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Research Article

Use of Games Designed with an Interdisciplinary Approach in Primary School Turkish and Mathematics Lessons[2]

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Abstract: This research aims to examine the effects of games designed with an interdisciplinary approach on the use of games in Turkish and mathematics courses on the success of 2nd-grade students in these courses. For this purpose, action research, one of the qualitative research methods, was used in the study and the data collected as a result of the semi-structured interview with the teacher who carried out the application was analyzed through content analysis. As a result of the analysis, it was examined under the subheadings 'skills developed through interdisciplinary games' and 'association skills developed through interdisciplinary games', and these titles were used as subthemes based on the codes during the analysis. However, another finding, the use of interdisciplinary games in educational activities, was examined in two categories: factors originating from teachers and the concept of interdisciplinary games themselves. As a result of this, the codes of 'thematicity and naturalness' in the context of factors originating from the interdisciplinary game concept itself, in the context of factors originating from teachers, the codes of 'prejudice, difficulty being seen and awareness' were reached. In the current research, it was determined that games designed with an interdisciplinary approach were significantly effective in teaching Turkish and mathematics disciplines and enriched learning situations.

Keywords: interdisciplinary approach; gamified teaching; Turkish lesson; mathematics lesson

1. Introduction

Primary school, the first and most important step of education, is the stage where the foundations of all life-related acquisitions, especially academic skills, are laid. It can be considered the most important level of the education-training stage, especially in terms of forming the basis of further education stages (Gültekin, 2007). However, In primary school, students are expected to grow up not only as individuals who receive information in a ready-made form, but also as individuals who think, research, ask/question, actively use higher-level thinking skills, and produce correct solutions to the problems they encounter (Kula, 2020).

Today, the individual accepted by the modern world is not one who accepts the information conveyed to him/her as it is, waiting indifferently to directions and formatting, but one who interprets the information in his/her own mind and actively participates in the process of creating this meaning (Yıldırım & Şimşek, 2005). At this point, the most important feature of the constructivist education function that allows the learner to structure, interpret and develop the information can be mentioned (Balım, 2009). In constructivist learning, where the learner is active, instead of just reading and listening, learning acquisitions are achieved through active participation in the learning process such as discussing and defending ideas, hypothesizing, questioning and sharing thoughts. It is stated that the interaction between students is important at this point. Learners do not accept the information as they receive it, they create or rediscover the information (Perkins, 1999).

However, when the literature is examined within the scope of the aim of the research, it is seen that game is used as a research subject in teaching various disciplines at the primary school stage (Özyürek & Çavuş, 2016) In examining the use of games as a teaching method

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by primary school teachers, Akkaya (2018) examined the effect of game-based teaching in eliminating misconceptions about geometry sub-learning areas in the fourth-grade primary school mathematics course. Similarly, Aydeniz (2019) examined the effect of the game-based learning method on students' school commitment and rule awareness levels in primary schools. Ergül and Doğan (2022) examined the effect of the game-based approach on student success in primary school mathematics teaching. Angın and Çetinkaya (2021) also examined the effect of educational game-based listening comprehension activities on the listening comprehension skills of 4th grade students. Mete (2021) evaluated the opinions of BİLSEM Turkish teachers on the game-based teaching method in her study. Ergül and Doğan (2022) examined the game-based approach in mathematics teaching in her study; Boz (2018) examined the effect of the game-based teaching method on academic success in the 4th-grade primary school Turkish course. Çil and Sefer (2021) also examined the opinions of classroom teachers on game-based mathematics activities. When the studies in the literature were examined, it was seen that their scope was generally based on a single discipline. No study has been found in the context of using games as a method in the development of academic skills in expression skills courses such as Turkish and mathematics by adopting an interdisciplinary approach. Therefore, it is thought that this research will contribute greatly to the literature, set an example for teachers in the field to adopt an interdisciplinary approach and teach their lessons by gamifying them in this direction, and provide a multidisciplinary perspective.

Many studies have shown that there are positive effects when Turkish and mathematics lessons are associated with games. However, in this study, only the game-Turkish lesson or game-mathematics lesson relationship was not examined; firstly, the contribution of the interdisciplinary dimension in students' gaining skills such as making connections between lessons, making synthesis, multi-dimensional thinking, active learning by designing interdisciplinary games by the researchers, and then the effect of the concept of games were examined, and the effect of the games designed with an interdisciplinary approach on the success of 2nd grade students in these lessons was aimed to be examined. The following research questions were sought for the purpose of the study:

1) What is the importance of interdisciplinary gamification in improving the Turkish and mathematics skills of 2nd grade students?

2) What are the evaluations of the classroom teacher who carries out teaching with games regarding the process of playing these games and their impact on Turkish and mathematics lessons?

2. Materials and Methods

2.1. Model of the Research

In line with the purpose of the study, the applications of the games developed with an interdisciplinary approach for the 2nd grade students, who are the subjects of the study, regarding the development of Turkish and mathematics course skills were carried out using participatory action research, which is one of the qualitative research designs. Participatory action research is a research conducted by expert researchers, with the participation of implementers and those who are parties to the problem, aiming to determine the precautions to be taken to improve the situation by making a critical evaluation of the existing practice (Karasar, 1999). Participatory action research, which is also referred to as teacher research, is a systematic and continuous research conducted to improve the practices of educators and inform them (Calhoun, 2002). Yıldırım and Şimşek (2005) also stated that action research includes systematic data collection and analysis aimed at revealing problems related to the application process or understanding and solving an already emerging problem. Therefore, this model was used in the relevant study in order to eliminate different understandings of Turkish and mathematics courses among students that the teacher sees as a problem.

However, Swann (2002), who states that participatory action research emerges from a problem or uncertainty that the researcher thinks he is in, expresses that it is a research method based entirely on practice. According to Watts (1985), participatory action research is the process of systematically and carefully reviewing the participants' (teachers or educational administrators) own educational practices using research techniques (as cited in Ferrance, 2000). The clearest feature that distinguishes action research from other types of research is that it provides the collection of data that will help the teacher or administrator make decisions about their school (Borg, 1987).

In summary, first of all, the main purpose of action research is to improve practice. Therefore, producing theoretical knowledge is not among the priorities of action research.

Second, action research provides first-hand learning by ensuring the direct participation of individuals who carry out the practice in the research process and thus the voluntary application of what is learned. Third, since the research is conducted in the real world, it aims to directly solve existing problems. Therefore, there is no need for a preliminary application to determine the problem. Fourth, it brings about the empowerment of individuals, cooperation and social change through direct participation (Aksoy, 2003).

Based on all these statements, the most important element in designing the study as a participatory action research is that many of the topics that form the basis of the situation addressed within the scope of the purpose are not sufficiently settled in the minds of the students and the situations of showing different understandings towards different disciplines are eliminated, and that the researchers are directly involved in the process by taking a participatory action in which they cooperate equally and that the research is in a cycle of planning, implementation, observation and reflection, and that it is a systematic and recorded study.

Action research was then analyzed through content analysis. Content analysis, which is used in the field of social sciences and many qualitative studies, is a systematic technique in which the situation examined is summarized in detail within the framework of certain rules (Büyüköztürk et al. 2024). Therefore, in this study, all data were meticulously examined and analyzed in the context of the research questions.

2.2. Working Group

The fact that the application group of the study was determined as primary school 2nd grade students, in addition to the fact that learning is mostly game-based, the problems of adaptation to school have been eliminated and integration to school has now been achieved, and the curriculum has started to be enriched at a basic level were effective factors. The study group of the study was determined by the criterion sampling technique. Since the classroom teacher in the study was both the person who carried out the application and whose opinions and observation notes were used by the interviews, the information given by the teacher was evaluated as the basic data source, and the implementer teacher was determined as the participant person. In addition, the selection of the classroom teacher who was both the implementer and the data source in the study was based on the following criteria: the teacher having more than five years of teaching experience, being able to develop games that could be used in interdisciplinary applications, working as a primary school second grade teacher, having/doing postgraduate education in order to have a scientific research perspective while making field observations in the application process, and being a volunteer in the study as both an implementer and a researcher.

In this context, the study group of the research consists of 1 classroom teacher who meets the criterion and a group of 2nd grade primary school students with a population of 15. Considering that the small number of participants in action research makes it easier for the study to be conducted in more comprehensive examinations and applications (Wiersma, 2009), it is seen that the number of participants of the research is suitable for the purpose of the research.

2.3. Data Collection Tools

In the study, interviews were conducted with the classroom teacher who implemented the application to determine the effects of interdisciplinary games on students. These interviews were conducted through a semi-structured interview form developed by the researcher. The interview form included 6 questions prepared in accordance with the purpose of the study. In the creation of the data collection tool, first of all, studies conducted on games, interdisciplinary games, the effects of games on children and interdisciplinary games were examined. In order to ensure the content validity of the questions created as a result of this examination, expert opinions were obtained from two educational science experts who have studies in the relevant field and the questions were arranged. In order to test the clarity of the questions, a pilot interview was conducted with a different classroom teacher who was not involved in the research process and the incomprehensible statements were reviewed and revised.

Another data source of the study is the process-based observation notes taken by the implementing teacher during the action process, so observation notes were taken in the form of an unstructured field study (Yıldırım & Şimşek, 2008). The most important feature of these notes can be listed as describing the activities during the process, conveying thoughts, containing primary observations and even feelings/thoughts/reactions about the applied

ones (students) (Glesne, 2012). In this direction, the unstructured field study will not limit the implementing observer and thus provide rich data.

At the same time, the introduction of the games used in the application process and the gains associated with these games are presented in the tables below. Table 1 present the gains associated with the games used in the implementation process.

Table 1. Gains associated with the games used in the implementation process.

Turkish	Maths
T.2.3.8. Guess the antonyms of words.	**M.2.1.1.5.** Counts forwards and backwards by twos, fives and tens within 100; by threes within 30; by fours within 40.
T.2.3.9. Guess the synonyms of words.	**M.2.2.3.1.** Identifies and identifies missing elements in a repeating geometric pattern.
T.2.3.6. Applies reading strategies.	**M.2.2.3.2.** Creates new patterns with the same relationship with different materials by using the relationship in a geometric pattern.
T.2.4.1. Writes meaningful and regular sentences.	

At the same time, table 2 provides explanations and rules for the games used during the application. This table was developed by researchers.

Table 2. Games used in the application process.

Games	Turkish	Maths
1. Set a sentence-rhythmic drive* *The visual table of the game's material is presented just below the table	Word stops are designed on a black background cardboard. These stops are given in a mixed manner on the cardboard and students are asked to put these stops one after the other correctly and form meaningful and regular sentences.	Car stops are designed on a black background cardboard, counting by 2. These stops are given on the cardboard in a mixed manner; students are instructed to count by 2 rhythmically on these stops. The student moves the toy car given to him according to the rules of counting by 2.
2. Matte-other matter ** ** game instructions are provided just below the table	Geometric patterns are given on the activity sheet given to the students. These shapes are empty. Students are asked to continue the pattern with the opposite meaning of the first given word. The geometric pattern rule is also given additionally.	Geometric patterns are given on the activity sheet given to the students. These shapes are empty. Students are asked to continue the pattern with the opposite meaning of the first given word. The geometric pattern rule is also given additionally.
3. Rhythmic whisper-ear to ear ABC	For the ear to ear game, students line up one after the other. The student at the beginning of the line starts saying letters in alphabetical order into the ear of his/her friend behind him/her. Our first student says the letter A to his/her friend. Each student says a letter in alphabetical order to the friend after him/her. The student at the end of the line says our last letter out loud.	For the ear to ear game, students line up one after the other. The student at the beginning of the line whispers the number 2 into the ear of the friend behind him, as they have been instructed to count by 2s. Each student tells the friend behind him a number that is suitable for counting by 2s. The student at the end of the line says the last number out loud. For the ear to ear game, students line up one after the other. The student at the beginning of the line whispers the number 4 into the ear of the friend behind him, as they were instructed to count by 4. Each student tells the friend after him a number that is suitable for counting by 4. The

	student at the end of the line says the last number out loud. For the ear to ear game, students line up one after the other. The student at the beginning of the line whispers the number 3 into the ear of the friend behind him, as they were instructed to count by 3. Each student tells the friend next to him a number that is suitable for counting by 3. The student at the end of the line says the last number out loud. For the ear to ear game, students line up one after the other. The student at the beginning of the line whispers the number 5 into the ear of the friend behind him, as they have been instructed to count by 5s. Each student tells the friend after him a number that is suitable for counting by 5s. The student at the end of the line says the last number out loud.

The figures below belong to the content used in the first modules.

Figure 1a. Rhythmic drive-sentence game.

Figure 1b. Rhythmic drive-sentence game.

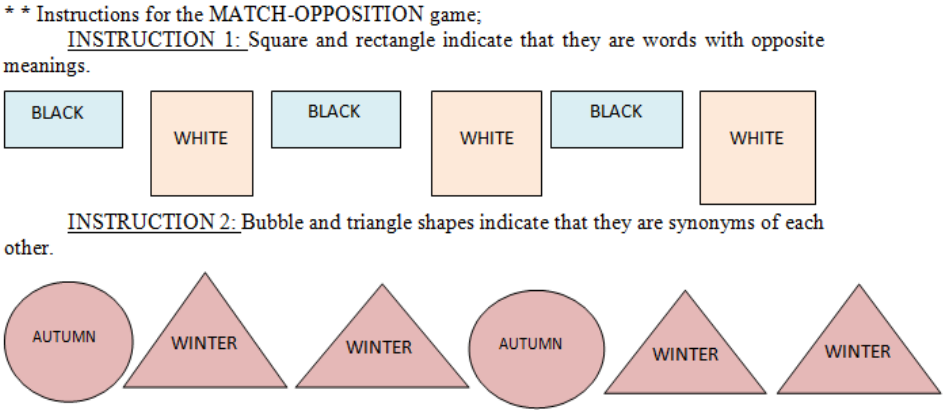

Figure 2. Demonstration of the second game used in the application.

The game can be used to teach maths and Turkish. Firstly, the student is asked to say the rule of the geometric pattern using the given geometric shapes.

Pattern Rule: 1 rectangle 1 square

Pattern Rule: 1 bubble 2 triangles

Then, the student is asked to continue the pattern with the antonym of the word given at the beginning.

2.4. Data Collection and Application Process

In this study, data were collected through a semi-structured interview form consisting of 6 open-ended questions. The duration of the implementation process was determined as follows: 2 class hours were allocated to the study group for each interdisciplinary game, and as a result, the data collection process was carried out in a total of 6 class hours – in different weeks. Since data saturation was achieved in the study and the application was carried out with 3 interdisciplinary games, it was observed by the researchers that this duration was sufficient. The implementation process of the action plans created for interdisciplinary games is comprehensively mentioned in the findings section.

2.5. Analysis of Data

The analysis of data in the study was carried out through content analysis. Content analysis, which is frequently used in the field of social sciences, is a systematic analysis technique in which the collected data group is examined in depth (Büyüköztürk et al. 2024). Therefore, the data of the study were created by examining and analyzing the data in detail within the scope of the purpose of the study and sub-problem questions. Applications were made to the 2nd grade students, who were the data source, in line with the purpose and sub-problems of the study , and in order to investigate the existence of an important finding regarding whether any awareness was created by examining their learning status regarding the application process, a semi-structured interview was conducted with the classroom teacher who carried out the application and the findings obtained were transferred to the tables. In addition, the observation notes of the teacher who was the implementer and the daily plans for the process were also used as data in the study. Then, the findings obtained were interpreted. The data presented comprehensively in tables by the researchers in line with the meanings determined with the examination were interpreted and evaluated under the title of findings.

2.5. Validity and Reliability

While ensuring the validity and reliability of the study, the purpose of the study was clearly stated, and the data collection and data analysis stages were carefully explained in accordance with the purpose of the study. In addition, the researchers evaluated the data they collected at different times and in different contexts. Then, they worked together on the findings. Since the practice teacher was also one of the researchers in the study, the semi-structured interview form regarding the process was created by the other researcher in order not to affect the reliability of the study, and the researcher in the practice was asked to give objective answers on this subject. However, in order to increase the reliability, the analysis of the study was carried out by the researcher who was not involved in the practice. Since the possibility of researcher bias is high in action research, getting help from experts in the

planning of the study, data collection, determination of the study group and conducting the research is considered important in conducting the research consistently and in accordance with its purpose (Büyüköztürk et al. 2024), expert opinions were also obtained during the research process. At the same time, since action research is usually conducted on small groups and with deliberate samples, its external validity is low, which constitutes a limitation of the study (Büyüköztürk et al. 2024).

3. Results

The action plan and implementation activities used in the process before presenting and interpreting the findings of the research are presented in table 3 below.

Table 3. Action plan for implementation.

Lesson*	Events
Lesson 1 (40 min)	The ”Make Sentences” game was played with the prepared material. The implementing teacher kept a diary of student evaluations.
Lesson 2 (40 min)	The “Rhythmic Drive” game was played with the prepared material. The implementing teacher kept a diary of student evaluations.
Lesson 3 (40 min)	The “Opposite Pattern” game was played along with the prepared activity. The implementing teacher kept a diary of student evaluations.
4th Lesson (40 min)	The “Knit Pair” game was played along with the prepared activity. The implementing teacher kept a diary of student evaluations.
Lesson 5 (40 min)	The “ABC from Ear to Ear” game was played along with the prepared activity. The implementing teacher kept a diary of student evaluations.
Lesson 6 (40 min)	The “Rhythmic Whisper” game was played along with the prepared activity. The implementing teacher kept a diary of student evaluations.

*Possible confusion that may occur in the student’s mind is prevented by implementing the courses on separate days.

Figure 3 expresses the hierarchical scope of the course content designed with interdisciplinary games. In the process of designing interdisciplinary games, the first step was to prepare a draft by focusing on the skill, and themes were determined that could associate the determined skill with at least two disciplines. The interdisciplinary game was synthesized with the achievements in the content of the determined themes, and integrity was achieved.

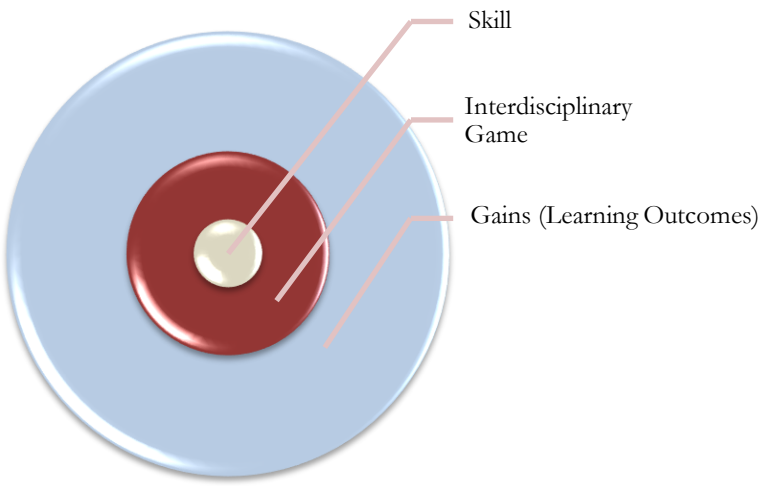

Figure 3. Hierarchical scope of the interdisciplinary game design process.

Table 4 ın line with the practitioner’s answers to the question “*What is a game?*”, the

concept of the game was analyzed in two stages: intuitive and conceptual dimensions.

Table 4. Themes, subthemes, categories and codes regarding the understanding of the concept of play.

Theme	Subtheme	Category	Codes
Understanding the concept of play	From an intuitive perspective From a contextual perspective	Educational game Interdisciplinary game In the context of disposition In the metaphorical context	Coal This Tree
			Stagnation Dynamics Innerness Motivation
			Multidimensionality Ability to relate Guess Permanence Functionality
			Pretend To enjoy Happiness

The concept of play, evaluated in terms of intuitive dimension, was examined in the context of metaphor and tendency.

The implementer's statement "*I want to make a metaphor; think of the game as the mine inside the child*" resulted in the mine code, the statement "*You can think of the game just like the water in the growth of a plant*" resulted in the water code, and the statement "*The game is a tree that goes everywhere. Its branches are very long*" resulted in the tree code.

Our title of the context of predisposition emerged from the statements received by the researcher in response to the question he asked, "*So the child can create a game on his own. Sometimes, surprisingly, the child can even define that game himself. In fact, we see how much the child knows about this game definition.*"

Within the context of predisposition, three codes were reached.

The dynamism code was obtained from the practitioner's statements, "*Trying to do some activities by thinking in multiple dimensions. Why do I say trying? Because there is no end to it.*"

"*The ability to reveal the world of imagination, the world of imagination is very important, intuitive thinking, insightful learning, these are not all words that are listed in a theoretical sense right now. All of these have been experienced one-on-one with children in the game, one-on-one, where I said, oh yes, this game revealed this too.*" The code of internality was reached from the statements.

The concept of game, evaluated in terms of conceptual dimension, was examined under two headings as educational game and interdisciplinary game.

Among the answers received by the researcher, the codes for -pretending, having fun and happiness were obtained from the expressions such as "*If we were to define it, we could define it as learning by pretending, having fun and relating the achievements in the education-training environment to daily life, in other words, as activities that should be useful for learning.*" and "*They were happy here because funny scenes emerged. This is also very fun.*"

The of our implementing teacher , "*After the application, I was very interested in the opinion of one of my students about the interdisciplinary games we played. My teacher said, "You never told us whether this is a Turkish, mathematics or social studies course, we find it ourselves. We find the subject ourselves, this place was very good*," he said .

Figure 4 shows the student's reaction to the discipline games played during the application. This view is as follows: "*It is very healthy. Because the course is not written on the paper. We find the subject ourselves. It is very good that the subject can be found.*"

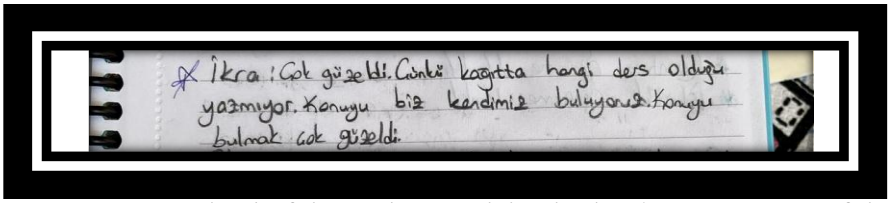

Figure 4. Visual of the student's opinion in the above statement of the implementing teacher.

The of the implementer, "*The second is permanent learning. What kind of permanent learning? For example, the child learns something from Turkish, he also learns something from mathematics, but as you can appreciate, it becomes more permanent when he makes an association.*", the code of being able to associate was mentioned once again and the code of permanence was reached.

In addition, the multidimensionality code created by the researcher was reached from the statements "*The child knows that he/she will use this in different areas. This comes directly from the multidimensional thinking skill.*"

Table 5 includes themes, sub-themes, categories and codes regarding students' understanding of their ability to relate interdisciplinary games. Students' skills in associating disciplines with interdisciplinary games were examined under the subheadings of "skills developing with interdisciplinary games" and "association developing with interdisciplinary games" , and these headings were used as subthemes based on the codes during the analysis.

Table 5. Themes, subthemes, categories and codes regarding the understanding of students' skills in associating disciplines with interdisciplinary games.

Theme	Subtheme	Category	Codes
Improving Students' Skills in Relating Disciplines with Interdisciplinary Games Understanding Regarding	Developing Relationships with Interdisciplinary Games Developing Skills with Interdisciplinary Games	Synthesis Discipline Multidimensional Thinking Creative Thinking	Dream Curiosity Interest Guess
			Observation Projection Ability to relate Interaction
			Turkish Maths
			Context Integrity

The title of creative thinking emerged from the practitioner's statement, "*So the child sees with eyes that you cannot. I always say that children are scientists to me.*"

Among the answers received by the researcher, the dream code was obtained from the statements, "*First of all, you are touching the world of imagination. From the moment that world of imagination inside the child, in his brain, is revealed, everything seems to come undone*."

The curiosity code was reached from the statements given by the implementer , "*It creates such great curiosity with play. After all, isn't our goal for the child to be that curious before entering the lesson? We also introduce curiosity. In other words, play equals curiosity.*"

The interest code was obtained from the practitioner's statement, "*I felt that it attracts the child's attention because we appeal to the senses.*"

In addition, the prediction code was obtained from the statements "*After the application, I was very interested in the opinion of one of my students about the interdisciplinary games we played. My teacher said, "You never told us whether this is a Turkish, mathematics or social studies course, we find it ourselves". He said, "We find the subject ourselves, this place was very good*" .

The title of multidimensional thinking created by the researcher was reached through the statements, "*The child knows that he/she will use this in different areas. This comes directly from the multidimensional thinking skill.*"

In addition, in the statements "*After the application, I was very interested in the opinion of one of my students about the interdisciplinary games we played. My teacher said, "You never told us whether this is a Turkish, mathematics or social studies course, we find it ourselves". He said, "We find the subject ourselves, this was very good*", we see that the student made an observation on the interdisciplinary game and made a prediction about what the course was. With this statement, the observation code

was reached as well as the prediction code.

The implementer's statement, "*Why don't we bring mathematics and Turkish together or two different courses together and reveal more permanent learning, more relational skills, and more ability to make connections?*"

"*Let's bring such games to the child that, since the child loves Turkish, he/she can learn Turkish while also developing a nice, moderate approach towards mathematics lessons*." which was among the answers received by the researcher.

Given by the implementer, "*My student came to me after the game and said, there is no connection between what my student normally says and the game I implement. My student said to me; teacher, I dreamed of making a road with straws for the first time, do you know? I was surprised.", we understand that the student reflects a detail in a situation to another situation and establishes a relationship.* In this context, the reflection code was obtained.

Due to the application of interdisciplinary games in Turkish and mathematics lessons, Turkish and mathematics codes were reached in the context of discipline.

The context code was obtained from the implementer's statement, "*So if the child is anxious about mathematics, does not like it, you give such a draft, such a game in front of the child that while the child is doing something he likes in Turkish class, he sees mathematics in the background*."

From the statements of the practitioner regarding the synthesis of two lessons, "*Now, apart from relating the two subjects to each other, let's relate the lessons. I want this. Why do I want it? For permanent learning. That's why I designed a game in my head. You will take it, sit down, synthesize it and create a game about it*."

Table 6 includes the themes, sub-themes and codes regarding the use of interdisciplinary games in educational activities. The use of interdisciplinary games in educational activities was examined in two categories: factors originating from teachers and the concept of interdisciplinary games itself.

Table 6. Themes, subthemes and codes regarding the use of interdisciplinary games in educational activities.

Theme	Subtheme	Codes
The use of interdisciplinary games in educational activities Understanding regarding the game and educational activities	Factors originating from teachers factors originating from the concept itself	Thematicity Naturalness
		Prejudice Hard to see Awareness

The codes "prejudice" and "being seen as difficult" were obtained from the statements of our teacher who implemented interdisciplinary games : "*I think our teachers are frankly prejudiced. Because it is difficult. It is not easy to do this. In other words, you will take two outcomes from Turkish and Mathematics or any other course and synthesize them*."

Of the implementer, "*I wish teachers would be given something related to this, right? How nice it would be. You know, the interdisciplinary work that explains that this is not difficult. Like training. Like a seminar.*", the code "awareness" was reached because it emphasized that teachers should receive training and become aware of interdisciplinary issues.

Shared by the implementer, "*So when you synthesize and give the game of two lessons as an activity to that child at the same time, the child's perspective on mathematics changes. This is a very good gain,*" it is stated that the scope of two lessons is given "at the same time." Giving two lessons at the same time evokes the thematic approach and creates a thematic code.

Among the answers received by the researcher, the code of "naturalness" was reached with the expressions "*The concept of interdisciplinarity is already in our nature. It exists in nature at its most, most, most basic level.*"

Figures 5a-5f presents nothes on studnets' opinions about interdisciplinary games during implementation.

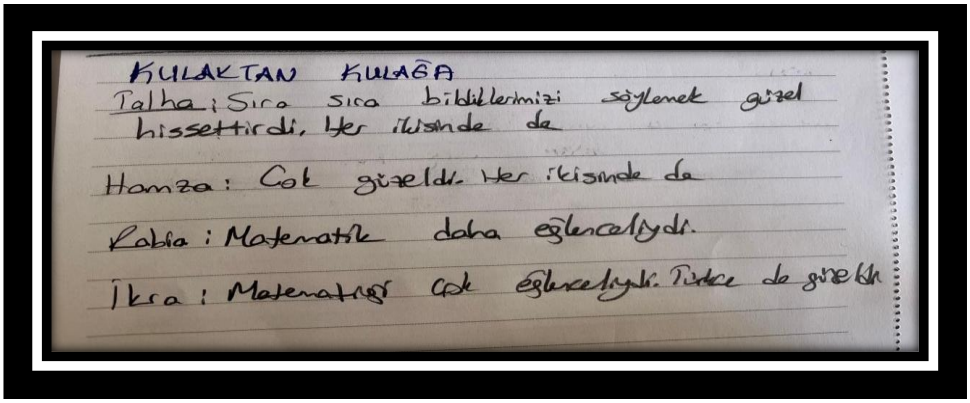

Figure 5a. Notes on students' opinions about interdisciplinary games during implementation

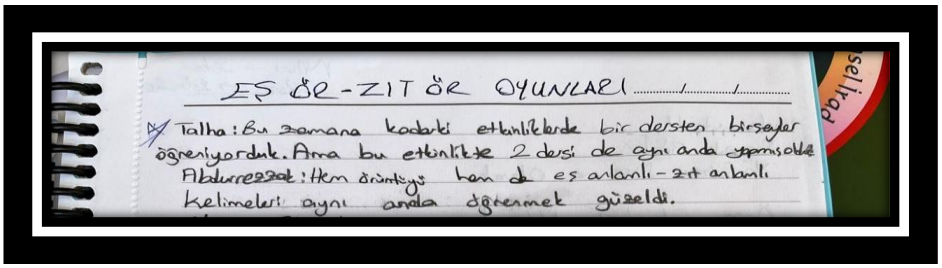

Figure 5b. Notes on students' opinions about interdisciplinary games during implementation.

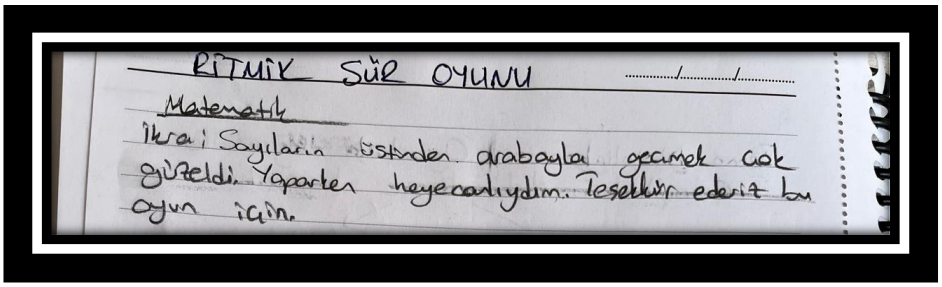

Figure 5c. Notes on students' opinions about interdisciplinary games during implementation.

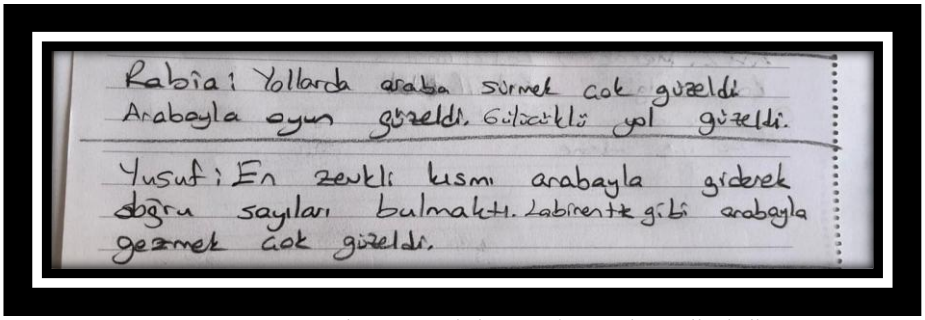

Figure 5d. Notes on students' opinions about interdisciplinary games during implementation.

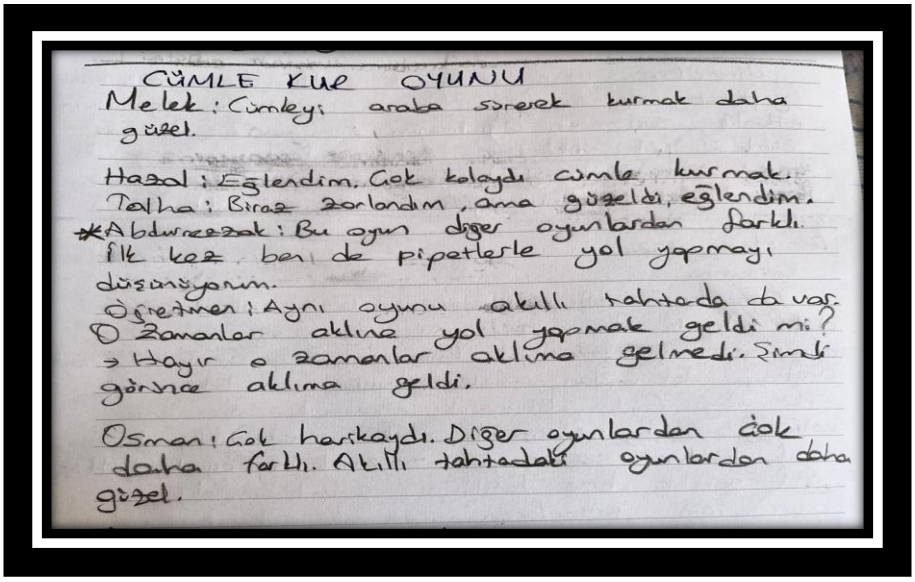

Figure 5e. Notes on students' opinions about interdisciplinary games during implementation.

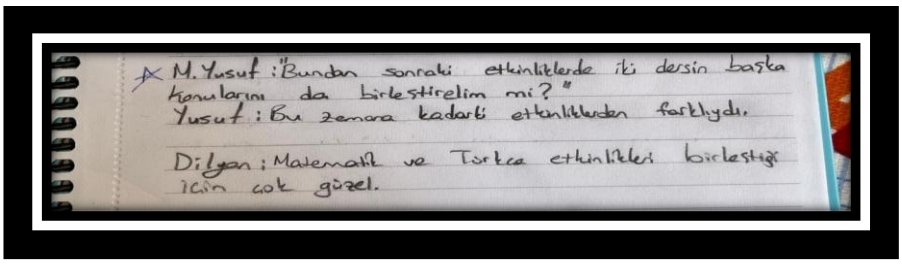

Figure 5f. Notes on students' opinions about interdisciplinary games during implementation

In this section, there are manuscripts of the opinions received from the students by the application teacher at the end of each interdisciplinary game regarding the entire application process. In each visual, the students' appreciation of the game and activity process was expressed.

4. Discussion

It is considered important to have information about the place and effectiveness of games in education and to implement applications on this subject in order to enrich the education-teaching process. Therefore, it is important to obtain data on whether existing or designed games are effective in this regard and how they contribute to students' learning achievements. Because every situation where the teaching process is not enriched and innovations are not introduced deepens the situation of children's inability to solve learning problems. In this study, it was determined that games designed with an interdisciplinary understanding are significantly effective in teaching Turkish and mathematics disciplines and enrich learning situations. Yılmaz and Aksoy (2011) reached the conclusion that game-supported learning positively affects students' achievements; Erkin-Kavasoğlu (2010) reached the conclusion that game-based teaching in mathematics class has a positive effect on students' success. These situations are significantly compatible with the results of our research. The findings of the study are also supported by research results indicating that games increase success in many different areas (Hanbaba & Bektaş, 2012; Yenice et al. 2019).

On the practitioner's understanding of the concept of game in line with the answers given to the question "What is a game?", intuitive and conceptual determinations were made. Intuitively, the concept of game was evaluated in the context of metaphor and disposition; conceptually, it was evaluated in the context of educational game and interdisciplinary game. When the obtained codes were examined, it was concluded that the functional aspect of the teaching should be emphasized by focusing on the current and future skills and needs of the students and this process should be suitable for group activities. According to UNESCO's (1986) research, the analysis of the person's needs, the strategies and methods used in the

teaching process, the suitability of the materials used in the teaching, and the implementation period are important. In the success of the interdisciplinary approach, teacher competence, students having some basic knowledge and skills, being able to use multi-dimensional thinking and ability to establish relationships were effective in the success of the application (Coşkun and Altun, 2011; Günsel, 2004). When the findings of the research were compared with the literature, it was determined that the obtained results were significantly compatible.

Another finding, the skills of students in associating disciplines with interdisciplinary games, was examined under the subheadings of "skills developed with interdisciplinary games" and "association skills developed with interdisciplinary games", and these headings were used as subthemes during the analysis based on the codes. It was observed that the designed interdisciplinary educational games had positive effects on students when experienced by them. Students saw the relationships between different courses thanks to these games. Students learned to reach a solution by cooperating during the application of the games and to think strategically while reaching a solution. Kaya-Gülağız, Ekinci, and Şahin al. (2017) and Uluçay and Çakır (2014) obtained findings that support the results of this research by concluding that educational interactive games increase students' reflective and strategic thinking skills.

Another finding, the use of interdisciplinary games in educational activities, was examined in two categories as factors originating from teachers and the concept of interdisciplinary games itself. As a result, the code of 'Thematicity and Naturalness' was reached in the context of factors originating from the concept of interdisciplinary games itself; and the codes of 'Prejudice, Being Seen as Difficult and Awareness' were reached in the context of factors originating from teachers. Yıldırım (1996) states that in order for the interdisciplinary approach used in the teaching process to be successful; teachers must have full command of the interdisciplinary approach and its principles and must not have any prejudices regarding it. At the same time, it has been stated It has been concluded that the success of the interdisciplinary approach used in the teaching process is affected by the teacher's competence and field-related skills, the students' basic level of knowledge and skills, and their ability to think multidimensionally and establish relationships (Coşkun and Altun, 2011; Günsel, 2004). In line with these statements, the findings of the study and the relevant research findings in the literature are significantly compatible.

The important detail in teaching with an interdisciplinary approach is the opportunity to combine all the fields that have an effect on the formation of the learning outcome and to provide the student with a holistic learning experience (Drake & Burns, 2004). Indeed, this approach ensures the active participation of the student, improves the learning/processing of information and supports learning in the long term. Therefore, the student's learning motivation increases. Students, subjects to real life, thus the learning experience and learning environment become more attractive. It develops a lifelong learning culture (Guercio, 2003; Sullivan, 2000). Different research results emphasized that learning experiences developed with an interdisciplinary approach produce beneficial results in the development of students' multi-dimensional thinking skills, the acquisition of high-level skills, and the increase in decision-making and problem-solving skills, as well as the development of verbal, mathematical and intellectual expression skills (Coşkun and Altun, 2011). In line with these evaluations, it has been determined that the findings obtained in the relevant research are significantly compatible with the literature.

5. Conclusions

The most important detail in the interdisciplinary approach applied in the teaching process is that it combines all the situations that affect the formation of the learning experience and offers the student the opportunity to show the big picture and have a holistic learning experience. Therefore, this approach activates the student's participation in the lesson and improves their ability to use the information they learn and supports long-term learning. This situation also increases the student's motivation to learn. At the same time, students have the opportunity to relate the subjects to real life, thus making the learning experience more attractive. As one of the most important gains, a lifelong learning culture develops in the individual. When different research results in the literature are examined, it is emphasized that learning experiences developed with an interdisciplinary approach yield useful results in the development of students' multidimensional thinking skills, their acquisition of high-level skills, their increase in decision-making and problem-solving skills, and the development of verbal, mathematical and expression skills. In this respect, it has been

determined that the research is in harmony with the literature. In addition to the fact that the game provides the student with many skills, the fact that it comes from within the child and emerges through a natural process makes the game important in terms of its relevance to the child. The child wants to integrate with the concept of game from birth. It has been observed that the activities carried out by synthesizing the concepts of interdisciplinarity and game in this natural process that occurs spontaneously develop permanent learning, multidimensional thinking and association skills. The attitude of the students towards the lessons has also changed positively with the interdisciplinary games carried out in the classroom environment. In fact, it has been determined that the child who loves the game also develops a positive attitude towards the lessons indirectly during the application.

The concept of game, unlike the title of educational game, can be addressed from an interdisciplinary or thematic teaching perspective and can be addressed in some areas as follows:

1) Interdisciplinary games or activities can be organized by making connections between different courses, especially skills courses such as Turkish and mathematics. When organizing these games, considering the hierarchical scope of the interdisciplinary game design process will strengthen the mental basis of the designed game.

2) It is more important to implement interdisciplinary games in large classes or combined classes in rural areas. Because with interdisciplinary games, two disciplines can be addressed sim-ultaneously or in the same lesson. In this case, classroom management can be provided more easily. In-service training can be given to all teachers, especially those in rural areas, on de-signing interdisciplinary games.

3) Activities designed with interdisciplinary games can be given more space in teaching programs. In addition, teachers can be guided on how to implement these games within the same program.

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