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Preservice Teachers' Views about the Use of Mind and Intelligence Games in Education

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Games, which are fun activities, have some benefits for learning environments when used educationally; they play an essential role in children's physical, mental, social, emotional, and language development. Similarly, mind and intelligence games can improve the cognitive abilities of individuals by improving their basic reasoning and problem-solving skills. This qualitative case study examines preservice teachers' views on the use of mind and intelligence games in education and their effects on individuals. Researchers collected the data using a semi-structured interview guide they developed, through focus group interviews with twenty-seven preservice teachers who were enrolled in and completed an elective course offered at the faculty of education in the fall of 2021. According to the findings, preservice teachers mentioned the advantages and disadvantages of mind and intelligence games according to the type of media. The findings showed that mathematics is a more appropriate course for using the mind and intelligence games, followed by primary school courses, psychological counseling, and social sciences courses. The preservice teachers found mind and intelligence games eligible to support primarily cognitive skills involved in remembering, understanding, applying, analyzing, evaluating, and creating. Furthermore, co-operation and sociability are the skills that were more frequently referred to by preservice teachers, along with other skills, including persistence, achievement motivation, and self-efficacy.

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Introduction

Many studies have been carried out on 21st-century skills recently. One of these studies, The Partnership for 21st-Century Learning-P21 (Battelle for Kids, 2019) project, is seen as a comprehensive educational project implemented in the USA and supported by different institutions. In this project, 21st-century skills were classified as; a) learning and innovation skills (creativity and innovation, critical thinking and problem solving, communication, collaboration), b) information, media and technology skills (information literacy, media literacy, ICT -information, communications, and technology- literacy), c) life and career skills (flexibility and adaptability, initiative and self-direction, social and cross-cultural skills, productivity and accountability, leadership and responsibility) (Battelle for Kids, 2019). To have students gain these skills, several changes and transformations have been made in our education system as well as in the rest of the world. New courses have been added, and different extracurricular activities such as STEM-based activities (Bircan, 2019; Tanın, 2021), inquiry-based activities (Çakıcı & Yakışan, 2020), robotic activities (Erdoğan, Kurt & Toy, 2020), digital storytelling (Çelik, 2021) have been designed.

However, these games, which have become very common in individual learning and personal development in recent years and have begun to be seen as a teaching tool, also stand out as a viable alternative for the development of 21st-century skills. Game is one of the most important activities in the life of children. It includes feelings of happiness, enthusiasm, excitement, and curiosity. Game is a powerful instructional tool that enables individuals to learn on their own and show off their abilities. Educational games can be very effective on children's physical, mental, social, emotional, and language development. Especially with the emergence of today's student-centered modern approaches, they have come to the fore even more (Kula, 2021; Sütçü, 2020; Taş & Yöndemli, 2018).

Considering this context, the use of mind and intelligence games, which are among the types of educational games, gains more importance daily. The Republic of Türkiye Ministry of National Education (MoNE) has included mind and intelligence games as an elective course in the curricula, considering it is an effective and useful method. In this way, it is expected that students will develop 21st-century skills in terms of gameplay and indirectly benefit from the learning-teaching process more effectively and efficiently. In this direction, it has been put into practice as an elective course at the secondary school level since the 2012-2013 academic year, within the scope of the general objectives given in the MoNE. MoNE has divided intelligence and mind games into various subgroups in the curriculum and resources related to the program. Accordingly, these are reasoning and processing games, verbal games, geometric-mechanical games, memory games, strategy games and intelligence questions. *Reasoning and processing games* include games in which conclusions are reached with logical inferences using clues. In this game type, the necessary information for solving the problem is given at the beginning of the game. *Verbal games* are games in which children benefit from general culture or vocabulary along with logical inferences. *Geometric-mechanical games* are games that require the visual perception skills of the players. *Memory games* require short- and long-term memory skills and can also be played visually or verbally. *Strategy games* are based on eliminating or acting against your opponent's move, resulting in either winning or losing. *Intelligence questions* are games that require a different reasoning skill than necessary, in which the player concludes by evaluating all the clues in the face of a problem whose solution is unclear at the beginning. These games have three difficulty levels: beginner, intermediate and advanced; According to the game type, they can be played as single or multiplayer, and many of them can be tried in the digital environment (MoNE, 2013).

Mind and intelligence games have significant potential for education and personal development when used for educational purposes. This potential has also been noticed in our country. In the past decade, there has been an increase in research papers, especially in Turkey, with the new elective courses offered in elementary schools. One study found that students' Turkish vocabulary understanding was improved when vocabulary was taught via intelligence games; furthermore, students enjoyed vocabulary-building exercises that included intelligence games, and they learned the terms more quickly as a result (Akçelik & Eyüp, 2021). Another study found that various mind games played by gifted students positively affect their analytical thinking, critical thinking, and decision-making skills (Bas, Kuzu, & Gök, 2020). Also, Taş and Yöndemli (2018) investigated the effect of eighth-grade students' intelligence games on mathematical reasoning. They concluded that mathematical reasoning skills could be improved by enabling students to deal with problems that require reasoning (intelligence games, etc.) rather than the usual pattern problems in learning environments. Zengin (2018) examined the effect of mind games on the leadership skills of fourth-grade primary school students. According to the results of the experimental research, it was determined that the post-test leadership scores of the students in the experimental group increased significantly after the application of mind games. At the same time, there was no significant difference in the students in the control group. The literature has similar examples that suggest the use of intelligence games to be helpful in various skills (Bartolucci, Mattioli & Batini, 2019; Bottino, Ferlino, Ott & Tavella, 2007; Demirel & Karakus Yilmaz, 2019).

In addition to being in the form of board games, intelligence games can also be in the form of digital (applications developed for desktop platforms or mobile devices) due to the rapid development of technology. For this reason, it is important to increase the knowledge, skills, and awareness about the mind and intelligence games in different structures (box or digital) of teachers and teacher candidates who will educate 21st-century students. For this reason, it is considered professionally crucial for students who continue their undergraduate education in education faculties to gain knowledge and awareness about the mind and intelligence games. However, due to the lack or inadequacy of the course or extracurricular activities related to mind and intelligence games in preservice teacher education, preservice teachers cannot be trained with sufficient knowledge on this subject. For this reason, lessons or well-planned activities are needed in preservice teacher education to learn mind and intelligence games and to use them in field education. In addition, determining preservice teachers' views about playing different kinds of mind and intelligence games and their use in field education can be considered necessary in many ways.

As a result, this study aims to examine the preservice teachers' views about the use of mind and intelligence games in education, and the following primary research questions guided this study:

- What are preservice teachers' views on the use of mind and intelligence games in education?
- What are preservice teachers' views about the mind and intelligence games played through different types of (physical vs. digital) media?
- What are preservice teachers' views on the effects of mind and intelligence games on cognitive, affective, and psychomotor skills?

Method

Research Design

This qualitative study examines the preservice teachers' views about the mind and intelligence games. Their opinions on the use of mind and intelligence games in education, the use of different media, and their effects on cognitive, affective, and psychomotor skills in an elective course are examined. For this purpose, case study design, one of the qualitative research methods, was applied. The data were collected by using a semi-structured interview method, the collected data were analyzed, and descriptive findings and results related to the examined course were revealed. As it is known, such studies are not carried out to generalize the data obtained, but to evaluate a phenomenon with its unique characteristics (Yıldırım & Şimşek, 2011). This study aims to reveal the evaluation results of an elective course by the preservice teachers.

Participants

The study participants are preservice teachers who study at a public university in the Central Anatolia Region, in Turkey. One common attribute of the participants that was considered a criterion for inclusion is that they enrolled and completed an elective course offered at the faculty of education named "The Mind and Intelligence Games in Education" in the Fall of 2021. Therefore, purposeful sampling procedures were used to select the participants. The researchers worked with selected participants rather than all participants in order to understanding of the research problem and maintain the process efficiently (Creswell, 2016). Preservice teachers, all of whom are studying in the second year, were distributed into four groups according to their program for the interview process. 27 of the 55 students who took the course were included in the study. As seen in Table 1, participants are students in four different programs at the faculty: Mathematics Education Program (n=8), The Guidance and Psychological Counseling Program (n=8); Elementary Education Program (n=7); and Social Studies Education Program (n=4).

Table 1. Participant and Interview Details

Group Codes	Group Size	Interview Duration (minutes)	Participant Codes	Gender	Program of Participants
MATH	8	43	P01	Female	Mathematics Education
			P02	Female	
			P03	Female	
			P04	Female	
			P05	Female	
			P06	Female	
			P07	Female	
			P08	Female	
PSYC	8	36	P09	Male	The Guidance and Psychological Counseling
			P10	Female	
			P11	Female	
			P12	Female	
			P13	Female	
			P14	Male	
			P15	Female	
			P16	Female	

CLAS	7	34	P17 P18 P19 P20 P21 P22 P23	Female Female Female Male Male Female Male	Elementary Education
SOCI	4	33	P24 P25 P26 P27	Female Female Female Female	Social Studies Education

Setting

In this course, preservice teachers played box-type mind and intelligence games and their digital versions. Games played within the scope of the lesson are as follows: Abalone, Chess, Dedective, Dobble Kids, Go, Hedef 5, Jenga, Kelime Avcısı, Kızma Birader, Köşe Kapmaca, Look Look, Mangala, Pentago, Pratik Bardaklar, Quoridor, Q-Bitz, Reversi, Story Cubes, Sudoku, Surakarta, Tabu XL, Tangram, Tik Tak Bom, and 9Taş. Students had the chance to play each game with their classmates by participating in at least two hours of online theoretical sessions and one hour of face-to-face practice sessions per week for 12 weeks of the term. In addition, students also played the digital versions of these box games they played throughout the week. Details of the process carried out are summarized in Figure 1.

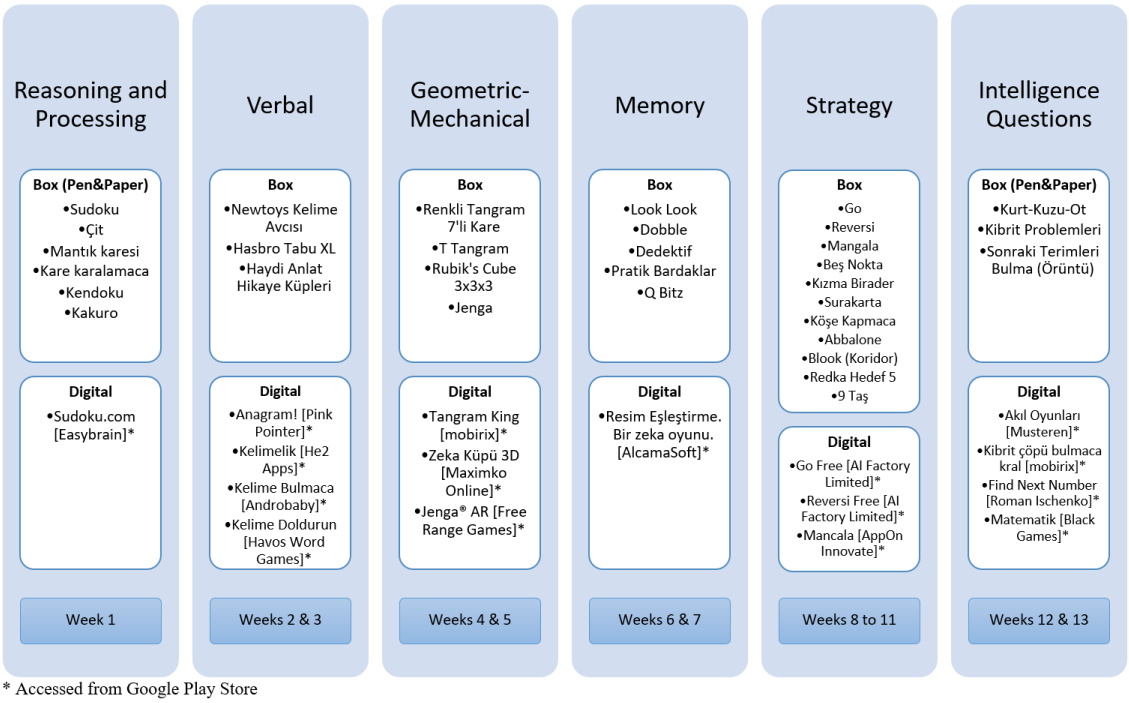

Figure 1. Intelligence and mind games are included in the course, and weekly course schedule.

Data Collection and Analyses

The data collection instrument used in this study is a semi-structured interview guide developed by the researchers. After determining whether the questions were understandable by sending them to two different people as an expert, the interview guide was finalized in terms of scope and content. The first part of the data collection tool includes information

about the personal characteristics of the preservice teachers, and the second part is an open-ended semi-structured interview form. At the end of the course, semi-structured interviews were conducted with researchers and took about 30–45 minutes. Before each interview, the preservice teachers were informed of the purpose of the interview.

Content analysis, which is one of the analysis methods of the qualitative research approach, was used in this study. The purpose of content analysis is to organize and interpret the data in a way that researchers can understand them by bringing them together in line with certain concepts and themes (Yıldırım & Şimşek, 2011). The data obtained in the study were accurately read, analysed, and coded by the researchers according to the categories. To ensure coding reliability, data were reanalyzed by more than one researcher at different times. As a result of the analysis, the themes explaining the data in the best way were determined through the MAXQDA qualitative research analysis program. In addition, codes in the form of P01, P02 etc. were added to the beginnings of direct quotations to determine that the views and statements belonged to the preservice teacher and to protect their privacy.

The Role of Researchers

The research was carried out under the guidance of three researchers. Two of the researchers from the field of Computer Education and Instructional Technologies work as research assistants and one as a professor at a state university. They participated in all weekly online and face-to-face sessions by preparing the sessions and contents of the elective course. In this course, students were instructed on and practiced how to play the selected box intelligence and mind games and how to teach those games.

Results

The results of the analysis are presented below under three main themes:

- Advantages and disadvantages of mind and intelligence games according to media type
- Enablers and barriers of using the mind and intelligence games in education
- The skills that can be affected by mind and intelligence games

Advantages and disadvantages of mind and intelligence games according to media type

The findings revealed a variety of mind and intelligence games that students remembered or found worth mentioning. Table 2 below shows the name of 17 different games and the number of times participants stated their names.

Table 2. Frequency of the games that the participants mentioned

Games	f	Games	f	Games	f
Kelime avcısı	7	TikTakBom	2	Dobble	1
Tangram	5	Pratik Bardaklar	2	Reversi	1
Sudoku	5	Q-bitz	2	Rubik's cube	1
Chess*	5	Jenga	1	Puzzle*	1
Tabu	4	9Taş	1	Köşe kapmaca	1
Mangala	3	Hedef 5	1		

* Games that were not included in the course

The table shows that the most popular game was Kelime Avcısı followed by Tangram, Sudoku, Chess, Tabu, Mangala, TikTakBom, Pratik Bardaklar and Q-bitz respectively. Moreover, some of the games were mentioned once by participants: Jenga, 9Taş, Hedef 5, Dobble, Reversi, Rubik's Cube, Puzzle, and Köşe Kapmaca. It was also seen in the findings that some of the games mentioned in interviews are not covered in the mind and intelligence games courses such as Chess and Puzzle. Furthermore, 9 games shown in the course were not mentioned at all; Abalone, Pentago, Quoridor, Dedective, Story Cubes, Birader, Look Look, Surakarta, and Go. Participants' opinions on these games will be examined below.

A broad range of mind and intelligence games exist on different platforms as digital or hands-on. Each is deemed to be unique with its own characteristics or specific attribute. The findings showed that mind and intelligence games could be categorized under two classes: box games and digital games; each having advantages and disadvantages. Table 3 presents the type of contributions students attributed to games under each class. As seen in the table, box games seem superior to digital games in terms of benefits. On the other hand, box games have more frequency of disadvantages than digital games too. Box games appeared to have a disadvantage with respect to two areas: inconvenience and user-related mistakes. On the other hand, the disadvantages attributed to digital games are being anti-social, inconvenient, distractions, and computer always wins.

Table 3. Advantages and disadvantages of mind and intelligence games according to media type

Categories			**f**
Box Games			**53***
	Advantages of Box Games		**42**
		Socializing	12
		Physicality - Touching the objects	10
		Enjoyable	7
		Analyzing the opponent	6
		Competing	3
		Exciting	3
		Interesting	1
	Disadvantages of Box Games		**11**
		Inconvenient	8
		User mistakes	3
Digital Games			**27**
	Advantages of Digital Games		**19**
		Useful	7
		Adjusting the difficulty level	4
		Affordable	3
		Familiarity	1
		One-person games	1
		Focusing attention	1
		Competing globally	1
		Enjoyable	1
	Disadvantages of Digital Games		**8**
		Anti-social	3
		Inconvenient	2
		Distractions	2
		Computer always wins	1

*Bold numbers represent the total of the sub-categories.

Both types of media for mind games had their own advantages, but box games are inclined to have more benefits because of their unique characteristic, which is being hands-on and played face-to-face. Due to being played in a natural environment instead of in a digital world, box games are capable of being touchable and enabling socialization. Some of the quotes from participants that represent the codes are presented below.

Participants mentioned socializing the most, as one of the advantages of box games, referring to playing them with friends and family.

> P21: It is very important for you to play by feeling or socializing in board games. So, you have to play the pieces by feeling the game. Playing with my friends while having fun and socializing, there is also such a difference [compared to digital games].

Participants mentioned the importance of physically touching the objects in the game because it allows for a richer experience.

> P08: I think it varies from game to game, but my personal preference is box games. Because I think that the fact that we have them in 3D and we are doing something, has a more direct effect on the skills.
> P02: I think so too, you know, I believe children can learn more when they physically touch. So, by seeing it in your own hands... Boxes are more advantageous in this regard.

Analyzing the opponent is another advantage of playing the box games, because it allows for the development of more skills such as reading the opponent's gestures and facial expressions, guessing their next move, and eventually affecting the game results.

> P09: Box games affect more because we see each other in these games. We do not see each other in digital games, we do not sense each other as sound or image. Since we can hear each other's voices, and see each other in board games, this affects our ambition. So, we don't just do things. How can I say it, how can I explain it… many skills, I think, when we play digitally, we have to disable many of our features. But that's what we do when we play in a friendly environment… we can use many of our features in many ways. We can see the features that our friend uses. That's why I think board games provide more advantages in these matters.
> P27: In the end, since we are playing with the person in front of us, we can follow his gestures and facial expressions and infer what move he will make, maybe which piece he will play.

Playing the box version of mind and intelligence games is more enjoyable, according to participants, again related to their socializing feature. Participants mentioned that competing with other players adds ambition to the game, also playing box games is exciting and interesting.

> P07: I think that all mind and intelligence games are actually very good for people psychologically. For example, when a person comes home with his head full of things and starts and plays a game with the other person, it becomes a more enjoyable, sympathetic environment. They blow off steam. In this way, I think their life would be more meaningful, they feel better.
> P02: For example, we were playing Taboo online, but it was not as fun and enjoyable as box version, because you just know the words and pass. It was developing more exciting and nicer in the board game.

Disadvantages of box games are mainly related to their inconvenience such as: Limited access to a variety of games because of their price; Limited access to games in a variety of places; The wear and tear of the objects; Losing the objects; Small objects being hazardous to little children. Also, user mistakes create disadvantages such as playing against the rules by mistake. Especially the Sudoku box game was mentioned as disadvantageous compared to the digital version.

> P26: [On the computer] There is no possibility of making a mistake and you are happier when you win. Because the person in front of me may fail to see it, the computer has coding with an analysis, artificial intelligence, so it does not miss the mistake.
> P16: I compared Sudoku both as a board game and online. I think there are more variations and options online. For example, in Sudoku, we stick to the booklet. If we produce it ourselves, mistakes can happen. But we can find millions of variations on the Internet. You can increase and decrease the game's difficulty level as you want. That's why I say this advantage of online games is better.

Although the advantages of digital games (f=19) were mentioned less than the advantages of box games (f=45), the advantages of digital games are more diverse: Useful; Adjusting the difficulty level; Affordable; Familiarity; One-person games; Focusing attention; Competing globally; Enjoyable. Participants relate the usefulness of digital games to their abundant variety, easy access in most places, and playing the games rapidly. Also, participants mentioned they can adjust the difficulty level of the digital games according to their experience levels, so that they can challenge themselves to get better, contrarily to box games where their opponents' level of experience limits them. Moreover, participants mention that they can access digital games, mostly free, to download on their phones.

Besides their advantages, digital games have some disadvantages too. Firstly, digital games can lead to anti-social behaviour because they are generally played alone. Furthermore, they can be inconvenient when people cannot access the internet or the devices. Also, pop-up ads in free digital games can distract players.

Enablers and barriers of using mind and intelligence games in education

The findings revealed two categories to which mind and intelligence games could be evaluated: enablers and barriers. Table 4 presents the enablers from most cited to the least: An elective course of mind and intelligence games; Utilizing the games to provide reinforcement; Utilizing the games to gain students' attention; Adapting games to various course subjects; Utilizing the games to assess students' various tendencies; to support cognitive development, to give enjoyment, and boost motivation. Moreover, there are also barriers associated with using these games in courses such as: large class sizes and problems with the management of the classroom. P22 stated her opinion on the most cited enabler, the elective course, as follows:

> P22: Actually, it can be done in two ways, I think, we can both offer an elective course and adapt the games to the lessons. Because there may be people who do not know the games. In that way, they learn the games in detail. Then we adapt the games they know to the lessons.

Table 4. Enablers and barriers of using mind and intelligence games in education

Categories		f
Enablers		**39**
	Elective course	11
	Reinforcement	7
	Gaining attention	6
	Adapting games to subjects	5
	Assessing tendencies	3
	Cognitive development	3
	Enjoyable lessons	2
	Motivating	1
	Creating games	1
Barriers		**3**
	Large class size	2
	Class management problems	1

It is possible to exploit mind and intelligence games in several courses. Nevertheless, some games appear to be more suitable for specific courses. For instance, the findings showed that the more convenient course for using the mind and intelligence games was mathematics, followed by elementary subjects, counseling, and social science subjects (Table 5). Since numbers are involved in most games, it is quite possible to achieve such a result.

Table 5. The course subjects that the mind and intelligence games can be implemented in.

Categories		f
Math subjects		**8**
	Geometry	2
	Area-perimeter	2
	Problem solving	1
	Numbers - operations	1
	3D shapes - perspectives	1
	Increase interest	1
Elementary subjects		**2**
	Language	1
	Geometry	1
Counseling		**4**
	Storytelling	3
	Analyzing students' reactions	1
Social sciences subjects		**3**
	Wars	1
	Culture	1
	Geography	1

The math subjects mentioned are Geometry; Area-perimeter; Problem solving; Numbers – operations; 3D shapes – perspectives; and Increase interest.

> P08: In terms of Tangram, the parity and similarity of triangles in geometry, for example, there is a large or a small one. It can also be played to show that they are similar and that those of the same size are equal.

> P05: For example, I thought Mangala about operations on natural numbers, for example. … I discussed the natural numbers, and mental addition objective. There may be those who know mangala, and those who do not. According to the situation, dividing them into groups those who know can play among themselves, while those who do not know learn the game by seeing it from them, and I think that there will be an in-class interaction and they will have applied the subject in a more fun way.

Elementary school subjects in which the games could be implemented are Language and Geometry. For instance, P22 states "Word generation game can be used in Language subjects".

The participants studying in counseling stated that they can utilize the mind and intelligence games as a tool for students to perform storytelling activities, so that they can observe and interpret their issues. Moreover, other types of games can be useful in that, they allow teachers to observe and analyse students' reactions while they are playing. Thus, if students have any behavioural issues teachers can inform counselors.

In social sciences subjects such as Wars, Culture, and Geography, their mind and intelligence games can be utilized as well.

> P24: While I was preparing the lesson plan, there was a subject called culture and heritage. There was a section like children's games where something came from the past to the present. I added it there as a new style, new game of today, by playing a part of these mind and intelligence games, it was as if it became an example of a game from our day to the students.

The skills that can be affected by mind and intelligence games

Participants' responses revealed three types of skills that can be affected by mind and intelligence games: Cognitive; Social and Emotional; and Psychomotor. Below, these will be presented in detail, together with participants' quotes.

Cognitive skills that can be affected by mind and intelligence games

Adapting mind and intelligence games to learning settings could benefit various learning domains. The study findings pointed out a broad range of cognitive skills that could be cultivated and promoted through mind and intelligence games. As Table 6 shows, participants found mind and intelligence games eligible to support cognitive skills in six categories. Those categories range from remembering to understanding, applying, analyzing, evaluating, and creating; as in the order of Bloom's Taxonomy (Bloom, 1956; Anderson et. al, 2001).

Table 6. Cognitive skills that can be affected by mind and intelligence games

Categories		f
Remembering		**12**
	Recognizing images	6
	Recalling words	5
	Recognizing words	1
Understanding		**5**
	3D thinking	2
	Self-expression	2
	Making associations	1
Applying		**4**
	Executing algorithms	1
	Deconstructing problems	1
	Solving problems	1
	Constructing new words	1
Analyzing		**18**
	Strategy	7
	Focused Attention	3
	Organizing objects	2
	Differentiating images	2
	Planning	2
	Deconstructing	1
	Distinguishing concepts	1
Evaluating		**1**
	Defending ideas	1
Creating		**1**
	Explaining in different ways	1

It is apparent from this table that analyzing category is the popular area where mind and intelligence games can affect more. In terms of frequency, analyzing category is followed by other less prominent areas like remembering, understanding, and applying. These results suggest that there is a growing trend toward developing mind and intelligence games that focus on strategy, recognizing images, recalling words, and focusing attention.

The effects of mind and intelligence games on the first level of the cognitive domain, remembering, are Recognizing images; Recalling words; and Recognizing words, according to the participants' opinions. For instance, one participant mentions how she recognizes images during play:

> P03: I love playing [visual games]. The reason is that it helps me to remember certain things visually; it gives me visual skills. Usually, I don't forget something that I look at. I think the memory games are pretty good for improving my memory. I mean, I used to play jigsaw puzzles since I was little, for example, I played a lot of picture-matching games like P06 mentioned, and I enjoy it. For example, it had such an impact on me; I usually don't forget things I've seen, and this allowed me to improve my visual skill. For example, when playing Q-bitz games, sometimes I see the image, that's in my mind, directly I'm trying to apply it there.

At the second level, Understanding, three cognitive skills were mentioned: 3D thinking, Self-

expression, and Making associations. For instance, the Taboo game was said to be helping people improve their self-expression and making associations skills. Thus being able to describe words in different ways shows understanding.

> P07: I think taboo also improves people's ability to express themselves while telling. In the same way, I think it also improves associating the words with each other as you can explain a word in different ways.

Applying the category of cognitive skills has four codes: Executing algorithms; Deconstructing problems; Solving problems; and Constructing new words; each mentioned once. For instance, P09 talks about how playing chess can help deconstruct problems in real life:

> P09: We are playing chess. We think a lot cognitively; like how should I move? What if I do this? When we encounter any problem in life, we look at it from many perspectives, not just one-dimensionally. So, we say, we look at the pros, we look at the cons, just like in chess. In other words, we can see life in a different way cognitively, we can see it from different angles.

The skills at the Analyzing level of the cognitive domain were the most popular among the participants, from most cited to the least are Strategy; Focused Attention; Organizing objects; Differentiating images; Planning; Deconstructing; and Distinguishing concepts. For instance, participants mention how Mangala -a strategy game-, and Taboo -a verbal game- can affect strategic thinking:

> P04: Mangala game develops strategic thinking and moves to thinking ahead. You both develop your own thinking, and you have to foresee what move you need to make after the other person.
> P02: [In Taboo] you need to know a lot of vocabulary, in fact, in order to describe a word in taboo, you have to approach it from many different places and come to that word, and since the banned words are the closest ones, I have to approach it from very different words. It is also a bit of a strategic game, because when you are telling, you have to think about where to tell it and apply a strategy right there and tell it right away.

In another level of cognitive domain, Evaluating, there was one comment that was interpreted as defending ideas. P06 explained the importance of having a rich vocabulary in order to make judgments about people's ideas and defend another idea, trying to persuade them:

> P06: Sometimes it can be [effective] for persuasion. In other words, it can be used in certain areas of life and can guide person's profession very well. A person who is a lawyer must have an incredible ability of persuasion, for example, for lawyers. They require a rich vocabulary ... and if he's not reading a book … he should improve it somehow. It can be accomplished with games.

At the top level of cognitive domain Creativity, the intelligence and mind games might have an effect on the skill of explaining in different ways. For instance, P26 explains how Taboo can affect creativity:

> P26: creativity is important. Because we draw something there or try to explain it with a puppet and we try to do it in different ways. Because it is very restricted, and I need to develop my hand drawing ability. Because as you say, you are drawing a picture. For

> example, you are telling in different and indirect ways with puppetry. Because there is an object there, you try to explain it by putting that object in different shapes. Creativity is key here.

Social and emotional skills that can be affected by mind and intelligence games

The capability of the mind and intelligence games is not limited to the acquisition of cognitive skills. They can also trigger the development of skills in various domains like social and emotional skills. Table 7 below provides a list of social and emotional skills participants cited mind and intelligence games could stimulate.

Table 7. Social and emotional skills that can be affected by mind and intelligence games

Categories	**f**
Co-operation	8
Sociability	7
Persistence	3
Achievement motivation	3
Self-efficacy	2
Creativity	1
Energy	1

A closer inspection of the table shows that co-operation and sociability are the skills that were more frequently referred by participants, along with the other skills, including persistence, achievement motivation, and self-efficacy. On the other hand, the skills less attributed to mind and intelligence games are creativity and energy. In light of these findings, it could be suggested that mind and intelligence games offer a cooperative environment where game players can socialize and persevere in winning the game. Especially the games played in groups allow people to build co-operation skills, to empathize with each other and work together to achieve a common goal.

> P24: In terms of inclination to group work, well, that [games] might be good for people to develop because there are so many different professions. No one works independently of each other. ... in a group, they communicate with each other, a group work. to create the groundwork for this...

Sociability, in terms of communicating with others, is another skill mentioned by participants, that would be improved by playing mind and intelligence games. P25 comments on sociability and self-confidence:

> P25: I mean, for example, some students may be more introverted, but when they play some games to be more social, they become more social. So, by saying I love this game, he can see that he is good at that game. Then arises his self-confidence. I think he can say that if I'm doing this, I can do other things as well.

Psychomotor skills that can be affected by mind and intelligence games

Besides the cognitive and affective domain, the psychomotor skills category emerged as well, from the analysis of participants' responses. Although a few times it was mentioned, while playing the mind and intelligence games people need to perform physical movements, they have to act in coordination with the environment, and use their motor-skills. Thus,

participants mention several instances of how these games can influence the development of these skills in terms of speed and precision. For instance:

> P26: Well, it [Dobble] can improve their reflex, that is, to be fast and to see.
> P24: …psychomotor also involved in the drawing part [of Taboo].
> P19: Jenga can improve psychomotor skills, like pulling and not shaking…
> P06: The "Word Hunter" game … is one of the very important games for verbal intelligence, and it also requires speed and practicality.
> P04: When we first came to the lesson, we played "Pratik Bardaklar", it is a game that teaches visual intelligence. You have to act fast in that game. You also need to think quickly and know how to line up the cups. That's why I think it carries the child forward in every way.

Discussion

It is seen that there are not enough studies on mind and intelligence games, which are increasingly used in the education and training process of teachers and supported by the MoNE. Also, even though it is clear that learning and playing mind and intelligence games provide students with very important mental and scientific skills that they will use for life (Altun, 2019; Demirel & Karakus Yilmaz, 2019; Kuzu & Durna, 2020; Baş, Kuzu & Gök, 2020), there are not enough studies conducted in the literature. In our country, an elective course has been taught since 2013, with the idea that mind and intelligence games will play an important role in improving students' mental skills and increasing their reasoning abilities, based on learning by having fun. Especially after this elective course, we need more research about the effects of mind and intelligence games on education. This research aimed to draw attention to the importance and the place of mind and intelligence games in teaching, to contribute to the development of the course applied in schools, and to create ideas and resources for the studies to be done in this field.

The results revealed that both sorts of media for mind games had their advantages and disadvantages. However, box games have a distinct advantage in that they are hands-on and performed face-to-face, which was seen as important by the participants. Box games are touchable and allow for sociability (Cassidy, 2006) because they are played in a physical environment rather than a virtual one. Thus, one of the most frequently reported benefits of box games is the opportunity to socialize with friends and family while playing them. Similarly, Yanuarto (2015) suggests that board games help children socialize and gain a sense of belonging to the group. In addition, participants stressed the necessity of being able to physically touch the game's items in order to get a more immersive experience. This finding supports the findings of both Lee, Holmes and Lobe (2016) and Toivonen and Sotamaa (2010) stating that concrete games create a more sense of ownership than digital.

Furthermore, playing box games helps one to learn new abilities such as analyzing their opponent's gestures and facial expressions, guessing their next move, and eventually influencing the game's outcome. On the contrary, digital games have the advantage of not needing an opponent, thus playing one-person games and adjusting the difficulty level rather than being bound by the opponents' skills. This finding shows an important advantage that is also expressed in the literature (IJsselsteijn, De Kort, Poels, Jurgelionis & Bellotti, 2007; Denisova & Cairns, 2019). This may allow one to challenge themselves to improve their performance in the game, however in some games where one plays against the computer a novice could feel intimidated because computers may not lose the game. The results of the comparisons of box and digital games tend to revolve around usefulness, with a little

emphasis on their effects on skills. Indeed, there are some studies on the comparison of the effect of concrete versus digital versions of intelligence games on skills. Sütçü (2020) compared the two versions of Katamino, Q.bitz Extreme, and Architecto games, which are in the geometrical-mechanical category. Sütçü (2020) did not disclose any significant difference between the concrete and digital versions of the games on the prospective teachers' skills, yet she found that both versions increased their spatial visualization and mental rotation skills significantly from pre to post tests.

Participants' views on the enablers and barriers of using the mind and intelligence games in education are mostly focused on the enablers. For instance, they stated their willingness to offer an elective course on intelligence games in the future, because they thought students would be exposed to various games and have a chance to improve their skills. Participants also mentioned the ways in which they would adapt the games to their subjects in other courses, to accompany the course's objectives. However, they stated that large class sizes and management issues would be barriers to implementing intelligence games in education. These findings are in line with the literature, where views of classroom teachers also revealed similar barriers (Kula, 2021). Cole-Hamilton, Harrop, and Street (2002) also stated that especially the large class size and the lack of classroom assistants are important limitations in their systematic review study.

The skills that can be affected by mind and intelligence games emerged in three categories: cognitive, social and emotional, and psychomotor domains. The findings of the study revealed that mind games can promote a wide range of cognitive skills. This finding also supports the opinion of Demirel and Karakuş Yılmaz (2019) that mind games can mainly promote cognitive skills. Recognizing images, recalling words, and Recognizing words are the effects of mind and intelligence games on the first level of the cognitive domain, remembering, according to the participants' perspectives. Related to these skills, one study about teaching vocabulary compared using traditional textbook versus intelligence games, some of which were included in this research as well, such as Double, Tik Tak Bomm, and Scrabble (Akçelik & Eyüp, 2021). They have found that vocabulary instruction via intelligence games was helpful in enhancing students' Turkish vocabulary knowledge (Akçelik & Eyüp, 2021). Three skills at the understanding level were: 3D thinking, Self-expression, and Making associations. The applying level emerged with the codes: Executing Algorithms, Deconstructing Problems, Solving Problems, and Constructing New Words. These skills are also studied in the literature with similar results. Demirel and Karakus Yilmaz (2019) found that intelligence games improved students' problem-solving skills, which is similar to Deconstructing Problems and Solving Problems. Kuzu and Durna (2020) found that students in the mind games group were more competent in writing than students in the traditional instruction group, which is similar to constructing new words. Analyzing level of the cognitive domain was the most popular among the participants: Strategy; Focused Attention, Organizing Objects, Differentiating Images, Planning, Deconstructing, and Distinguishing Concepts emerged as the skills that may be improved. Similarly, in the literature; logical and strategic reasoning skills (Bottino, Ferlino, Ott & Tavella, 2007); mathematical reasoning skills (Taş & Yöndemli, 2018); problem-solving strategies (Akcaoglu, Jensen & Gonzalez, 2021) were found to be improved by intelligence games. One comment was interpreted as defending ideas at another level of the cognitive domain, Evaluating. The participant stressed the importance of having a large vocabulary while making judgments about other people's beliefs and attempting to persuade them. Intelligence games may have an effect on the ability to explain things in different ways at the highest level of the cognitive domain Creativity. Other researchers also found that intelligence games can improve creativity (Ayperi, 2016; Ott & Pozzi, 2012).

Besides cognitive skills, mind and intelligence games affect social and emotional skills as well. Participants most commonly referred to co-operation and sociability, as well as other skills including persistence, achievement motivation, and self-efficacy. Creativity and energy were the least cited social skills. Based on these findings, it is possible that mind and intelligence games provide a cooperative atmosphere in which game players can socialize and persevere in their quest to win the game. People can improve their ability to cooperate by playing games in groups. Similarly, Sadıkoğlu (2017) stated that intelligence games enhance student autonomy and have beneficial effects on interpersonal relationships. Moreover, a study analyses the experiences of 100 participants from a wide range of age groups during brain games play and provides information that can be used to correctly predict player behaviour during brain game play (Ahmad, Zongwei, Ahmed & Muneeb, 2020).

Conclusion

Games are kinds of learning activities that motivate students internally with their features such as imagination, competition, pleasure, anxiety, uncertainty, decision, discussion, and emotional attachment. In other words, educational games play an important role in the development of children's different skills such as physical, cognitive, social, emotional, and language. With the effective use of these features of games, even difficult subjects or boring lessons can be made interesting and enjoyable for students. Similarly, mind and intelligence games are one of the types of games that support children's development, concept, and skill acquisition (Kula, 2021; Sütçü, 2020; Taş & Yöndemli, 2018).

In the results of this study, preservice teachers mentioned the advantages and disadvantages of mind and intelligence games according to the type of media. Both media types had their advantages for mind games, but box games tend to have more advantages because of their unique hands-on and face-to-face play. Also, the findings showed that the more convenient course for using the mind and intelligence games was mathematics, followed by elementary subjects, counseling, and social science subjects. The preservice teachers found mind and intelligence games eligible to support especially cognitive skills in remembering, understanding, applying, analyzing, evaluating, and creating. Furthermore, co-operation and sociability are the skills that were more frequently cited by preservice teachers, along with other skills, including persistence, achievement motivation, and self-efficacy. Also, they thought that they will use mind and intelligence games in their career, and they will adapt the games to their subjects in other courses.

It is important to determine the views of preservice teachers about the mind and intelligence games. Because these views of preservice teachers might be an indication of the frequency of including mind games in the education curriculum, which are beneficial to students and provide them with a rich educational environment. Determining these views can contribute to the further development of mind and intelligence games education programs and eliminate the deficiencies by revealing the preservice teachers' adoption of mind games.

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