The Effect of Teaching Practices with Real Life Content in "Heat and Temperature" and "Movement and Force" Learning Areas

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Abstract

In this study, it is aimed to investigate the effect of the Context-based Instruction Applications, prepared using verbal problems with real-life content and scenarios, on the level of pre-service teachers' learning areas of "heat and temperature" and "movement and force" and their level of creating contexts in daily life. The effect of the Context-based Instruction Applications the pre-service science teachers' level of associating science subjects and concepts with daily life was investigated. The research, which was conducted based on the single group pre-test and post-test experimental pattern, was carried out with 30 pre-service science teachers and data were collected with open-ended questionnaires prepared related to the use of learning areas in real life. At the end of the research, an increase was determined in the pre-service teachers' levels of associating the learning fields with daily life, that is, creating contexts between concepts and daily life. In addition, after the applications, it was observed that the pre-service teachers made associations more detailed and with different real-world application areas in real life.

Key words: Teaching practices, Real life content, Heat and temperature, Movement, and force.

INTRODUCTION

Context is a case of helping students give meaning to terms such as rule, concept, the law in line with their environment or life (De Jong, 2008). Context is a social and cultural environment, where the students and teachers are in (Whitelegg and Parry, 1999). For that reason, the concepts as 'real life, daily life, real-world, realistic, contextual, learning in context and situated learning, connecting with life' are used in the same meaning (Mosvold, 2008). Contexts are based on the strong communication of teachers and students during the educational activities as well as the connection of the issues with life. Accordingly, it is stated that one of the approaches developed to remove the obstacle in front of the educational activities is the "context-based learning approach". Thanks to the context-based learning approach, the students, who realise the relationship between the events in their daily life and the science subjects, can realise the connection with items outside the school's knowledge learned at school. Thanks to this situation, students can transfer the knowledge they learned to different situations and events they encounter (De Putter-Smits et al., 2013). Questions that students often get confused when they try to learn their lessons are why they should learn the topics and if they learn whether this information will work outside of school or not. Context-based learning approach should be applied in teaching to enable students to understand "how", "where" and "why" the information learned in a way that does not cause these questions to occur in their minds and to find answers to their questions (Glynn and Koballa, 2005; Tekbıyık, 2010).

The main purpose of context-based science education is to make the subject more relevant for students by addressing both the contexts in which the concepts are used and the relationships between the concepts more clearly. In this way, the context-based learning approach is thought to answer students' questions (Gilbert et al., 2011). As the events in daily life are examined, the desire to learn the concepts and laws for students is aroused (Güneş and Demir, 2007; Gürsoy-Köroğlu, 2011).

According to Finkelstein (2005), context analytically takes the context at the centre of learning instead of taking it as the basis of learning or as a separate factor. While learning the content takes place through the contexts in the teaching environment by the students, the learning result gives different meanings to the context. Thus, contexts will become an integral part of the learning process in time. In the context-based learning approach, the learning environment is shaped around the events in life, and "learning" is not a goal, but a tool. Sözbilir, Kutu and Yıldırım (2007) suggest that it is aimed to increase the motivation of the students by offering them scientific concepts with the events chosen from daily life and by motivating them to learn science. By increasing awareness of the relationship between science subjects and real-life events, it is aimed to increase students' interest in science lessons at the

beginning of their academic careers and help them develop their scientific process skills (Wijaya et al., 2015). Yam (2005) refers that in the learning process of the students, they learn a concept related to science and its real-life applications in the context of their own culture when they relate to real life, which includes their family and friends, and more permanent and meaningful learning takes place (Ulusoy and Onen, 2014).

In order to integrate context-based learning into learning environments in accordance with the purpose, the biggest task is of teachers. Teachers should have sufficient knowledge and experience in this regard. However, in the study conducted by Topuz, Gençer, Bacanak and Karamustafaoğlu, (2013), it was found that most of the teachers did not have sufficient knowledge about the context-based approach and did not find themselves sufficient to make Context-Based Teaching. Furthermore, some teachers do not fully understand the context-based approach, but only associate them with daily life examples and describe them as narration (Ayvacı, 2010). In addition, Stolk, De Jong, Bulte and Pilot, (2011) referred that teachers have difficulty in creating a new context-based unit scheme. In the study conducted by Kurnaz (2013), it was aimed to determine the thoughts of physics teachers about writing context-based questions and to evaluate their question writing situations. Although teachers stated that they used context-based questions in their lessons, they showed that none of the questions given by any of them was appropriate. It was concluded that teachers could not fully understand the difference between context-based and traditional question.

There are different applications in making sense of the context-based approach and its application in teaching environments. While Le Roux (2008) addressed the expression of real life with the problems of using the real-life context in teaching environments, Stylianides, and Stylianides (2008) thought as activities and problems involving real-life activities directly or indirectly and involve the relationship of the subject with different disciplines such as science, commerce, engineering, and economy. The expression of real in activities associated with the real world or daily life is considered as a feature that should be revived in the mind of the student (Van den Heuvel Panhuizen, 2005). Romberg and Kaput (1999), refer to problems, examples, activities, and tasks in linking issues with real-life as the student's ability to explore, model and research, provide evidence and use technology, and most importantly, the experiences that the student will enjoy and trust. On the other hand, Moschkovich (2002), emphasizes that real-life problem and states that these problems should offer more than one solution and that these problems should be a starting point for students in determining how to use the activities to be created with topics.

Demircioğlu, Bektaş and Demircioğlu (2018), on the other hand, emphasize that it is necessary to provide a suitable environment for real-life activities to be learned by discussing in groups, and in their study, they designed a story based on a real event. The stories also include questions that consist of events chosen from daily life and that may attract students'

attention. Demircioğlu (2008) expresses the use of stories or real-life events in a contextual approach. In addition, Bilgin, Yürükel and Yiğit (2017), defines attempts to solve this situation by giving the student one of the complicated situations in real life, Stinner (2006) defines them as interesting examples from real life and created a learning environment for students in accordance with their definitions. In the study by Overton and Potter (2008) in addition to the method named as the problem/life-based learning, it is seen that students try to attract the attention of the students with a real-life problem situation and there is multiple intelligence theory, concept maps, case studies and web-supported teaching. In the study by Ültay and Ültay (2014), in which the studies on the context-based learning were reviewed, they referred that most of the studies on the context-based learning topic the vast majority includes creating real-life scenarios to create contexts that may be interesting for students and to provide meaningful learning. In the present study, it is aimed to investigate the effect of the Context-based Instruction Applications, prepared using verbal problems with real-life content and scenarios, on the level of pre-service teachers' learning areas of "heat and temperature" and "movement and force" and their level of creating contexts in daily life.

It was determined from the conducted studies that the pre-service science teachers had difficulties in understanding the “heat and temperature” and “movement and force” topics (Atasoy and Akdeniz 2007; Madu and Orji, 2015; Gönen and Akgün, 2005; Özcan et al., 2009; Türkoğuz and Yankayış, 2015; Tanahoung et al., 2009), they had misconceptions especially in these topics (Aydoğan, Güneş and Gülçiçek, 2003; Frederik et al., 1999; Ongun, 2006). In science lessons, instead of conceptual learning, the emphasis is placed on the solution of scientific problems with the help of mathematical equations. This application makes it difficult to learn basic concepts conceptually and causes misconceptions to occur (Zhou et al., 2015). The primary reasons are that the subjects are both abstract (Kurt and Akdeniz, 2004) and that they are frequently used in daily life and are used in wrong meanings (Callanan et. al., 2013). It was observed that the frequency of encountering misconceptions increases in the proportion of the problems or experiences encountered with daily life (Doğan et al., 2004; Taşdemir and Demirbaş, 2010).

Students come to school with misconceptions due to their experiences in daily life. The source of most of the misconceptions determined in students is the experiences that arise from their environment and in their daily lives (Gürel et al., 2003). This also explains the reason for the misconception that is present in students, teachers, pre-service teachers, and many scientists (Krause et al., 2009). The fact that these concepts are related to daily life also facilitates their teaching because they are easily associated with daily life and can be reinforced with many examples (Harris et al., 2018). In order for students to achieve meaningful learning, education should be given at the level of concepts; first, the focus should be on the relationship between concepts and daily life (Chi, Slotta and Leeuw, 1994). It is not

enough to know these concepts or to have good academic success in this subject to relate the concepts with daily life (Pekdağ et al., 2013). It is also related to the qualifications and competence levels of the teacher (Kahyaoğlu and Yavuzer, 2004). However, they also have a relationship with the issues and their attitudes. They associate the subjects with a positive attitude and their interests with daily life more easily (Balkan-Kıyıcı and Aydoğdu, 2011). The fact that pre-service teachers, who are the future teachers, also associates the issues with daily life is of great importance in terms of both correcting the misconceptions and information deficiencies that exist in them and establishing contexts between these subjects and their students' natural life in their professional life (Karaca et al., 2006). Thus, they will realise their own learning experiences correctly and in accordance with their purpose and they will learn how to create the educational environments they will create in the future by learning one to one (Coştu and Ayas, 2005). In the present study, it is aimed to investigate the effect of the Context-based Instruction Applications, prepared using verbal problems with real-life content and scenarios, on the level of pre-service teachers' learning areas of "heat and temperature" and "movement and force" and their level of creating contexts in daily life. In addition, it is also aimed to increase the awareness and sensitivity of the relationship between real life and concepts or increase the existing consciousness and sensitivity.

METHODOLOGY

Study Pattern

The weak experimental pattern was employed in the research. In the weak experimental pattern, the effect of the experimental process is tested by working on a single group. Measurements of the subjects related to the dependent variable are obtained before and after the application by using the same measurement tools as the post-test (Weinberg, 2002). The study is experimental, and the only group of pre-test post-test patterns used within the scope of weak experimental designs, in which the effect of the experimental process on a single group was examined using pre-test and post-test (Bogdan and Biklen, 2003). The study was conducted on a single group as it was thought that it would be difficult to keep the variables under control in the control group since the study included a period of approximately one year. The study was carried out with 30 pre-service science teachers. The proper sampling method (Büyük Öztürk, 2011), which is one of the purposeful sampling methods, was used to prevent loss of time and labour, especially in determining the sample. The purpose of selecting the working group from the fourth grade is that they are both about to complete their pre-service education and that they can perform the teaching profession when they meet the necessary conditions a year later.

Data Collection Tools

The data were collected with the Open-Ended Questionnaires related to the Use of Learning Areas in Real Life. These questionnaires were prepared to determine the knowledge and development of the participant pre-service teachers about the relationship between mathematics and real-life before and after the activities. The questionnaire, prepared in line with the common opinions of four science education researchers who are knowledgeable about qualitative research, consists of the questions as, does the learning field of …… have a relationship with real life? If any, explain how it is used by writing all the areas of use you know."

Practice

This study was carried out with the application of Context-Based Instruction Practices prepared for two different learning areas to pre-service teachers. The process of determining Context-Based Instruction Practices started by reviewing the existing literature in accordance with the purpose of the research, by selecting the relevant practices and creating a pool. As the research involves the participants who will teach at the five, six, seven and eighth grades of primary education, the examples, activities and practices that link the learning areas in the textbooks, resource books and guidebooks that should be handled at these grade levels with real-life, are carefully investigated. At the end of this review, it was tried to include practices that are parallel to the existing events, but also to diversify these activities with different points of real life. Furthermore, researchers also wrote new applications in accordance with the purpose and considering the mentioned points. Do the Context-Based Instructional Applications selected from the pool and the written applications completely cover the learning areas by four researchers? Is it capable of revealing the relationship / contextual capacity of learning areas with real life? Is the meaning expressed clearly and understandably? Can it be made in terms of time and materials available? Is it sufficient to allow participants to see the different relationships between learning areas and real life? For each activity, days were determined by considering the appropriate times of the participants and researchers, and these days were notified to the participants and their participation was ensured. Context-Based Instruction Applications for each learning area are named with that learning area. Thus, totally two activities were performed related to the learning areas. Approximately four or five hours was given to each of these activities. During the activities, the pre-service teachers worked in groups of four or five.

Collecting and Analysing the Data

The participants were brought together in a classroom environment to determine their prior knowledge and to prevent the possibility of using different sources. The open-ended

questionnaires related to their learning areas before the activities were applied to the participants. Similarly, the data collection process was completed by allowing the participants to fill in the same questionnaires within the two days determined after the activities and the collected data was transferred to the computer environment for easy analysis. The qualitative data gathered from the open-ended questionnaires were subjected to the descriptive analysis. Contexts expressed by the participants between the learning areas of physics and Context-Based Instruction Applications were directly identified, then collected under codes-categories and depicted with the determined frequency values to realize a more regular presentation of the findings. Three researchers working together and simultaneously, creating codes and categories carried out the analysis process. The answers given by the students to the questionnaires were reflected and the three researchers expressed their opinion about which aspect of these expressions relate to real life. If it is understood in a common idea, that category and code were taken exactly, and when there was no meeting at a common point, the final decision was made by a majority of votes. Therefore, the categories in the study were created with the meaning of the codes in terms of common features. Information on how each category and code created was explained in more detail in the findings section.

FINDINGS

During the research process, activities were prepared to take into account the learning areas. For this reason, the analysis of the data was made within the scope of these learning areas and the findings obtained on the basis of fields were presented into the table.

Findings in the Movement and Force learning area related to the first sub-problem as, *"What is the effect of Context-Based Teaching Applications on the pre-service teachers' level of movement and force learning and their level of contextualization?"* are presented in Table 1.

Table 1. *Movement and Force Learning Area Qualitative Data Analysis*

	Categories	Codes	Pre-Interview frequency	Pre-Interview frequency
MOVEMENT AND FORCE	Nature	Nature Events	-	6
		Fields	-	3
	Entertainment	Playgrounds	-	3
		Lunapark	-	8
		Toy	-	7
		Game	-	1
	Places of Use	Kitchen equipment	3	11
		Information technologies	-	6

	Transportation vehicles	10	10
	Profession	-	8
	Car	-	9
	Daily Tools, Equipment	-	11
	Physical Terms	7	13
	Chemical Events	-	2
	Sound	-	5
	Simple machines	14	41
	Daily life	30	43
	Sport	-	8
Actions	Singing	-	1
	Painting	-	3
	Energy production	-	1
	Spring compression	-	1
	Forming	-	1
Place	Construction	-	5
	Hospital	-	1
	Factory	-	3
	Dams	-	1
	Laboratory	-	1
Use Areas	Construction	2	-
	Health	2	-
	Transportation	2	-
	Technology	1	-
	Space	1	-
	Education	1	-
Benefits	Contribution to the economy	1	-
	Ease of work	1	-
	Saving on time	1	-
	Making life easier	1	-
Daily Tools and Equipment	Elevators	2	-
	Business Machines	2	-
	Motor	1	-

As a result of the analysis of the preliminary interview and the last interview data made with the participants about the places where movement and force are used in daily life, 8

categories came into existence. The categories are nature, places of use, benefits, daily materials, entertainment, use areas, actions, and space.

The places of use category consist of kitchen equipment, information technologies, transportation vehicles, profession, car, daily tools, physical terms, chemical events, sound, simple machines, daily life, and sports codes. The preliminary interview data consists of 34 frequencies in this category, while final interview data consists of 167 interview frequencies. In the preliminary interview (30) and the final interview (43), the daily life code emerged. The code of daily life forms expressions such as the movement of the participants, displacement, nailing, braking, swinging, acceleration, deceleration, changing direction, turning propellers, turning the windmill, changing the direction of moving objects, stopping moving objects, stopping, walking, running, moving arm, blinking, holding a pencil, removing water from the well, carrying loads, climbing stairs, carrying coal, writing, lifting objects, changing the place of the objects, sitting on the table, pushing the sofas, breaking wood. The participants also used these expressions: *"For example, Movement is used to provide energy production. "," We see that an athlete running, walking, and then revealing the velocity again is force one to one. ","“ When we see the force in brush strokes in the painting area, when we consider the force, we understand again how relevant a weightlifter, the shot put, is. There is physics in everything, in the boxer applying force, in colliding cars, people shaking hands”. “In the breath of the singing singer, there is movement in the stroke of the brush of the artist who draws.”*

The nature category consists of the answers given by the participants in the last interview and consists of two codes. These codes are natural events and places. While the code of natural events constitutes the expressions of the participants' Wind and Wave movement, the places code consists of the expressions of the planets, stars, and the sun. The participants stated that force and motion are in the sun, stars, wind, and wave movements.

The answers of the participants in the post-interview form the entertainment category. This category, consisting of 19 frequencies, constitutes the thoughts that movement and force exist in the entertainment venues and entertaining equipment of the participants.

The category of the place consists of the answers given by the participants in the post-interview. In this category of 11 frequencies, it is stated that movement and force are also used in hospitals, factories, dams, and laboratories. The places of use category consist of the pre-interview data and totally include 9 frequencies. The participants expressed that they used movement and force in the fields of construction, health, transportation, technology, space exploration and education. The participants used the following expressions: *"For example, elevators or levers use to lift materials upstairs in the construction site operate under the influence of force.”, “Rollers are used in all compulsory areas such as friction, gravity, pressure. For example, tackles, pulleys are used in construction, on shipboard.”*

In addition, the post-interview data include benefits, daily tools, and equipment category. The benefits category consists of the codes of contribution to the economy, ease of work, saving time and making life easier. Elevators, construction equipment and engine codes constitute the daily equipment category. The participants expressed their thoughts as, *"We use movement and force to facilitate our lives, our work", "We can move very heavy items with very small forces and carry them wherever we want when transportation and lifting systems are insufficient."*

Table 2. *Motion and Force Learning Areas Wilcoxon Signed Ranks Test Results*

Pre-test – post-test	N	Rank Averages	Standard Deviation	z	p
Negative rank	13	12,73	165,5	-3,314[b]	0,001
Positive rank	27	24,24	654,5		
Equal rank	1				

Statistically, a significant improvement was found in favour of the post-test according to the results of Wilcoxon Signed Ranks Test analysis in the context of the Movement and Force learning areas of the participants in the pre and post-tests (z= -3.314, p=0.001). The Wilcoxon Signed Ranks Test analysis results are presented in Table 2. As Table 2 is analysed, it can be referred that after 13 contexts (negative rank) created by pre-service teachers, they either did not create any context or created a smaller number. However, it is observed that after the application, they created a context in 27 themes (positive rank) that they did not create any context before. In 1 theme, it was determined that they formed an equal number of contexts both before and after application.

The findings related to the First Sub-problem as *"What is the effect of Context-Based Teaching Applications on the pre-service teachers' Heat and Temperature learning area and their level of creating contexts?"* are presented in Table 3.

Table 3. *Qualitative Data Analysis of Heat and Temperature Learning Area*

	Categories	Codes	Pre-Interview Frequency	Post- Interview Frequency
HEAT AND TEMPERATURE	Places of Use	Transportation	3	-
		Industry	4	5
		Industry	3	-
		Meteorology	2	-
		Health	13	1
		Medicine	-	5
		Factory	-	2

	Construction	-	2
Daily Events	Heating	15	16
	Realization of reactions	1	2
	Food storage	2	3
	The life of living things	2	3
	Photosynthesis	1	1
	Expansion	1	1
	Toy running	-	1
	Car start	-	1
	Solarium	-	1
	Natural gas	-	7
	Insulation	-	4
	Enzymes	-	1
	Friction	-	1
	Disinfection	1	1
	Energy transformation	-	2
	Ironing	-	2
	Thermometer	1	10
	Nature events		5
Technological tools	Large home appliances	1	6
	Small appliances	2	7
	Machinery	-	1
	Fire sensors	-	1
	Tools	-	3
	Lighters	-	1
	Central heating	3	7
	Solar panels	-	4
	Night vision camera	-	2
Place	Sauna	-	1
	Thermae	-	1
	Observatories	-	1
	Thermal power plants	-	1

Considering the answers given by students about heat temperature, a total of 4 categories emerged. These categories are places of use, daily events, technological tools, and place. As the answers of the students in the pre-interview were taken into consideration, the

categories of places of use, daily events and technological tools categories emerged. In the category of the places of use, 8 codes and 25 frequencies came into existence in the pre-protocol. The codes came forth in the pre-interview in the places of use category are health, industry, transportation, meteorology, industry codes; on the other hand, 5 codes appeared in the post-interview in the category of places of use, the total frequency was 15. In the category of places of use, the codes that came forth during the last interview were medicine, factory, industry, health, and construction codes. The sample answers of the participants in creating this code are: *"It is used in hospital treatments.", "For example, for the thermometer, it is used to measure the body temperature","* *In laboratories in medicine, in the deterioration of chemicals ". " It is frequently used in heat and temperature, in industrial facilities, high temperature is used in welding processes." "... heat and temperature are used in weather forecasts."*

While totally 8 codes emerged in the daily life category in the pre-interview, the total frequency of this code was 24. The codes emerged in the pre-interview were food storage and the life of the living things. As the answers of the students in the daily life category were taken into consideration, totally 18 codes emerged. The total frequency of these 18 codes was 62. The codes came forth in the post-interview were heating, natural gas, insulation, and thermometer codes. The sample answers of the students are as, *"Burning metal wires radiate around and provide light. ","* *It can be used in various fields by making energy conversions again. " "The bulbs become incandescent (i.e., warm-up) to illuminate by emitting light.", "... used in water heaters, stoves, flashers, air conditioners, solarium, saunas, hot springs, solar panels, natural gas, water heaters, bathroom boilers, washing and dishwashers, exterior insulation, cooking food, glassmaking." "Heater cores provide the heating of the environment by convection.", "Temperature is the required temperature for enzymes to work without spoiling."*

While a total of 3 codes appeared in the pre-interview in the technological tools category, the total frequency of these codes was 6. In the pre-interview, the heating code came forth in the category of technological tools. In the post-interview, while 9 codes appeared in the technological tools category, the frequency of these 9 codes was 32 in total. The codes that came to the forefront in the post-interview in the technological tools category were the codes of small home appliances, large home appliances, heating systems and solar panels. The total frequency of these codes was 24.

The students represented the category of the place by 4 codes in the post-interview. In the post-interview, the category of the place consists of 9 frequencies. The 4 codes in the last category in the venue category have equal frequencies.

Table 4. *Temperature And Temperature Learning Areas Wilcoxon Signed Ranks Test Results*

Pre-test – post-test	N	Rank Averages	Standard Deviation	z	p
Negative rank	4	26,13	104,5	-3,353[b]	0,001
Positive rank	30	13,35	490,5		
Equal rank	4				

Statistically, a significant improvement was found in favour of the post-test according to the results of Wilcoxon Signed Ranks Test analysis in the context of the heat and temperature learning areas of the participants in the pre and post-tests. (z= -3.353, p=0.001). The Wilcoxon Signed Ranks Test analysis results were presented in Table 4. As Table 4 was analysed, it was determined that pre-service teachers created contexts (negative rank) in 4 themes before the applications in the areas of heat and temperature learning, but at the end of the application, they did not create contexts in these themes. In 30 themes (positive rank), it was seen that they did not create contexts before application, but they created contexts in these themes after application. Besides, it can be claimed that all three themes (equal rank) created an equal number of contexts before and after application.

RESULT AND DISCUSSION

In this research, it is aimed to investigate the effect of the Context-based Instruction Applications on the level of pre-service teachers' learning areas of heat and temperature and movement and force and their level of creating contexts in daily life. When the contexts that they established about the Movement and Force Learning field were examined, it was determined that while pre-service teachers did not create contexts in the fields of nature, entertainment, actions, and place before starting the applications, they created contexts in these areas. On the other hand, although they created contexts in the categories of daily tools and equipment, benefits, places of use areas at the beginning of the application, they did not create contexts in these categories at the end of the application. This case can be explained by the fact that pre-service teachers formed more specific, more detailed, and more subjective contexts at the beginning of the application rather than creating contexts with more general and familiar (such as benefits, places of use). The number of contexts they create after applications is approximately 3 times the number of contexts they create before applications. In addition, as a result of the analysis made between these contexts, it is also an indicator that pre-service teachers made significant progress in favour of post-test in terms of creating context. In the heat and temperature learning field of the pre-service teachers, it was determined that they created contexts in the categories of place, technological tools, daily events, places of use, and these contexts were statistically significant progress in favour of the post-test at the end of the application. It was determined that pre-service teachers were not

aware of the relationship such as machines, fire sensors, place, vehicles, lighters, solar panels, night vision camera, but at the end of the project they realised their use in these areas and established contexts. In general, the number of associations made by the participants after the applications was about twice the number of the associations they had made before the implementation.

At the end of the study, in both learning areas, an increase was observed in creating contexts in daily life; that is, in associating the learning areas with daily life. Furthermore, it was determined that these associations are more detailed and made with different application areas in real life. This increase was observed in three ways in the study. The first of these is that the frequency of association made by pre-service teachers increased after the applications compared to the before the applications. The second is that the associations of some codes are not made before the application but after the applications. The third of these is that some of the pre-service teachers did not think that some learning areas were related to daily life before the applications and did not establish contexts but realised the relations that existed after the applications. Another result that was reached in the study is that it was observed that pre-service teachers include more simple descriptions in their expressions before applications and descriptions that are more detailed after applications. The results reached within the scope of this research demonstrate a similarity with the other studies in the literature. In the study conducted by Stolk, Bulte, De Jong and Pilot (2012), the extent to which the professional development program prepared by the researchers strengthened teachers' ability to design context-based learning units was investigated. At the end of the process, teachers' understanding of the nature of the context-based curriculum was increased and their application skills improved. In addition, it was stated that the professional knowledge of teachers and the active role of the field expert contributed to the program and strengthened the teachers. In the study by De Putter-Smits, Taconis, Jochems and Van Driel (2012), the learning and changes of the teachers in the commission that designed the materials for the curriculum renewed according to the context-based approach were examined. Five context-based teaching competencies, called context use, teaching emphasis, material arranging, organizing the teaching environment, and leading innovation, were examined under cognitive and behavioural dimensions. At the end of the analysis, it was observed that teachers with design experience differ in terms of context usage and material editing compared to other teachers. In the study by Valdmann, Rannikmae and Holbrook (2016), they investigated the effectiveness of the professional development program in the development of teachers' context-based science teaching self-efficacy. At the end of the study, it was observed that applied program-based education programs were effective in teachers' self-efficacy regarding new interdisciplinary content knowledge, teaching approaches and classroom practices.

The Science curriculum consists of abstract concepts and events that are difficult to understand. Even though these concepts and subjects are thought to be appropriate for the cognitive level of the students, the information given is not beyond being memorised information in cases where various teaching methods in which abstract concepts are embodied for the students' senses are not used. Also, it negatively affects attitude towards science (Dede Er, Şen, Sarı and Çelik, 2013). However, it was also observed that students' motivation, participation in courses and their desire to learn increased due to the lessons by associating the information with daily life (Balkan-Kıyıcı and Aydoğdu, 2011; Demircioğlu et al., 2013; Erdemir and Bakırcı, 2009). Giving concepts by associating them with daily life leads to learning of concepts that are more accurate at schools. At the same time, their attitudes towards their environment and life begin to change positively (Kalıpçı et al., 2010). Teaching subjects by associating them with daily life both increases the participation and performance of individuals, correct their misconceptions, and contributes to meaningful and permanent learning (Acemioğlu and Doğan, 2019). However, it was determined that students had difficulty in associating the information with daily life (Atasoy and Akdeniz, 2005; Montanero et al., 2002; Küçüközer, 2004) and their association levels were quite low (Yiğit, Devecioğlu and Ayvacı, 2002; Eryılmaz and Kaya, 2011). Thanks to the context-based learning approach, students who see the relationship between the events that they encounter in their daily lives and science subjects, enable them to see the information learned at school and its connection with items outside the school. With the help of this case, students can transfer the knowledge that they learn to the different situations and events they encounter (Ünal, 2008). As the education given in schools remains in theory and the concepts cannot be adequately associated with daily life in the textbooks, the students apply to what they learn by going to over-generalization. This situation creates missing, insufficient information and misconceptions in students (Akgün et al., 2015; Göçmençelebi and Özkan, 2011; Gürel et al., 2003). Students belong to their elders, especially from a very young age. Children at this age often associate scientific knowledge with what they read, what they learn in food or what they learn in games. From this age, it can be claimed that students' abilities in associating scientific concepts are not at the desired level (Roychoudhury, 2014). Teaching concepts by associating them with daily life leads to learning of concepts that are more accurate at schools. At the same time, their attitudes start to change positively with respect to their environment and life (Çepni et al., 2017; Hürcan and Önder, 2012; Kenar, Şekerci, Erdem, Geçgel and Demir, 2015). Science learning is different from the information in daily life and requires the guidance of the teacher (Sikder and Fleer, 2015; Fragkiadaki and Ravanis, 2016; Areljung and Sundberg, 2018). It necessitates teachers to have the necessary knowledge, skills, and equipment to provide the essential and sufficient guidance. First, in the in-service and pre-service training of the teachers, education should be given in the areas where they are missing

or needed by the students. Teachers and pre-service teachers should be educated well to associate the daily life, which is perceived as a problem in science education, with science issues and concepts, in creating contexts. Teaching contexts and concepts in teachers and pre-service teachers will both enable them to learn the concepts correctly and meaningfully, and while teaching these concepts; they will learn which concepts and which contexts they can establish to their students. They will have experience in preparing this learning environment in which they are one-to-one with their students in the future (Karakoç and Alacacı, 2012; Sağırlı et al., 2016; Yorulmaz and Doğan, 2019).

RECOMMENDATIONS

It is very important to teach basic concepts fully and correctly in 4th and 5th-grade science lessons where the concepts that form the basis of science teaching are started to be taught. In addition, it is of great importance to associate science lessons with daily life and to conduct lessons by creating appropriate contexts. It is of great importance in terms of being difficult to understand by students, disconnected from daily life, and even where the thoughts they use will be used and how they will adapt to life. It is doubtful that teachers who do not have the necessary experience in science subjects and who do not have the necessary experience will learn these concepts sufficiently. In order to eliminate this problem, the required opportunities should be created for pre-service teachers to become aware of the insufficiency of knowledge in the field of science and to eliminate these insufficiencies. For this reason, in the context knowledge lessons taught at the Faculty of Education, these insufficiencies should be tried to be eliminated by applying the teaching methods that take the student to the centre other than the traditional methods, providing effective learning and by associating them with daily life, creating contexts, and conducting their studies in cooperation with the academicians giving the context knowledge lessons. In the stage of creating contexts with topics, it is necessary to focus on the usage areas of concepts in daily life, how to interpret the situations they encounter, how to analyse these situations and what information and methods can be resolved when necessary. As long as the individual understands the meaning and importance of the subject in her/his life, her/his interest and attitude towards the subject will change positively. This study was conducted with pre-service science with two of the science learning areas. Similar studies can be conducted with different study groups and different learning areas.

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