. N., Kök, M. (2007). Çocuğun Gelişim Sürecinde Eğitsel Bir Etkinlik Olarak Oyun. *Atatürk Üniversitesi Kazım Karabekir Eğitim Fakültesi Dergisi,* 16: 324-342.

Kohlberg, L. (1968). Early Education: A Cognitive-Developmental View. *Child Development, 39*(4), 1013-1062. doi:10.2307/1127272.

Lewis, C. A (1996). *Green Nature, Human Nature: The Meaning of Plants in Our Lives*, Chicago, University of Illinois Press.

Louv, R. (2005). *Last Child in The Woods: Saving Our Children from Nature-Deficit Disorder. Chapel Hill,* NC: Algonquin Books.

Mi-Hwa, P., & Riley, J. (2015). Play in Natural Outdoor Environments: *A Healthy Choice. Dimensions Of Early Childhood, 43*(2), 22-28.

Moore, R. (1996). Compact Nature: The Role of Playing and Learning Gardens on Children's Lives. *Journal of Therapeutic Horticulture, 8*, 72-82. Retrieved February 23, 2021, from http://www.jstor.org/stable/44025358.

Morrier, M., Ziegler, S. (2018). I Wanna Play Too: Factors Related to Changes in Social Behavior for Children With and Without Autism Spectrum Disorder After Implementation of a Structured Outdoor Play Curriculum. *Journal of Autism and Developmental Disorders.* 48: 2530–2541.

Olsen, H., Thompson, D., & Hudson, S. (2011). Outdoor learning: Supervision is more running head: The developmental benefits of outdoor play 28 than watching children play. *Dimensions of Early Childhood, 3*(1), 3-10.

Ouvry, M. (2003). *Exercising muscles and minds: outdoor play and the early years curriculum*, London: National Early Years Network.

Öncü, E. Ç. (2011). *Okul Öncesi Eğitimde Gelişim Odaklı Oyunlar ve Etkinlikler.* Ankara: Eğiten Kitap.

Özer, A., Gürkan, C, & Ramazanoğlu, O. (2006). *Oyunun Çocuk Gelisimi Üzerine Etkileri*. http://www.firat.edu.tr.

Öztürk, A. (2001). *Okul Öncesi Eğitimde Oyun.* İstanbul: Esin Yayınevi

Pehlivan, H. (2005). *Oyun ve Öğrenme.* Ankara: Anı Yayıncılık.

Perry, J. P. (2001). *Outdoor Play: Teaching Strategies with Young Children*. New York: Teachers College Press.

Pica, R. (2003) *Your Active Child: how to boost physical, emotional, and cognitive development through age-appropriate activity.* Chicago: Contemporary Books.

Pica, R. (2011). Taking movement education outdoors: Learning by leaps and bounds. *National Association for the Education of Young Children,* July, 2011.

Poyraz H. (2003*). Okul öncesi dönemde oyun ve oyuncak.* Ankara: Anı Yayıncılık.

Richardson, G. (2007). The great outdoors. *Education Review, 20*(1), 92-99.

Rivkin, M. (1997). The schoolyard habitat movement:what it is and why children need it. *Early Childhood Education Journal, 25*(1), 61-67.

Rivkin, M. S. (1990). Outdoor play—What happens here? In: Wortham, S. and Frost, J.L. (Eds.), *Playground for young children. National survey and perspectives*. A Project of the American As- sociation for Leisure and Recreation. An Association of the American Alliance for Health, Physical Education, Recreation and Dance.

Rivkin, M. S. (1995). *The great outdoors. Restoring children's rights to play outside*. Washington D. C.: National Association for the Education of Young Children.

Rivkin, M, (2012). Children's Outdoor Play: *An Endangered Activity. Play from Birth to Twelve: Contexts, Perspectives, and Meanings*.In ed. Doris Pronin Fromberg, Doris Bergen. New York: Routledge: 329-336.

Rivkin, M. (1995). *The great outdoors: restoring children's right to play outside*, Washington, DC: NAEYC.

Rivkin, M. (1998). Happy play in grassy places: the importance of the outdoor environment in Dewey's educational ideal. *Early Childhood Education Journal, 25*(3), 199–202.

Rogers, C. S., & Sawyers, J. K. (1988). *Play in the lives of children.* National Association for the Education of Young Children.

Sandseter, E.B.H. (2007). Categorising risky play—how can we identify risk-taking in children's play? *European Early Childhood Education ResearchJournal, 15*(2), 237-252.

Sandseter, E.B.H. (2010). 'It tickles in my tummy'-Understanding children's risk-taking in play through Reversal Theory. *Journal of Early Childhood Research, 8*(1), 67-88.

Sandseter, E.B.H. ve Kennair, L.E.O. (2011). Children's risky play from an evolutionary perspective: The anti-phobic effects of thrilling experiences. *Evolutionary Psychology, 9*(2), 257-284.

Sarı, Ç. Saime (2011). Çocuk Oyun ve Öğrenme. *Eğitime Bakış, 20*(7), 21-25.

Sciarra, D. J., Dorsey, A. G. ve Lynch, E. (2009). *Developing and administrating a child care and education program.* USA: Wadsworth Cengace Learning.

Söderström, M., Mårtensson, F., & Grahn, P. & Blennow, M. (2004). *The outdoor environment of day care centers. Its importance to play and development* Ugeskr Laeger, 166(36),pp. 3089-3092.

Södeström, M. (1998). *Ger friluftsliv friskare barn? Nordisk Konfer- ens Barn och Friluftsliv friluftslivets pa ̇verkan pa ̊barns utveck- ling, ha ̇lsa och naturfo ̈rsta ̇else.* Konferensrapport. Stockholm: Friluftsfra ̈mjandet.

Stephenson, A. (2003). Physical Risk-taking: Dangerous or endangered? *Early Years,* 23, 35-43. 10.1080/0957514032000045573.

Taşcı, B.G. (2010). *An evaluation of street as children play space*. (Yüksek lisans Tezi). YÖK Tez Merkezi. (Tez no: 283625)

Taylor, A.F., Kuo, F.E., Sullivan, W.C. (2001). Coping with add: The Surprising Connection to Green Play Settings. *Environment and Behavior*. 2001;33(1):54-77. doi:10.1177/00139160121972864

Tovey, H. (2007). *Playing outdoors: Spaces and places, risk and challenge.* Maidenhead: Open University Press.

Tremblay, M. S., Gray, C., Babcock, S., Barnes, J., Bradstreet, C. C., Carr, D. & Brussoni, M. (2015). Position statement on active outdoor play. *International journal of environmental research and public health*, *12*(6), 6475-6505.

Tuğrul, B. (2014). *Okul öncesi dönemde oyun.* A.B. Aksoy (Ed.) Her yönüyle okul öncesi eğitim 3 içinde. Ankara: Hedef CS Basın Yayın.

Tuğrul, B., Ertürk, G., Özen Altınkaynak, Ş., Güneş, G. (2014a). Oyunun Üç Kuşaktaki Değişimi. *International Journal of Social Science*, 27, 1-16

Tuğrul, B., Metin, Ö. (2006). *Çocukların Oyun Oynama Hakkı.* 3. Uluslararası Çocuk ve İletişim Kongresi Kitabı: 195-202.

Türkçe Sözlük (2011), Ankara: TDK Yayınları.

Ünal, M. (2009). Çocuk Gelişiminde Oyun Alanlarının Yeri ve Önemi. *İnönü Üniversitesi Eğitim Fakültesi Dergisi, 10*(2), 95-110.

Wardle, F. (1994). Playgrouds, Viewpoint. *Day Care and Early Education, 22*(2),39-40. ISSN-0092 4199.

Wardle, F. (1999). In praise of developmentally appropriate practice.*Young Children*, 54(6), 4-12.

Wardle, F. (2003). *Introduction to early childhood education: A multidimensional approach to child centered care and learning.* Boston, MA: Allyn and Bacon.

Wardle, F. (Fall, 2000). The order in mess. How children learn.*Children and Families*, 82-83.

White, J. (2014). *Playing and learning outdoors* (2ed.). Routledge.

Wilson, R. (1997). The Wonders of Nature: Honoring Children Ways of Knowing. *Early Childhood News, 9*(2), 6-9. ISSN-1080-3564.

Wilson, R. (2008). Nature and Young Children: *Encouraging Creative Play and Learning in Natural Environments.* Abingdon: Routledge.

Yavuzer, H. (1984). *Çocuk Psikolojisi* (1. Baskı). İstanbul: Altın Kitaplar Yayınevi.