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Opinions of Students, Parents and Classroom Teachers on Implementing a Science Course with Activities Based on Multiple Intelligences Theory*

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Abstract

This research aims to evaluate the opinions of the students participating in the application, their parents and the classroom teacher about the application process related to the teaching process carried out with the activities within the scope of multiple intelligences theory applications based on daily life problem-solving skills in the primary school fourth-grade science course, which was carried out with the phenomenology model, one of the qualitative research models. The research participants comprised 23 students attending the fourth grade in a public primary school in Istanbul in the 2022-2023 academic year, their parents, and the classroom teacher. Within the scope of the research, a six-week implementation process was carried out with the students in the classroom environment, and the researcher prepared the lesson plans within the scope of the "Our Food" unit. After the implementation, the data were collected through a semi-structured interview form prepared by the researcher. The research data were analysed using content analysis. As a result of the analysis of the data obtained in the research, it was concluded that the implementation process positively contributed to the students' course achievement, attitudes towards the course and the development of daily life problem-solving skills. In this context, activities based on the theory of multiple intelligences as an effective teaching method for students' cognitive, affective and skill development at the primary school level and in the context of science courses are recommended in line with the research results.

Keywords: multiple intelligence, science course, primary students

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Introduction

In today's "information and technology" age, where scientific and academic knowledge increases exponentially, technological innovations have gained significant momentum, and the impact of science and technological developments is prominent in all areas of our lives, it can be seen that science education has a vital role in terms of the development of society (MEB, 2006). Educational activities related to science enable individuals to understand their environment better and provide them with skills related to creative thinking. Science education also allows individuals to recognise their world and make sense of it correctly. It also develops the individual's logical thinking and problem-solving skills. This enables students to solve the problems they encounter in daily life more efficiently and to control their learning processes. Thus, while increasing students' practical skills for daily life, the development of science skills and learning to learn are provided (Hançer et al., 2003).

Intelligence is a mental ability or skill that originates from human biology and psychology and arises from the capacity to calculate or process information (Gardner, 2006). The theory of multiple intelligences is a student-centred educational approach that offers rich activities and materials compatible with the individual differences and dominant intelligence areas of students and their specific learning styles in this direction, where the teacher is in the position of a guide. It shows educators the differences between students and how they can learn (Baykal, 2005). Multiple intelligences theory is an educational theory developed by Howard Gardner as an alternative perspective on intelligence, who argues that the traditional method of testing intelligence does not capture the wide range of potential people have (Armstrong, 2020). Gardner first explained his theory in his book "Frames of Mind", published in 1983 (Nuzzi, 1997; Gardner, 1999).

According to Gardner's theory of multiple intelligence, eight areas of intelligence are innate to every individual and offer options that can support the individual's understanding and learning styles. These include "verbal-linguistic intelligence", "logical-mathematical intelligence", "visual-spatial intelligence", "musical intelligence", "bodily-kinesthetic intelligence", "interpersonal intelligence", "intrapersonal intelligence", and naturalistic intelligence (Türkuzan, 2004). Wilson (2018) explains each intelligence as a transformative process for students' education. However, Gardner (1993) interpreted human intelligence as each student's discovery of their power in teaching. Accordingly, each intelligence defines how students can understand various lessons taught in the classroom. The fact that their strengths are different for each student and the goal of helping students in a group reach their maximum learning potential reveals the necessity for the instructor to carry out studies to diagnose students in the teaching process (Gardner, 2004).

Currently, as a reflection of the student-centred education approach, studies on Gardner's multiple intelligences theory have increased (Kural, 2020). An examination of studies conducted in Turkey and abroad revealed that these studies were carried out in

a broad target group from the preschool period to adulthood and within the scope of many different courses (Çelik Özer, 2010; Koç, 2012; Ermiş, 2012; Durmuş, 2013; Dalbudak Pekdemir, 2014). However, studies generally focus on increasing academic achievement in specific courses or determining the multiple intelligences areas of the relevant target group. The studies carried out in Turkey are generally aimed at foreign language education at the high school and university levels; however, studies conducted within the scope of high school science courses such as physics, chemistry and biology have come to the fore (Yavuz, 2010; Kurt, 2012; Şakir, 2013; Pourfeiz, 2014; Tüysüz, 2015; Hergüner, 2016; Elgün Gündüz, 2017). In addition, domestic and foreign studies on skills carried out with gifted, special needs or preschool children are also included in the literature (Çalışandemir, 2010; Şahlı, 2010; Darga, 2010; Koç, 2012; Şahin Zeteroğlu, 2014). The literature review observed that the number of studies carried out at the primary school level on the multiple intelligences theory in Turkey was more significant than in other countries. The fact that these studies, which were carried out primarily within the scope of the science course, were mainly aimed at determining the intelligence areas of the students and did not focus on the skills expected to be gained by the students in line with the objectives of the science programme, caused the functionality of the theory of multiple intelligences within the scope of the science programme to not be fully revealed.

Problem Statement

According to Gürkan and Gökçe (2000), students' interest in science is relatively high in the first stage of primary education, but this interest decreases in the following years. Since students' attitudes towards science are generally low in Turkey, there has been a decrease in their achievement in science. The emergence of this situation can be thought of as a problem arising from the fact that students are not handled with different intelligence areas (Öngören, 2007). Educators can optimise student education by learning a child's strengths and preferences. This situation increases the value of using the theory of multiple intelligences effectively in daily teaching processes (Adcock, 2014). Research also shows that using teaching activities based on multiple intelligences theory by students in science lessons is more exciting and fun than the current teaching methods and increases academic achievement (Altınsoy, 2011). However, within the scope of the research, it was inferred that evaluating the opinions of students, parents and teachers about the activities related to the theory of multiple intelligences within the framework of the relevant application will provide findings that will allow a general framework to be drawn for the application development process.

Importance and Purpose of the Research

Science includes all branches of science consisting of the knowledge acquired by human beings from examining themselves and their natural environment (Çilenti, 1985). With the rapid development of technology, the importance of science is rapidly increasing in the 21st century. The first aim of education is to raise well-equipped individuals who will keep up with age, research, and questions through critical thinking (Bökeoğlu & Yılmaz,

2005). Among the main objectives of the courses related to science, raising individuals who think, ask, and do comes to the forefront. To achieve these aims, it is necessary to work on teaching ways of learning and to provide the opportunity to apply what has been learned instead of providing students with ready-made information (Gürkan & Gökçe, 1999). Science education allows individuals to recognise the world they live in and their environment while also providing them with creative thinking skills. In this direction, it enables individuals to recognise their world, make sense of it correctly through good communication processes, and develop their logical thinking and problem-solving abilities. This enables students to solve the problems they encounter in daily life more efficiently and to control their learning processes. Thus, students' practical skills for daily life increase when they develop science skills and learn to learn (Hançer et al., 2003).

Gardner (1983) introduced the theory of multiple intelligences to the literature. This theory suggests that individuals have varying intelligence at different levels and that this reveals individuals' learning styles, interests, skills, and tendencies. With this theory, educators have revealed new methods for preparing programmes that emphasise students' differences and strengthen them through the basic principles they use creatively. The theory of multiple intelligence, which enables a student-centred approach, has a vital role in achieving the goals of the science education process (Kurt, 2012).
Individuals differ in mental, psychological, and social aspects as well as physical differences (Kuzgun, 2004). Considering that the essential tools that individuals use to learn and adapt to their environment in daily life are their intelligence and abilities that emerge specific to the individual in line with their differences, it is necessary to organise the teaching processes in line with these parameters (Turgut et al., 2016). Individual differences also play an essential role in determining educational policies. In the face of situations such as the economic structure of society, its goals for the future and the quality of the workforce planned to be trained, it becomes necessary to direct individuals according to their differences in the education process. (Kuzgun, 2004; Aktepe, 2005).
The roles of teachers and students, as well as the curricula from past to present, have changed over time, and in this direction, the aim of creating more efficient learning environments has come to the fore in the teaching process. (Alkan et al., 2013; Deniz, 2019). In this context, the course content applied within the curricula should transform to keep up with the age of the new perspectives gained by the programmes and the expectations of the students. Research shows that students have positive attitudes towards lessons taught in line with lesson plans developed based on the theory of multiple intelligences (Kural, 2020). In this direction, a multidimensional approach to the teaching processes related to multiple intelligences applications carried out within the scope of the science course will provide a better understanding of this change process.
It is well known that in traditional learning environments, teachers do not consider students' prior knowledge and see students as empty structures filled with information about the subject to be covered (Baki, 2008). As the sole responsibility for the delivery of the lesson in these environments lies with the teacher, under the influence of this responsibility, teachers usually only know the answers to questions such as what, how

and why to teach and learn in the teaching process in which they are at the centre, and therefore, they have to be very active. The relevant objectives are generally included in applications related to the theory of multiple intelligences, which rejects the didactic transmission of objective knowledge and its unquestioning acceptance. Instead of teaching the subject directly, the aim is to enable students, individually or as a group, to make sense of their existing knowledge using the teaching tools developed. Research shows that with this new role of the teacher in line with the theory of multiple intelligences, the role of the students has also changed. However, teachers and students have difficulties adapting to the new situation (Gürbüz & Birgin, 2011). In addition, parental involvement is a factor that increases the success of implementing the theory in applications based on multiple intelligences theory (Erdem & Demirel, 2005). In this vein, the opinions of students, parents, and teachers will help us obtain in-depth information about the implementation of the theory.

Therefore, this research will reveal students', parents', and teachers' opinions about applying multiple intelligences theory in primary school science courses. In line with this purpose, questions about the opinions of students, parents, and classroom teachers about the applications of multiple intelligences theory carried out within the scope of the research were sought. In this context, as the problem statement of this research, the question of what the opinions of students, parents and classroom teachers are about science courses carried out in the context of multiple intelligence theory was determined.

Method

Research Model

This research focuses on the opinions of the students, their parents, and the classroom teacher about the implementation process within the framework of the six-week lesson plan prepared by the researcher based on the theory of multiple intelligences within the scope of the "Our Foods" unit, which is among the units of the fourth-grade science course of primary school. The lesson plans prepared by the researcher were designed to teach the relevant outcomes within the scope of the science course. They included creative drama, storytelling, singing, physical activities, writing activities, logical analyses, mutual communication processes, and internal decision-making stages. The researcher aimed to enable students to use different intelligence areas in teaching processes through these activities. According to the literature, qualitative research methods are the most appropriate methods for obtaining information about individuals' perspectives, opinions, and perceptions (Bell, 1992; Yıldırım & Şimşek, 2008). Accordingly, phenomenology, a qualitative research model, was used in this research. Cases can appear in different forms, such as experience, perception, orientation, concept, and situation (Yıldırım & Şimşek, 2008). The phenomenological model is defined as a phenomenon in terms of the experiences of individuals or a particular group (Christensen et al., 2014). In this context, a phenomenon is something that is accepted

as existing, true or realised. A phenomenon can be defined as the truth within the scope of the research. In this direction, in case studies, analyses are made on the reality in the nature of the research. Accordingly, in this research, the aim was to explain the process of multiple intelligences theory applications in line with the thoughts and experiences of the participants, including their perceptions.

The Role of the Researcher

In this research, the researcher is involved in more than one role. In this research, the researcher in the role of instructor carried out the preparation of the lesson plans in the background of the research, the implementation of the lesson plans prepared by the researcher, and thus the transfer of knowledge necessary for the acquisition of the relevant outcomes to the students. With the role of guide, the researcher carried out the guidance activities necessary for the use of the data collection tools within the scope of the research in accordance with the purpose of the research and to meet the feedback needs of the participants regarding the problems that arose during the process. The researcher carried out the necessary activities to obtain the findings by creating reports on the behaviours exhibited by the participants during the implementation, the processes put forward, and the implementation of the prepared lesson plans. Finally, the researcher was involved in the research as a participant observer in the research process.

Participants of the Research

Within the scope of the research, a state primary school in the Bağcılar district of Istanbul Province was selected as the school where the research would be conducted. Detailed studies were carried out to determine the school within the scope of the research. In this context, general statistical data were utilised to determine ideal schools. Within the scope of these data, it was given importance that the school where the research was carried out overlapped with the socio-economic and educational characteristics of the population. In this direction, it was aimed that the participants of the study would be typical members of the population. In determining this school, the nature of the research population, the distribution of the characteristics sought within the population and research opportunities were considered. In qualitative research, purposive sampling methods are used for in-depth investigation of situations that are thought to have rich information content (Yıldırım & Şimşek, 2008). In this research, the criterion sampling method, a purposeful sampling method, was used to identify the participants. Considering the purpose of the research, the criteria used to identify the students who participated are given below.

- Being a 4th-grade student in primary school,
- Volunteering to participate in the research,
- Their families allowed them to participate in the research,
- Having problems in line with the aims of the research.

In line with the criteria determined for the research participants, this research consisted of 23 fourth-year students attending a public primary school in the Bağcılar district of Istanbul Province in the autumn term of the 2022-2023 academic year, their parents and the teacher of the class in which they were studying. The participants of the research other than the students consisted of seven families and one classroom teacher.

Data Collection Tools

In this research, semi-structured interview forms were used to collect the data. The interview questions were prepared separately for the students, parents and classroom teachers, and corrections were made after the expert evaluation and the application were carried out. Patton (2014) emphasises the importance of interviews in revealing people's feelings, thoughts, and intentions that we cannot observe directly and in determining people's perspectives on a subject. The interviews revealed a mutual and interactive communication process by asking and answering questions per a predetermined purpose (Stewart & Cash, 1985).

Maxwell (2018) emphasises that interviews focus on three types of questions:

- Questions about the meaning of the activities and events of the people involved in the process,
- Questions connected with the effects of physical and social orientation in the context of these events and activity processes,
- They are process-oriented questions about the occurrence of event and activity processes and the resulting situations of these processes.

Semi-structured interviews reveal a technique in which researchers prepare the questions they plan to ask. However, researchers can change the flow of interviews by directing different questions that vary depending on the interview process or obtaining more detailed answers from the individuals to whom the questions are directed (Türnüklü, 2000). The continuation of semi-structured interviews based on previously prepared interview questions enables semi-structured interviews to reveal more systematic and comparable information (Yıldırım & Şimşek, 2008).

Data Collection and Analysis

Qualitative data were used to find a solution to the problem within the scope of the research. These data were collected with the participants from the school where the research was carried out in the autumn of the 2022-2023 academic year, with the activities carried out in the classroom environment within the scope of the "Our Food" unit in the primary school fourth-grade science course programme and the data collection tools used within the scope of the research. The "content analysis" method was used to analyse the collected data.

Data analysis can be defined as the process of exporting the meaning of the data to answer the research questions. Transferring the meaning of the data is a process of interpretation that combines, reduces, and interprets what the participants say with what the researcher sees and reads (Merriam, 2015).

Content analysis is a data analysis method used to analyse written, verbal, and visual communication statements (Cole, 1988). It can produce reproducible and valid results for comprehending texts and providing information from texts (Krippendorff, 1980). Two approaches are used in content analysis: inductive and deductive (Mayring, 2000).

Inductive content analysis enables researchers to create criteria for definitions that align with the answers to the research questions and the theoretical framework. Researchers have attempted to reveal the main themes for the problems in line with the descriptive and detailed data they collected to ensure that the collected data have the structural integrity that contains meaning and to develop a theory in line with these data (Yıldırım & Şimşek, 2008). In deductive content analysis, the category structure created in advance for researchers to provide definitions, examples, and coding rules within the scope of all deductive categories is revealed. In this regard, inductive content analysis was used to analyse the data obtained through the data collection tools used in this research.

Within the scope of content analysis carried out within the scope of qualitative data, there are also two theoretical approaches. These are manifest content analysis and latent content analysis. In manifest content analysis, the context is derived from the apparent and literal meanings of words, and these meanings are accepted as they are. In latent content analysis, you apply a more profound, interpretive analysis to extract the underlying meaning from the words or phrases you have chosen to analyse. Both overt and covert qualitative content analysis produce phenomenological explanations that seek to explain people's lived experiences and how they explain these experiences. However, the approach to producing these explanations is different. Explicit content analysis is typically achieved through a deductive, top-down research approach with preexisting studies or theories about your research topic. On the other hand, latent content analysis typically results from an inductive, bottom-up analysis where you begin your study without preconceived categories or theories. This is often because preexisting theory or literature on the topic is sparse. This study utilised latent content analysis in line with inductive content analysis. The latent content analysis extends the explicit analysis to an interpretative level and reveals the implicit meaning that is implied rather than expressed literally. This allows going beneath the surface of the text and revealing what the people quoted in the text say (Catanzaro, 1988; Downe-Walbolt, 1992; Berg, 2001).

The data obtained within the scope of the research were analysed and interpreted using the microanalysis method. In this method, the data are evaluated by reading the data line by line to the finest detail (Corbin & Strauss, 1998). In this context, the data were first divided into sections containing meaning; the conceptual meaning of each section was analysed, and the sections were named and coded. After this stage, the thematic

coding stage was started to reveal the findings. In the thematic coding phase, the data were re-evaluated to determine the similarities and differences between the codes.

The coding process was completed by categorising the codes and identifying similar and different situations between the codes. In this vein, the data defined through the reorganised codes were used to explain the findings.

Findings

Findings Related to Semi-structured Interviews with Students

The students who participated in the application were asked what they thought about the Science lesson carried out together during the six weeks. All students had positive thoughts about the application process when the answers were evaluated.

- Mehmet: It was very fun; I was never bored. I wish all lessons were like this.
- Büşra: The Science class was delightful. I wish it would never end.
- Deniz: The activities were very nice. We had much fun.
- Özgür: Before you came, we were not doing activities in science class. I understood better when we did activities.
- Caner: It was perfect. Let us perform the activity again.

When the students' answers are evaluated, the activities based on multiple intelligences attract the students' attention in the lessons, and they enjoy performing these activities; however, the students find it more beneficial to teach the lessons with activities in general, and as a result of this benefit, they think that their achievement and attitudes towards the course are positively affected.

Within the scope of the six-week implementation, the students were asked to describe the activities carried out in the lessons and the teaching process. Most students answered this question in line with the relevant unit acquisitions.

- Deniz: We learned about food families, healthy eating, and not overeating junk food.
- Ayşe: We learn about healthy and balanced nutrition and the harm of smoking.
- Mehmet: We learned what we should pay attention to when we buy something. We learned about the TSE certificate.
- Ezgi: We learned that if we eat unhealthy things, we can gain much weight.
- Büşra: We saw food groups, did drama, and sang songs. We learned that we must eat a balanced diet to protect our health.

The students' responses are primarily evaluated in relation to the relevant unit acquisitions and their daily life problem-solving skills.In this vein, activities based on

multiple types of intelligence within the scope of the application are appropriate activities for developing students' daily life problem-solving skills.

The students were asked how they felt about the Science lessons we taught together. When the answers to this question were evaluated, it was seen that the students had a positive attitude towards the lessons.

- Ayşe: It was lovely; I had much fun.
- Deniz: I was thrilled; we learned a lot of new things.
- Mustafa: I would not say I liked science class either, but it is good like this.
- Özgür: I used to get bored at school. Physical education and art classes were fun, but we wrote in maths and science classes. I had much fun doing science lessons with activities. I do not get bored at school anymore.
- Çağdaş: I did not want to come to school very much, but I want to come even if I am sick on the days when there is a science lesson.

The responses of a student named Mustafa, who answered the question, revealed that the application could increase positive attitudes towards science courses. When the responses of students named Özgür and Çağdaş were evaluated, it was revealed that their positive attitudes towards the course also positively affected their attitudes towards school. When the students' responses were evaluated in general, all the students used positive keywords such as "fun", "beautiful", "enjoyable", and "instructive" for the application process. In this vein, lesson plans with activities based on multiple types of intelligence have positive attitudes towards the course and school.

The students were asked to state which skills they thought they developed through the activities within the scope of the applications. Some students answered this question within the scope of teaching methods and techniques.

- Mustafa: I could not do the lessons, but the activities are perfect; I can do them when there are activities.
- Deniz: We learned how to do drama.
- Göksu: We learned about drama and brainstorming.

A significant portion of the students provided answers related to daily life problems.

- Caner: When we go to the supermarket, I buy nothing without looking at the packaging.
- Erdem: In the supermarket, I examine everything first.
- Zahra: I pay attention to what I eat now. I eat more healthy and child-friendly foods.
- Deniz: I warn my friends when they eat unhealthy things.

When the students' answers are evaluated, it can be said that the teaching plan carried out with activities based on multiple intelligences can also improve students' skills in

course methods and techniques that are not included much in the lessons taught with traditional methods. In addition, problems in activities associated with daily life reveal a significant improvement in students' skills, especially in daily life problems.

The students were asked how the activities affected their learning of the subjects within the scope of the "Our Food" unit. All students stated that the science lessons taught with activities based on multiple types of intelligence over six weeks positively affected their learning within the scope of the related unit. The answers given by the students, Eda, Ömer and Mehmet, to the questions are below.

- Eda: It is enjoyable to teach with activities. It helped me understand the subjects better.
- Ömer: I did not understand science subjects very well before. In the lessons we had with you, everything was straightforward. I understood very well.
- Mehmet: I am very bored in lessons, especially science class, but your activities were fun. They helped me learn better.

The student named Ezgi answered the question and stated that she thought the lesson taught with activities based on multiple types of intelligence was more suitable for other students and herself.

- Ezgi: I think doing activities in the lesson is better for our learning. I learned the subjects better.

The student named Deniz, who answered the question, revealed that he thought the homework assignments within the scope of the application were more valuable than the homework assignments given to them before.

- Deniz: I was always sleepy while doing homework. However, the homework you gave me was better. I understood the subjects better.

In line with the students' common perceptions, it can be said that the in-class and out-of-class activities carried out in the science course, which was taught with activities based on multiple intelligence, enabled the students to understand the topics covered in the unit better. The data obtained through the evaluation forms about the students' course achievement also support this. However, the students used positive expressions intensively about the application process. This situation reveals an essential idea about the student's interest and attitudes towards the activities.

The students were asked to compare the activities prepared within the scope of multiple intelligences theory in which they participated during the unit with the traditional teaching activities they performed in other lessons. All students revealed differences between the activities in the science course and other courses. What the students named Büşra, Mehmet, Eda and Deniz, who answered the question, said about this issue is given below.

- Büşra: Before you came, we did not do any activities in science class. Now we do activities in science classes.
- Mehmet: We were always solving tests in class, and in Turkish, we were dictating. It is not very interesting.
- Eda: I wish every lesson were like this. Our teacher does not perform any activities.
- Deniz: Our teacher reads from the book, and we write in the notebook. We cannot learn anything.

Caner and Nil, like Deniz, associated the differences in the teaching of the lessons with course achievement.

- Caner: There are no activities in math classes. We permanently solve tests. I do not understand anything.
- Nil: Sometimes we also do activities in English class. That is why my English class is also good.

The students Ezgi and Göksu explained the differences in teaching the courses, citing their interests and attitudes towards them.

- Ezgi: I like Science class very much now, but I would not say I like other classes. Science class is enjoyable.
- Göksu: I like science lessons very much because we do activities in them, but in other lessons, we always write. That is why I do not like them that much.

The students who responded to the question stated that the previous science and other courses were generally taught using traditional processes. For this reason, they revealed that science courses taught with activities based on multiple types of intelligence differ from other courses. They stated that this difference affected their course achievement and attitudes towards the course. In this vein, conducting a science course with activities based on multiple types of intelligence positively affects students' academic achievement and attitudes towards the course in the context of their self-evaluations.

The students were asked whether the application process we carried out within the scope of the science course affected their other courses. Göksu and Mehmet answered the question, stating that they applied the new methods and techniques they learned within the scope of the application in their other courses.

- Göksu: We made a drama for our teacher in an English class; she liked it very much.
- Mehmet: I did not understand how to make a concept map; now I can do it quickly.

The student named Mustafa, who responded to the question, answered the question by evaluating it in terms of his attitude towards other courses.

- Mustafa: I was afraid to raise my finger in class before you came. Now, I raise my finger in every class.

Ömer, who answered the question, evaluated it in terms of attitude and stated that they participated more in similar activities within the scope of other courses.

- Ömer: I did not want to get up on the blackboard before, but if our teacher organises a good activity like you, I would like to participate.

A significant portion of the students who responded to the question evaluated the question within the scope of activities. It stated that activities similar to those in the science course are not carried out in other courses. In this vein, students' expectations about activities in other courses are essential regarding their attitudes towards other courses. For this reason, it can be said that the activities carried out during the implementation positively affected the students' attitudes in the science course, unlike other courses. However, this effect was not observed in other courses due to the continued use of traditional teaching methods. This positive change in student attitudes could not be transferred to other courses.

Students were asked to indicate whether they could transfer what they learned within the scope of the application to their daily lives. Students Zehra and Erdem who answered the question stated that they examined the nutritional value of the products while shopping in supermarkets.

- Zehra: I now read all the packages at the supermarket. I wonder what is inside the things I buy.
- Erdem: I look at what is in the chocolates. They are all very sweet.

Eda and Cansu, who answered the question, also warned their families about this issue.

- Eda: I told my mom she should not buy anything without reading the packaging. Sometimes, she forgets. I always remind her.
- Cansu: Some of the articles are too small; I cannot read them. I told my mom, who reads them to me before I buy them, not to buy the harmful ones.

The student named Eda also stated that she started drinking mineral water to meet her body's mineral needs and that she recommended this to her family.

- Eda: Mineral water has the most minerals in the mineral family. I ask my dad for it. We all drink it, and my brother drinks it, too.

Göksu, Fatma and Ezgi stated that they go to the market with their families and now pay more attention to the products there.

- Göksu: When I go to the market with my mom, I check everything we buy. We do not buy the rotten ones.
- Fatma: I go to the market to help my mother. I tell her that we should ensure all the fruit and vegetables are fresh.

It was also observed that the student named Ezgi expressed an opinion on food waste during Sunday shopping.

- Ezgi: We should buy as much as we need in the market. I warn my mom that if we buy too much, it might rot at home, so we do not buy more.

Caner is another student who expressed an opinion on food waste within the scope of this question.

- Caner: I pay attention to the expiration dates of what we buy. If there is expired food at home, I say that we should not eat it. We should eat everything before it spoils. However, we should buy as much as we need so they do not spoil.

Caner and most of the students stated that they paid more attention to the expiration dates of the products.

- Eda: I check the expiry date on everything before I buy it.
- Zahra: I pay attention to the expiration dates.
- Mehmet: I pay attention to expiry dates in supermarkets.

Within the scope of the question, many students expressed their opinions in line with their orientations about healthy and balanced nutrition.

- Eda: I do not buy things like crisps and cola anymore. They are all very harmful.
- Mustafa: I eat fruit in my diet but have not eaten it before.
- Nil: I eat a small quantity of everything. If I overeat, I can become obese, and my health can deteriorate.

The student named Mehmet expressed an opinion about smoking and healthy nutrition.

- Mehmet: I tell my mom that we should eat things that are good for our health. I told my dad that he should not smoke because we might get sick.

Again, Zehra and Murat also had opinions about the harm of smoking.

- Zehra: I told mom not to smoke. She is poisoning herself and us.
- Murat: I tell my mom and dad that smoking around children is a terrible thing.

When the answers given to the question asked to evaluate the students' ability to associate what they learned within the scope of the application with their daily lives were evaluated, almost all of the students increased their skill levels for the problems they may

encounter in their daily lives within the scope of the "Our Food" unit. This situation was reflected in their behaviours.

Findings Related to Semi-structured Interviews with Parents

The parents of the students who participated in the application were asked to indicate whether their children shared anything about the application process carried out in science lessons. All parents stated that their children shared their process in the Science lesson with their families at home.

- Mrs Asiye: Sometimes, she tells them what they did when she returns from school. However, she started to talk about the science lesson all day. She always talks about the activities you do.
- Mrs Gül: He always talks about science at home. We do drama together at home.
- Mrs Aysun: Normally, he used to talk about what he did at school all day, but currently, he talks more about what he did in science class. When there is something he likes at school, he talks about it all the time.
- Mrs Hatice: Our son is not very talkative about his lessons. However, he has always started talking about science lessons.
- Mrs Ayşegül: We review what they do at school daily. We always talk about science lessons. I know what is done in the classroom.
- Mrs Emine: His father and I always ask him how he is doing at school. Ours is quiet. However, he currently has a particular interest in science lessons.
- Mrs Burcu: While doing homework, we discuss what she does in class and during breaks. The subject always comes to science class.

When the parents' answers are evaluated, the students constantly and mostly willingly share the processes carried out within the scope of the application with their families with positive words. This situation can be seen as an indicator of students' positive attitudes towards the course.

Parents were asked to share their observations about the implementation process's effects on their children's daily lives.

- Mrs Asiye: She always talks about nutrients while cooking. He told me we must cook with protein and not too much fat.
- Mrs Gül: He has been cautious about what we eat. I used to tell him not to overeat junk food, but now I feel he is being careful, too, and he says so.
- Mrs Aysun: These days, we read the packages of everything we buy at home, check the nutritional values, and start sorting our purchases according to food families. We constantly do quiz competitions, asking which food family this product belongs to.
- Mrs Hatice: I have noticed some changes, especially since he started paying more attention to health. He banned smoking at home.

- Mrs Ayşegül: He asks market vendors questions. Questions such as: Is this fresh, when did it arrive? She also tells me about it.
- Mrs Emine: She tells her brother what she learned in science class like a teacher. We are making a TV programme, which we are combining with a game.
- Mrs Burcu: She is cautious about what we buy from the market and the market. She mentions that if we shop a lot, we might waste. He also pays more attention to what he eats.

The parents' responses revealed that the students can use the daily life problem-solving skills they are expected to acquire within the scope of the application within the unit in their daily lives.

The parents were asked how they thought that the science course we taught with their children affected their success in the course.

- Mrs Asiye: I think he understands the subjects better with the activities. He does not have difficulty doing science homework.
- Mrs Gül: I notice that she is more confident. She answers my questions at length. We also answered all the questions in the exercise book. I think his success has increased even more.
- Mrs Aysun: She studies more when she likes her lessons. He started to like science lessons very much. This helps him understand better.
- Mrs Hatice: I think it is positive because we do our homework with fun. Usually, we would have much trouble. We also talk about it in the parent group. All parents are delighted.
- Mrs Ayşegül: I think her success in her lessons has increased. She does her lessons more willingly. Especially science lessons. He does not tire me out.
- Mrs Emine: We have problems in lessons, but Science has improved in the last few weeks. The teacher also said there was improvement.
- Mrs Burcu: I think he understood the lessons better, mainly thanks to the activities. He is already a brilliant student, but sometimes he cannot devote himself to the lessons. I saw that the activities were helpful, and it will get better.

When the parents' responses are evaluated, the students' course achievement increases in a way that the parents can observe in addition to other measurement tools.

Parents were asked how the six-week implementation process affected their children's interest and attitudes towards the science course.

- Mrs Asiye: Our student is hardworking. However, he often becomes bored while doing homework. I think science activities increase his interest in homework. He starts to tell us about his science homework without us telling him.
- Mrs Gül: I think he is more interested in science. He was not like this before, but I can see he likes the activities very much, which is good for us.

- Mrs Aysun: We had more problems with the school than with the lessons. Children do not like school very much. It is as if we send them to school by force. However, I observed that he loved science class very much. He waits all week for Wednesday (when weekly practices are carried out).
- Mrs Hatice: He talks more about what was done in science class. I have never heard him speak badly; he always talks well. I can also see that he makes more effort.
- Mrs Ayşegül: I can see the effect of the activities very well. I noticed that he started to like the lesson.
- Mrs Emine: What we want the most is for him to like school more and to be engaged in his lessons. He is a brilliant child, but he says he does not like school and nothing else. Science class is not like this. I can see that he is very interested in science now. I hope it will continue like this.
- Mrs Burcu: He likes his teacher and his friends, but the important thing is that he also likes his lessons. Since you came, I can see that he likes his lessons more. He goes to school more eagerly.

The parents' answers reveal that implementing a six-week course with activities based on multiple intelligences positively affected the students' attitudes towards the science course.

Findings Related to the Semi-structured Interview with the Classroom Teacher

The teacher of the class where the implementation was carried out was asked how he/she thought the Science implementation affected the students' course achievement. The classroom teacher stated that the increase in students' course achievement could be evaluated with different measurement tools.

- Classroom Teacher: It varies from student to student, but I have to say at the very beginning that I have seen that the students' success in the course has increased with this practice. I am not saying this only about exam results or exercises, which can sometimes make it difficult for students to reveal their achievements. In particular, exercise books.

The classroom teacher explained the measurement tools on which she based her opinion about the increase in students' course success.

- Classroom Teacher: The evaluation forms you use in practice are beneficial. I also ask such questions to the students in the lessons. However, I realised I was pushing myself and the students regarding exam questions. The work that students perform in lessons and for homework is also important. The most important thing is my observations of the students. As a teacher, I see that students have a good command of the subject covered in the lesson. All these factors increase course success.

When the classroom teacher's response was evaluated, it was revealed that the application increased the students' academic achievement. The classroom teacher also observed this situation using different methods.

The classroom teacher was asked about the students' current attitudes towards school and lessons and how she thought the implementation process affected the students' attitudes towards the science course. The classroom teacher stated that the students initially had a negative attitude towards school and listed the reasons for this.

- Classroom Teacher: Students' attitudes towards lessons vary. In addition, I can say that they are generally negative. There are many factors affecting this situation. First, students have prejudices against the school. This also negatively affects their attitudes towards school and lessons. We are trying to overcome this. However, the greatest obstacle we face is the curriculum. The curriculum allows us to provide students with information. It is impossible to go around this. Because there is not enough time for anything. Monotonous education causes students to become bored. This feeds their prejudices.

The classroom teacher stated that the current curriculum did not allow them to implement alternative teaching practices. Thus, they could not use different methods or approaches with students.

- Classroom Teacher: We cannot perform such activities in the classroom. Most of the time, our lessons are spent trying to keep up with the curriculum. This causes students to become bored. I can understand this from their looks.

The classroom teacher stated that the six-week implementation, which included activities based on multiple types of intelligence, positively affected the students' attitudes towards the course. She thought this was due to the activities carried out during the implementation.

- Classroom Teacher: Regarding the Science lessons you did, I can see that the students' attitudes towards the lesson improved more than I expected. Yes, I expected it to be better, but not this much. The most important reason for this is related to activities. Students were always able to be in the lesson. Instead of telling students to "sit down", telling them to "get up and show us" affects them. They can express themselves. This causes them to take ownership of the lesson. They can give all their attention to the lesson.

In line with the classroom teacher's opinions, it was revealed that the current curriculum hurt students' interest and attitudes towards the lessons; however, the science application carried out with activities based on multiple types of intelligence had a positive effect on students' interest and attitudes towards the lessons because it allowed them to express themselves in different ways.

The classroom teacher was asked which skills she thought were developed in the students with the activities carried out in the science course during the implementation. The classroom teacher especially emphasised communication skills in this regard.

- Classroom Teacher: I have observed an improvement in students' communication skills, and I think this is because they are allowed to express themselves. In the lessons we do in the form of question-answer, there is one correct answer to a question. You either know this answer correctly or incorrectly. In your activities, students encountered questions with more than one correct answer. I can see that their communication skills improve as they can express their thoughts.

The classroom teacher stated that apart from communication skills, she also observed that students' skills towards classroom rules increased.

- Classroom Teacher: They have also become better about classroom and lesson rules. We make much effort to help them respect each other's right to speak, obey orders, and clean the classroom. Instead of being rules to be obeyed, these were given by doing – experiencing the activities, which affected the students even more.

In line with the classroom teacher's responses, the application positively affects students' classroom skills, such as communication and adaptation.

The classroom teacher was asked whether she observed a difference in the students' daily lives through the implementation process and the unit outcomes. In this direction, the classroom teacher shared her observations about the feeding hours.

- Classroom Teacher: I observed that they applied them one-to-one in the lesson, but the most important thing was that I saw examples of this outside the lesson. I can give nutrition as an example. Usually, they were forbidden to eat junk food, but no matter how much we told them, they could not follow this rule. Now I see that they have dialogues with each other about healthy nutrition. I also heard this from my parents.

The classroom teacher stated that the students also associated these skills with other lessons and observed this during break times.

- Classroom teacher: Balanced nutrition is also on the agenda in other lessons. Students have internalised this. Even during breaks, I saw them reading the nutritional value of the fruit juice they drank to each other.

In line with the classroom teacher's opinions, it was revealed that the students could transform the daily life problem-solving skills that they were expected to have within the scope of the unit outcomes into behaviours in the school environment.

The classroom teacher was asked to provide feedback from the students regarding the applications carried out within the scope of the science course.

- Classroom Teacher: The students always say that they have much fun. I already notice this, too. The lessons are very lively.

The classroom teacher stated that the students also wanted other lessons to be taught with activities.

- Classroom Teachers: They want to perform activities such as science in all lessons. Sometimes, they even get up and show an example of an activity.

The responses of the classroom teachers show that the students' attitudes towards the course are positive. The students are interested in and have positive attitudes towards the activities.

Another evaluation of the implementation process by the classroom teacher is given below.

- Classroom Teacher: When I first saw the lesson plans and even when we started the lessons, I thought this subject might not be completed. However, I observed a very efficient implementation process that went in the opposite direction of my expectations. There was enough time for all activities. If a well-planned lesson process is implemented, our problems related to the curriculum will be solved.

In line with the classroom teacher's evaluation, the lesson plans within the application's scope are appropriate and can help students acquire the relevant outcomes.

Discussion and Conclusion

In the teaching process carried out with activities based on multiple intelligences in the science course, a six-week teaching process was planned by preparing activities for different areas of intelligence within the scope of the "Our Food" unit, which is among the fourth-grade units of primary school. After the teaching process, the opinions of the students who participated in the application, the parents of these students and the classroom teacher about the application process were collected through semi-structured interviews. The conclusions reached within the scope of the findings obtained as a result of the research, the discussion within the scope of the relevant literature and the suggestions related to the research process are given below.

According to the research results, it was concluded that applying multiple intelligences theory in primary school science courses positively affected students' success in science courses, their comprehension of course subjects and their practical learning experience.

The studies conducted by Gürçay and Eryılmaz (2005) with ninth-grade secondary school students in a physics course, Yıldırım and Tarım (2008) with fifth-grade primary school students in a mathematics course, and Gülfırat Kıbrız (2016) with fourth-grade primary school students in a social studies course also supported this result. According to the results of studies in the literature, teaching based on the theory of multiple intelligences and the use of activities based on multiple intelligences in lessons positively affect students' course achievement compared to the methods and activities in traditional and current programmes (Köroğlu et al., 2001; Balım et al., 2004; Işık et al., 2007; Alaz, 2009; Altınsoy, 2011; Gün, 2012; Aydın, 2015; Şahan, 2018; Kural, 2020). This situation supports the results of the research. In addition, this typical result obtained in studies conducted in different courses and units, as well as in different grade levels and age groups, reveals the importance of using multiple intelligences theory-based teaching and activities for all courses and all grade levels in the curriculum. In addition, the results related to the fact that the application of different methods, techniques, and approaches for student achievement supported by the theory of multiple intelligences significantly increases the effects of these methods, techniques, and approaches on course achievement, which are also considered necessary.

Another study concluded that applying multiple intelligences theory in a primary school science course positively affected students' interest in and attitudes towards the science course. When the findings obtained within the scope of the research were evaluated, it was seen that the activities based on multiple types of intelligence enabled the students to be happy during the lesson process, to have fun in the lessons, to enjoy the lessons, to be excited about the lessons and to participate willingly in the activities included in the lessons. In addition, the implementation process effectively improved students' self-confidence and self-efficacy perceptions. The studies conducted by Bümen (2001) with eighth-grade primary school students within the scope of the Citizenship and Human Rights course, Hamurlu (2007) with ninth-grade secondary school students within the scope of the English course and Atik (2010) with fourth-grade primary school students within the scope of the science course supported this result. According to the research results obtained in the literature, activities based on the theory of multiple intelligences positively affect students' interest and attitudes towards courses (Balım et al., 2004; Üngören, 2007; Yıldırım & Tarım, 2008; Kutluca et al., 2009; Beyazıt, 2009; Baş, 2010; Altınsoy, 2011; Gün, 2012; Aydın, 2015; Nasri et al., 2021). This situation supports the results of this research. In addition, this typical result obtained in studies conducted in different courses and units, as well as in different grade levels and age groups, reveals the importance of including more activities based on the theory of multiple intelligences in all courses and all grade levels in the curriculum.

In this research, it was also concluded that students associated the subjects they learned with their daily lives and applied them in their daily lives through activities prepared based on daily life problem-solving skills. Research in the literature has shown that activities based on the theory of multiple intelligences contribute to the development of different types of skills for students (Talbot, 2004; Lin & Xie, 2009; Çayır, 2011; Torreon & Sumayang, 2021). However, no similar research in the literature investigates the effect of lessons carried out with activities based on the theory of multiple intelligences

evaluated within the scope of the research on students' daily life problem-solving skills. For this reason, it is thought that this research will fill an essential gap in the field.
In this context, it is recommended that educators use activities based on the theory of multiple intelligences as an effective teaching method for the cognitive, affective, and skill development of students at the primary school level and in the context of science courses as well as at other grade levels, age groups, teaching levels, and courses.

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Genişletilmiş Türkçe Özet

Zekâ, insan biyolojisinden ve psikolojisinden kaynaklanan, hesaplama veya bilgiyi işleme kapasitesine yönelik olarak ortaya çıkan zihinsel yetenek veya beceriyi tanımlamaktadır. Çoklu zekâ kuramı, öğrenci merkezli, öğrencilerde bireysel farklılıklara ve baskın zekâ alanlarına ve bu doğrultuda kendilerinin özgül öğrenme biçimlerine uyumlu zengin aktivite ve materyaller sunan, öğretmenin rehber konumunda olduğu, öğrencilerin farklılıklarını ve ne şekilde öğrenebileceklerini eğitimcilere gösteren bir eğitim yaklaşımıdır. Gardner tarafından geliştirilmiş olan Çoklu Zekâ Kuramı'na göre, her bireyde doğuştan gelen, bireyin anlama ve öğrenme stillerini destekleyebilecek seçenekler sunan sekiz zekâ alanı vardır. Bunlar "sözel-dilsel zekâ", "mantıksal-matematiksel zekâ", "görsel-uzamsal zekâ", "müzikal-ritmik zekâ", "bedensel-kinestetik zekâ", "kişilerarası-sosyal zekâ", "içsel-özedönük zekâ" ve doğacı zekâdır. Geçmişten günümüze öğretim programlarının yansıra öğretmen ve öğrenci rollerinin de zaman içerisinde değiştiği ve bu doğrultuda günümüzde daha verimli öğrenme ortamlarının oluşturulması amacının öğretim sürecinde ön plana çıktığı görülmektedir. Bu kapsamda öğretim programları dahilinde uygulanan ders içeriklerinin de programların kazandığı yeni bakış açıları ve öğrencilerin beklentileri dahilinde çağa ayak uyduracak şekilde bir dönüşüm sürecinden geçirilmesi gerekliliği ortaya çıkmaktadır. Bu doğrultuda fen bilimler dersi kapsamında gerçekleştirilen çoklu zekâ uygulamaları ile ilgili öğretim süreçlerinin çok boyutlu bir biçimde ele alınması bu değişim sürecinin daha iyi anlaşılmasını sağlayacaktır. İlkokul dördüncü sınıf fen bilimleri dersinde çoklu zekâ kuramı uygulamaları kapsamında gerçekleştirilen etkinlikler ile yürütülen öğretim süreci ile ilgili olarak uygulamaya katılan öğrencilerin, bu öğrencilerin velilerinin ve sınıf öğretmeninin uygulama süreci ile ilgili görüşlerini değerlendirmeyi amaçlayan bu araştırma nitel araştırma modellerinden olgu bilim modeliyle gerçekleştirilmiştir. Araştırmanın katılımcılarını İstanbul'daki bir devlet ilkokulunda 2022-2023 öğretim yılında dördüncü sınıfa devam eden 23 öğrenci ile onların velileri ve sınıf öğretmeni oluşturmuştur. Araştırma kapsamında Fen bilimleri dersinde çoklu zekâya dayalı etkinlikler ile yürütülen öğretim sürecinde ilkokul dördüncü sınıf üniteleri arasında yer alan "Besinlerimiz" ünitesi kapsamında farklı zekâ alanlarına yönelik olarak etkinlikler hazırlanarak altı haftalık öğretim süreci planlanmıştır. Gerçekleştirilen öğretim süreci sonrasında uygulamaya katılan öğrencilerin, bu öğrencilerin velilerinin ve sınıf öğretmeninin uygulama süreci ile ilgili düşünceleri yarı yapılandırılmış görüşmeler aracılığıyla toplanmıştır. Araştırmanın verileri içerik analizi ile çözümlenmiştir. Araştırmanın sonuçlarına göre İlkokul Fen Bilimleri dersinde çoklu zekâ kuramı uygulamalarının öğrencilerin Fen Bilimleri ders başarısına, ders konularını kavramalarına ve etkili bir öğrenme yaşantısı geçirmelerine olumlu yönde etki ettiği sonucuna ulaşılmıştır. Araştırmanın bir diğer sonucuna göre İlkokul Fen Bilimleri dersinde çoklu zekâ kuramı uygulamalarının öğrencilerin Fen Bilimleri dersine yönelik ilgi ve tutumlarına olumlu yönde etki ettiği sonucuna ulaşılmıştır. Araştırma kapsamında

elde edilen bulgular değerlendirildiğinde, çoklu zekâya dayalı etkinliklerin öğrencilerin ders sürecinde mutlu olmalarını, derslerde eğlenceli vakit geçirmelerini, derslerden keyif almalarını, dersler ile ilgili heyecan duymalarını ve derslerde yer verilen etkinliklere istekle katılmalarını sağladığı görülmüştür. Bununla birlikte uygulama sürecinin öğrencilerin öz-güven ve öz-yeterlik algılarını geliştirmede etkili olduğu anlaşılmıştır. Araştırmada ayrıca öğrencilerin günlük yaşam problemleri çözme becerileri temelli olarak hazırlanan olan etkinlikler yoluyla öğrendikleri konuları günlük yaşamlarıyla ilişkilendirdikleri ve günlük yaşamlarında uyguladıkları sonucuna ulaşılmıştır. Bu kapsamda çoklu zekâ kuramına dayalı etkinliklerin öğrencilerin gerek bilişsel gerekse duyuşsal ve beceri gelişimleri için ilkokul kademesinde ve fen bilimleri dersi bağlamında olduğu kadar diğer sınıf düzeyleri, yaş grupları, öğretim kademeleri ve derslerde de etkili bir öğretim yöntemi olarak kullanılması araştırma sonuçları doğrultusunda eğitimcilere önerilmektedir.

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