ACJES
Academy Journal of Educational Sciences

Volume:5/Issue:1 June/2021

ACADEMY JOURNAL OF EDUCATIONAL SCIENCES
INTERNATIONAL PEER REVIEWED E-JOURNAL

E-ISSN: 2602-3342

Publication Frequency
Biannually

Publication Type
Periodical

Publication Languages
Turkish and English

Contact
editor@acjes.com

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EDITORIAL

Dear researchers,

We are happy and proud to share the eighth issue of Academy Journal of Educational Sciences (ACJES) with you. We would like to thank the members of the editorial board, advisors, writers and referees who have contributed to the publication of ACJES.

Hope to see you again in the next issues...

On behalf of ACJES
Editor
Dr. Ömer Faruk TAVŞANLI

Academy Journal of Educational Sciences
June 2021, Volume 5, Issue 1, 1-14

Analyzing a Human and Environment Unit at The 5th Grade Science Curriculum Within The Environmentally Literate Citizenship Context

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Abstract

All the countries have an effort in cultivating environmentally literate citizens since the governments and citizens are responsible to protect the environment. Turkey is one of these countries which integrated environmental education topics and objectives into the science curriculum. Different frameworks have been developed to assess individuals' views about, attitudes and behaviors towards the environment and address environmental issues. These frameworks mostly focus on environmental literacy, but they do not emphasize environmental citizenship. Assessment of the curriculum through the lens of a framework that grounds on both environmental literacy and citizenship is important and needed in order to cultivate environmentally literate citizens. Therefore, this study aimed to investigate the extent to which the newly developed science curriculum provided the opportunity to constitute environmental literate citizenship at the 5th grade level. We benefited a coherent framework grounded by environmental literacy and environmental citizenship in our inquiry to analyze the curriculum. Included among the data collection sources were curriculum documents, objectives, and learning and assessment activities at the 5th grade level. The data analysis consisted of two steps: (i) analysis of the objectives and (ii) content analysis of the human and environment unit at the 5th grade science textbook within the context of environmental literate citizenship. Our findings indicated that the objectives under environmental citizenship required social action and these objectives were associated with critical environmental literacy. In conclusion, the content had the potentiality to help students develop critical viewpoints about environmental issues from critical environmental literacy and justice-oriented citizenship aspects and take social action to make a change in their environment.

Keywords: Science Curriculum, Science Textbook, Content Analysis, Environmental Literacy, Environmental Citizenship

Introduction

Cultivating environmentally literate citizens has been a prominent goal for educators, policymakers, and governments (Green et al., 2016; National Science Teacher Association [NSTA], 2003; Salmon, 2000) because we are facing several problems resulting from human interactions with the environment in a global village such as deforestation, production of waste and pollutants, and overuse of natural resources. Data on water scarcity and drought in Turkey for 2000 and beyond show that there is an increase in water-stressed regions every ten years. In addition, water scarcity in Turkey, especially in metropolitans, is expected to reach its highest level in 2030 (Turan & Bayraktar, 2020). The National Meteorological Service [NMS] reemphasizes and draws our attention to this problem with the yearly

About the Article

Type: Research
Received: 11 December 2020
Accepted: 01 March 2021
Published: 30 June 2021
DOI: 10.31805/acjes.839228
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Suggested APA Citation

Ayar, M. C., & Özalp, D. (2021). Analyzing a human and environment unit at the 5th grade science curriculum within the environmentally literate citizenship context *Academy Journal of Educational Sciences, 5*(1), 1-14. http://dx.doi.org/10.31805/acjes.839228

rainfall data collected in the last few decades (NMS, 2017). Besides, in the last five years, people worried that they did not observe snowfall and envision that the next summers would be more challenging, which in turn increase food prices and put the society under stress due to the drought. While these things appear in the media and scientific journals, we wonder how young individuals and communities will react to this problem. Meantime, we question what opportunities the newly developed science curriculum provides for them to take actions and respond to similar problems personally and collectively.

We know that Turkey is one of the countries in the world that enacted a law for environmental education in 1982 (Republic of Turkey Constitution, 1982). According to this act, each citizen has the right to live in a clean, healthy, and stable environment. The government and citizens are responsible for maintaining, restoring, and improving the environment, and preventing environmental problems. This act also encourages each citizen and the government to participate in activities that serve the environment (Ministry of Environment and Forestry [MoEF], 2004). In a line with this act, there have been several attempts in both national and international contexts (e.g., Supreme Council for Science and Technology, the National Science, Technology, and Innovation Strategy (2003-2023) (The Scientific and Technological Research Council of Turkey, 2004), United Nation's Biodiversity Agreement (1997), United Nation's Climate Change Agreement (2004), National Environment Action Plan (1998), National Forestry Program (2004), National Environment Strategy Plan (2006) (Ministry of Environment and Urbanization [MoEU],2011), Climate Change Action Plan (2011-2023) (MoEU, 2011), the Paris Agreement (United Nations Framework Conventions on Climate Change, 2016), and Islamic Declaration on Global Climate Change (The Islamic Foundation for Ecology and Environmental Sciences [IFEES], 2015).

The goal of environmental education is to develop citizens with knowledge, attitudes, and skills necessary for long-term responsible behaviors, and the observable and recordable actions (Green et al., 2016; Roth, 1992; Short, 2010; Stable, 1998). The objectives of environmental education focus on awareness, concern for environment, knowledge, and skills (Chawla & Cushing, 2007; Rogayan, & Nebrida, 2019). Environmental literacy refers to knowledge and understanding of a wide range of environmental concepts, problems, and issues, cognitive skills and abilities, appropriate behavioral strategies, and applying knowledge and understanding to make sound and effective decisions (Hollweg et al., 2011).

In an educational context, developing environmental literacy through school curricula is one way of addressing environmental issues in world education systems (Barraza, 2001; Craig & Allen, 2015; Erdogan et al., 2009; Innes et al., 2018; Gillian & Niranjan, 2019; Klakayan & Singseewo, 2016; Lee, 2000; Negev et al., 2008; Ross, 2007; Srbinovski et al., 2010; Sontay et al., 2015; Yucel-Ozata & Ozkan, 2014). Analyzing environmental literacy and citizenship in educational programs, curricula and textbooks have been a critical issue across many countries (Acuna, 2015; Carvalho et al., 2011; Cheng & So, 2015; Hart, 2002; Lieflander et al., 2015; Srbinovski, 2013). Specifically, in the Turkish education system, we witnessed three curriculum development efforts (the Year 2005, 2013, and 2017) through which to emphasize environmental education in science curricula for students aged 9-14 in the last two decades. In 2005's science curriculum, the environment component was integrated into the science-technology-society [STS] framework (Aikenhead, 1992). The students were expected to conceptualize the relationship between science, technology, society, and environment, be sensitive towards environmental issues, and make decisions to serve the environment within the context of recycling, water pollution, deforestation, and environment protection (Ministry of National Education [MoNE], 2005) as the curriculum aimed to cultivate scientifically literate individuals (National Research Council, 1996, 2013; National Science Teacher Association, 2003). Likewise, the Year 2013's science curriculum continued to integrate the environment component into the STS framework. Within the STS-Environment framework, socio-scientific issues (SSI), nature of science, science and technology relationships, and sustainable growth were among the learning areas in the science curriculum. The students were exposed to environmental concepts and issues to generate solutions to light pollution, explain the effects of noise pollution on human health and environment, and propose projects to maintain, restore, and improve the environment (MoNE, 2013). Although the frameworks which were developed to assess individuals' views, attitudes and behaviors towards the environment emphasize environmental literacy, they do not focus on environmental citizenship. Therefore, in this paper, we created a coherent framework ground on both environmental literacy and citizenship, and we aimed to use this framework to investigate the extent to which the newly developed science curriculum provided the opportunity to constitute environmental literate citizenship at the 5th grade level.

Theoretical Framework

Many frameworks have been developed to assess individuals' views about attitudes and behaviors towards the environment and address environmental issues (Berkowitz et al., 2005; Erdogan et al., 2009; Hollweg et al., 2011; Kim, 2003; Roth, 1992; Stables, 1998). In this study, we utilize a framework grounded on literacy and citizenship. We benefit from the environmental literacy framework developed by Stables (1998), which focuses on environmental knowledge, cultural perspectives on the environment, and effective action that may generate a solution to environmental problems. In our framework, we associate effective action with citizenship and enlarge it with citizenship adapted to the environmental context. In other words, we broaden critical environmental literacy with citizenship, which comprises three categories—personally responsible, participatory, and justice-oriented (Westheimer & Kahne, 2004) within the environmental context. Therefore, we create a coherent framework to analyze the 5th grade science curriculum (Figure 1).

Environmental Literacy

Environmental literacy has been defined within the context of knowledge, skills, behaviors, and attitudes to understand environmental issues from social, political, economic, and cultural perspectives (Hollweg et al., 2011; Kim 2003; McBeth & Volk 2009; OECD, 2016; Roth, 1992). Stables (1998) categorized environmental literacy into three: (1) functional environmental literacy, (2) cultural environmental literacy, and (3) critical environmental literacy. Functional environmental literacy is a prerequisite for cultural and critical environmental literacy. It is associated with the ability to recognize the interactions between humans and the environment to develop a broader knowledge and understanding. Yet, it does not engage an individual with a notion of what environment means to her and others. Cultural environmental literacy requires knowledge and skills to explain the importance of natural things to the culture and their existence in the culture without any human intervention.

Critical environmental literacy refers to effective action, which needs functional and cultural perspectives to unders by Stables (1998) because its definition and categories are very likely to be close to the Turkish environmental education standards (Erdogan et al., 2009).

Environmental Citizenship

Citizenship refers to how individuals act in society. For one perspective on citizenship, individuals get accustomed to how the government works and know their responsibilities to the government and society. For the other, they participate in community organizations, solve problems, and pursue a social change in society (Dimick, 2015). Citizenship is grounded on a reaction of individuals to any situation or phenomena as Weber (1978) defined social action. In this regard, Westheimer and Kahne (2004) discussed three categories of citizenship—personally responsible, participatory, and justice-oriented. In an environmental context, a personally responsible citizen can act responsibly in a community and contributes to a recycling bin at home, work, and school. A participatory citizen can be an active member of a community organization and can participate in community organizations to create recycling bins at home, work, and school. Justice-oriented citizens, sharing a similar vision with participatory one, commit to analyzing why people do not recycle, exploring the ways to encourage recycling through public announcement, and reporting the process. The European Network for Environmental Citizenship (2018a) defined environmental citizenship as;

> The responsible pro-environmental behavior of citizens who act and participate in society as agents of change in the private and public sphere, on a local, national and global scale, through individual and collective actions, in the direction of solving contemporary environmental problems, preventing the creation of new environmental problems, achieving sustainability as well as developing a healthy relationship with nature. Environmental citizenship includes the exercise of environmental rights and duties, as well as the identification of the underlying structural causes of environmental degradation and environmental problems, the development of the willingness and the competences for critical and active engagement and civic participation to address those structural causes, acting individually and collectively within democratic means, and taking into account inter- and intra-generational justice.

Environmental citizenship includes having the knowledge and awareness about the environmental issues, feeling responsibility and consciousness toward the environmental problems, having the ability to produce solutions for the problems, and showing respectful behavior to solve those problems (Smederevac-Lalic et al., 2020). Environmental citizenship requires to make a commitment to the common good, to recognize the rights and responsibilities that transcend national boundaries, to know environmental responsibilities followed from environmental rights as a matter of natural justice, and to live sustainably so that others may live well (Dobson, 2007). Therefore, environmental citizenship may necessitate individuals' reactions to examine and interpret the interactions between human and environment from a variety of perspectives—physical, geographical, biological, sociological, economic, political, technological, historical, aesthetic, ethical, and spiritual (Kim, 2003; Stable, 1998; Schild, 2016).

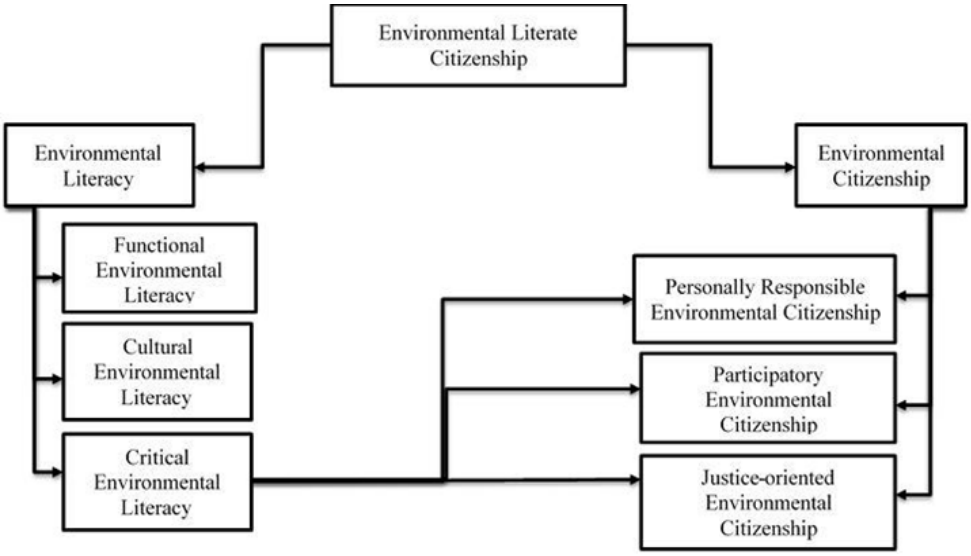

Figure 1. *Environmental literate citizenship framework adapted from Stables (1998) and Westheimer and Kahne (2004).*

Education for environmental citizenship aims to improve environmental knowledge and competences, to develop positive values, beliefs, attitudes toward the environment, and to enable their active participation to solve environmental issues as citizens (Goldman et al., 2020). All the countries have an effort in cultivating environmentally literate citizens since the governments and citizens are responsible to protect the environment. As one way to achieve this goal, they have integrated the environmental education topics into their curricula. To find out whether those efforts have been met, there should be some kind of criteria that include the expectations regarding environmentally literate citizens. Different frameworks have been developed to assess individuals' views about attitudes and behaviors towards the environment and address environmental issues. These frameworks mostly focus on environmental literacy, but they do not emphasize environmental citizenship. Therefore, in this paper, we generated a coherent framework ground on environmental literacy and citizenship to explore to what degree the fifth-grade science curriculum enables students to develop their reactions to environmental problems or issues and to engage with the solutions.

Methodology

Research Design

In this research, the case study which is one of the qualitative research approaches was used since we found that it is the most appropriate one in giving in-depth exploration of the situation that we examined. Case-study research involves the study of a situation explored through one or more cases, giving in-depth exploration of the particularity and complexity of the studied case or cases (Creswell, 2007). The data for this study were collected through curriculum documents, objectives, and textbook in order to provide a full understanding of the situation and explore the extent to which the newly developed science curriculum provided the opportunity to constitute environmental literate citizenship at the 5th grade level.

Data Collection

In this study, we used qualitative documents as the data collection procedure. The qualitative documents can be public documents such as the official reports or they can be private documents such as diaries, (Creswell, 2014). In this research, we analyzed the newly developed science curriculum within the environmental literate citizenship context through several data sources such as curriculum documents, objectives, and learning and assessment activities at the 5th grade level science textbook.

Data Analysis

Our data analysis consisted of two steps: (i) analysis of the objectives and (ii) content analysis of the human and environment unit at the 5th grade science textbook within the context of environmental literate citizenship. In this research, we developed an environmental literate citizenship framework which includes separate criteria for environmental literacy and environmental citizenship. For the data analysis of this study, first, we focused on the fifth-grade objectives from the list throughout the curriculum to determine their relevance to environmental education. Then we utilized the environmental literate citizenship framework to evaluate the objectives. Environmental literacy component had three categories—functional environmental literacy (F), cultural environmental literacy (C), critical environmental literacy (Cr) (Stables, 1998), and environmental citizenship component had three categories— personally responsible, (P) participatory (Pa), and justice-oriented (J) (Westheimer & Kahne, 2004). We generated expressions referring to each category within environmental literacy and environmental citizenship. We conceived of each expression as an evaluation criterion for curriculum objectives. We listed five criteria under functional environmental literacy category, seven criteria under cultural environmental literacy category, and nine criteria under critical environmental literacy category; five criteria under personally responsible citizen category, six criteria under participatory citizen category, and five criteria under justice-oriented citizen category (Stables, 1998; Westheimer & Kahne, 2004).

Two researchers, one is curriculum development specialist, and the other is science education expert, independently analyzed each objective in the curriculum and matched the objective with the criteria within the context of environmental literacy (Appendix A). For instance, the objective —explains the destructive natural disasters caused by the natural processes [F.5.1.5.1] was located under the first criterion in F (providing of saying or remembering what is meant by a concept regarding environment). Another objective —provides suggestions for resolving an environmental problem in the immediate surrounding or in our country [F.5.6.2.2] was located under the second criterion in Cr (provides forming a view on how to further oppose the environmental problems in a way that can be later translated to action). Then we gathered to decide how much we agreed on the categorization of objectives from environmental literacy aspects. We met disagreements on the categorization of some objectives. We calculated the coefficient of consistency as 0.94 (Krippendorff, 2018). We removed some objectives from the objective list because they were not relevant to environmental education. For instance, one objective was about the negative effects of cigarettes and alcohol on human health, the other was concerning the carbon monoxide intoxication and its precautions. We also utilized environmental citizenship categories to analyze the objectives (Westheimer & Kahne, 2004). For our analysis, we individually matched the objectives with the criteria of the categories within the environmental citizenship context (Appendix B). For instance, the objective —questions the importance of biodiversity for natural life giving examples to plants and animals that are endangered or facing danger of extinction in our country and in the world [F.5.6.1.1] was located under the first criterion in J (critically assesses the problems or issues related to the environment and evaluates in terms of social, cultural, economic and political aspects). And the objective —makes inferences about the environmental problems that may arise in the future as a result of human activities [F.5.6.2.3] was located under the fourth criterion in J (analyzes the insensitivity and behaviors of people and society to solve environmental problems). We had some disagreements on several objectives. For instance, while one researcher included five objectives into the categories, the other did not make any decision or missed the objectives in the list. In addition, we came to agree on one objective concerning participation in environmental cleaning in the home, school, and class that would be personally responsible citizen category rather than the participatory citizen category. It is because the objective did not require a citizen to organize a cleaning activity. Rather, the objective asked them to act responsibly in their environment. Therefore, we reached a consensus on the categorization of the objectives regarding environmental citizenship and the coefficient of consistency was calculated as 0.97 (Krippendorff, 2018).

Second, we examined the 5th grade science curriculum because at the time only 5th grade objectives and its science textbook had been released by the government across the country. Thus, we performed the content analysis of two chapters under the human and environment unit at the 5th grade science textbook according to the criteria for environmental literacy and citizenship (Appendix-A and B). Two chapters were associated with natural disasters and biodiversity, and human-environment relationship topics. For the content analysis, we independently analyzed each chapter line by line to understand the extent to which the content of these topics represented environmental literate citizenship. For instance, we worked on two objectives such as (1) Students will be able to explain destructive natural phenomena led by natural processes and (2) Students will be able to express the ways to protect from destructive natural phenomena. In this sense, we searched for the statements from the chapters that would be possibly associated with the categories of environmental literacy and environmental citizenship. For instance, we found a statement, "Soil pollution decreases biodiversity by destroying the living spaces of living things" and associated it with functional environmental literacy because it aimed to enable students

to know the subject matter. In addition to that, another statement from the textbook, "Fruits and vegetables such as Gherkin, govelez, oleaster, Celtis, ahlat, hunnap, maythorn, alfalfa, vetch, cherry laurel are among our biological riches in the biodiversity of our country [Turkey]," would be associated with cultural environmental literacy because it aimed to make students understand the importance of natural images in their culture. Somewhere in the text, we met some precautions against environmental pollution. For example, one precaution listed there was about recycling. It said, "Wastes of paper, plastics, battery, and glass should be thrown into recycling bins." Because this precaution aimed to enable individuals to act as responsible for recycling, we decided that this would be associated with the personally responsible citizen category. We met some questions in the text as we read the chapter such as, "What might be the reasons for the extinction of the living beings in our country?" We associated this question with the justice-oriented citizen category because it targeted to enable students to critically assess the problem of extinction of some species that could be related to the environment and evaluate the extinction in terms of social, cultural, economic, and political aspects. Although we had disagreements on claims, statements, and questions at the textbook, which would be associated with environmental literacy and environmental citizenship, we calculated the coefficient of consistency as 0.95 (Krippendorff, 2018).

Findings

Analysis of Objectives within the Environmental Literacy Context

At the 5th grade level, we observed that eight out of thirty-six objectives were relevant to environmental education (Appendix A). Our findings indicated that only three objectives were under the functional environmental literacy category. These objectives were associated with a criterion referring to remembering and telling a concept of the environment (F1). It was because the first objective was to explain the destructive natural disasters caused by the natural processes, the second does so to explain the importance of interaction between humans and the environment and the third expresses the ways of protection from the destructive natural disasters. We located five objectives under the critical environmental literacy category. Specifically, the first objective, referring to discussing the factors that threatens biodiversity based on research data was matched with Cr1(providing the understanding of the factors that cause environmental change/problems). Second—providing suggestions for resolving an environmental problem in the immediate surrounding or our country— and third —expressing the ways of protection from the destructive natural disasters were located under Cr2 (initiatives to take action on environmental issues and problems). Fourth—questioning the importance of biodiversity for natural life… giving examples to plants and animals that are endangered or facing the danger of extinction in our country and the world— was located under Cr3 (questioning of what a place or an environmental problem means for itself). Finally, we matched Cr5 (referring to how to respond to environmental problems to generate a solution) with two objectives—making inferences about the environmental problems that may arise in the future as a result of human activities and discussing the examples of cons and pros of the relationship between human and environment. Based on the findings, we can say that at the 5th grade level the objectives encourage the students more to remember and tell a concept of the environment, understand causes-effects on environmental change, and generate a solution to respond to that change. On the other hand, the objectives do not primarily focus on the knowledge and skills to explain the importance of natural things to the culture and their existence in the culture without any human intervention.

Analysis of Objectives within the Environmental Citizenship Context

At the 5th grade level, there were no objectives associated with personally responsible and participant environmental citizenship. Yet, there were five objectives at the 5th grade level relevant to the justice-oriented environmental citizenship (J) (Appendix B). We matched one objective referring to questioning the importance of biodiversity for natural life and another objective referring to discussing the factors that threaten biodiversity based on research data with the J1. Two objectives—making inferences about the environmental problems that may arise in the future because of human activities and discussing the benefits and harmful situations in human-environment interaction on examples— were under the J4 respectively. Only one objective that was to provide suggestions for resolving an environmental problem in the immediate surrounding or our country was under the J5. Overall, it can be said that at the 5th grade level the objectives more focus on critically assessing the environmental problems in terms of social, cultural, economic and political aspects, analyzing the behaviors of people and society to solve those problems, questioning environmental issues for environmental justice, and trying to change the built-in system.

Content Analysis within Environmental Literacy Context

We identified a human and environment unit including two chapters associated with environmental education at the 5th grade textbook. The first chapter focused on natural disasters, biodiversity, natural life, extinct species, and species under risk of extinction topics. The second included environmental pollution, greenhouse effect, global climate change, and environmental protection and landscaping topic under the human-environment relationship. Here, we presented and explained some examples associated with three categories of environmental literacy. In the text, we realized that some factors threatening biodiversity in Turkey and the world were listed such as overpopulation, environmental pollution, overhunting, global warming, erosion, natural disasters, and overgrazing. In addition to this, somewhere in the textbook, we captured several statements, such as soil pollution decreases biodiversity by destroying the living species of living things. To put in detail, chemical substances used in farming accumulate on plants. These plants harm human health when consumed by people and the climatic conditions, the terrestrial forms of the earth structure, the earthquakes, and the relationship between living things that affect the biodiversity of the region [Excerpt 8]. Since the number and variety of living things in a region is called biodiversity, the climatic conditions, the terrestrial forms of the earth structure, the earthquakes, and the relationship between the living things affect the biodiversity of the region [Excerpt 9]. These statements were associated with the objective—explaining the importance of interaction between humans and the environment [F.5.6.2.1]. That is, they were the representation of functional environmental literacy. It was because these statements indicated the concept of biodiversity regarding the environment and the negative effects of environmental pollution on health. Also, we found two more statements, a flood is a condition in which the soil that is in a particular area is completely, or partially underground [Excerpt 11] associated with the objective—explaining the destructive natural disasters caused by the natural processes [F.5.1.5.1] and residential areas should not be located where landslides are likely. The natural vegetation

must be preserved in the sloped terrain. Water channels should be opened throughout the slope to allow the water to run easily and not cause any landslides [Excerpt 4] associated with the objective—expressing the ways of protection from the destructive natural disasters [F.5.1.5.2]. These statements represented the destructive natural disasters and ways of protection from them. All referred to as a criterion of functional environmental literacy—remembering and telling a concept of the environment [F1] (Table 1).

In the biodiversity unit, the textbook provided some information about a natural trip to the Mediterranean. The excerpt we captured from the textbook was below:

> Melisa observed Laurus nobilis [laurel], arbutus, Myrtus communis [myrtle], qercus aucheri [a kind of oak], and olea [olive tree] during the trip. As they passed through Mount Ida (Kazdagi), Melisa saw eagle and hawk floating through the sky. Her father told her they were predators and endemic to the region. [Excerpt 1]

This excerpt represented the critical environmental literacy in a way that introduced questioning of what a place or an environmental problem means for itself. Another excerpt continued to mention fruits and vegetables such as gherkin, govelez; oleaster, Celtis, ahlat, hunnap, maythorn, alfalfa, vetch, and cherry laurel are among our biological riches in the biodiversity of our country [Turkey] [Excerpt 2]. These excerpts were the representation of the first part of the objective in the text—….questioning the importance of biodiversity for natural life as referring to a criterion of questioning of what a place or an environmental problem means for itself. [Cr3]. Yet, it did not represent the second part of the objective—giving examples to plants and animals that are endangered or facing the danger of extinction in our country and the world. [F.5.6.1.1] (Table 1).

Furthermore, our content analysis comprised of mini-activities provided in the textbook. One activity was about investigating a picture of nature demonstrating a chain of mountains, rivers, and forests. Possibly this picture would be called a natural wonder. However, the text informed students, this natural wonder will be transformed into residential areas. With its greenness, blueness, and biological diversity, it has been planned to construct buildings, parks, and factories in the area of the natural wonder. With the opening of these factories in this area, there will be many job opportunities for people [Excerpt 6]. We associated this excerpt with the objective–making inferences about the environmental problems that may arise in the future as a result of human activities [F.5.6.2.3] (Table 1). Based on this information, students were asked, when construction was completed in this area, what kind of environmental issues would people face? What could be the positive and negative consequences of building factories and residential areas in this place? [Excerpt 7]. We associated this excerpt with the objective–discussing the benefits and harmful situations in human-environment interaction on examples [F.5.6.2.4] (Table 1). Then, they were expected to write their assumptions. We put this activity under the critical environmental literacy category because students were expected to analyze the factors that would threaten biodiversity and cause environmental problems or changes [Cr5].

In another activity, Tom and his friends were expected to investigate water pollution in a river. To do so, they listed a variety of plants and animals in certain remote areas around the river. They began to search the river about 3 km away from the part of the bog. Then, they presented their results after their research. They found that there were 60 water plants, 5 ducks, 25 frogs, and 45 water bugs in the park near the river about 3km away from the bog. They also added that there were 40 water plants, 1 duck, 12 frogs, and 20 water bugs on the roadside about 2 km away from the bog. Their results also included the area nearby a painting factory about 1 km away from the bog. They observed 15 water plants, zero duck, 1 frog, and 5 water bugs in this area. Finally, they listed that there were 80 water plants, 5 ducks, 4 frogs, and 52 water bugs in the area of the bog. Using this information, students were expected to answer some questions, such as why do you think that bog resulting from pollution has more species and is rich in biodiversity? Which would be the least polluted area? What are the reasons for the decrease in the number of frogs and ducks on the roadside? [Excerpt 3]. This activity was associated with the objective—discussing the factors that threaten biodiversity based on research data. [F.5.6.1.2] (Table 1). It represented the critical environmental literacy because students were expected to examine and compare the results given in the table. Moreover, they would consider and question what might be the consequences of such environmental problems [Cr1] (Table 1).

Besides, we met a statement—identify an environmental problem at your local residence. Write down the precautions you need to take to eliminate the environmental problem you have identified [Excerpt 5]. We associated this excerpt with the critical environmental literacy expression such as, provides forming a view on how to further oppose the environmental problems in a way that can be later translated to action [Cr2]. This statement also referred to as the objective—providing suggestions for resolving an environmental problem in the immediate surrounding or our country [F.5.6.2.2]. It is because the students were expected to generate solutions to a problem in an environmental context, which in turn would lead to taking action (Table 1).

Overall, we can say that the 5th grade textbook encourages the students more to remember and tell a concept of the environment, understand causes-effects on environmental change, and generate a solution to respond to that change. On the other hand, the textbook does not primarily focus on the knowledge and skills to explain the importance of natural things to the culture and their existence in the culture without any human intervention.

Content Analysis within Environmental Citizenship Context

Some excerpts we used for content analysis within the critical environmental literacy context occurred in this step. Here, we listed some excerpts from the 5th textbook in Table 2. As we mentioned above about Melisa's trip with her family to Mount Ida and during her trip, she met plant and animal species endemic to the area she has passed through. We focused on the same excerpt because there was a question at the end—why is biodiversity important for a country [Turkey]? [Excerpt 14] We envisioned that the question given aimed to help students question the importance of biodiversity. That question would spark their interest in understanding such as; the loss of biodiversity affects the extinction of some plants and animals in advance [F.5.6.1.1]. In addition, there were additional questions in the text such as, what animals do you see when you look around? What could be the importance of having so much diversity of living things in nature? [Excerpt 13] Therefore, we concluded that the statements and questions from the story had the potential to enable students to critically assess environmental problems and make evaluations in terms of social, cultural, economic, and political aspects [J1] (Table 2).

Table 1. *Excerpt for the content analysis of the textbook within environmental literacy context.*

Category	Criteria		
Critical EL	Cr1	F.5.6.1.2.	Tom and his friends have searched and listed the variety of plants and animals living in certain remote areas around the river to search for pollution in a river. They started to search the river about 3 km away from the part of the bog... why do you think that bog resulting from pollution has more species and is a rich of biodiversity? Which would be the least polluted area? [Excerpt 3]
	Cr2	F.5.6.2.2	Identify an environmental problem at your local residence. Write down the precautions you need to take to eliminate the environmental problem you have identified. [Excerpt 5]
	Cr3	F.5.6.1.1.	Elf observed laurus nobilis [laurel], arbutus, myrtus communis [myrtle], qercus aucheri [a kind of oak], and olea [olive tree] during the trip. As they passed through the Mount Ida (Kazdagi), Elf saw eagle and hawk floating through the sky. Her father told her they were predators and epidemic to the region. [Excerpt 1]
			Fruits and vegetables such as gherkin, govelez, oleaster, celtis, ahlat, hunnap, maythorn, alfalfa, vetch, cherry laurel are among our biological riches in the biodiversity of our country. [Excerpt 2]
	Cr5	F.5.6.2.3.	.... it has been planned to build buildings, parks and factories in this area. With the opening of these factories, there will be many job opportunities for people. When construction was complete in this area, what kind of environmental issues people would face? What could be the positive and negative consequences of building factories and residential areas in this place? Write your assumptions. [Excerpt 6]
		F.5.6.2.4	What could be the positive and negative consequences of building factories and residential areas in this place? [Excerpt 7]
Functional Environmental Literacy	F1	F.5.6.2.1.	Soil pollution decreases biodiversity by destroying the living spaces of living things. Chemical substances used in farming accumulate on plants. These plants harm human health when consumed by people. [Excerpt 8]
			The number and variety of living things in a region is called as biodiversity. The climatic conditions, the terrestrial forms of the earth structure, the earthquakes, and the relationship between the living things affect the biodiversity of the region. [Excerpt 9]
		F.5.1.5.1	Flood is a condition in which the soil that is in a particular area is completely, or partially underground. [Excerpt 11]
		F.5.1.5.2.	Residential areas should not be located where landslides are likely. The natural vegetation must be preserved in the sloped terrain. Water channels should be opened throughout the slope to allow the water to run easily and not cause any landslides. [Excerpt 4]

Table 2. *Excerpt for the content analysis of the textbook within environmental citizenship context*

Category	Criteria		
Justice-oriented citizen	J1	F.5.6.1.1.	What animations do you see when you look around you? What could be the importance for us having so much diversity of living things in nature? [Excerpt 13]
			...Along the road, sweetbay, oak and wild olive trees were like friends with them. As they passed through the Mount Ida (Kazdagi), the Elf saw the eagle and hawk in the sky... Why is biodiversity important for a country? Please Explain. [Excerpt 14]
		F.5.6.1.2.	What might be the reasons for the extinction of the living beings in our country? [Excerpt 15]
			Tom and his friends have searched and listed the variety of plants and animals living in certain remote areas around the river. ..What could be the reason for the decrease in the number of frog and ducks on the roadside? [Excerpt 16]
			... most of the fruits and vegetables grow up early and rotted on their branches. There is something weird this year. The seasons came 20 days-1 month earlier... What is the reason of the situation in the passage? [Excerpt 17]
	J4	F.5.6.2.3.	... it is planned to build buildings, parks, and factories in this area. With the opening of these factories, there will be many job opportunities for people. What kind of environmental problems may arise when the construction is completed? [Excerpt 18]
		F.5.6.2.4.	...What could be the positive and negative consequences of building factories and residential areas in this place? Write your estimations. [Excerpt 19]
	J5	F.5.6.2.2.	Identify an environmental problem at your local residence. Write down the precautions you need to eliminate the environmental problem you have identified. [Excerpt 20]

For the same criterion, J1, with a different objective [F.5.6.1.2], we found some statements. For instance, there was a question like, what might be the reasons for the extinction of the living beings in our country? Also, there was a passage, "...most of the fruits and vegetables grow up early and rotted on their branches. There is something weird this year. The seasons came twenty days-1 months earlier...What is the reason for the situation in this case?" [Excerpt 17]. Moreover, we used the activity in which Tom and his friends investigated water pollution in a river with research data [Excerpt 3, 16]. This time we focused on the same activity concerning the justice-oriented citizenship category because this activity had the potential to make students discuss the factors that would threaten the biodiversity based on research data. In turn, it would enable them to critically assess and evaluate environmental issues from social, cultural, economic, and political perspectives [J1] (Table 2).

We had another activity about the transformation of a natural wonder into a residential area where to build apartments, parks, and factories as stated in Excerpt 18 as ...it is planned to build buildings, parks, and factories in this area. With the opening of these factories, there will be many job opportunities for people. What kind of environmental problems may arise when the construction is completed? This question aimed to enable students to make inferences about the environmental problems that may emerge shortly because of people's intervention on nature [F.5.6.2.3]. Somewhere in the text, several questions were provided—what kind of environmental problems may arise when the construction is completed? What could be the positive and negative consequences of building factories and residential areas in this place? [Excerpt 19]. These questions were to discuss the benefits and harmful situations of the human-environment interactions as referring to the objective [F.5.6.2.4]. These statements also showed that there was a potentiality to analyze behaviors of people when they interacted with the environment and to generate solutions to problems if any [J4] (Table 2).

We captured another statement such as; identify an environmental problem at your local residence. Write down the precautions you need to eliminate such a problem [Excerpt 20]. We associated this statement with the objective referring to providing suggestions to resolve an environmental problem... [F.5.6.2.2.] because identifying an environmental problem around their residence and listing some precautions to such a problem could make students internalize the situations and get motivated to bring the change to their society. Instead of bringing problems irrelevant to their daily life, offering them to identify a problem from their daily life would have them internalize and encourage them to bring environmental justice in society. Therefore, this statement matched with J5 referring to monitoring and questioning environmental issues for environmental justice and tries to change the built-in system (Table 2).

The findings within environmental citizenship context indicate that the 5th grade textbook more focuses on critically assessing the environmental problems in terms of social, cultural, economic and political aspects, analyzing the behaviors of people and society to solve those problems, questioning environmental issues for environmental justice, and trying to change the built-in system.

Discussion and Conclusion

In our inquiry, many objectives across the whole curriculum represented two components of the environmental literate citizenship framework—environmental literacy and environmental citizenship. Very limited objectives represented environmental literacy. As a result, it can be said that the newly developed curriculum provides more opportunities to constitute environmental citizenship but less opportunities to constitute environmental literacy. Among the schooling goals, it was not expected to cultivate "critical thinkers, social inquirers, and problem solvers, or active participants in environmental and political (or even educational) decision making" (Stevenson 2007, 145). According to Srbinovski et al. (2010), more attention was given to functional environmental literacy in the science curriculum. On one hand, our analysis is a contrast to Stevenson (2007) and Srbinovski et al. (2010) because there was more space for critical environmental literacy compared to the other categories throughout the whole curriculum. This suggests that the new curriculum have more potential to cultivate critical environmental literacy but have less potential to cultivate functional and cultural environmental literacy. On the other, the results from Stevenson (2007) and Srbinovski et al. (2010) supported our analysis because there was more space for functional environmental literacy at the 5th-grade level. In addition, we observed no attention given to the cultural dimension of environmental literacy at the 5th grade level. This was in a line with Acuna (2015) that cultural aspects were limited to understand the interactions between humans and the environment in Chilean school textbooks. At an early age, exposure to environmental education is a means to develop positive attitudes towards the environment and contribute to cognitive development (Horwitz, 1996). Our analysis at the 5th grade level showed only eight objectives. Out of eight objectives, five were under the critical environmental literacy category in contrast to Srbinovski (2013). The remaining was located under functional environmental literacy. This results that 5th grade science curriculum provides more opportunities to constitute critical environmental literacy but less opportunities to functional environmental literacy. In addition, it does not have any potential to improve cultural environmental literacy.

Within the environmental citizenship context, there was more space for justice-oriented environmental citizenship at the 5th grade level. In contrast, most educational programs put more focus on personally responsible environmental citizenship (Westheimer & Kahn, 2004). In more specifically, at the 5th grade level, there were five objectives under justice-oriented citizenship. On the contrary, the Chilean school textbooks provided limited opportunities for individuals to take social action. The textbooks did not encourage collective action towards environmental problems (Acuna, 2015). This suggests, 5th grade science curriculum provides more opportunities to constitute justice-oriented environmental citizenship, but it does not have potential to constitute personally responsible and participatory citizenships.

In our theoretical framework, we associated the categories of environmental citizenship with the critical environmental literacy because environmental citizenship required participation and action in different degrees to understand causes-effects on environmental change and generate a solution to respond to such change. This would be aligned with critical environmental literacy (Stables, 1998). Our analysis had evidence that the content of a human and environment unit had the potential to cultivate environmentally literate citizens. This was in line with Chawla and Cushing's (2007) suggestion that educators encourage students to gain knowledge, form positive attitudes about the environment, and practice action skills. Moreover, the objectives associated with two components of the environmental literate citizenship framework appeared throughout the text. In other words, the text was written in light of the objectives

and highlighted the essence of environmental literate citizenship. Yet, eight objectives represented the functional and critical environmental literacy, whereas five did so the justice-oriented environmental citizenship at the 5th grade science textbook. Five objectives of environmental citizenship were aligned with critical environmental literacy. This was coherent with our theoretical framework. As a result, we can say that 5th grade science textbook provides more opportunities to constitute critical environmental literacy and justice-oriented citizenship but less opportunities to functional environmental literacy. In addition, it does not have potential to improve cultural environmental literacy, and personally responsible and participatory citizenships. This result is coherent with the 5th grade curriculum.

First, literacy and citizenship have different definitions in nature. Literacy may not require individuals to act necessarily as in the functional and cultural environmental literacy whereas citizenship empowers individuals to have knowledge, skills, and attitudes to act as in critical environmental literacy (Berkowitz et al., 2005; Ellis & Waterton, 2004). Likewise, our analysis indicated that the objectives under environmental citizenship required social action, and these objectives were associated with critical environmental literacy. We think that this result occurs normally in the conventional classroom, where the teacher transferred content knowledge to the students and made them familiar with environmental issues. We assumed that due to students' grades and knowledge level, enabling them to take action on environmental issues was missing. In contrast, engaging students with environmental issues and providing opportunities to take action could help them become active learners (Short, 2010). For instance, Hart (2002) stated that science curricula in environmental education should provide the students with experiences. Hart added that those experiences require the instructional leadership that stresses engagement, reflection, and action-oriented group work in natural settings as modes of learning. In addition, Venville et al. (2009) pointed out this problem as referring to several countries where students were highly engaged in high-stakes tests, which in turn reduced their contextual, issue-based, and applied to learn.

Second, among the objectives under environmental literacy, the whole curriculum puts more emphasis on the critical aspects of environmental education quantitatively. In contrast, Cermak (2010) indicated that the textbook and teacher limited the students to gain more functional environmental literacy characteristics and less cultural and critical environmental literacy characteristics. Also, Walker (1995) found that the teachers had some difficulties to have their students take action on environmental issues though they had taken a course on teaching environmental issues. She suggested that the teachers be willing to include activities and concerns associated with environmental education in their classroom if they want their students to take action. As Cheng and So (2013), Cotton (2006), and Lee (2000) pointed out, this situation might be completely related to teachers' beliefs toward the environment and teaching strategies in environmental education.

Third, we associated the objectives at the 5th grade level with the justice-oriented citizenship category. This was not our expectation because usually educational programs were grounded on the personally responsible citizenship (Westheimer & Kahn, 2004). In other words, the perspective of justice-oriented citizenship was least commonly pursued compared to participatory citizenship as Westheimer and Kahn (2004) reminded us. Furthermore, the whole curriculum did not include the participatory environmental citizenship aspects in terms of objectives. Yet, participation in the making process within the environmental context was essential to reshape the individual and society. It could help individuals to respond to social problems and structural critiques (Ellis & Waterton, 2004; Schild, 2016).

Finally, the content presented in the textbook represented critical environmental literacy more. Interestingly, the content we analyzed in terms of environmental citizenship was more related to justice-oriented environmental citizenship. Therefore, the text had the potential to help students develop critical viewpoints about environmental issues from critical environmental literacy and justice-oriented citizenship aspects and take social action to make a change in their environment. In this sense, we agreed with Dimick (2015) on that helping students to generate personalities toward social and environmental justice was a specific challenge in environmental education.

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Appendices

Appendix A: Potential objectives associated with environmental literacy

A. Functional Environmental Literacy

Criteria	Objectives
F1) Providing of saying or remembering what is meant by a concept regarding environment.	F.5.1.5.1. Explains the destructive natural disasters caused by the natural processes. F.5.6.2.1. Explains the importance of interaction between humans and environment. The negative effects of environmental pollution on people's health are mentioned.
F2) Provides the recognition of a concept related to the environment among the similar concepts.	
F3) Providing of distinguishing the differences of the concepts related to the environment.	
F4) Provides the knowledge about which part of the environment is formed by a concept of environment.	
F5) Provides the ability to make an informed guess about what something half-known is likely to be by using observation from contextual cues.	

B. Cultural Environmental Literacy

Criteria	Objectives
C1) Provides the ability to understand the significance that society attaches to the natural images in terms of culture (national parks, a specific treetype, Kangal dog, etc.)	
C2) Provides the understanding that the environment is formed not merely by climate, glaciation and topography, but formed by shaping and enclosing the landscape that people owned for many centuries.	
C3) Providing the knowledge of why the natural things are there when the causes are clearly not simply geological or climatic with no apparent human intervention.	
C4) Providing the ability to accept the dominant value system/ cultural heritage regarding the culture that is in the environment.	
C5) Provides the ability to acknowledge the metaphorical/ symbolic meanings of natural things they possess in that culture (As an English, knowing what is implied by the term heart of oak) even though there is not a scientific basis.	
C6) Provides the ability to be aware of and conscious about the norms and values regarding the environment in the natural culture.	
C7) To provide an understanding of the norms and values of the national culture in order to influence on the environmental change.	

(Appendices Cont.)

C. Critical Environmental Literacy

Criteria	Objectives
Cr1) Provides the understanding of the factors that cause environmental change / problems.	F.5.6.1.2. Discusses the factors that threatens biodiversity based on research data.
Cr2) Provides forming a view on how to further oppose the environmental problems in a way that can be later traslated to action.	F.5.1.5.2. Expresses the ways of protection from the destructive natural disasters.
	F.5.6.2.2. Provides suggestions for resolving an environmental problem in the immediate surrounding or in our country.
Cr3) Provides questioning of what a place or an environmental problem means for itself.	F.5.6.1.1. Questions the importance of biodiversity for natural life. Gives examples to plants and animals that are endangered or facing danger of extinction in our country and in the world.
Cr4) Provides questioning of what a place or an environmental problem means for others.	
Cr5) Provides questioning what might be the consequences of continuing the existing situation regarding a space or environmental problem.	F.5.6.2.3. Makes inferences about the environmental problems that may arise in the future as a result of human activities.
	F.5.6.2.4. Discusses the examples of cons and pros of the relationship between human and environment
Cr6) Provides questioning whether it should be acted differently for the solution of the problem.	
Cr7) Provides questioning how it should be acted for the solution of the problem.	
Cr8) Provides questioning of whether the existed value system is ready for change as a result of what is now known about the solution of the problem.	
Cr9) Provides questioning of how the existed value system should be translated into effective action.	

Appendix B: Potential objectives associated with environmental citizenship

A. Personally responsible citizen

Criteria	Objectives
P1- Demonstrates individual responsibility towards the environment in the community.	
P2- Obeys the social rules and laws concerning the environment.	
P3- Attaches importance to recycling.	
P4- Be sensitive to environmental problems.	
P5- Looks optimistically about and participates in environmental organizations.	

B. Participatory ciziten

Criteria	Objectives
Pa1- As an individual, he is part of an environmentally sensitive organization and is an active member of it.	
Pa2- Participates in organizational work to develop and maintain sensitivity towards the environment.	
Pa3- Attaches importance to the order and cleanness of the environment and encourages other people.	
Pa4- Knows the institutions and organizations involved in the protection of the natural environment and knows the strategies necessary for exhibiting collective tasks.	

(Appendices Cont.)

Pa5- Helps to do organizational work to protect the natural environment.	
Pa6- Takes leadership and actively takes part in the protection of the natural environment.	
C. Justice-oriented citizen	
Criteria	**Objectives**
J1- Critically assesses the problems or issues related to the environment and evaluates in terms of social, cultural, economic and political aspects.	F.5.6.1.1. Questions the importance of biodiversity for natural life. Gives examples to plants and animals that are endangered or facing danger of extinction in our country and in the world. F.5.6.1.2. Discusses the factors that threatens biodiversity based on research data.
J2- Considers the concept of justice to solve problems with a critical point of view.	
J3- Takes leadership of change in order to avoid insensitivity to the environment with a democratic point of view.	
J4- Analyzes the insensitivity and behaviors of people and society to solve environmental problems.	F.5.6.2.3. Makes inferences about the environmental problems that may arise in the future as a result of human activities. F.5.6.2.4. Discusses the benefits and harmful situations in human-environment interaction on examples
J5- Monitors and questions environmental issues for environmental justice, and tries to change the built-in system.	F.5.6.2.2. Provides suggestions for resolving an environmental problem in the immediate surrounding or in our country.

Academy Journal of Educational Sciences
June 2021, Volume 5, Issue 1, 15-26

The Effect of Teaching Math's through Storytelling on Students' Math's Achievement

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Abstract

The purpose of this research is to determine whether the use of the narrative (storyline) method in middle school 5th grade mathematics class is effective for students' mathematics achievement and mathematics anxiety. The study is a quasi-experimental study with a pretest-posttest design. During the course of the application, decimal numbers were presented in the mathematics lesson using the narrative method in the experimental group whereas the traditional presentation method was used in the control group. The study was carried out with a total of 64 students who attended the 5th grade of a middle school selected by the purposeful sampling method in Bornova district of İzmir province. The mathematical achievement test and mathematics anxiety scale were used for data collection. The collected data were scored and analyzed according to the scale previously prepared by the researcher. According to the analysis; teaching decimal numbers using the narrative method resulted in increased mathematics success and decreased mathematical anxiety when compared to the traditional teaching method.

Keywords: Narrative Method, Mathematics Teaching, Mathematics Achievement, Mathematics Anxiety

Introduction

Education, in its most basic definition, is the process of creating behavioral change in an individual. This change should be compatible with the expectations of society, norms, and moral background. In addition, it is important that the new behavior acquired is permanent and sustainable, and that it develops and occurs regularly with successive changes in a process. The period in which we live, in which a rapid change occurs on a global scale, is called the information age. Rapid developments in information technologies cause social structures to change and reshape. This rapid process has made it necessary to discover new approaches in education systems (Çalık and Sezgin, 2005).

Education should be done in a planned, programmed and systematic way. This plan and program should be developed by taking into account each country's own history, culture, geopolitical position, economic and social structure. It is unlikely for education to remain stagnant, especially in this age where changes in social life are experienced rapidly. Catching up with the age through the changes to be made in the education system is also important for the interests of the country. Planning of education has been seen as one of the tools of general economic and social change, as well as being a solution to educational problems. In Turkey, after the 1960s, the tendency to solve the problems of the education system through planning has become stronger. During the planned period, "failure to implement policies and decisions in accordance with the plan" and "failure to reach the plan goals" were frequently mentioned among the reasons for not solving education problems (Adem, 1995: 152; Kurtkan, 1977: 267; Küçüker, 2010).

About the Article

Type: Research
Received: 18 April 2021
Accepted: 04 June 2021
Published: 30 june 2021
DOI: 10.31805/acjes.919686
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Suggested APA Citation

Katipoğlu, S. N., Katipoğlu, M., & Sezer, S. (2021). The Effect of Teaching Math's through Storytelling on Students' Math's Achievement. *Academy Journal of Educational Sciences, 5*(1), 15-26. http://dx.doi.org/10.31805/acjes.919686

Until the last quarter of the 20th century, the basic principles of behaviorist learning theory were mostly taken as the basis throughout the planning and implementation of educational processes. However, the fact that this theory keeps mental processes out of the cluster and associates' learning with conditioning has left unanswered a number of questions that emerged with the developing technology and the change experienced (Gardner, 2004). As a result, theories focusing on cognitivism such as constructivism, discovery learning, meaningful learning, and brain-based learning have come to light. These theories argue that each student has a specific life, and their experiences appear as an important factor in learning, rather than just giving pure knowledge to students (Özmen, 2004).

One of the subjects that need cognitive theories to be used in the classroom is mathematics. According to Altun (2001), the main purpose of teaching mathematics is; to teach the person the mathematical skills required in daily life, to teach problem solving, and to provide a way of thinking that handles facts in a problem solving approach. Although mathematics is used in all areas of social life, it is considered "difficult" all over the world. The difficulty of mathematics arises not only from its own structure but also from prejudice and fear developed against it (Umay, 1996). Unfortunately, in our country, we see that there is a prejudice against mathematics lessons from an early age .It will be insufficient to explain the reason for this with the intricate structure of mathematics itself. Along with the difficulty inherent in mathematics, variables such as the mathematics teaching, the teaching methods and techniques used, the lack of facilities and infrastructure, the readiness levels of the students, environmental factors, etc. are effective in prejudice developed against mathematics (Boz, 2008).

Yılmaz ve Yenilmez's (2008), study suggested that there are some misconceptions in students as follows : Inability to grasp the meaning of decimals, thinking that multi-digit decimal numbers are smaller, thinking that multi-digit decimal numbers are larger, not being able to see zero as a place value, thinking that zero has no meaning, not being able to name the digits in the fraction part of the decimal number correctly, assuming that zero makes the numbers smaller, ignoring the comma of a decimal number, perceiving the decimal comma as a separator between two different numbers, and not being able to grasp the relationship between fractions and decimals. (Altıparmak and Palabıyık, 2017).

Unfortunately, large number of students, the lack of sufficient teachers, the inflexibility of the curriculum, and the idea of getting the subjects ready at the end of the year forces teachers to teach in a traditional way and obstruct the transition to a constructivist approach in many schools today. When social life problems and other topics are added to these problems, the quality of education decreases and schools become insufficient in teaching. In their study, Aslanargun and Bozkurt (2012) identified the problems experienced in the schools with the help of school principals. According to the study, the problems faced are related to the issues such as lack of parents' interest, lack of communication, lack of auxiliary staff, cleaning, warming, lack of teachers and equipment, insufficient planning regarding education, inadequate work of school family unions and insufficient school budgets. Ogder (2019) categorized the above general problems by dividing them into the many subheadings.

Problems Experienced in terms of School

The problems faced regarding the school can be listed as follows:

- Physical problems of schools scarcity of information technology classes,
- Insufficiency of libraries, laboratories, and multi-purpose halls,
- Inability to use social reinforcement areas actively,
- Combined classroom practices
- Having dual education in some schools due to physical impossibilities and insufficient number of classrooms,
- Not having enough branch teachers in schools,
- Adaptation problems of teachers coming with assignment and high number of students per school.

Problems Experienced in Students

Besides the problems related to schools, there are various student-related problems as follows:

- Lack of purpose and mission found in most of the students,
- Insufficient awareness and guidance of students about reading, research, thinking, practice,
- Students' lack of nutritional habits at a sufficient level,
- Students transported within the scope of bussed education practice,
- Level differences between boarding students and central school students, and transportation problems,
- The fact that students are held responsible for subjects other than their interests,
- Having a high level of examination anxiety and its negative effect on student achievement,
- Insufficient learning of the lessons in the course,
- Inability to use resources, tools and equipment adequately,
- Inability to plan the duration of study, extracurricular activity and social environment times.

Problems Experienced in Families

The problems related to student's family as follows:

- The insensitivity of the parents of the students and their inability to follow their students,
- The absence and negativity of the students' working environment at home,
- The lack of nutrition,
- The calculation of the student's contribution to the workforce by the family,
- The employment of students in different sectors as a source of income,
- Domestic problems, violence, crowded family environments affecting student success,
- The lack of education of families.

Problems Experienced in Teachers

In addition to school, there are some problems related to teachers as follows:

- Education policies that disrupt teachers' morale

and motivation,
- Motivation disturbance caused by the fact that two spouses working in different provinces and districts,
- Appointment of those who do not have sufficient motivation as teachers,
- Teachers not being able to renew themselves,
- The thought of retiring with the knowledge they graduated, keeping away from innovations,
- Deficiencies in presenting information,
- Insufficient attention to in-service training activities and inefficiency of the trainings,
- The elimination of teacher staff deficiencies with substitute and inexperienced teachers.

Other Problems

Lack of time and the effort to finish their course subjects by the end of the year, the system of passing classes in primary schools (encouraging each student to move to the higher grade), not knowing effective study methods and not being able to teach this behavior to the student, the fact that exam anxiety is very high, having fewer connections and not paying enough attention to literacy problems are among the other problems related to education in Turkey.

If we consider international exams such as PISA and TİMSS that measure country achievements, the problems mentioned above are extremely important and must be solved, especially in terms of mathematics education. The fact that our country ranks among the bottom countries in these exams clearly shows that the problems to be overcome are not limited to these. Considering the 2018 PISA mathematics results, while the average mathematics score was 489, Turkey's average mathematics score was 454 points. Thus, Turkey ranked 33rd among 37 OECD countries in this field. In addition, when OECD partners are included in the ranking, Turkey ranked 42nd in the field of mathematics (OECD, 2018).

How the student receives information and how he or she creates a schema in her mind about that information is very important in the learning process. The preparation of a rich and attention-grabbing learning environment in terms of the materials to be used in the teaching of the lesson, the integration of teaching with daily life accelerates and facilitates the systematic processing of information in the student's mind and makes this process more enjoyable for the learner. Addressing more than one sense of the learner, which is a prerequisite of a contemporary learning environment, makes teaching more attractive and easier (Koğ & Başer, 2011).

One of the contemporary teaching methods is the narration (storytelling) method. Storytelling is a learning and teaching method developed in Scotland. It is based on the core principle that what is learned is made meaningful and easily remembered by the student (Hein, 1991). Students are included in the story with the perspectives of the characters in the stories developed and play a role by creating a line between imagination and reality in order to give meaning to the subject (Yiğit, 2007). Narration is a teaching and learning method developed in Scotland. It is based on the idea that the information is made meaningful by the student and can be easily remembered. Because the story is a basic meaning-making activity that begins in the first childhood and continues throughout human life, it is mostly benefited from the willingness of students of all ages to create a story in the narration method (Fusai, Saudelli, Marti, Decortis, & Rizzo, 2003).

This method is known as its original name in various countries, especially in Scotland, but an equivalent was tried to be found in Turkish, and in the previous studies, Güney (2003) used the title "Story Based Learning", while Coşkun (2013) used the title "Narration Method".

"Story is a type of short writing that contains episodes from human life, moving as place and time. According to another definition, it is a short literary work that tells about the events that happened or could happen. In each story, it is possible to mention three main elements: persons, place and action. Stories are based on an action or situation. One of the main elements of the stories is the human being, and they usually include certain sections of their lives without going into much detail. Each story has a message. Like messages, narration methods are also a basic element in stories. Generally, there are two types of narration methods. The person tells what happened, or one of the assistants can narrate it, or the event is narrated from the third person. In this case, a narrator intervenes between the reader and the story (Kavcar & Oğuzhan, 2002, as cited in Coşkun, 2013). "

It is simpler for students to learn what they like. Therefore, a positive attitude towards mathematics is very important in mathematics teaching (Nazlıçiçek&Erktin, 2002). In the narration method, students' comprehension of the lesson with the characters they like may be effective in their positive attitude towards mathematics. Using a story that is intertwined with daily life and with characters known to the majority of students in mathematics teaching can reduce students' anxiety towards the subject of mathematics and also make them love it (Coşkun, 2013). Learning by doing and experiencing is the basis of the narration method. In this method, which is based on constructivism, the main objective is that students learn better and the learning is more permanent (Coşkun, 2013). In addition, this method, which is based on storytelling and being in the story, initiates the learning process with a story in general and it involves being taught in a gradual set of topics after strengthening with time, space, and character connections (Yiğit, 2007).

Considering this positive contribution of the teaching through storytelling, the aim of the research was determined to analyze the effect of storytelling teaching in mathematics on 5th grade students' mathematics achievement. The reason for choosing the 5th grade is to ensure that the concept of decimals is handled in all aspects while moving on to the second level education. In this context, decimals unit was chosen. For this purpose, answers will be sought for the questions to what degree the teaching to be done affects students' math achievement scores and math anxiety scores. In addition, the study was limited to the subject of the decimals, and during the study, students in the experimental and control group understood the questions posed to them correctly and answered them realistically and sincerely without any pressure.

Method

Research Model

The research model is the arrangement of the necessary conditions for the collection and analysis of data economically and in accordance with the research purpose (Karasar, 2009). Pretest-posttest quasi-experimental design with control and experimental groups was used in the study. Quasi-experimental designs come after real experimental designs in terms of scientific value. Semi-experimental designs are regarded as the best possible and evaluated in this way (Karasar, 2014). In the pre-test-post-test design model, the experimental group is exposed to the independent variable; however, the control group is not affected by the independent variable. Subjects are not randomly assigned. If there is no significant difference between the pre-test scores of the groups, it can be said that the groups are equivalent. In testing the assumptions, the scores of both groups that change from pre-test to post-test are compared to determine whether there is a significant difference (Bulduk, 2003; Kıncal, 2010; Karasar, 2009; Balcı, 2004).

In this study, which was prepared to determine the effect of mathematics teaching through storytelling, a quantitative research method was used. In addition, a survey method was used to gather students' opinions about storytelling. Pretest-posttest quasi-experimental design with control and experimental groups was used in the study. Quasi-experimental models are posterior to real experimental designs. Quasi-experimental designs are regarded as the best possible designs and they are evaluated in this way (Karasar, 2014).In this study, the 5th grade mathematics curriculum was taken into consideration. 5 separate classes were selected from the school where the implementation was performed, and according to the level determination study, 2 equal classes were assigned as experimental and control groups.

While the mathematics lesson in the experimental group was taught by adopting a constructivist approach and integrating the storytelling method into the presentation method, the lesson in the control group was taught with the traditional presentation method. Mathematics achievement test and mathematics anxiety scale were applied to the experimental and control group students at the beginning and at the end of the study. In addition, the students in the experimental group were asked about their opinions about storytelling with an open-ended question, and the effects of teaching on them were tried to be determined.

Math Achievement Test

In this study, a math achievement test consisting of 20 multiple-choice questions prepared to measure the math achievement levels of the students was applied before and after the research. 5th grade achievements were taken into account in the development of the math achievement test. The questions in the test consist of the acquisition comprehension tests published by the Ministry of National Education and the questions that came out in previous exams prepared by the Ministry (MoNE, 2019). Content validity of the achievement test was provided by consulting to expert academicians. Some questions have been eliminated by the experts. The reliability study of the test was conducted with 51 6th grade students selected from the secondary school where the application was performed. As a result of the reliability study, the final version of the 20-question math achievement test was created by removing 1 question from the test, which reduced the reliability of the test, and the Cronbach Alpha reliability coefficient was found to be .81 as a result of the calculation made through the statistical package program.

Math Anxiety Scale

In this study, Mathematics Anxiety Scale developed by Recep Bindak (2005) was used. Math anxiety scale includes 10 question items consisting of positive and negative expressions including whether students like the subject of Math, whether they like the activities related to this lesson, and fear of math. The anxiety scale was formed as a Likert-type, 5-grade scale. In the items in the anxiety scale, it is coded as Never (1), Sometimes (2), Often (3), Always (4). Reliability and validity analyzes were made with data collected from the middle school students. The scale consists of a single factor and the explained variance rate is 51.7%. The Cronbach Alpha internal consistency reliability coefficient of the scale was 0.84. Out of 10 items on the scale, the ninth item is negative for anxiety and the others are positive.

Study Group

Probabilistic sampling is one of the methods used in quantitative studies. Probabilistic sampling methods are generally used to increase the representation power of studies. One of the methods used in this context is the simple random sampling method. In simple random sampling, the participants to be included in the study are selected by random method. In this method, in addition to the equal probability of participants to participate in the research process, the population of the study is also homogeneous. The population of the study consists of all students of a secondary school in Izmir province, and the sample consists of a total of 64 students from two 5th grade classes of the same school. In order to determine the experimental and control groups, the math achievement scores of the previous term of five 5th grade classes of the school were compared, and one of the two 5th grade classes with the closest averages was randomly selected as the experimental and one as the control group.

Data Collection Process

The application was took place in the second semester of the 2018-2019 academic year. The researcher has developed the stories used for the application by making use of historical, cultural figures and stories in the literature. The opinions of the faculty members of the Department of Educational Sciences and the Department of Mathematics Education were taken that the stories developed were useful for the study and suitable for the development levels of the students. Before the application, the hours allocated to the subjects in the 5th grade mathematics lesson program were taken into consideration and the 6-week application process was planned. The course hours of these learning outcomes are as in the table.

While writing the stories, the book "Mathematics World through Stories with Questions" written by Aydoğan (2018)

Table 1. *Course Hour Periods of Learning Outcomes*

Learning Outcomes	Course Hours
Determines that when a whole is divided into 10, 100, or 1000 identical parts, the units of the resulting fraction can be expressed in decimal notation.	5
Expresses a fraction with a denominator of 10, 100, or 1000 in decimal notation.	5
Understands the relationship between the whole part in decimal notation and the value of the decimal digit.	5
Writes and reads the decimal notation of fractions that can be expanded or simplified to a denominator of 10, 100, or 1000.	5
Decimal representations show and rank the given numbers on the number line.	5
Performs addition and subtraction operations with given numbers with decimal representations.	5

was used. While developing the stories, the learning outcomes in the Ministry of Education's student textbook were taken into account. The final version of the stories was completed by the 2nd author. The stories were written in electronic form and turned into worksheets. The worksheets were reproduced in color before being distributed to the students in the experimental group. At least one story was prepared for each outcome and reproduced so that each student could work individually. In addition, the smart board was used while lecturing, and the stories were presented by the teacher through the smart board. All the stories are pasted into their notebooks for students to repeat, and are also displayed on the activity board in the classroom. The stories used in the study are given below:

Stories of the Land of Mathematics

Yusuf and his classmate Mine, living in the same apartment, came back from school one day and saw a yellow necklace with very bright stones in a garden close to their home. When they got closer, they heard some sounds coming from the shiny stone of the necklace. They were very scared at first, but then they wondered. They were very surprised when they took the necklace in their hands. Because the necklace was magical and could speak. "I am a magic necklace. If you put me around your neck, I will take you to the Land of Mathematics." the necklace said. Yusuf and Mine looked at each other in surprise and smiled. "I'll wear the necklace first." said Mine immediately. Meanwhile, they heard a voice coming out of the necklace again "Whoever wears the necklace can take a friend to the Land of Mathematics with him." The two friends were very happy about this. The necklace continued to speak and said: "There are some conditions to wandering around the Land of Mathematics alone. In order to move forward and return home, you have to answer the questions you are asked correctly and not tell anyone about this necklace." Hearing this, the two friends were a little nervous at first, but then they built up their courage and accepted this condition. Mine, who took the necklace, put it on her neck and held her friend's hand. Suddenly, colorful lights started to come out from the necklace. Looking at the surrounding lights, a huge door suddenly appeared in front of them with the words "Welcome to the Land of Mathematics". As soon as they stepped through this door, Yusuf and Mine's journey to the Land of Mathematics began.

Nasreddin Hodja and the Land of Mathematics

While Yusuf and Mine were walking in the Land of Mathematics with curiosity, they ended up by a river. Looking around, they saw a white-bearded man with a turban on a donkey from afar. "Yusuf! The man on that donkey looks like Nasreddin Hodja right?" Mine said. "Yes Mine. He rides the donkey backwards as we were told" Yusuf replied. Moreover, he has a turban on his head." he said. The man came close enough to hear them and said, "Stop Karakaçan!". He looked at them without the need to dismount his donkey and smiled sweetly: "Hello, Yusuf and Mine. You were not mistaken, I am Nasreddin Hodja. I came to ask you some math questions." he said. "Nasreddin Hodja, we know you well. You lived in Akşehir and became famous for your funny and thought-provoking stories." Yusuf said. Nasreddin Hodja bowed his head as if to approve and smiled, "Yes, children, now it is time for the questions." he said. Yusuf and Mine were curious and started to wait for the questions Nasreddin Hodja would ask, "I am asking my first question, children. Listen carefully" Hodja said.

We can write fractions with denominators 10, 100, 1000 in another way. How do we write it? "Yusuf and Mine smiled, probably because of the simplicity of the question. " I want to answer." Mine said," We write fractions with 10, 100, 1000 denominators with Decimal Notation." she continued. Well done, you got it right. "Hodja said, and moved on to the second question: "Okay; how do we show fractions 1/10, 1/100, 1/1000 in decimal notation?" This time, Yusuf wanted to answer the question and took his notebook and pencil out of his bag and said, "I'm writing it immediately. "Since these are proper fractions which means they don't have a whole part, in decimal notation, 0 is written in the whole part. "he added. After writing the answer, he showed it to Hodja.

Looking at the paper "Well done, Yusuf, you got it right, too." Nasreddin Hodja said. The children were relieved to get the questions right. "I'm asking the last question, children. If you get this question right, you can move forward in the Land of Mathematics " he added. Yusuf and Mine were eagerly

awaiting the last question. Nasreddin Hodja asked the last question:

$\frac{1}{10} = 0,1$

$\frac{1}{100} = 0,01$

$\frac{1}{1000} = 0,001$

"How to calculate the number of digits after the comma in the decimal representation of fractions with denominator 10, 100, 1000?" Hodja asked. "2 digits after the comma in decimal representation of fractions with a denominator of 100; There are 3 digits after the comma in the decimal representation of fractions with a denominator of 1000." Yusuf and Mine replied. Nasreddin Hodja grimacing:" Unfortunately, it's not correct. "he said. While thinking that they got it wrong, "Nasreddin Hodja said: "Children, I'm just kidding, your answer is correct." The children got relieved and started laughing after Nasreddin Hodja's joke. Later, they said goodbye to Nasreddin Hodja and continued down the road.

Kaloghlan and the Land of Mathematics

While Yusuf and Mine were walking curiously in the Land of Mathematics, they saw a bald boy with a bindle on his back was coming up to them from afar."Mine, this must be Kaloghlan. Look, he has his clothes on his back!" Yusuf said. Mine nodded her head as if to agree with this idea. Meanwhile, the bald boy came up to them: "Hello friends, my name is Kaloghlan. I am going to collect the herbs my mother wants. "he said. While Yusuf and Mine were staring at Kaloghlan, Kaloghlan smiled: "Anyways, I don't have much time. I have questions to ask you, let me ask them and move on. My first question is to Yusuf. Can you explain the parts of decimal numbers with respect to commas?" he said. After thinking a while:" In decimal numbers, the part to the left of the comma is called the whole part, and the part to the right of the comma is called the decimal part. The digits to the left of the comma are called the ones, tens, hundreds... The digit names to the right of the comma are called tenths, hundredths, thousandths ... from left to right. Also, to find the digit value, we multiply the numbers by the number they are located." Yusuf replied.

"You got it right, can you give an example?"Kaloghlan said. Yusuf immediately took his notebook out of his bag and started writing. When he finished writing: "I took the decimal number 27.15 as an example." He said and showed Kaloghlan what he wrote in his notebook.

Tens Digit	Ones Digit	,	Tenths Digit	Hundredthes Digit
2	7	,	1	5
Step Value	Step Value		Step Value	Step Value
2 x 10	7 x 1		1 x 0,1	5 x 0,01

Kaloghlan congratulated Yusuf and quickly moved on to the second question: "Tell me Mine, we understood fractions with denominators 10, 100, 1000. Well, how do we show fractions with denominators which are not 10, 100, 1000 as decimals?" he asked Mine. Mine thought a little while, and then: "We make fractions with denominators which are not 10, 100, 1000, by expanding or simplifying their denominators into fractions with denominators 10, 100, 1000." she said. Kaloghlan also asked for an example from Mine. Mine also took Yusuf's notebook and started to write. When she finished writing, she turned to Kaloghlan: "I took the number 8/5 as an example." she said and showed Kaloghlan what she wrote in the notebook excitedly.

"The denominator of this fraction has a 5. If I expand the numerator and denominator by 2, that is, if I multiply the denominator, I can make the denominator 10. So I get the fraction 16/10. Then I count the digits from the right of the number in the numerator and put a comma," she said.

"Well done Mine, it was a good example."Kaloghlan said. While Yusuf and Mine were waiting for the third and last question , "Children, I am in a hurry, my mother is waiting for me. I am very happy to meet you, take care of yourself." Kaloghlan said and quickly continued on his way. Mine and Yusuf were baffled by the haste of Kaloghlan, then they held hands and continued on their way.

Pinocchio and the Land of Mathematics

As Yusuf and Mine were wandering around excitedly and curiously in the Land of Math , they suddenly ended up in front of a puppet shop. "Gepetto's Puppet Shop" was written on the door. Looking at each other and smiling surprisedly, "Hurray! This is the shop of the artisan who made Pinocchio!" they said and entered the shop. They were excited to see the master Gepetto in front of them. "Master Gepetto! I wonder, where is Pinocchio?" Yusuf asked Gepetto in curiosity. Without waiting for the answer of Gepetto, Pinocchio came out from under the table: "Welcome children. As you know, my name is Pinocchio. I am famous for the growth of my nose when I lie." he said.

When Yusuf and Mine saw Pinocchio, whose stories they read in the books, they hugged him with joy. "Come on guys, come on! I have questions to ask you." Pinocchio said. Yusuf and Mine started to wait impatiently for the questions Pinocchio would ask. "My first question is to Mine." said Pinocchio. "Tell me, Mine, how is the 4/10 fraction pronounced as decimal?" Mine calmly said: "First we have to write the fraction 4/10 as decimal. Then it is easier to read. The decimal representation of the number 4/10 is 0.4. Since 0 is to the left of the decimal number, zero is the whole part, and the decimal part consists of tenths, so it is read as four tenths. That is, zero and four tenths, it is read. "She said."Well done! You got it right." said Pinocchio. "Next, I have a question to ask Yusuf." Tell me, Yusuf; how is it that the fraction 27/1000 is read as a decimal? "Yusuf smiled thereupon because he knew the answer," Dear Pinocchio! "he said." As Mine said, we must write it in decimals first. The decimal notation for 27/1000 is 0.027. Of course, you thought I would be wrong by writing the answer 0.27, right? But, since the denominator is 1000, I have not forgotten that the decimal part must have three digits. "So, Pinocchio said well done to Yusuf and moved on to the last question. Well, What if I asked my questions reversely? So, if I said the decimal number and asked you to show it with a fraction bar, what would you do then? "Pinocchio asked.

Yusuf and Mine looked at each other in surprise upon this question. Because; While this part was being covered in class , they remembered that they could not go to school because they were both sick. Suddenly, they got anxious. "If we do not get this question right, how will we return home?" said Yusuf. When Mine said the same thing, Master Gepetto, who was working on repairs behind them, whispered to help the children. Thereupon, the children answered the question. "No! You got it wrong, children." Pinocchio said. While Yusuf and Mine looked at each other confusedly, Pinocchio's nose suddenly started to grow in length. Pinocchio suddenly started laughing when his nose elongated towards Yusuf and Mine. "Hahaha. Guys, I lied to you for you to see how my nose is growing." he said. Yusuf and Mine took a deep breath and burst out laughing. Since Pinocchio told the truth, his nose started to become shorter and returned to normal. Then "Oh children! You never lie, no matter what." he added.

"Come on everybody, get to work." Master Gepetto said. Thereupon, Yusuf and Mine said goodbye to them, left the shop and continued their way hand in hand.

Snow White and the 7 Dwarfs and the Land of Mathematics

As Yusuf and Mine continued on their way, they ended up in a deserted forest. Moving forward anxiously, they saw a small hut among the trees. They immediately went towards the hut and started knocking on the door and waiting. Suddenly, the door opened very loudly. Around an old and very short man who opened the door, there were 6 more people of his own height. "Yusuf, I think we have come to the house of the seven dwarfs." Said Mine. The dwarf who opened the door smiled and said, "You got it right, Mine. We are seven dwarfs. Welcome to our hut."

Yusuf and Mine went inside with joy. "Well, where is Snow White?" asked Mine curiously. The dwarves also said that Snow White was not at home, and they would ask a few questions until she came. "I'm asking the first question" said the old dwarf and continued:"Tell me children, how do we show decimal fractions on the number line?" Since Yusuf knew the answer, he immediately started to speak: "I want to explain this question by giving an example. For example, consider the number 1.6. First, we determine the interval by looking at the whole part of the number. Since the whole part is 1 here, our number is between 1 and 2 on the number line. We look at the decimal part of the number. Since the decimal part consists of 1 digit, we divide the range into 10 equal parts. Since the decimal part of our number in the example is 6, we count 6 parts from the beginning and mark our number. That is it! "Yusuf replied.

"Congratulations, Yusuf." said the old dwarf. Then another dwarf asked the second question: "Well, how do we sort the decimals?" Hearing this, Mine was happy to know the answer to the question, "First, we look at the whole part of the numbers. The number with the larger part is already greater. But, if the whole parts are equal, then we look at the decimal part. If the number of digits in the decimal of two numbers is equal, the known order is made. "Mine replied. Meanwhile, the wise dwarf in the corner suddenly said: "What if the numbers of digits in the decimal parts of the two numbers are not equal?" Just as Mine was to answer the question, the door suddenly opened and the beautiful Snow White came in. Mine, unable to take her eyes off the beautiful princess, started to answer the question: "If the number of digits in the decimal part is not equal, it is easy to equalize it. For this, we write zeros to the far right of the decimal part of those with less digits and we sort by looking at the numbers in the decimal part." answered the question and immediately took out her notebook and wrote an example.

2,17 3,15 2,19 2,7 2,75

2,17 < 2,19 < 2,70 < 2,75 < 3,15

"Well done, you know it again. "said the sleepy dwarf. Yusuf and Mine were very happy that they could answer all the questions correctly. Then, looking at Snow White, "Snow White, don't eat the apple that would be given to you! Because that apple is poisonous." they said. Snow White thanked them for this warning. Thereupon, the children left the hut for another journey and continued on their way in curiosity and excitement.

Results

Before analyzing the data obtained from the study, the normality test was applied to determine whether the exam results were suitable for normal distribution. Skewness and Kurtosis values of data groups were examined in normality test. According to George and Mallery (2003), if the Skewness and Kurtosis values are between +2 and -2, it can be said that the tested groups are suitable for normal distribution. In this study, Skewness and Kurtosis values were found to be -1.10 and 1.67, respectively. It can be suggested that the tests show a normal distribution since the values are in the range specified above. Therefore, it was deemed appropriate to use parametric tests for data analysis.

Mathematics Achievement Test

Mathematics achievement test was applied to both groups before and after the study in order to understand whether there was a significant difference between the mathematics achievement scores of the students in the experimental group in which mathematics teaching was taught through storytelling and the control group in which mathematics teaching was performed through traditional presentation.

Pre-Achievement Test Results

Table 2. *Comparison of Pre-Achievement Test Results of Experimental and Control Groups*

Groups	N	X	SS	df	t	p
Experimental	32	44,69	13,85	62	0,24	0,809
Control	32	45,47	11,87			

Looking at the pre-achievement test results of the experimental and control groups, the test average of the experimental group was 44.69 while the test average of the control group was 45.47. There is no significant difference between the two groups. It is understood from the p value that there is no significant difference between the groups (p = 0.809> 0.05). Therefore, the experimental and control groups were equal groups before the application.

Final Achievement Test Results

Table 3. *Comparison of Final Achievement Test Results of Experimental and Control Groups*

Groups	N	X	SS	df	t	p
Experimental	32	73,13	16,78	62	3,06	0,003
Control	32	57,19	24,19			

Looking at the final achievement test scores of the experimental and control groups, the test average of the experimental group increased from 44.69 to 73.13, and the test average of the control group from 45.47 to 57.19. The achievement scores of both groups increased. Whether this increase is significant or not is understood from the p value (p = 0.003 <0.05). When looking at the p value, it is found that there is a significant difference between the two groups. Therefore, a significant difference occurred between the experimental and control groups in terms of mathematics achievement after the application.

Mathematics Anxiety Scale

Mathematics anxiety scale was applied to both groups before and after the study in order to understand whether there was a significant difference between the mathematics anxiety scores of the students in the experimental group in which mathematics education was taught by storytelling and control group.

Pre-Anxiety Scale Results

Table 4. *Comparison of Pre-Anxiety Scale Results of Experimental and Control Groups*

Groups	N	X	SS	df	t	p
Experimental	32	73,43	0,28	62	-1,63	0,10
Control	32	76,12	0,36			

Considering the pre-anxiety scale scores of the experimental and control groups, the average anxiety score of the experimental group was 73.43, while the anxiety score of the control group was 76.12. There is no significant difference between the two groups. It is understood from the p value that there is no significant difference between the groups (p = 0.10> 0.05). Therefore, it can be said that the experimental and control groups had similar mathematical concerns before the application.

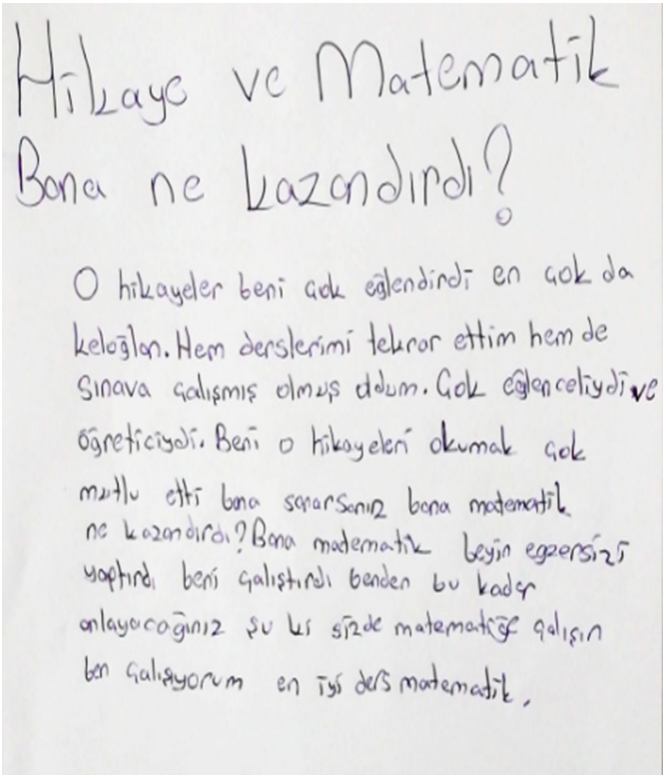
Final Anxiety Scale Results

Table 5. *Comparison of Experimental and Control Groups' Final Anxiety Scale Results*

Groups	N	X	SS	df	t	p
Experimental	32	45,34	0,46	62	-14,28	0,00
Control	32	75,48	0,36			

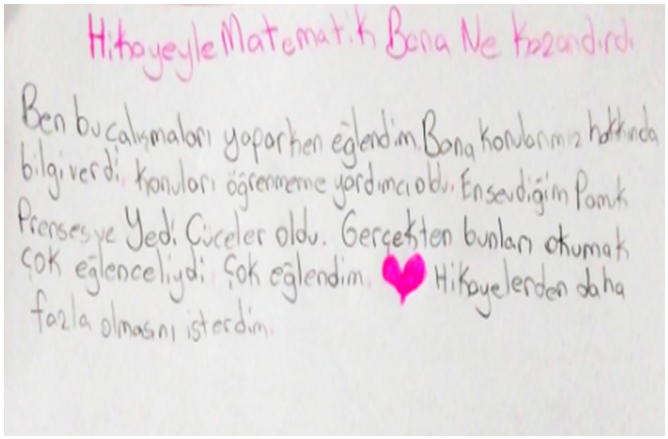
Considering the final anxiety scale scores of the experimental and control groups, the average anxiety scores of the experimental group decreased from 73.43 to 45.34, and the average anxiety scores of the control group from 76.12 to 75.48. There is a significant difference between the two groups. It is understood from the p value that there is a significant difference between the groups (p = 0.00 <0.05). Therefore, there was a significant difference between the experimental and control groups in terms of mathematical anxiety after the application.

At the end of the application, the experimental group students were interviewed about teaching mathematics through storytelling. Students were asked to write these opinions on the interview form. The forms written by some students are given below.

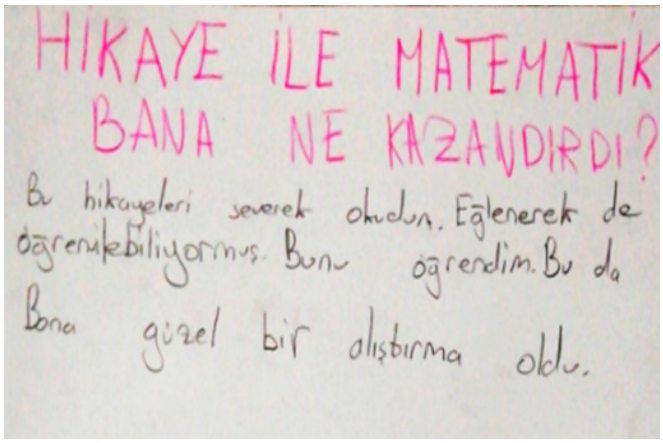

Hikaye ve Matematik
Bana ne kazandırdı?
O hikayeler beni çok eğlendirdi en çok da keloğlan. Hem derslerimi tekrar ettim hem de sınava çalışmış olmuş oldum. Çok eğlenceliydi ve öğreticiydi. Beni o hikayeleri okumak çok mutlu etti bana sorarsanız bana matematik ne kazandırdı? Bana matematik beyin egzersizi yaptırdı beni çalıştırdı benden bu kadar anlayacağınız şu ki siz de matematiğe çalışın ben çalışıyorum en iyi ders matematik.

(My thoughts on Teaching Math's through Storytelling
Those stories amused me a lot. Especially Keloghlan. I both repeated my lessons and studied for the exam. It was very fun and instructive. Reading the stories made me very happy

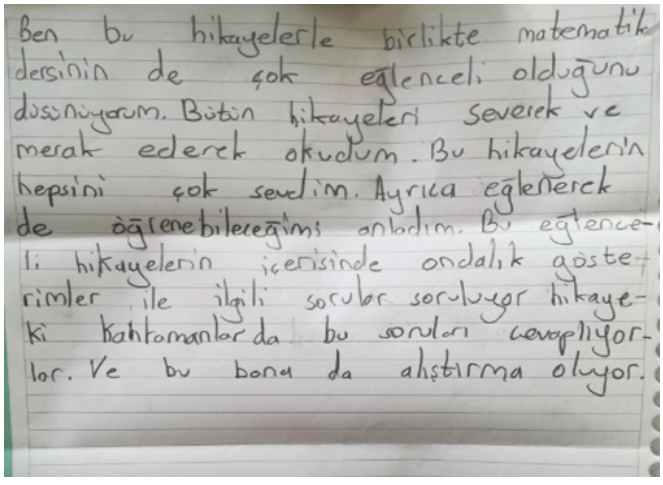
and was a brain exercise. I'm studying math now and it's the best subject for me)



(My thoughts on Teaching Math's through Storytelling
First of all, I had a lot of fun reading the stories. The stories gave me tips on topics and helped to learn the lesson. My favorite story was Snow White and the seven dwarfs. It was really enjoyable to read them. I would like the stories to be more in the upcoming lessons.)



(My thoughts on Teaching Math's through Storytelling
I read these stories fondly. You can learn by having fun. I have learned this. It was a very good exercise for me.)



(My thoughts on Teaching Math's through Storytelling
I think the math lesson is very fun with these stories. I read all the stories with amusement and curiosity. I liked all of these stories. I also understand that you can learn by having fun.

In these funny stories, questions about decimal notations are asked, and the heroes in the story answer these questions. This stays in my mind and becomes an exercise.

Conclusion, Discussion and Suggestions

Mathematics is more abstract compared to other sciences. For this reason, it is frequently stated in scientific studies that mathematics is considered difficult by the majority of society. The educational approaches adopted in mathematics teaching are among the main factors that led to the formation of this idea. With the curriculum changes made in our country in recent years, modern approaches have been adopted in mathematics lessons, the principles of constructivist approach have started to be used, especially in mathematics teaching, and the subject has come to the fore by visualizing and making the students to understand by connecting with their social life. This study is important in terms of introducing cultural stories. It is also important in terms of examining the effect of storytelling teaching on students' achievement levels and anxiety towards mathematics. The results obtained from this study are also important for teachers, as they may create positive changes in the teaching methods adopted by teachers (Katipoğlu, 2016).

In this study, the effect of teaching mathematics through storytelling on students' mathematics achievement, mathematics attitude and mathematics anxiety was examined. Accordingly, two 5th grade study groups

consisting of 64 students in total were selected and the study was carried out with these two 5th grade students. Two classes were assigned as experimental and control groups. In the experimental group, the mathematics lesson was taught through the storytelling method, while in the control group, the lesson was taught through the traditional presentation method. The application was carried out in a secondary school in Bornova district of Izmir province and lasted 6 weeks. The following results have been achieved in line with the data obtained as a result of the application:

- Before and after the study, the mathematics achievement test prepared by the researcher was applied to both classes selected as the experimental and control groups. According to the results of the mathematics achievement test applied before the lessons start, the success scores of both groups were equal to each other. After the application, the mathematics achievement scores of the experimental group students were found to be significantly higher than those of the control group students. According to these results, it was determined that teaching through storytelling is more effective than the traditional method in increasing students' mathematics achievement. This result is in line with the studies of Ünüvar (2019), Yaralı (2019), Akdemir (2018), Yıldırım (2018), Sertsöz (2017), Aksoy (2010), Kavasoğlu (2010), Subaşı (2010), Öztürk (2011), Erdağ (2011), Tayan (2011), Yılmaz (2012) and Coşkun (2013)

- The mathematics anxiety scale developed by Recep Bindak (2005) was applied to both classes selected as the experimental and control groups before and after the study. According to the results of mathematics anxiety scores before the application, it was seen that the anxiety scores of both groups were equivalent to each other. After the application, the mathematics anxiety scores of the experimental group students were found to be significantly lower than those of the control group students. According to these results, it was determined that teaching through storytelling was more effective than the traditional method in reducing students' mathematical anxiety, decreasing their fear towards mathematics and endearing mathematics. This result is in line with Ünüvar's (2019) study.

After the application, the students in the experimental group were asked their opinions about teaching through the story with an open-ended question, and the effects of this method on them were tried to be determined. Students generally stated that;

- After the story-based teaching, the lessons turned into fun and they liked lessons more,
- With the help of stories, they both repeat their lessons and study the exam,
- Mathematics lessons are difficult and cause confusion, with the help of stories, these confusions are eliminated and the subjects become easier and more enjoyable,
- Learning by having fun is permanent and they develop positive feelings towards their teacher.
-
-

When the mathematics textbooks are examined, it is seen that there is not enough room for teaching through story. Using this method more in textbooks can facilitate teaching and make the lesson more enjoyable. In addition, teachers' teaching the lessons by integrating the teaching method with the traditional method and using the stories related to daily life can increase the success in teaching. Stories to be developed with mathematical literacy problems, which have gained importance in recent years, can directly affect students' permanent learning. Since this study is limited to the subject of decimals, the effect of mathematics teaching on students can be examined with different stories.

Teachers can be trained on how to visualize and make a lesson more concrete. Thus, teachers can support the teaching with visual tools and associate it with daily life while teaching mathematics, which is an abstract subject. They can increase the motivation level of the students especially by using the storytelling model. Teachers can create stories themselves or they can be presented to students ready-made.

The research was conducted with 5th grade students. Research can be diversified by expanding the study group. In addition, different psychological factors can be examined using the storytelling method. The effect of teaching through stories can be investigated with different data collection methods. In their comments, the students generally asked other course teachers to teach with stories. In this respect, teaching with a narrative story can be applied not only for mathematics lessons but also in other branches and its effect on students can be examined. Storytelling can be transformed into animation or cartoon format using emergent technologies and presented to students. Thus, the way can be paved for addressing different senses.

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Academy Journal of Educational Sciences
June 2021, Volume 5, Issue 1, 27-44

Investigation of Preeschool Teachers' Questioning' Types*

Kübra DEMİR ÖĞRENCİ[a]

Abstract

This study is a discourse analysis in the context of early childhood education. The aim of the study is to detect the preschool teacher's questioning typologies in the classroom. To put it differently, discourse-cognition relations were plumbed in the context of learning and teaching in the period of early childhood. The participants are a preschool teacher and 15 students. As part of this study, the teacher's questioning typologies during in-class discourses were determined. The subjects of the in-class discourses which were video-recorded were specified beforehand. The data were analysed theory-based and data-tendency coding catalogues. The data which obtained by recorder were analysed thorough specific coding catalogues (in seconds or minutes). Then the teacher's questioning typologies were proportioned so as to make inter-implementation comparisons. The teacher applied to seven higher categories of questioning: "communicating", "monitoring", "evaluating", "challenging", "seeking for evidence", observations-comparison- prompting to prediction", "prompting to concluding/ inferencing". It was determined that communicative questioning typology was used more than the other categories) that required high cognitive demand. From this point of view, the teacher's questioning in class is mostly lower level (comprehension, remembering). It is aimed that the obtained evidence of teacher's questioning will contribute significantly to the vocational education actions

Keywords: Discourse Analysis, Teacher Questioning, Teacher Training, Preschool Teaching

About the Article

Type: Research
Received: 14 May 2021
Accepted: 30 May 2021
Published: 30 June 2021
DOI: 10.31805/acjes.937166
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Suggested APA Citation

Demir Öğrenci, K. (2021). Investigation of preeschool teachers' questioning' types. *Academy Journal of Educational Sciences, 5*(1), 27-44. http://dx.doi.org/10.31805/acjes.937166

Introduction

Questioning is one of the effective learning methods frequently preferred by teachers to achieve learning-teaching objectives. Children are born with a sense of curiosity and start to ask questions at the moment they speak and to make sense of the world through various questions they ask. Supporting children's sense of curiosity, and the improvement and diversification of their existing emotions are closely associated with the typology and cognitive level of questions from teachers (adults) (Cheminais, 2008; DeVries, Zan, Hildebrant, Edmiaston and Sales, 2002; Dantonio,1990; MacNaughton and Williams, 2004; Savage,1998; Soysal, 2018; 2019). Essentially, engaging children in educationally significant discussions is the goal of many curricula (Boyd and Galda , 2011; Haves and Matusov, 2005). In line with this goal, questions are used as a tool for knowledge creation and learning (Blatchford and Mani, 2008; Chin, 2007; Storey, 2004; Soysal, 2018).

It is important in many aspects to study the questions preferred by teachers in the instructional processes. First, by asking questions, the teacher gives the learners the opportunity to motivate to think, to reveal their curiosity, to prompt their thoughts and to be a partner in expressing themselves (Jegede and Olajide, 1995). Furthermore, through questions, educators can engage learners in processes such as revealing their existing thoughts, deepening, critical thinking, dreaming, problem solving,

predicting, and hypothetical reasoning (Sosyal, 2019). In addition to these processes, since questions are designed to get an answer from the learners by their nature, they can reveal discursively important verbal statements, and thus, they may also significantly affect learners' language development (De Rivera , Girolametto and Weitzman, 2005; Haves and Matusov 2005; van Kleeck, Vander Woude and Hammet, 2006; Yolder, Davies, Bishop and Munson , 1994; Zucker, Justice, Piasta and Kaderavek, 2010).

Teacher's questioning has been a research subject with regard to the improvement of in-class instruction for more than 100 years (Cadzen, 1988; Soysal, 2018). The teacher uses questioning in the classroom as an instructional tool and also for purposes such as starting, continuing and summarizing the course (Johnston, Halocha and Chater, 2007; Vogler, 2005). Teacher's questioning is also an important opportunity to help the child build his/her own knowledge and to reveal the existing thought (Morgan & Saxton, 1991; Cheminais, 2008). Questioning at different cognitive levels contributes to critical thinking (Sanders, 1966). Qualified questions also support children to make cognitive contributions to the discussion (Lee, Kinzie, & Whittaker, 2012). Furthermore, since children give more complex answers to the questions that are more cognitively challenging for children, these questions may be more useful for the language development of children (Gall, 1970). Therefore, teacher's questioning allows children to think effectively and supports them to search for a solution to the problems in a discursive way (Wilen, 1991), which indicates that properly planned and asked questions evoke learners' cognition (Duschl, 2008). In other words, teacher's questioning for probabilistic thinking ensures that the answers are also in this direction (Chapell, Craft, Burnard, & Cremin, 2008). For instance;

Teacher: Do you have any idea how an earthquake occurs?
Student: When the objects under the ground move, the ground also moves, then the earthquake starts to occur.
Teacher: So what makes those stones move?
Student: If something heavy jumps, then the ground moves.
Teacher: Do you mean that "the stones under the ground move when something heavy moves"?
Here, the teacher asks the learners to deepen ("What makes the stones move?") and clarify (Do you mean that "the stones under the ground move when something heavy moves"?) their answers.
Teacher: However, look now, S4 says that if the earthquake occurred when the volcanoes erupted, it would come to our home and could demolish our houses? What do you say?
Student: But it erupted and did not come to our homes.
Teacher: Moreover, our homes would melt away from the heat.

Different typologies of teacher questions are presented here. For instance, teacher requests a simple explanation from learners with the question "Do you mean that "the stones under the ground move when something heavy moves"?". As a response to this question, learners usually give a single-word "yes" or "no" responses. However, for the question "However, look now, S4 says that if the earthquake occurred when the volcanoes erupted, it would come to our home and could demolish our houses? What do you say?" learners must assess discourses of their friends, judge, and form a new evidence-based claim. This demonstrates that the question must be answered with a higher cognitive effort. As demonstrated by samples, the possible cognitive efforts that would be created by learners change as typology of question changes. The purpose of the study is to test this cognitive interpreting based on typology-demand relationship and data-based perspective.

When teacher's questioning is examined in terms of the cognitive demand it contains, the questions asked in in-class instruction may be at different cognitive levels (low, medium, high) (Chin & Osborne, 2008 Klein, Hammrich, Bloom and Ragins, 2000). For instance, "What are lava like? So, is it hard or fluid?" this question is a questioning typology that requires learners to predict at a simple level. Therefore, children will answer this question by making a simple comparison. This question is at the comprehension level in terms of the cognitive demand it contains. However, the teachers may ask learners to evaluate the outcome or their own discourse at the end of the process or may reveal the epistemological and ontological contradictions within students' answers. "There are no dinosaurs today, but earthquakes continue to happen. So, are dinosaurs the cause of earthquakes?" for this question, students need to think about the contradiction in the answers, which indicates that it is a questioning typology that requires a high level of cognitive demand. Therefore, teachers should consider the structure and distribution of their questions before in-class applications (Morgan & Saxton, 1991; Goodwin, Sharp, Cloutier, & Diamond , 1983).

Therefore, it is important for teachers to develop and maintain questioning strategies during all activities in order to raise creative, productive and researching individuals who use critical thinking skills effectively. Studies reveal that preschool teachers frequently use questioning strategies, however, they do not use these strategies effectively, and they mostly used low cognitive level, closed-ended, reminder and recognition questions (Blatchford and Mani, 2008; De Rivera , Girolametto and Weitzman, 2005; Good and Brophy, 1970; Massey, Pence, Justice and Bowles, 2008; Wragg and Brown, 2001; Zucker, Justice, Piasta and Kaderavek, 2010; Tsung-Hui and Wei-Ying, 2008). Furthermore, it is observed in the studies that the cognitive level of teacher's questioning generally remained at the level of comprehension and recall (Massey, 2004; Dovigo, 2016; Bay and Alisinanoğlu, 2012). Therefore, early childhood educators should be aware of what types of questions they use during their activities and should know how to use them in a combination in changing situations. Furthermore, they should also be aware of what kind of cognitive demand (Bloom) these question types require in order to present the questions in a certain rhythmical order. In brief, teachers should be professional interrogators in instructional processes (Wilen and Clegg, 1986). Because, teachers should make evaluating questions that require high level cognitive demands (evaluating, creating) relevant in the classroom for learners to engage in higher-level cognitive processes such as critical thinking and evidence-based reasoning (Storey, 2004).

Preschool teachers should be aware that they use questioning typologies and should know which type of question to prefer in changing situations. Furthermore, they should also be aware of what cognitive level these typologies correspond to for the planning of questions. In brief, they should know the Bloom Taxonomy in general terms. Studies indicate that teachers generally prefer questions that require low level cognitive demand (comprehension, recall) (Gall, 1970). The most important reason for this is that they have no idea about the questioning typologies and the cognitive demands they contain. Because all these in-class applications require significant cognitive demands (Soysal, 2018). Studies also emphasize that teachers' questions that require high cognitive demand are important in revealing the cognitive outcomes of learners (Oliveira, 2010; Soysal, 2018). Because the fact that cognitive outcomes of learners are at a high level (analysis, evaluation, creation) largely depends on the cognitive demands of the teacher (Joyce and Showers,1983; Storey, 2004).

In conclusion, teacher's questioning typologies contribute positively/negatively to students' cognitive contributions in the classroom. This mutual effect creates the "discourse-cognition" relation (Gee & Green, 1998). By addressing teacher's questioning, the discourse can be explained as follows: the teacher creates and maintains learning opportunities for learners by using various types of questions to continue classroom teaching or to support various instructional purposes (Gee & Green, 1998). Cognition refers that learners make a cognitive effort while answering various questions of teachers. The degree of this effort is determined by the cognitive level and typology of teacher's questioning (Gee & Green, 1998).

In Turkey, teacher's questioning in early childhood has not been examined in a discursive context. When the international literature is reviewed, classroom discourse mostly researched in primary education and beyond (Chin, 2006; Mortimer & Buty, 2008; Grace & Langhout, 2014; van Kleeck, Vander Woude and Hammet, 2006). Studies conducted in early childhood indicate that the number of studies in pre-school period should increase (Goodwin & Kyratzis, 2007; Sands, Carr, & Lee, 2012). Recent studies on preschool children are remarkable (Massey, 2004; Dovigo, 2016; Harlen, 1999). Furthermore, studies show that children may engage in conversations getting deeper and deeper (with adults or peers) from the age of three (Dorval and Eckerman, 1984; Garvey, 1984; Massey, Pence, Justice and Bowles, 2008). In this context, it is considered that the study will contribute to the field by investigating the teacher's questioning typologies through discourse analysis in early childhood. Early childhood educators should be aware of questioning typologies, should know the cognitive level involved in these questions, and should be aware of what situations to use them. Therefore, it is critical to investigate the teacher's questioning typologies and the cognitive demand they contain in early childhood.

The aims of this study are as follows:

> to determine the questioning typologies used by preschool teachers in instructional processes
>
> to determine the proportions of questions used by preschool teachers in instructional processes

Justification for the Study

Studies demonstrate that teachers can frequently use questions that require low levels of cognitive demand or remain at the level of "understanding-remembering" in terms of possible intellectual effort created by learners ("How many days are there in a week?") in class (Bay and Alisinanoğlu, 2012; Blatchford and Mani, 2008; De Rivera , Girolametto, and Weitzman, 2005; Dovigo, 2016; Gall, 1970; Storey, 2004; Massey, Pence, Justice, and Bowles, 2008; Wragg and Brown, 2001; Zucker, Justice, Piasta, and Kaderavek, 2010; Tsung-Hui and Wei-Ying, 2008). Teachers might not have the conscious awareness of monitoring their own questions and analyze cognitive demands embedded in them. This lack of conscious awareness usually leads to teachers asking questions with low cognitive levels (Storey, 2004; Massey, Pence, Justice, and Bowles, 2008). In other words, the activity of asking questions in the class includes quite complicated processes for teachers and educators. Bringing in effective question-asking skills to teachers or candidate teachers during in-service and pre-service periods depends on thorough and qualitative knowledge on in-class question-asking activities. Thus, thorough analysis of question-asking activities can present prototype information for teachers and teacher educators that are exterior readers of this study.
Pre-school teachers and teacher educators have very limited information on question types that would trigger and sustain true intellectual acquisition in class and possible cognitive demands these might contain (Storey, 2004; Blatchford and Mani, 2008). Also, when relevant literature is examined, it was noted that studies usually studied teacher questions in the process of a few in-class applications (e.g.; Öztürk-Samur and Soydan, 2013). In this study longitudinal observation was conducted on typologies of teacher questions and possible level of cognitive demands they include for one semester, thus it is possible to acquire more realistic and thorough findings. As an important point, studies on question typologies and studies that directly or indirectly covered cognitive demands of questions usually involved participants at primary or secondary school levels. Also, generally they were observed to have been conducted in science and mathematics education areas (e.g.; Pontecorvo and Sterponi, 2002; Pimentel and McNeill, 2013; Martin and Hand, 2010), while only a limited number of studies were observed to include pre-school period or context (e.g.; Dovigo, 2016). Thus, this study researches answers to the following questions:

> How do question typologies used by pre-school teachers in instructional processes vary?
>
> How do proportions of questions used by pre-school teachers in instructional processes vary?

Theoretical Framework

Researchers have conducted various studies to prove the possible relationship between teacher questions and cognitive state of learners and tried to characterize teacher questions as a result (Aschner, 1961; Soysal, 2018). In a traditional classroom, the teacher generally uses questioning to evaluate student's knowledge (Soysal, 2018; 2019). In these classrooms, the teacher usually asks the students to recall their prior knowledge, seeks a scientific idea, or asks them to find the answers in the teacher's mind (Chin, 2007). The teacher is considered as the authority of knowledge and students accept what the teacher says without discussing their opinions (Van Zee and Minstrell, 1997b). Therefore, teacher's questioning is perceived as a challenge and a threat to students in this classroom (Baird and Nortfield, 1992). In these classrooms, the teacher usually talks more than the children. Teacher's questioning is generally closed-ended, and learners' responses are expected to be accepted in a single reality since it is assumed that the teacher knows the correct answer. Teachers' responses to the questions are usually in the form of wrong or right (Mehan,1979; Wells and Arauz, 2006). Therefore, children can mostly answer such questions as "yes" or "no" and the teacher decides the course of the discussion.

According to studies, researchers agree that teacher's questioning must improve thinking skills instead of imposing correct information to learners (Blatchford and Mani, 2008; De Rivera, Girolametto, and Weitzman, 2005; Dovigo, 2016). As described in detail in the previous section, teacher has some certain responsibilities in in-class processes. While fulfilling such responsibilities the teacher can consciously or unconsciously engage learners in many situations with questioning. For instance; with questioning teacher

can motivate learners to think, give them opportunities to express themselves, and use questioning at varying levels at appropriate time to invite learners to high level thinking processes (Jegede and Olajide, 1995; Dovigo, 2016; Johnston, Halocha, and Chater, 2007; Klein, Hammrich, Bloom, and Ragins, 2000; Soysal, 2018). Thus, it is critical to determine questioning typology directed by teachers in class.

Socratic Education Model

Socratic philosophy of education exists by revealing the potential of the individual. This method aims to teach learners new knowledge through a series of questions they know in advance. The basis of philosophy is that everything in the human mind is known in advance and knowledge is revealed by questions. It can be defined as the way of teaching how to philosophize, not philosophy. It is referred as the art of forcing the learner to freedom and aims to reveal ignorance by getting rid of prejudices. Socratic thinking is considered as one of the most important strategies of today's critical thinking. Socrates argues that knowledge exists in human beings from birth and emerges by recalling it. This method consists of two stages, including ironie and maeutik. In the ironie step, the learner finds out that he/she has no concern with the questions asked. In the maeutik step, learner will be able to access accurate knowledge (Verseyni, 2007).

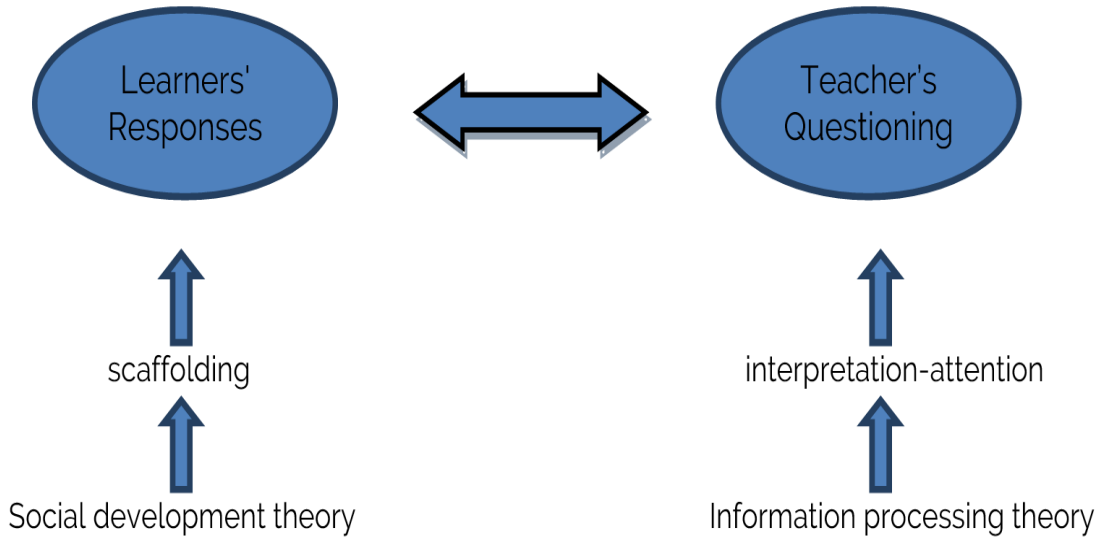
For children, philosophy is a program led by Matthew Lipman, inspired by the philosophies of Plato and John Dewey, inspired by the Socratic method (Murris, 2008). In the program for it, discussions are made with directed discussion plans and games using directed programs. The concepts such as truthfulness, honesty, freedom and justice are addressed in these discussions. Thus, it improves children's thinking abilities and reasoning skills and contributes to the development of their cognitive skills. This method, which forces learners to think critically, is considered as a powerful education method (Sue , 1991).

Vygotsky's Learning and Teaching

Vygotsky (1987) emphasized that social interactions have an important place in the development process of individuals, which suggests that children's cognitive development is affected by the structure and content of social interactions. Vygotsky (1987) considered that each individual has a zone of proximal development. This zone of development refers to the range from what children can do without getting help to what they can do with help. Jerome Bruner describes the teacher as "scaffolding" in the zone of proximal development (Wood, Bruner and Ross, 1976).

For instance, if the learner encounters a challenging question and cannot solve that question on his/her own, the teacher may act as a scaffold by supporting him/her (tips, strategies, etc.). The teacher can use the questions as an effective tool in the scaffolding method by requesting the learners to detail, justify or explain their answers. Teacher's scaffold questioning continues according to the learners' responses, and in this context, adjusted support is provided to the group with questions (van de Pol, Volman, Oort and Beushuizen, 2015). Learners' responses can be explained by the information processing model (Atkinson and Shiffrin, 1968). In order to answer the questions, learners must first pay attention to and understand the question through "sensory record" (Broadbendt Gathercole, 1990). Then, the part of interpreting and making sense of the question in "short-term memory" is started. Finally, regarding the question asked from the long-term memory, the meanings found appropriate to the curriculum material will be recalled. According to Vygotskian perspective, mental development refers to the process of transforming meanings in social contexts into individual structures (Vygotsky, 1978; 1978; 1987). Vygotsky argued that learning takes place from sociality to individuality. In this context, he did not consider language only as a means of communication, but claimed that language was related to various intellectual orientations. Vygotsky considers that language cannot be only a means of communication,

Graphic 1. *Question and Answer Path*



according to him, considering language only as a means of communication shallows his position in learning and teaching. Individuals reveal pedagogical knowledge from their own perspectives through various intellectual orientations. Thus, they can expand, change or verify each other's claims in the process of discussion. Therefore, since learners will employ knowledge from sociality to individuality, each of them will understand-internalize the knowledge differently and originally. What the new mental state of learners after instructional processes will be is related to the ability to internalize the knowledge. Learners restructure each other's mental states together with linguistic elements on the social platform. For the completion of instruction, the outcomes should be internalized and adapted or reduced to subjective situations (Vygotsky, 1987).

Furthermore, when Vygotsky's ideas about learning and mental development are examined closely, two facts appear: "spontaneous concepts" and "scientific concepts". Spontaneous concepts include the knowledge acquired by people through their daily experiences, and the language-thinking system (John-Steiner and Mahn, 1996). With spontaneous concepts, people acquire knowledge directly or indirectly without being involved in formal processes and make sense of life from their own perspectives (John-Steiner and Mahn, 1996). However, scientific concepts require formal processes and are structured in company with a direct instruction. In brief, scientific concepts are realized through deliberate thinking (Vygotsky, 1987). For instance, children are very creative in making sense of the "things" that exist in their minds. While they can attribute various and creative meanings to the existence of the sun ("The thing that gives warmth", "A yellow ball" etc.), for educators, they can attribute the existence of the sun to the continuity of life on earth, which also indicates that every linguistic system is linked to a thinking system. In brief, our intellectual systems determine the speech systems. In this context, within the scope of study, it was considered that daily languages and intellectual systems of the learners included incomplete or unstructured knowledge. In the study, the teacher improved the discourses presented by learners offer intuitively through questions and attempted to bring it closer to the language of science, and also, he enabled them to utilize these systems at appropriate times. In this context, it can be said that the teacher continued the instructional processes by using the questioning in the classroom as part of the social interaction (Dantonio, 1990; Fairbain, 1987). Along with the combination of social language and scientific language in the classroom, learning takes place and a pedagogical tension occurs. This tension begins to occur when the teacher forces the learners to transform their daily language into the scientific language. At this point, the teacher guides the learners with his/her questions. In this study, the cognitive level of the questions used by the teacher in classroom activities was examined in detail. In other words, the systematic approach aimed in the study is as follows: how the teacher initiated, maintained and completed the processes of guiding learners from social language to scientific language by cognitively examining the questions asked during classroom discussions was examined, and the cognitive level of the questions in Bloom's Taxonomy was determined.

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In a traditional classroom, the teacher generally uses questioning to evaluate student's knowledge (Soysal, 2018; 2019). In these classrooms, the teacher usually asks the students to recall their prior knowledge, seeks a scientific idea, or asks them to find the answers in the teacher's mind (Chin, 2007). The teacher is considered as the authority of knowledge and students accept what the teacher says without discussing their opinions (Van Zee and Minstrell, 1997b; Wells and Arauz, 2006). Therefore, teacher's questioning is perceived as a challenge and a threat to students in this classroom (Baird and Nortfield, 1992). In these classrooms, the teacher usually talks more than the children. Teacher's questioning are generally closed-ended, and learners' responses are expected to be accepted in a single reality since it is assumed that the teacher knows the correct answer. Teachers' responses to the questions are usually in the form of wrong or right (Mehan,1979; Wells and Arauz, 2006). Therefore, children can mostly answer such questions as "yes" or "no" and the teacher decides the course of the discussion.

Dialogic and Monologic Talks

Teacher's questioning was categorized by the researchers in terms of including dialogic and monologic conversations (van Boveen, 2015). Monologic conversations mostly progress as monophonic and generally involve the speech processes of the teacher. In classrooms where closed-ended questions are preferred, discussion usually progresses as a monologue (Mehan, 1979; Wells and Arauz, 2006). Because in these classrooms, the focus is on the correct and scientific information provided by the teacher. For instance, ("You say that snow is formed when the cold season comes, but this is not acceptable information!") or ("All you have said are completely irrelevant to the subject!"). When these discourses are examined closely, it is observed that they contain only the voice or authority of the teacher. Furthermore, the person here who decides on the accuracy of the information is the teacher, and he/she determines its decision according to the proximity of the provided answer to his/her correct information (Mcmahon, 2012). On the other hand, dialogic conversations are structured with open-ended questions and mostly involve teacher-student and student-student interaction. Furthermore, through "dialogic" conversations, children have the opportunity to "think together" and "understand with the voices of others" (van der Veen , Van Kruistum, and Micheals, 2015). Dialogic relations are also closely related to the extent to which children are accepted by others. Moreover, "peer conversations" increase with dialogic conversations, and the teacher begins not to

be considered as the only authority in the classroom. Unlike, in a classroom with high peer interaction, the topics and roles may vary fluently, however, the teacher determines the rhythm of this verbal interaction with medium and long term educational goals (Dorval and Eckerman, 1984). Furthermore, in classrooms with dialogic interactions, the teacher directs the child to give more personal and detailed answers that encourage the child to give something. Accordingly, the reasoning and arguments in the dialogic processes are not the product of the individual, but of the group resulting from mutual negotiations.

To put it in detail, the interactions in the learning environments can be grouped under certain headings. They can be categorized as non-interactive-autocratic, interactive autocratic, non-interactive-dialogic, interactive-dialogic (Mortimer and Scott, 2003). In the first one, non-interactive-autocratic category, there is no interaction between the learners and the teacher, and the management is entirely in the hands of the teacher. The teacher transfers the information and the learners directly accept the information provided and transmit it to their long-term memory (Chin, 2007, Mcmahon, 2012). The teacher desires to obtain generally accepted scientific information. For instance, he asks questions such as "What is an earthquake?" that require clear information, and he demands a memorized definition in return for it. Therefore, monologic interactions are mainly dominant in this category. The teacher takes an evaluative role and tends to evaluate the answers by judging (Olivera, 2010; van Booven, 2015). In the interactive-autocratic category, there is a social interaction between teachers and learners, however, the presence of dialogue is not enough to make the process dialogic. In brief, dialogic conversation is not just a mutual interaction, it is the presence of alternative ideas in instructional processes. If the teacher accepts alternative ideas while providing the targeted gains, it can be said that there is a dialogic interaction here. In brief, although there are no different voices, a dialogic phenomenon can be mentioned in the presence of alternative ideas. In the interactive-autocratic category, the teacher guides the learners with questions, may choose the prominent answers, or eliminate the answers that he thinks are irrelevant. For instance, "We're not talking about it right now, are we?", "Did you hear what your friend said?" (Kawalkar and Vijapurkar, 2013). Another category is non-interactive-dialogic. Although there is no verbal interaction between the learners and the teacher, the teacher may present various alternative ideas to the learners. In the interactive-dialogic category, there are both a social interaction and alternative ideas. For instance, learners may be asked to explain the ideas that exist in the background of the responses, such as "Can you explain to us why you think thunder blows volcanic mountains?" (Pimentel and Mcneill, 2013). Furthermore, in this category, the teacher can consider learners as co-evaluators and share the authority with them. For instance, "Your friend claims that lava causes earthquakes. Do you agree?". With this question, the teacher assigned an epistemic authority task to the learner and asked him to decide whether the answer was correct or incorrect (Pimentel and McNeill, 2013). In this category, the teacher uses the “we”-voice instead of “I”-voice, which is instructive, in in-class instructional processes. For instance, "We didn't quite understand what you mean. Can you explain a little more?". The teacher may act in an "argumentative-challenging" way with the questions in this category (Christodoulou and Osborne, 2014). With these questions, it is revealed that the existing answers of the learners are inadequate and they are directed to give more extended answers. "Dinosaurs do not live today, but earthquakes still occur. So, could dinosaurs be the cause of the earthquake?". With these questions, the teacher can reveal the ontological, epistemological or conceptual contradictions within the learners' answers, thus he can pull them to an instructively acceptable platform. However, this method of persuasion should progress dialogically, because it should be in the form of an invitation to a reasonable conversation process with the method of revealing the cognitive contradictions within the learner's response, not the truths that the teacher believes in himself. Furthermore, it can direct learners to provide reasonable evidence to support their answers through teacher's questioning. "Your friend says that the power of sound can blow the volcanic mountains. Then can you persuade us?" (Jadallah, et al., 2011). Moreover, in this category, the teacher can follow where the discussion takes place, what will happen next or what has just happened through his questions. "Let's talk about the earthquake first. Can we move on to the landslide later? "," Let's go back to our topic, but we haven't reached any conclusion for now, right?", Learners can also watch where the argument takes place with these moves. Thus, learners can keep their mental vitality alive in the process.

Closed and Open-Ended Questions

Teacher's questions were basically classified into two sub-categories as closed and open-ended. While the dialogues progressed in the initiation-response-evaluation (IRE) pattern in closed-ended questions, they progressed in the initiation-response-follow up (IRF) pattern in open-ended questions (Sinclair and Coulthard, 1975; Mehan, 1979). IRE questions are based on predicting the "correct" answer in adults' minds by assuming a passive role for children and basically preserving the argument made by the teacher (Wells, 1993; Lee , 2007). IRF questions connect learners to the process by explaining their own thoughts and making them think about the process. Unlike IRE questions, the learner responds more to the teacher feedback in the "IRFRF" chain, which provides the opportunity to structure the discussion on the basis of learners' claims while exploring them. When the questions are open-ended, students use a more diverse vocabulary and more complex sentence structures (Molinari, Mameli and Gnisci , 2013). Furthermore, open-ended questions are effective in supporting children's skills such as inferencing and predicting.

Teachers mostly use the IRE structures. The main purpose of these questions is to give children a passive role in in-class processes and direct them to find the correct answer in the mind of the authority, provided that they do not go beyond the argument made by the teacher (Wells, 1993; Lee, 2007). Learners' responses to these questions usually consist of one-word, "yes" or "no" (Mehan, 1979; Wells and Arauz, 2006). The accuracy of the answers from the learners is also decided through the explanations on the teacher's agenda that are close to the scientific language. Although the quality of the interaction is impaired in the process, the authority continues to ask questions until the answer in its mind is reached. Therefore, the essential point in these classes is the transfer of knowledge (Chin, 2006; 2007; Soysal, 2018;2019),

which was named as a pedagogical game ("know what's in my mind") by Olivera (2010). IRE questions continue until the desired teacher answer is received, although the quality of interaction with the learner is impaired (Mehan, 1979). Therefore, IRE questions require "convergent thinking" as a control element. On the other hand, IRF questions require "divergent thinking" in a broad context. Studies on teacher's questioning generally focused on IRE or IRF sequences. Studies show that ideas are expressed more easily in classrooms where open-ended questions are used, and consequently, cognitive outcome can be at higher levels in these classrooms (Boyd and Rubin 2006; Deshmukh, et al., 2019). Another classification involves explaining open-ended and closed-ended questions in another context as asking "contingent questioning" (Boyd and Rubin, 2006). Contingent questions involve more complex processes than the "open and closed" classification. In contingent questioning, the teacher uses the information in the learner response and plans the next question accordingly. Accordingly, the questions were classified as open-ended, closed-ended, open-ended-contingent, closed-ended-contingent. Researchers argued that the fact that the questions were cognitively high was due to the fact that they contained contingent questions rather than whether they were open or closed-ended (Boyd and Rubin, 2006; Molinari et al., 2013). Moreover, the sequence of question typologies should also be investigated to follow learner responses (Gall, 1970). Sequencing indicates the questioning technique of the teacher and is an effective strategy. Thus, by determining with what kind of questions the teacher started and continued or ended the course, awareness can be raised about how the cognitive level of the questions should be followed in the discussion.

Method

Research Approach

This study includes an analysis of the preschool teacher's questions on the basis of minutes and/or seconds. In this context, the teacher asked questions for various purposes. The main purpose of the study was to determine the typologies of a preschool teacher's discourses (instructional and pedagogical) in the classroom. The data to be obtained from the teacher's in-class discourses within the course were deciphered. The data were analyzed through systematic observation, which is a branch of the sociocultural analysis approach, to determine how the meanings structured in the classroom were linked to the teacher's questioning typologies (Mercer, 2004). The data were analysed theory-based and data-tendency coding catalogues.

A qualitative approach was preferred to find an evidence-based answer to research questions. Within the context of the study, how the meanings realized in a certain period of time were connected to the teacher's questioning typologies were examined. In brief, teachers' questions were analyzed in depth using a case study approach (Mercer, 2004). To this end, within the scope of the study, the cognitive levels of a preschool teacher's discourse (instructional and pedagogical) in the classroom were determined, questioning applications", "strategies" or "typologies" were detected, and the "cognitive demands" that were hidden or directly embedded in them were determined. The participants of the study consisted of a preschool teacher and 16 children. 10 activities of the teacher were video recorded. The subjects of the practice were science activities (natural disasters, states of matter, etc.) and Turkish-language activities. The discourses to be obtained from the in-class applications of the teacher within the scope of the course were deciphered. The data were analyzed through systematic observation, a branch of the sociocultural approach (Mercer, 2004). Systematic observations were carried out in two stages: coding and counting. Teacher's questions were analyzed in two categories as "typology analysis" and "cognitive demand analysis". The data collected with the video recorder were analyzed analytically on the basis of sentences through the catalogs created.

Participants

The participants of the study consisted of a pre-school teacher with 13 years of early childhood education experience, and 16 children. The school where the application took place is located in the Marmara region of Turkey, a major city of Turkey, and in a district with a medium-high socio-economic level. The applications were carried out in classrooms that were arranged separately for each type of activity (Turkish-language, science activities). The researcher participated in some negotiations with the participating teacher and had the opportunity to observe the teacher. The prior knowledge of the teacher about the determined subjects was arranged with the participating teacher. He was provided with professional support on how to conduct discussions. Therefore, he gained an awareness of the importance of the questions he posed in in-class applications. A total of 10 activities of the teacher were recorded. The implementations took a total of 368 minutes.

In-Class Implementations

The in-class applications of this study progressed with learner-centered activities in the questioning process, and learners were supported to make their own reasoning. Possible relations between discourse and cognition were examined in an instructional environment created in this context. A total of 10 applications were carried out within the scope of the study. The applications were designed based on the learning outcomes in the pre-school education curriculum.

Data Collection Processes

The data were collected through a video recorder placed in the classroom for discursive analysis of classroom practices, and technical processes were also arranged. All teacher-student conversations negotiated during an activity hour were deciphered. All teacher-student conversations negotiated during an activity hour were deciphered. In deciphers names of learners and teachers were kept hidden. Camera records were placed in class to ensure all teacher questionings were clearly understood. Also, in order to discriminate between voices of students and teachers speaking at the same time, applications were recorded using two cameras. In addition, an assistant teacher accompanied teacher during applications in class next to the researchers. Assistant teacher provided technical assistance to participant teachers while also helping in preparation of shooting environment.

Learners were accustomed to be video recorded through pilot studies. Thus, the situation known as Hawthorne effect that could be described as change in actions and attitudes due to being watched did not take place. Learners' families and teachers were informed before the video-based data collection processes started, and consent forms were signed by their families on behalf of each student. İstanbul Aydın University Ethics Board decision numbered 2020/01 and dated 28/01/2020 declared that data collection tool and data collection processes used in this study would not violate a possible ethical situation for participants or cause physical/psychological damage to persons.

Ethics Committee Permit Information

Ethics Board that Conducts the Assessment: Istanbul Aydın University
Date of Assessment Decision: 28.01.2020
Assessment Document Number: 88083623-020

Data Analysis

This study includes minute and/or second based analysis of teacher's questioning typologies directed for various reasons during early childhood period and possible cognitive demand created on the side of learners. Thus, all verbal and non-verbal moves of teacher and students in an activity process were recorded. Speeches of teacher in the scope of activities were deciphered by preserving the essence and raw data were acquired. The acquired data were analyzed through systematic observation that is a branch of sociocultural analysis approach to determine how meanings created in class are linked to teacher's questioning typologies and cognitive demands it contains (Mercer, 2004). Systematic observations were carried out in two stages: Coding questioning typologies and counting the questions coded. Teacher's questioning typologies were coded and these codes were placed in the specified categories. This coding was implemented for each application. Teacher's questioning typologies were analytically analyzed through theory-based and data-tendency coding catalogues on the basis of sentences (in seconds or minutes). Teacher's Questionings Coding Catalogue is a coding catalogue formed to theoretically determine which functional purposes are served by questions (Soysal, 2018). In the study this catalogue was used to determine typologies of questions and data-based new codes are formed and assigned for questions that could not be placed in any categories or sub-categories during analysis. These could be listed as the following: searching for information, referring to pre-learning. Studies on categories and descriptions of TQCC are presented on Graphic 2.

Table 1. *In-Class Applications and Their Content*

In-Class Applications	Application Time	Application Content
1. Professions	45	Process that started with introduction of professions (police, teacher, cook, pilot, doctor, etc.) was discussed in sub-topics such as what they do and its benefits to the society.
2. Our World and Continents	36	Discussed in sub-topics such as "Formation of the world and continents", "Location of our country between continents.
3. Natural Disasters	46	Discussed in sub-topics such as "What are natural disasters?", "Which events do we call natural disasters and why?", and "Why does earthquake take place?"
4. What would happen if we had two heads?	47	Discussed in sub-topics such as "What would happen if we had two heads?", "Can this happen in reality?", "How would we have felt if we were in their position?"
5. Hibernating animals	52	Discussed in sub-topics such as "Which animals hibernate?", "Why do they hibernate?"
6. What is disability?	47	Discussed in sub-topics such as "Who are called disabled?", "Which situations create a disability?", and "How would we have felt if we were in the position of disabled people?"
7. Gravity	35	Discussed in sub-topics such as "Would falling to the ground differ for heavy and light balls?", "Why do balls fall to the ground?", and "What is gravity?".
8. Seasons and formation of snow	11	Discussed in sub-topics such as "How do seasons form?", "Why does it rain or snow?" and "How does snow form?".
9. Heavy and light stones	31	Discussed in sub-topics such as "What is weight?", "How can we find weight of stones?"
10. States of matter	10	Discussed in sub-topics such as "What is steam and how does it form?", "What are the states of matter?"

Graphic 2. *Teachers' Questionings Coding Catalogue (TQCC)*

Category	Codes	Discursive functions	Related studies
Communicating	Deepening	Teacher wants the answer given to be deepened.	Pimentel & McNeill (2013), Leach & Scott (2002)
	Asking for explanation	Teacher wants to learn the detail under answer given or wants further explanation.	
	Restructuring	Teacher restructures answer of the student in a way everyone would understand.	
	Concretization	Teacher requests concrete situations, examples, and analogies for answers given.	
	Seeking alternative discourses	Teacher wants to find alternative "answers, discourses" in class.	
	Searching for information	Teacher requests "simple recalls" from students regarding pre-learnings.	
	Referring to pre-learnings	Teacher makes "references" to concepts discussed in previous classes.	
Monitoring	Meta discourse development	Teacher wants students to rethink on previous student ideas.	Van Zee & Minstrell (1997a), Simon et al. (2006); Mortimer & Scott (2003)
	Focusing	Teachers draws attention of students to a particular answer.	
	Monitoring-1 (instant)	Teacher makes a reminder on what is discussed in class at that instant and the where the discussion was.	
	Monitoring-2 (retrospective)	Teacher makes a reminder on what was discussed a while ago in class and where the discussion was.	
	Monitoring-3 (prospective)	Teacher makes a reminder on what will be discussed in class after a while and where the discussion will be.	
	Summarizing	Teacher categorizes and summarizes answers.	
	Selection-elimination	Teacher selects some of the answers, ignores some, categorizes and summarizes.	
	Testing change of mind	Teacher directs students to think if their previous opinions have changed.	
Evaluating	Student discourse	Student wants students to evaluate what each other said.	Christodoulou & Osborne (2014), Simon et al. (2006)
	Teacher discourse	Teacher wants learners to evaluate what he/she said.	
	Situation	Teacher asks that a situation, event, claim created by him/her would be evaluated.	
Challenging	Devil's advocate	Teacher reveals epistemological, ontological, and conceptual challenges in student claims.	Christodoulou & Osborne (2014), Simon et al. (2006), Jadallah et al. (2011)
	Challenging by monitoring	Teacher compares student ideas that lack internal consistency.	
Seeking for Evidence	Using evidence	Teacher questions if students have sufficient and appropriate evidence about what they say.	Oh & Campbell (2013), McNeill & Krajcik (2011)
	*Referring to EBR	Teacher directs students to *Evidence-Based Reasoning situation.	
	Awarding evidence	Teacher awards and reinforces evidence based reasoning.	
Obs-Comp-Pred	Comparison	Teacher wants learners to compare situations, examples, claims, etc.	Mortimer & Scott (2003), Soysal (2018)
	Prediction	Teacher wants students to make predictions.	
	Observation	Teacher wants learners to make instant observations or share their observational experiences.	
Inferencing	Finalization	Teacher wants learners to arrive at a conclusion.	Mortimer & Scott (2003), Soysal (2018)
	Assumption prompting	Teacher wants students to make probabilistic or contingent reasoning.	

TQCC contains seven categories and 28 different codes that can characterize teacher questionings or discursive (pedagogic) functions. With TQCC all teacher questionings that could be asked in class could be analyzed in a broad variety. Also it has the functionality that can detail and capture all functions of teacher questionings. TQCC is formed to be have both theory-base and data-tendency (Mercer, 2010; Soysal 2018; 2019). In other words, when TQCC was being formed analytic codes developed with theoretical studies were used while new codes with data-tendency were also added.

Detailed explanation of coding processes is presented below:

> T: Why do you think disability is permanent? (Communicating-Deepening)
>
> S: Because they might lose a limb in the accident. That is why it becomes permanent.
>
> T: However, look now, S4 says that if the earthquake occurred when the volcanoes erupted, it would come to our home and could demolish our houses? What do you say? (Challenging-Devil's advocate)
>
> S: But it erupted and did not come to our homes. (Discussion obtained "What is Disability?" application. Application time: 42 Application sequence: 7).
>
> T: Look S7 said in order to be called a disabled he/she must have a big accident and lose a limb in that accident. Do you agree? (Evaluating-student discourse)
>
> S: Yes, but for example we can call a person with no arm no legs, who cannot hear a disabled too. (Discussion obtained from "What if We Had Two Heads?" application. Application time: 47 Application sequence: 4).

Validity and Reliability

In order to ensure the validity of the coding catalogs used, new sub-categories were created for the questions that could not be encoded in any sub-category after the in-class applications (searching alternative discourses, searching for information, referring to pre-learning). In order to increase the reliability of the codes assigned for each question, the intra-video and inter-video codes assigned were compared and their similarities were interpreted. Furthermore, inter-coder consistency was calculated as 95% for coding errors that may arise from the researcher. The necessary negotiations were performed for the conflicting codes. Moreover, expert evaluation (in science education) was performed to prevent incorrect coding that may occur due to the bias of the researcher (Creswell, 2003). Furthermore, researcher, the participant teacher and the field expert had deep discussions to follow the interactions related to the discussions, and thus, it was possible to observe more deeply for which purpose the teacher used his discourses (Lincoln and Guba, 1985).

Results

The questioning typologies used by the teacher during in-class applications are presented in this part of the study. In the sub-categories described above, how often the teacher used questioning typologies in different categories is presented cumulatively. When all in-class applications are examined, teacher's questioning typologies are as follows:

Table 2. *Ratios of Instructional (Discursive) Functions of Teacher's Questioning in In-Class Applications*

Category	Sample Discourses	Ratios
Communicative	"Do you say that the it will not affect the earthquake because it is so far away?"	46.9%
Monitoring	"Now Ayşe said that the lavas get hot under the ground and move the stones. And she has also previously said when something too heavy jumps, the stones move and an earthquake occurs."	17.3%
Evaluating	"She said I think it may occur in both of them, do you agree?"	7.9%
Challenging	"Dinosaurs do not exist in the world today, but earthquakes occasionally occur. Then, is dinosaurs the cause of earthquakes?"	6.1%
Seeking for Evidence	"How do you know that this is so?"	3.3%
Observation	"What could margarine be like?"	2%
Comparison	"With which fingers do you feel more cold?"	2%
Prediction	"Well, do you think what they consume can provide energy for a long time?"	7%
Inferencing	"So lava is a moving thing? It can move under the ground."	7.3%

Teacher's Questioning for Communicating Purposes

The questions included in this questioning typologies and their answers served for the establishment of a healthy intellectual communication in the teacher-student and student-student interactions in the classroom. To this end, the teacher used "deepening" questions to learn the ideas in the background of learners' responses or to express supporting claims. A section taken from in-class applications is presented in Table 3. The teacher asked a probe question to find out the deep "reason" in response to the learner's short answer in Line 2. With the "asking for explanation" questions, the teacher asked the learner to explain his discourse in a more understandable way. As it can be seen in line 7 in Table 3, the teacher requested a new explanation for the learner's discourse which was not semantically clear. In parallel with the "asking for explanation" questions, the "restructuring" questions also aimed to present the learners'

responses to the group in a format that could be understood by the teacher. The answer provided by the learner in line 11 was presented to the group more clearly in line 12. With the "concretization" questions, the teacher requested the learners to re-explain the answer with concrete situations or analogies. For instance, ("You said two-headed people may face some difficulties. Can you give an example? What challenge may they face?"). Thus, the claims presented could be materialized. With the questions of "seeking alternative discourses", the teacher resorted to search for other reasonable and scientific answers that would ensure the continuity of the discussion. For instance, ("Does anyone have any other ideas? How does the air cool?"). The questions of "searching for information" ask learners to make simple recalls, the main purpose of which is to recall information from long-term memory. For instance, ("What warms our world?"). With questions in this category, the teacher aimed to probe the learners' responses and to take their answers to a more understandable platform. Thus, learners were able to actively participate in the processes. Furthermore, the formation of a common language in the classroom depends on the presence of communicating questions. Therefore, the teacher attempted to listen to the learners' claims before criticizing them and to reveal the ideas in the background of their answers. The significant condition for benefiting from activities in classroom discourse is the interpretation of the discourse by other learners and the formation of a holistic spoken language

Teacher's Questioning for Monitoring Purposes

Teacher questions for monitoring purposes were chosen to ensure that the group would be adhered to the process instructively and cognitively. To this end, with "monitoring (instant)" questions, the teacher could share where the discussion was that moment with learners (Table 4, Lines 1-3 and 9). Similarly, the teacher checked "what was talked for a while ago" (Line 26) with "retrospective monitoring"

Table 3. *Sub-typologies of the Teacher's Questions in the "Communicating" Category*

Turns at talking	Discourser	Discourse	Teacher's questioning typology	Brief explanation
	T*	Is an earthquake a natural disaster?	The process begins with a closed-ended question	-
	S1**	No	-	-
	T	Why not?	Communicating-Deepening	Asks for deepening behind the learner's answer.
	S2	Yes		
	T	If no, can you explain "why" no? because I did not understand.	Communicating-Deepening	-
	S1	Because earthquakes do not save us.	-	-
	T	Is it a natural disaster because it does not save??	Communicating-Asking for explanation	Wants to learn the detail or explanation behind the learner's response.
	S3	It also puts us into trouble.	-	-
	T	"Puts into trouble." Can you explain to us what you mean?	Communicating-Asking for explanation	Wants to learn the detail or explanation behind the learner's response.
	S3	I mean, our belongings are broken when an earthquake occurs. We also get into trouble. And if our belongings are broken, we will be sad.	-	-
	S4	When the underground stones move, they also move above the ground, then earthquakes start to shake.	-	-
	T	You mean "underground things move when something heavy moves"?	Communicating-restructuring	The teacher restructures the answer so that the whole class can understand.

*T: Teacher; **S: Student (The dialogues in Table 4 were obtained from the "Earthquake and Natural Disasters" implementations. Application Time: 46 minutes, Application Sequence: 3).

questions. The teacher could also check what would be talked "after a while" with monitoring questions (e.g.; "Let's talk about it a little later?"). He attracted the attention of the group to a specific answer provided by "focusing" questions, the main purpose of which was to ensure that they think about an answer which was considered important for discussion. In line 5, the teacher could draw attention to a specific answer provided with the "focusing" question. With "selection-elimination" questions, the teacher could highlight some answers, however, he ignored some of them and threw them back (e.g.; "Some of your friends say that lava can affect ground shaking. We can continue on this topic, how about it?"). Thus, the answers that were important for the discussion could be examined again. With the questions of "testing change of mind", he could notice and reveal the learners whose minds changed during the discussion. Thus, he could create an awareness in learners that their claims may change in the face of another, more reasonable discourse. An example of the questions of "testing change of mind" asked by the teacher is presented in Line 11 in Table 5. Furthermore, with the "meta discourse development" questions, the teacher could make the learners think again about their answers. Thus, the learners could reconsider the appropriateness or scientific appropriateness of their answers. Metacognitive thinking ability is critical for the development of self-regulation skills. Therefore, it is

Table 4. *Sub-typologies of the Teacher's Questions in the "Monitoring" Category*

Turns at talking	Discourser	Discourse	Teacher's questioning typology	Brief explanation
	T	Can we go back to our topic? We haven't come to a conclusion for now, right? // Your friend says lightning causes the lava to heat up and the volcanic mountain erupts. Your other friend says it explodes because of the loud noise. Elif had previously said that they explode due to lavas and an earthquake occurs, right? //Do you think it could be the cause of the eruption of volcanoes?. Do you think they trigger the earthquake?	Monitoring-instant // Monitoring-summarizing // Meta-discourse development	The teacher recalls what was discussed at that moment. // Collects the answers given. // Allows learners to reconsider their answers.
	S1	Planets collide, so an earthquake occurs.	-	-
	T	Look, your friend says something different, which answer is right now, I couldn't understand. Can you support me?	Monitoring-instant	The teacher instantly recalls the things discussed.
	S2	Planets are not side by side.	-	-
	T	Your friend says they are not together, so they do not affect each other. Look, there are different ideas?	Focusing	The teacher focuses the students' attention on a specific answer.
	S3	Volcanoes explode when they encounter with meteorite, then cliffs collide and encounter meteor and volcanoes flow.	-	-
	T	When the meteorites hit each other, the volcano starts to flow, right?	Communicating-Asking for explanation	-
	S4	Excuse me? Planets stand in very different places.	-	-
	T	Now, this is not our topic, we are talking about something else, but now. Do earthquakes occur when meteorites encounter? Do you agree with S5?	Monitoring (instant) // Evaluation - student discourse	-// Asks the student's answer to be evaluated by other learners.
	S5	They stand side by side and some stand apart.	-	-
	T	Is this what causes the earthquake? Do planets collide? // Do you agree with your friend?	Communicating-Asking for explanation // Evaluation - student discourse	-
	S6	I think it is right.	-	-
	T	Would you explain it to us then??	Communicating-Asking for explanation	-
	S6	(No answer).	-	-

(Table 4. Cont.)

S5	Since there are suns and mountains of volcanoes, the lava gets hot and the volcanic mountain erupts.	-	-
T	The lava is underground but can it warm it? // Could the sun be hot enough to warm it harm the earth?	Challenging (devil's advocate)// observations-comparison-prompting to prediction	The contradiction in the student's answer is revealed. // Students are asked to make simple predictions.
S5	Our life ends.	-	-
T	Yes. So is the sun the cause of the eruption of volcanoes? // Think about it this way, if the sun had blown volcanoes, there would be no living things around it, the temperature would be high, but people are alive right? // What do you think about this subject?	Communicating-Asking for explanation // Challenging (devil's advocate)// Evaluation (teacher discourse)	-//-// The teacher asks that to an event created by him would be evaluated by the learners.
S7	Trees dry at very high temperatures.	-	-
T	Right? But we see hey are alive, we know.	Challenging (devil's advocate)	-
S6	But sea creatures also live.	-	-
T	But we are talking about something else right now. Now S6 thinks the sun warms the volcanoes and makes them explode. Shall we talk about this? // It could happen on planets that are close to the sun. // Can we survive at very high temperatures?	Monitoring (instant) // Challenging (devil's advocate) // observations-comparison-prompting to prediction	
S	No.	-	-
T	There is life on planets that are too close to the sun.	Non-code discourse	-
S4	Is there no people living there??	-	-
T	Yes, we are not discussing that issue now. Shall we focus on the subject? Let's talk about whether the existence of planets will cause earthquakes and will the sun heat volcanoes. Actually, S2 explained this at the very beginning. She said "As the lava moves underground, the lava moves outward and an earthquake occurs. Some tremors occur as these lavas move outward" Shall we discuss this topic?	Monitoring (instant) // Monitoring (retrospective)	-// The teacher recalls what was discussed a while ago.

(The dialogues in Table 4 were obtained from the "Earthquake and Natural Disasters" implementations. Implementations Time: 46 minutes, Application Sequence: 3).

important for preschool children to develop a meta-cognitive perspective.

Teacher's Questioning for Evaluation Purposes:

With the questions for "evaluation" purposes, the teacher asked the group to evaluate the learners' discourse, the teacher's discourse or a situation that occurred during the negotiation. With the questions in this category, learners could be openly invited to the evaluation processes. Thus, cognitive interactions within the group increased. Furthermore, the exchange of ideas among learners was also increased and the conversations in classroom practices were supported to be more student-student centered. With "evaluation (student discourse)" questions, the teacher ensured that the discourse was evaluated by other learners by presenting it (see Table 6, lines 1-3-11). With "evaluation (teacher discourse)" questions, the teacher opened his own discourse to evaluation. With the questions in this category, in-class processes were not maintained by a single authority, and anyone with a logical explanation could share the authority, which also raised the focus of the learners on the process and encouraged them to make arguments on the level of logic. As it can be seen in Line 18 in Table 6, the teacher presented his own discourse for the evaluation of the learners. With "situation" assessment questions, the teacher asked the group to evaluate the situation arising during the negotiation. (e.g.; "Now we claim that the disappearing waters return to the earth in the form of rain. Does everybody think like that?"). With these types of teacher questions, it can be ensured that cognitive interactions between learners increase.*Teacher's Questioning for Evaluation Purposes:*

With the questions for "evaluation" purposes, the teacher asked the group to evaluate the learners' discourse, the teacher's discourse or a situation that occurred during the

Table 5. *Sub-typologies of the Teacher's Questions in the "Evaluation" Category*

Turns at talking	Discourser	Discourse	Teacher's questioning typology	Brief explanation
1.	T	Now, S said that the temperature of lava increases underground and causes the stones to move. And before, when something heavy jumps on the earth, the stones move and an earthquake occurs. // Which one do you find right?	Monitoring-retrospective // Evaluation-student discourse	The teacher recalls the topics discussed a while ago. // asks learners to evaluate what each other says.
2.	S	It could happen in either case.	-	-
3.	T	She said it could happen in either case, what do you think?	Evaluation-student discourse	asks learners to evaluate what each other says.
4.	S1	I agree, I think so.	-	-
5.	T	Then, the earthquake may be due to the temperature that activates both underground. You say it may also occur due to the weight moving over the ground?	asking for explanation	-
6.	S1	Yes.	-	-
7.	T	We experienced an earthquake the other days. So, did a too big object jump?	challenging-devil's advocate	reveals the contradiction in the learner's answer.
8.	S2	No.	-	
9.	T	Do you think something heavy moved??	observations-comparison-prompting to prediction	asks learners to make simple predictions.
10.	S3	I think it moved under the ground because we didn't see anything high coming out.	-	-
11.	T	So, the things moving on earth do not cause earthquakes, right? Do you think so, S??	Monitoring-testing change of mind	directs learners to think about whether their mind has changed.

(The dialogues in Table 5 were obtained from the "Earthquake and Natural Disasters" implementations. Implementations Time: 46 minutes, Application Sequence: 3).

negotiation. With the questions in this category, learners could be openly invited to the evaluation processes. Thus, cognitive interactions within the group increased. Furthermore, the exchange of ideas among learners was also increased and the conversations in classroom practices were supported to be more student-student centered. With "evaluation (student discourse)" questions, the teacher ensured that the discourse was evaluated by other learners by presenting it (see Table 6, lines 1-3-11). With "evaluation (teacher discourse)" questions, the teacher opened his own discourse to evaluation. With the questions in this category, in-class processes were not maintained by a single authority, and anyone with a logical explanation could share the authority, which also raised the focus of the learners on the process and encouraged them to make arguments on the level of logic. As it can be seen in Line 18 in Table 6, the teacher presented his own discourse for the evaluation of the learners. With "situation" assessment questions, the teacher asked the group to evaluate the situation arising during the negotiation. (e.g.; "Now we claim that the disappearing waters return to the earth in the form of rain. Does everybody think like that?"). With these types of teacher questions, it can be ensured that cognitive interactions between learners increase.

Teacher's Questioning for Challenging Purposes

With the questions in this category, the teacher aimed to reveal the epistemological, ontological and conceptual contradictions in the answers given by the learners. For instance, ("So let's throw the stones on the ground into the water and let it grow to form continents. Will it be?"), ("Look, your friend says dinosaurs cause earthquakes. There are no dinosaurs today, but earthquakes still occur."). Here, the teacher revealed the contradiction in the student's answer and refuted the claim by proving it. Furthermore, with these types of questions, students' ideas without internal consistency can be revealed by comparing ("Well, do volcanic mountains erupt every time there is thunder?"), ("But you just said nothing jumped above the ground but an earthquake occurred."). Here, students' discourses that do not have internal consistency were revealed.

Teacher's Questioning for the Purpose of Seeking for Evidence

With teacher's questioning for the purpose of seeking for evidence, the availability of sufficient evidence for the learners' claims was examined. With the questions in this category, the teacher directed the learners to present evidence and also encouraged them to use evidence in their

reasoning. With these questions, the teacher directed the learners to present scientifically valid evidence to help their answers. For instance, "Well, why are you saying that thunder lead to the explosion of volcanic mountains? What makes you think like that?".

Teacher's Questioning for Observation-Comparison-Prediction Purposes

With teacher's questioning in this category, the learners were asked to compare the situations, examples, and claims. For instance, ("With which fingers do you feel more cold?"), ("Is foot fracture an obstacle?"). Here, the teacher directed the learners to compare and determine whether a foot fracture was an obstacle. Learners may also be asked to share their observational experiences or make instant observations ("What is the weather like now?"). They can also be asked to predict ("Why do we wear glasses?"), ("Well, what would the traffic be without a traffic police there?").

Teacher's Questioning for Inferencing Purposes

With teacher's questioning in this category, the group was asked to make an "inference" based on the topic under discussion. The "finalization" questions ask learners to reach a conclusion based on the activity. For instance, ("So, are all professions retired at the end?). In this question, the teacher invited the learners to come to a conclusion based on the spoken situation. "Assumption-prompting" questions ask learners to make a probabilistic reasoning about the event that exists. For instance, ("Then do we know the old people from outside?"). In this question, the group is asked to make hypothetical inferences based on the spoken subject.

Discussion, Conclusion and Suggestions

The teachers used questioning typologies at certain intervals for various purposes such as initiating, continuing and summarizing the discussion in the classroom. When teacher's questioning typologies were examined, they were determined as communicating (46.9%), monitoring (17%), evaluating (7.9%), challenging (6.1%), seeking for evidence (3.3%) observation (2%), comparison (2%) , prediction (7%), inferencing (7.3%) questions. When the results of the study were evaluated, it was observed that the teacher mainly asked communicating questions and used less questioning typologies requiring a high level of cognitive demand, such as evaluation and creation (evaluation (situation/teacher/student discourse), challenging). As it was explained, "communicating" questioning typologies include demands such as deepening the answers of the learners and ensuring that the speech can be monitored instantly in in-class applications. This questioning typology is included in the level of comprehension in Bloom's Taxonomy. In other words, teacher's questions generally (46.6%) require low-level cognitive demand and such questions increased the speaking time (Martin & Hand, 2009). However, the insufficiency of questioning typologies requiring a high level of cognitive demand, such as "challenging" (6.1%) and "evaluation" (7.3%), was also remarkable. In other words, almost half of the teacher's questions require (low) level of cognitive demand such as deepening, asking for explanation, and restructuring. In the studies, it was revealed that there was an increase in the problem solving skills of children who were subjected to cognitive questioning at a high cognitive level (Turner & Durrett, 1975). Therefore, teacher's questioning plays a very critical role for the improvement of teaching and for a cognitively balanced course.

It is observed that teachers are not aware of which discursive purposes their questions serve while performing in-class instructional activities in the preschool period (Cochran, 2005). It is aimed that the results obtained will contribute to the professional development activities of teacher's questioning. It is considered that teachers will be motivated to professional development and change processes and adopt learner-centered instructional processes by showing them their questioning typologies and their proportions through professional development programs.

The most important result from the above data-based interpretations is whether the teacher is mostly aware of which discursive purpose his questions serve in the instructional processes in the classroom (Cochran, 2005), which may have led to the teacher's failure to use his questions homogeneously. This may also have caused certain questioning typologies (e.g.; communicating and monitoring) and the others frequently preferred during the applications (challenging and evaluating) to remain in the background. So, the cognitive level of teacher's questioning was low ("81.62%") during the applications, except for a few applications, which may cause the cognitive states of the learners to be at similar levels accordingly. However, a more cognitively productive classroom environment was achieved by using certain categories (monitoring and evaluation) together on the basis of applications. Productive classroom can be defined as an environment where learners take each other seriously and think and elaborate together (van der Veen, van Kruistum and Michaels, 2015). Similarly, as can be seen in the study, the way for teachers to achieve a productive classroom environment is to use the questions in combination, which can be seen in the application named "Natural Disasters" in a data-based way. Based on all these results, it can be said that teachers' use of questions with varying degrees of harmony will contribute to the cognitive states of the learners.

As it was explained in detail in other chapters, it can be said that early childhood educators are generally unaware of questioning typologies and the cognitive demands that arise due to these typologies (Oliveira, 2010). This situation also led to similar results in the study and caused the teacher questions to remain mostly at the level of comprehension-recall ("81.62%"). Accordingly, teachers' awareness of asking question strategies can be increased through various vocational development programs (Dantonio, 1990; Fairbain, 1987; Joyce & Showers, 1983). If, questioning typologies and cognitive demands that change accordingly and are embedded in the questions are presented to teachers on the basis of evidence through development programs, they will be motivated to their vocational development and adopt learner-centered instructional processes (Otto & Schuck, 1983; Sitko & Slemon, 1982). The main way for teachers to be motivated for vocational development programs is that they have the belief and awareness that the strategies they use can affect the cognitive states of the learners. Accordingly, it is necessary to provide support for the change of

epistemological beliefs of the teachers as well as improving their questioning skills. Because, in order to get a permanent and desired result from vocational development, the teacher should be first aware that the questions asked will affect the differentiation in the cognitive effort levels of the learners.

It is considered that the results of the study are important in terms of being the first study examining teachers' questioning typologies with the perspective of discourse analysis in the context of pre-school education in our country, and that they are also useful in terms of revealing the importance of questioning in pre-school education.
When the results of the study are examined, some recommendations are offered. early childhood educators should include more questioning in the activities in the daily schedule, should have a general knowledge about the cognitive level of the questions to be asked, should increase the frequency of questions requiring high-level cognitive effort such as evaluating-creativity (high) as well as comprehension-recall (low) questions, and they also should consider the cognitive development levels of children while asking questions.

For researchers, it is recommended that the levels of teacher's questioning, their status according to Bloom's Taxonomy, and the effect of questions on learners' cognitive outcomes should be examined with a discourse analysis perspective in early childhood education. In addition to the examination of questioning typologies, it is necessary to seek for evidence for their questions, and they should be subjected to a professional development program so that teachers can engage in this process, and consequently, it is recommended to examine the changes in the cognitive levels of the questions.

Institutions and organizations responsible for training pre-school teachers should be provided with in-service seminars to improve teachers' questioning skills. Furthermore, academics training early childhood educators should also be provided with in-service training to improve questioning skills.

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Academy Journal of Educational Sciences
June 2021, Volume 5, Issue 1, 45-51

Adaptation to Emergency Online Education: A Case of Oral Communication Skills Course in ELT*

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Abstract

The significant growth of the cases all around the world caused by the Covid-19 pandemic necessitated the intermittent closures in higher education in March, 2020 in Turkey. Yozgat Bozok University started online education synchronously and asynchronously via Google Meet and Google Classroom. This paper aims to present ELT students' online experience in carrying out Oral Communication Skills course adapted to distance learning. Secondly, by conducting qualitative research methods, it presents students' standpoints concerning the problems they faced with an unplanned and unprepared online education. The researcher sent reflective writing questions to students and then arranged online interviews. Qualitative data were analyzed by NVivo 12 and learner-reported data bring fruitful insights on students' attitudes towards Google Meet and Google Classroom. It is founded that these applications increase students' interaction and help them promote communication skills. However, poor internet connection and lack of internet access are noted by all the participants as a basic problem for online education. The present study drawing on current distance learning literature suggests instructors to design student-centred online environment to foster student participation.

Keywords: Communication Skills, English Language Teaching, Google Classroom, Google Meet, Online Education

Introduction

Corona virus (Covid-19) pandemic, which started in December 2019 in Wuhan City of China and then rapidly expanded all around the world, has produced a huge effect on social life, economy, and, most predominantly, health. While governments around the world search ways to take precautions for preventing the rapid increase of cases, social-distancing is realized as one of the basic protection methods against Covid-19, which necessitates crowded places such as universities to be closed intermittently. In Turkey, the transition to online distance education due to Covid-19 for all levels of education started on March, 2020 just after the World Health Organization (WHO) declared Covid-19 a pandemic. Thus, institutions adapted their courses according to emergency online education which was unplanned and unprepared.

Educational institutions in Turkey implementing emergency distance teaching due to Covid-19 shifted their teaching systems from in-person classes to digital and/or virtual systems by using various online platforms and mobile applications. Zoom, Google Classroom, Google Meet, WhatsApp, and Instagram are mostly preferred digital platforms and applications used by universities during the lockdown. These user-friendly digital tools facilitate teaching and learning in many ways for both teachers and learners. Being paper-free, handy, and time saving, Google Classroom (GC) and Google Meet (GM) help teachers organize their courses for online teaching in terms of video conferencing, virtual presentations, posting announcements and instructions, sharing materials, and grading assignments. Submitting assignments anytime and anywhere, commenting on discussions, getting instant feedback from instructors and

About the Article

Type: Research
Received: 16 May 2021
Accepted: 01 July 2021
Published: 30 June 2021
DOI: 10.31805/acjes.937851
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Suggested APA Citation

Özışık, B. Z. (2021). Adaptation to Emergency Online Education: A Case of Oral Communication Skills Course in ELT. *Academy Journal of Educational Sciences, 5*(1), 45-51. http://dx.doi.org/10.31805/acjes.937851

the screen-share facility for presentations make GC and GM convenient for students in order to prevent breakdown in their educational life during such emergency distance and online learning.

Unsurprisingly, online distance learning is challenging and has a reasonable adverse impact on students and teachers with low digital literacy and incompetence in media-driven environments. Emergency online education requires adjustment in educational technology and investment in innovations, which might be demanding for both teachers and learners as traditional teaching and learning settings need less technological devices and are mainly based on face to face interaction with teachers and peers. Hence, GC and GM could be respected in regards to their efficiency in enhancing digital literacy of all shareholders of education. Challenges and opportunities of GC and GM in an unexpected situation are proper to discuss in order to help instructors and learners who would practice upon these digital environments.

Google Classroom

The present situation which necessitates closing schools and universities reminds us of the importance of digital tools to be used extensively and effectively in language teaching and learning. Hence, education in Yozgat Bozok University shifted from in-class to online systems with the "emergency" or "forced" distance learning by using GC and GM.

Since it was launched in 2014, GC has been remarked by researchers with the intention of exploring its effectiveness. Despite the limited availability of the studies, all the research related to GC shows the positive perception of students and teachers towards using GC for distance learning and teaching (Azhar & Iqbal, 2018; Khalil, 2018; Sukmawati & Nensia, 2019; Syakur, Sugirin, & Widiarni, 2020). The features of GC can be listed as:

- Fast setting process: Teachers can add students to the classroom by sharing the class code on WhatsApp groups or by mass e-mailing.
- Fast information sharing: It enables teachers to the share materials and links of online resources on the class stream. Also, teachers can start online discussions and provide forum questions through which students give feedback and comment on the teacher's and other students' posts.
- Time saving and paper-free: Posting homework becomes easier for teachers and submitting assignments takes little time for students. Teachers do not waste time by distributing and collecting papers. It helps teachers give feedback and grade assignments in an easy and paperless way.

Google Meet

Shifting face to face instructions to online distance education can be challenging for the nature of some courses which require the active participation of learners. Oral Communication Skills course carried out by the researcher in the department of ELT is one of such courses. As group works, presentations, discussion and interaction are integrated part of classroom activities of the course, with the changing environment of teaching and learning due to Covid-19 pandemic, learners should not fall behind in speaking and communication skills compared to other basic language skills in language learning. At this point, GM fulfils a need for a virtual class to hold a video conference.

Research shows that GM improves learners' self-efficacy and motivation (Ningias & Indriani, 2021; Putra, 2021) leading to increase in participation and to enhance speaking skills (Fakhruddin, 2018). GM provides many features for any kind of meetings and helps teachers to organize online live conferences. GM features can be listed as:

- Video and voice conferencing: Teachers can start unlimited number of meetings with their students. When needed, learners can turn on their video cameras and microphones to participate in the discussions, or to hold an online presentation.
- Drive Cloud storage: Teachers as organizers can safely and freely save recordings and store them in a folder in their drive. Recording link can be shared with the students by the teacher.
- Screen sharing: By selecting an application or a window on their web browser teachers or learners as presenters can share the entire screen or only a window during the presentation. Hence, GM provides a learning environment which increases interaction and participation.
- Chat messaging: Participants of the meeting can easily mute or unmute their microphones and, in order to avoid noise pollution, participants can enter a chat message during the video conference. Teachers can post questions using the chat field like a blackboard.

With the expanded use of Internet and innovations in educational technologies, web-based instruction is recognized as a crucial teaching and learning medium for online distance education (Khan, 2000; 2007). Teachers offering online courses should enrich learning environments by using technology and organize activities that enable students' engagement and flexibility (Khan, 2007; Oncu & Cakir, 2011). As research shows that engagement and motivation are the foremost challenges teachers face during synchronous online courses, teachers should foster learners' participation by dominantly student-centered activities and allowing them to create and present projects in a supportive environment, which in turn engages students in their learning process and increase their autonomy and flexible learning (Dennen & Bonk, 2007; Hernandez & Florez, 2020). Providing choices and giving instant feedback are also important to activate reluctant students. Considering all these elements to design a student-centered online class, the researcher designed Oral Communication Skills course providing interactive learning environment. The current research is prepared to make a contribution to the limited literature by asking the research questions below:

1. What do students think about the role of student presentations in online communication skills course?
2. What are the challenges of emergency online learning for EFL students?
3. What are the benefits of using online tools to promote communication skills?

Literature Review

Several research and studies have put their effort to describe the benefits and challenges of online learning for instructors and learners. The current study, however, is limited to positive impacts and inevitable problems of GM and GC experienced by EFL learners of ELT department during their online practice. Accordingly, providing methodologies, strategies, and classroom tasks to further the benefits of technology in language classrooms, the literature reported considerable data significantly needed to be discussed to assist educators in an emergency online learning that we have been experiencing due to Covid-19 pandemic.

The literature review shows that several studies reveal the benefits of technology for EFL learners in online education in terms of improving learners' interaction, vocabulary knowledge, communicative skills, speaking performance and alleviating their speaking anxiety by motivating them to feel more confident and more relaxed (Alkan & Bümen, 2020; Banafshi et al., 2020; Gleason & Suvoalrov, 2011; Khalil, 2018; Ningias & Indriani, 2021; Putra, 2021; Syakur et al., 2020; Tirtanawati, 2020). Attempting to compare EFL learners' improvement in vocabulary in two different settings, in class and online environment, Banafshi et al., (2020) found out that some features of communication such as "answering others' comments, the stickers, and humour were more dominated in the online classroom" (p. 136). Also, the research shows us that virtual classes are more effective in learning vocabulary. Similarly, Cakrawati (2017) indicated the significant role of online platforms to help learners acquire new words. The asynchronous online learning, according to Alkan and Bümen (2020), "helped the participants' speaking anxiety decrease and their speaking performance increase" and in their study "asynchronous learning was found flexible" (p.140). Ningias and Indriani (2021) also present EFL learners' positive attitudes towards online education as the results of their research show that "the learners have enough self-efficacy in speaking during online learning" (p.28) and they stress how "the atmosphere of the classroom also becomes one important point to motivate them in delivering their speech" (p.32). Similarly, the research carried out by Gleason and Suvorov (2011) addresses the effectiveness of computer-mediated communication tasks presenting learners' perceptions regarding its benefits on improving their speaking skills, pronunciation, and its feedback opportunities.

Creating an online environment through GC is found effective as it enables learners and instructors to "carry out the learning process more deeply" (Syakur et al., 2020, p. 482). GC is regarded highly effective in supporting learners' motivation and confidence while helping instructors to complete scores and provide information and course materials without a time limit (Amin & Sundari, 2020; Khalil, 2018). In parallel with these findings, the research by Putra (2021) emphasizes that GM also provides effective learning process as the research concludes "the use of GM could significantly affect students' motivation in learning English during the virtual learning" (p.35). GM is considerably helpful to make students enthusiastic about responding and answering questions and to increase students' participation in speaking activities.

Fully online education, however, has some difficulties. Keeping self-motivated, studying regularly, and poor internet connectivity which prevents the natural flow of communication result in the misinterpretation of expressions, lack of interaction, and the lack of reliability of assessment and evaluation. Moreover, teachers' lack of skills in using technology leads to a more teacher-centred methodology (Dhull & Sakshi, 2017; Ismaili, 2020; Korkmaz & Toraman, 2020; Lim, 2017; Moorhouse, 2020; Sun, 2014; Tirtanawati, 2020). Hernandez and Florez (2020) provide statistics (see Figure 1) to show demotivating situations that learners experience during online education.

According to EFL learners' and teachers' perceptions on effectiveness of GC, although this platform is useful for sharing materials and uploading assignments, it is insufficient for communicative and interactive facilities. Thus, it is suggested to be accompanied by other user-friendly online platforms (Amin & Sundari, 2020; Azhar & Iqbal, 2018). In order to enhance learners' motivation and participation in online classes, teachers should develop their technology competence and be prepared for a more planned and purposeful online class and design classroom tasks used with technology integrated language teaching (Al-Haj, 2020; Atmojo & Nugroho, 2020; Gunuç & Babacan, 2017). Recommendations to EFL teachers to create a more interactive and motivational digital environment can be listed as:

- Be knowledgeable and competent to operate educational devices.
- Be aware, appreciative, and equipped on using these educational devices.
- Establish guidelines.
- Adopt variations of technology.
- Provide access to your students.
- Encourage student interaction.
- Keep backup plan. (Al-Haj, 2020, p.566)

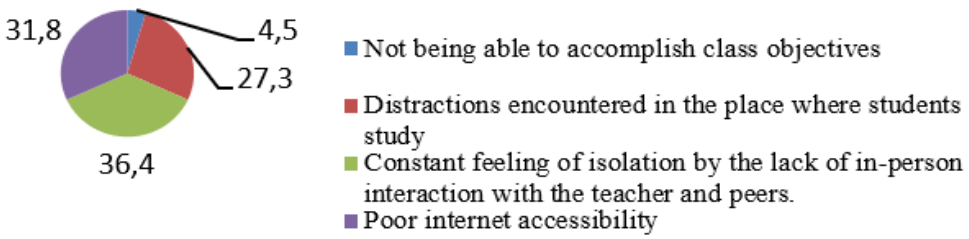
In conclusion, the research in the literature to improve the effectiveness of technology in language classrooms and eliminate the challenges, we can suggest teachers to apply student-centred approach. Enhance student interaction and participation by increasing the number of discussion sections will helpfully encourage students' creative and critical thinking. Additionally, it is suggested teachers to improve their digital literacy on purpose of a more planned and prepared classes in a digital environment.

Method

Research Design

The present qualitative exploratory study was designed to reveal ELT students' opinions about Oral Communication Skills course which was adapted to online education due to Covid-19 pandemic. The course was designed to enhance students' participation orally and motivate them to share their opinions in discussion sections. The course was divided into three sections: students' presentations, discussion part, and written comments.

Figure 1. *Situations that might demotivate students the most (Hernandez &Florez, 2020, p.162)*



A list of presentation topics was provided to students by the instructor through GC. They were given one week to choose the topic and then through GM, the instructor organized video conferences for online presentations. Students used the screen share facility of GM and on chat board they asked questions during the presentation. At the end of each presentation, at least one discussion question was addressed to the entire class by the student who made the presentation. After the live session, the instructor submitted homework on GC by asking students to write about the topic they discussed that week. The point of the written reflections as homework is to make students follow the live online course carried out on GM.

Data was collected qualitatively in two steps. First, the researcher requested the students to make written reflections by asking them four questions regarding their online practices. Reflective writing questions were designed to shed light to the research questions of the current study. Reflective questions are listed below:

1. Do you believe that live online presentations contribute to your communication skills in English?
2. Do you believe that discussions via Google Meet contribute to your communication skills in English?
3. What are the challenges you face with distance education carried out online due to Covid-19?
4. Do you find Google Classroom and Google Meet practical and easy to carry with unplanned online Oral Communication Skills course?

Secondly, semi-structured interviews were conducted to six students on volunteer basis through GM to clarify their responses to the reflective writing. The interviews were conducted individually in the English language and lasted 15 – 20 minutes. The participants of the interview were asked three questions to explain their opinions in detail about online presentations, the facilities of GM and GC, and challenges of these programmes.

Procedure

For the validity, the researcher sent reflective writing questions to two experts; one from the Department of Assessment and Evaluation, and the other from the Department of English Language Teaching both occupied in Yozgat Bozok University as assistant professors. After the questions were reviewed and revised by the experts, the researcher applied for ethics committee approval from Yozgat Bozok University. Receiving the ethical approval, the researcher explained the objectives of the study to the student participants and obtained their informed consent. Reflective writing questions were sent to volunteer students by e-mail and the semi-structured interviews were conducted via Google Meet. Meetings were recorded and stored on Google drive. Interviews were transcribed by the researcher and the transcriptions were sent to each participant to verify the data.

Participants

Participants of the current research were ELT freshman students who took Oral Communicative Skills course in the spring term of 2019-2020 academic year in Yozgat Bozok University. 42 students took the course but 38 of them (called as RW1 – RW38) voluntarily answer the reflective writing questions. Also, 6 students (called as S1 – S6) were involved in the semi-structured interview. Consent forms were sent to the participants before the interview.

Data Analysis

Data obtained from reflective writings and the transcriptions of the interview was analyzed through NVivo (version 12). Some grammatical changes were done while transcribing the interviews for the language efficiency without changing the intension and the meaning of the texts. The researcher used the software for the purpose of identifying codes, categories, and themes of the texts.

Ethical Permission Information of the Study

In this study, all the rules stated in the Committee on Publication Ethics (COPE) were followed.

Ethics Committee Permit Information

Ethic Board that Conducts the Assessment: Yozgat Bozok University Ethics Committee
Date of Assessment Decision: 19.08.2020
Assessment Document Number: 12/20

Findings and Discussion

Table 1. *Themes, categories, and codes*

Themes	Categories	Codes
Benefits of online presentations	Higher self confidence	Decreasing anxiety Higher motivation Willingness to share opinions
	Improvement in peer to peer interaction	Involvement orally Posting questions Responding questions
Benefits of using Google Meet and Google Classroom	Facilitation of video conferencing	Experience in video presentations Facilities of using microphone and camera Screen share feature
	Facilitation of chat board	Instant feedback Facilitating communication Announcements and forum discussions Message any time
	Facilitation of record keeping	Not missing the class Classroom folder Watching any time
Issues faced due to online learning	External factors	Poor internet connection Power cut Sharing computer with family members No convenient environment
	Personal issues	Not being able to use camera and microphone Being unmotivated to participate Difficulties in comprehension

Data was collected to gain insights into students' opinions about the adaptations to online Oral Communication Skills course carried through GM and GC. The course included three sections: student presentations, discussions, and homework. Hence, reflective writing questions prepared by the researcher aimed at understanding students' perception of the effectiveness of presentations, benefits of implementing GM and GC, and challenges faced due to online learning (see Table 1). Then, interview questions shed light into the codes gathered from the reflective writing providing analysis in detail.

Benefits of Online Learning

Participant responses to role of the live presentation in contributing their communication skills are analyzed and findings show that it affects students' learning process in two ways. First, presentations contribute to improving students' confidence in speaking skills. Secondly, by including discussion section after the presentation, it is observed that student participation and interaction increase. RW3 puts it clearly "Even if we make preparations before presentations, we always encounter with unexpected questions during the presentations. I think this is the hardest thing about presentations. Moreover, thanks to the presentations, we learn how to handle our anxiety and we can easily contact with audience." Also, RW9 points to the effectives of presentations:

> "I believe that live presentations contribute to improving my communication skills in English, because I get questions about my presentation topic from my classmates and try to respond them in English. While I am doing this, I try to do my best to express myself in that language. I try to think about the most appropriate words or expressions. Also, since I get prepared before the presentation in terms of my speech, I learn how to address to people."

Similarly, RW14 addresses the same point by stating "while we are doing live presentations, we can ask and answer questions. It improves our self-confidence."

In order to understand the coded data, the participants were asked about the effectiveness of presentations in terms of improving communication skills in the interview. And the data obtained from the interview underlines that online presentations help shy students to decrease anxiety and to increase their willingness to participate as S1 puts it "If we did not prepare presentations, it would be bad for us, I mean for our speaking skills, because you know many students do not want to talk during the class. It is helpful for them, for shy students". Additionally, online presentations are challenging although it can be overcome by practicing as SP2 states clearly "At the beginning it was difficult, but later I started to feel confident and do my best to participate in the discussion sections" and continues by saying "the most important part of online presentations is, for me, that I do improve my speech, I mean, organizing my speech. You know I had to think critically before answering the questions". In the same way, S4 thinks that online presentations motivate students as they are more comfortable than in-class presentations indicating that "I think it is best way to improve my speaking skills in online learning, because I was so comfortable when compared to face to face education, I felt anxious to speak in face to face class."

In accordance with the current results, previous studies also reveal the need for promoting interaction in online learning including video conferences and presentations (Efriana, 2021; Nartiningrum & Nugroho, 2020; Putra, 2021; Yaşar, 2020). Abuseileek (2012) stresses in his research the significance of computer-based environments for decreasing students' anxiety in helping them feel less shy. He found that students do not fear to make mistakes and the reasons of shyness are eliminated in online settings. By the same token, Miftah (2011) points out that using presentations motivates students to participate and effectively increases interaction. From a parallel view, Putra (2021) highlights the idea that online courses are tended to be monotonous and boring for students if teachers do not vary their online classes with various activities and strategies. He finds that video conferencing motivates students and raises their success in learning process. Students by asking and responding questions during the presentations actively participate in the class and this direct engagement helps them develop their communication skills. Higher level of interaction contributes to achieving learning goals and online presentations are beneficial for language learners in that shy students feel more motivated to participate in discussions compared to their performances in face-to-face learning.

Benefits of Using Google Meet and Google Classroom

According to the data of the reflective writing, the main benefits of implementing GM and GC are the facilitations of video conferencing, chat board, and record keeping. Students agree upon the fact that to improve communication skills, interaction is significantly important and video conferences through GM are highly beneficial in online education. As it is pointed in RW15"Especially Google Meet is more suitable for this course because it has various features and one of them is video conferencing". Moreover, students found it easy and practical for presentations as stated in RW20"it has a 'share screen' button and it makes everything much easier". Also, RW1agrees upon the same point "I think Google Classroom and Google Meet are practical and easier to carry with unplanned and unprepared online Communication Skills course because thanks to these tools we can easily express our thoughts".S5 and S3point to the recording and storage facilities of GM and GC:

> "We can easily reach materials and have no chance to miss or forget doing it; I mean homework or assignments, because they are always there without time limitation. We have notifications that inform us about announcements, feedbacks and assignments." (S5)

> "We receive feedback for homework instantly and so it feels like a real class. Google Meet enables us to contact with our classmates and we can share our ideas easily, which is very important for communication skills. And if we are confused or miss something, then we can ask the teacher to clarify it and get answer immediately." (S3)

In line with the current findings of the present study, Khalil (2018) indicates that according to students GC is highly beneficial to increase student to student and student to teacher interaction as they easily access teacher feedback and course materials. Also, according to Cakrawati (2017), students find online learning practical and simple that encourages them to learn at any time in any place thanks to mobile phones, tablets, and computers. In a similar vein, Sukmawati and Nensia (2019) address to the practicality of GC which enable students to obtain information faster and to communicate directly with the teacher by sending a private comment.

The features of video conferencing, recording, sending message, and storage materials uploaded by the teacher make GM and GC preferable for online education. Baron (2020) confirms in the research that GM is found practical and easy to use in speaking lessons by students. In line with these findings, the present study signifies the effectiveness of these platforms to use with Oral Communication Skills course as students highlighted the features which help them share their opinions and comment on their friends' thoughts.

Issues Faced due to Online Learning

Analysis of the interview and the reflective writing reveals the challenges that students face during online learning.

The issues are categorized as external and personal factors affecting students' online learning process negatively. Poor internet connection is the major challenge students have to deal with according to the data gathered from interviews and reflective writing. Being unable to concentrate on online classes due to family members interrupting during the class is another important reason preventing students to be successful in the online setting.

In RW10 the issue is stated as "Poor internet connection was the most challenging thing because sometimes I could not catch what the teacher says because of my Internet." Also, RW32indicates the same problem "Internet connection is one of the main problems, and I do not have a computer so I connect with my mobile phone and this makes it difficult for me, I mean doing my homework on my phone takes too much time." RW2, RW3, RW6, RW17, and RW38 put the fact that home environment and family members play a vital role in students' online performance:

> "Dealing with the family members is so tiring. Sometimes they do not think that you are at the online class and they just burst into the room." (RW2)
> "Sometimes the situation of my home is not suitable for the lesson. So I have to focus on my lesson while listening to vacuum cleaner." (RW3)
>
> "The biggest problem for me is that home environment and living with my family is not suitable for online education." (RW6)
>
> "You know we have to attend the class from home, and sometimes it is difficult to find a suitable and quiet place for online class." (RW17)
>
> "My home is not convenient because I have a big family living in the same house. Also, I have to help my parents for housework. And so I am usually tired and all these things affect my performance in online learning." (RW38)

Data of the interview provides detailed information about personal factors such as the inability to use technological devices, being unmotivated to participate, and comprehension difficulties. S4 addresses the issues stating "You know we require some technological devices for online education, but some of my classmates do not have laptops and it is difficult to follow the teacher through a mobile phone. Also, we could not see each other so it is not always easy to comprehend the subject." According to S3, online settings or environment can be unmotivating for students as he states "Some students do not have microphones and cameras and in such circumstances, they have no opportunity to make eye-contact or see facial expressions. I mean due to these, students feel unmotivated to participate or even anxious." Additionally, S6 talks about the same problem by saying "My computer is not new and sometimes I have problems with turning on my video camera because it does not work properly. And this makes me really nervous during the class."

The findings related to the challenges students faced during their online experience are similarly indicated by the research conducted by Korkmaz and Toraman (2020). According to their research, the major problem educators experienced occurs from students' poor internet connection. Also, lower student motivation is another problem experienced by the instructors during the online education. In a similar vein, Tirtanawati (2020, p.21) finds out that the "slow-speed internet access" is the main obstacle for students although they consider GC and GM effective virtual learning platforms.

Referring to another reported problem of decreased motivation, the finding of the research carried by Sun (2014) suggests students' lack of maintaining self-motivation during their online practices. The research indicates that fully online learning demanding student to be more organized in terms of self-regulation becomes difficult for students to keep themselves motivated. In line with the findings of the present study, Efriana (2021) demonstrates the similar problems in the research in which students' unwillingness to participate in online learning is stated as one of the major problems reviewed by the researcher. Briefly, the findings of the current study reveal the similar problems founded by the studies in the literature.

Conclusion and Suggestions

The findings of the current study reveal ELT students' experiences during online education due to Covid-19. Data gathered from reflective writings was coded and the interview was conducted to analyse the coded data in detail. The study explores the role of online presentations in Oral Communication Skills course, set of challenges in emergency online learning for students, and the benefits of implementing GC and GM to promote the students' communication skills.

Online presentations held through GM enable students to interact with each other and participate in the online class orally. Students feel less anxious and more confident to talk in English in online environment compared to in-class performances. GC is beneficial for students in terms of receiving the course materials and teacher feedback, and submitting homework, leaving comment and sending private message. Although students find these platforms practical and easy to use, data confirms that they face some problems which make online learning challenging. The biggest problem is poor internet connection or no internet access. Another problem the participant students have reported is the inconvenient home environment as they want their parents to be more sensible during the video conference and less noisy to prevent the issue of loss of concentration.

As the literature suggests, these challenges can be overcome by implementing several strategies and teachers have a significant role to motivate students during the online learning process. Teachers should follow the current innovations in educational technologies and increase their technology-literacy. Several technological devices and online platforms offer teachers online settings to carry lessons when it is needed. However, teachers should search and decide on the application which suits the objectives of the course.

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