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Examination of the Perceptions of Students Diagnosed with Special Talent regarding the Application of Kahoot-Assisted Astronomy

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Abstract: The aim of this study is to examine the experiences of the students regarding the "Kahoot assisted astronomy application". Phenomenological design was used in the research. The study group of the research consists of 40 students with special talents who are studying in a science and art center in Van in the first semester of the 2022-2023 academic year. Twenty-four of the participants were girls and 16 were boys. Easily accessible case sampling method was used in the formation of the study group of the research. In the research, first of all, 35 questions related to the subject of astronomy were prepared and these questions were uploaded to the Kahoot application, which is a Web 2.0 tool. Students used the sub-applications of "classic mode", "color siege", "team mode", "treasure chest" and "submarine team" in Kahoot application for eight weeks in groups. A semi-structured interview form was used as data collection tools within the scope of the research. Descriptive and content editing approaches were used in the analysis of the data. Codes and themes were created from the obtained data. As a result of the research, it was determined that the students' "Kahoot assisted astronomy application" had positive effects on students' motivation and perception towards astronomy. In addition, with this application, it was concluded that the students learned new concepts about astronomy, repeated the concepts they learned and eliminated their misconceptions about astronomy. In addition, it was observed that the students enjoyed the applications throughout the whole process.

Keywords: Astronomy, Kahoot, Gifted student

Introduction

Mankind has been curious about space since prehistoric times. Space has become one of the areas that humanity is most interested in. Throughout history, human beings have observed space, studied the positions and movements of celestial bodies, and as a result, they have planned their daily, monthly, seasonal and annual studies. People recorded their space observations throughout the process and organized their daily lives based on the data they obtained. Astronomy is accepted as a gateway science by everyone, regardless of age, culture or tendency towards science (Salimpour et al., 2020). Such sciences have a critical importance for people to understand the events they encounter in daily life such as the change of day and night, the phases of the moon, and the seasons (Almeqbaali et al., 2022).

In fact, astronomy is one of the oldest known sciences. (Bailey & Slater, 2003). Astronomy is a natural science based on observation (Li et al., 2019). This field of science has been influential in people's understanding of their environment and themselves for years (Trumper, 2006). For this, studies on astronomy education have been carried out in schools for a long time. Many countries have included activities for astronomy education in

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their new programs. Of course, the purpose of science taught in school is not to create astronauts, but to inspire students to appreciate science in general (Slater, 2018). Students studying at all levels from pre-school to university have a high level of interest and curiosity towards astronomy.

Many methods and techniques are used to increase students' interest, attitude and motivation towards astronomy, to learn astronomy concepts and to eliminate misconceptions about this field. Some tools such as animation, cartoon, video can be used in teaching concepts related to this field in schools. Many different studies are carried out. For this, researchers or teachers benefit from Web 2.0 tools. As it is known, students and teachers can actively use Web 2.0 tools in the lesson (Çetgin, 2021). The "Kahoot" application, a Web 2.0 tool, can be used to help students learn concepts about astronomy and to eliminate their misconceptions. Kahoot is a Web 2.0 tool that can be used for educational purposes.

The Aim of the Study

The aim of this study is to develop a Kahoot assisted astronomy application, which is a Web 2.0 tool, and to examine the views of the students towards the developed application. For this purpose, an answer was sought to the following question;

“What are the perceptions of students diagnosed with special abilities towards kahoot assisted astronomy?”

Method

Research Design

In the research, phenomenology design, which is one of the qualitative research methods, was used in order to determine the opinions of gifted students about Kahoot assisted astronomy. In the phenomenological design, participants' experiences, perceptions and comments about a phenomenon are examined (Creswell, 2007). This research model is used to illuminate the cases that we are aware of but do not have an in-depth and detailed understanding (Yıldırım & Şimşek, 2013). In this study, as a phenomenon, "Kahoot assisted astronomy application" was discussed and the perceptions of the participants towards this application were examined.

Research Group

The study group of the research consists of 40 students with special talents who are studying at a Science and Art Center (BİLSEM) located in a city center in the Eastern Anatolia Region of Turkey in the first semester of the 2022-2023 academic year. The study group of the research was determined by the easily accessible case sampling method. With this method, the researcher gives speed and practicality to the research as he chooses a situation that is close to him and easy to access (Yıldırım & Şimşek, 2013). The participants continue their education at the school where the researcher-teacher works. Eighteen of the participants study in support (3rd and 4th grade) and 22 in BYF (Being Aware of Individual Talents) (5th and 6th grade) groups. Twenty-four of the participants were girls and 16 were boys.

Implementation of the Study

For the studies, first of all, an astronomy question pool consisting of 50 true-false questions, which should fill in the blanks, was created. While creating the questions, the support of BİLSEM and the characteristics of the BYF group special talented students were taken into account. The pool of questions created was subjected to the necessary expert examination and after the examination, a quiz of 35 questions was created. The questions created were put into the Kahoot application, which is a Web 2.0 application. Depending on the difficulty level of the questions, they were scored as "standard score" or "double score" and were time-limited as 5 seconds, 10 seconds, 30 seconds and 60 seconds. As a result of the studies, Kahoot Assisted Astronomy Application has been finalized. After the application was prepared, the participants were informed about the application for 1 lesson hour and then a sample study was made and the application was introduced. After the development and promotion of the application was completed, the actual application was started. The working group carried out its work in groups of 4-5 people. The application lasted for a total of 8 hours, two hours a week for 4 weeks. During the application, each student was given a tablet. The teacher starts the application from the smart board

and each student first answers the questions that are reflected on their tablets individually. After the answers given, the success ranking is reflected on the main screen. The name of this mod is «classic mode». First of all, all the studies were done with the classical mode in kahot, and in the later lessons, the sub-applications of "color siege", "team mode", "treasure chest" and "submarine team" in the kahoot application were used.

Data Collection

In this study, in-depth interviews were conducted with gifted students who shared common experience, and thus their reactions and views on the developed kahoot assisted astronomy application were made sense of. As a data collection tool, a semi-structured interview form was prepared. For the semi-structured form, first of all, a draft form consisting of 14 questions was prepared and presented to the opinion of two field experts in order to ensure the content validity of the form and one Turkish teacher to examine it in terms of grammar. In addition, a pilot interview was conducted with a student for the clarity of the questions. As a result of the feedback received from the experts and the pilot application, some questions in the form were removed from the form, some were corrected and some questions were added to the form. As a result of all these studies, a semi-structured interview form with 7 questions was obtained.

Ethics

Before the application, the purpose of the research was explained to the participants and explanations were made about where and for what purpose the collected data would be used. In this process, all students in the study group gave their consent to the study and were told that they could withdraw from the study whenever they wanted. In addition, the confidentiality of the participants was taken as a basis in the research and within this framework, the participants were given codes as Student-1, Student-2.....Student-40.

Data Analysis

In the analysis of the data obtained by using a semi-structured interview form, descriptive and content analysis methods, which are among the qualitative analysis methods, were used. First of all, the answers given by the students to the interview questions were transferred to the computer environment. The interview, which was transferred to the computer, was deciphered by making various readings on the raw data. In the analysis of the data obtained, the stages of coding the data, finding the themes, organizing and defining the data according to the codes and themes, defining and interpreting the findings were followed (Yıldırım and Şimsek, 2013). As a result of reading the data, codes were created from student opinions, and the codes were examined in terms of similar relationships and brought together under certain themes. Then, the codes and themes were interpreted and presented in a way that the reader could understand. In the study, two independent researchers created a code list simultaneously and these codes were compared. Miles and Huberman's (1994) reliability calculation formula was used to determine the reliability of the encodings made by the researchers, and as a result, the agreement between the coders was found to be 90%. During the interpretation of the data, codes and categories were tabulated and given as frequency (f) and percentage (%).

Results

In this section, the findings regarding the data obtained with the semi-structured interview form are given. After the readings on the answers given by the students to the interview questions, codes and themes were formed by combining similar codes. As a result of the analyzes, the themes of "Cognitive Characteristics", "Concept Learning", "Affective Features" and "Removal of Misconceptions" were formed.

The Cognitive Features theme and the codes included in this theme are given in Table 1. When Table 1 is examined, 25 of the students in the study group learned new information with the Kahoot assisted astronomy application, 24 learned with fun with this application, 20 found the application useful/useful, 15 repeated and reinforced their knowledge with the application. Among them, the application was effective in remembering information, 10 of them were that the application cleared some misconceptions about space, 8 of them were that the application was instructive / educational, 5 of them were that the practice improved attention and quick decision-making skills, and 4 of them were the permanence of their knowledge about space with the application.

reported an increase. Some students' opinions were given to give more detail regarding the code which were created under Cognitive Features.

Table 1. Cognitive features theme and the codes that make up this theme

Theme	Code	f	%
<i>Cognitive Features</i>	Learning new information	25	62.5
	Learning with fun	24	60
	Useful	20	50
	Repetition and reinforcement of knowledge	15	37.5
	Remembering information	12	30
	Clearing the misconception	10	25
	Tutorial/tutorial	8	20
	Being alert and making quick decisions	5	12.5
	Persistence of knowledge	4	10

Some student opinions that created these codes are given below;

S1. Very good. Great. I like it a lot. I am very pleased. Useful for learning new information.

S3. It was beautiful. That was so fun. Even if I made a few mistakes, I was not upset at all. Because it was so much fun.

S5. It was a very nice and easy application. I liked that it was easy the most. I both learned new information and reinforced what I already knew.

P8. It was a very instructive and educational application.

S9. I swear it's a legendary app. I have never heard of such an application before. I loved this app. I learned a lot because I love it.

S10. It was a very good application. I learned a lot of new information. This app is very helpful as it teaches me new information and concepts.

P11. This app is both educational and beautiful and fun.

S12. It's a very nice application. I like it a lot. We played and learned at the same time. In fact, we learned by having fun. It is a very logical and beautiful application.

S13. I think it's a very good app. I really liked that it contributes to the education of children by combining play and education.

S26. Actually, I did not learn new information, I already knew all of them, but I refreshed the information I had forgotten. Besides helping me refresh my knowledge, it also improved my reflexes.

S29. Through this study, I learned a great deal about space.

S32. It improved my ability to be careful and act quickly.

S33. I learned new information about astronomy that I did not know.

S36. It made the knowledge I had learned more permanent. There was no mistake I knew about this, but I reinforced what I learned.

It is seen that students state that they have gained necessary information within the given topic and they liked the application that they used. Another theme created as a result of the analysis of students' answers is the "Concept Learning" theme. The Concept Learning theme and the codes included in this theme are given in Table 2.

Table 2. Concept Learning theme and the codes that make up this theme

Thema	Code	f	%
<i>Concept Learning</i>	All astronomy concepts	20	50
	The phases of the moon	18	45
	Age of the universe	15	37.5
	Galaxy	14	35
	Nebula (nebula)	13	32.5
	Supernova	12	30
	Earth's twin planet	8	20
	Evening star	8	20
	Asteroid belt	8	20
	Earth's natural satellite	6	15
	Meteor	6	15
	The planet with the most moons	6	15
	The invisible phase of the moon	5	12.5

When Table 2 is examined, 20 of the students in the study group learned all the astronomy concepts with the application, 18 of them learned the phases of the Moon, 15 of them the age of the universe, 14 of them the concept of galaxy, 13 of them the concept of nebula, and 12 of them the concept of supernova. 8 are Earth's twin planet, 8 are which planet the evening star is, 8 are what the asteroid belt is and where it is located, 6 are Earth's only natural satellite, 6 are the concept of meteorites, 6' Two of them stated that they learned about the planet with the most satellites and 5 of them stated that they learned about the unseen side of the Moon. It is not easy to remember some concepts in astronomy which are being taught in schools. So students' reflections are being paid attention, in this scope. As we authors of the study believe in that some students in our country have some difficulties while they are being educated within astronomy and astronomy based topics.

Some student opinions that created these codes are given below;

- S1. I found out how old the universe is.
- S3. I learned that the sun is not a planet but a star. I also learned how old the universe is.
- S8. I did not know the phases of the Moon before, thanks to this application, now I know all of them. I learned the concepts of full moon, new moon, bulging moon, crescent moon, first quarter and last quarter.
- S9. I learned that the only natural satellite of the Earth is the Moon.
- S10. I learned new information. For example, I learned what a meteor is.
- P11. I learned everything about astronomy.
- S12. I learned good information about space.
- S16. I learned that the age of the universe is 13-14 billion years.
- S29. I learned how many moons the nebula, galaxy, Saturn planet has, how old the universe is, and so on.
- S35. I learned what Nebula and Supernova are.
- S38. I learned the phases of the Moon, the name of the star explosion is supernova, the other name of Venus is the evening star, the planet with the most moons is Saturn.

Another theme created as a result of the analysis of the students' answers is the "Affective Characteristics" theme. The Affective Characteristics theme and the codes included in this theme are given in Table 3:

Table 3. Affective Characteristics theme and the codes that make up this theme

Theme	Code	f	%
<i>Affective features</i>	Beautiful	35	87.5
	Fun	34	85
	Enjoyable/Enjoyable	30	75
	Interest and motivation towards astronomy	20	50
	Perfect	20	50
	curiosity about space	16	40
	Excitement	14	35

When Table 3 is examined, 35 of the students in the study group found the practice enjoyable, 34 found it fun and 30 enjoyable/pleasant, 20 students found the practice to increase their motivation and interest in astronomy, 20 said the practice was excellent, and 16 students found it enjoyable. 14 of them stated that the application was exciting. For giving more detailed information with the students' views, some statements created by those, were given.

Some students opinions that created these codes are given below;

- S1. My interest in space has increased. I had a lot of fun in this process and it was very enjoyable for me.
- S3. I was already very curious about space. I will deal with this matter further from now on.
- S5. It increased my curiosity about space and I was eager to learn new information about space. I had a great time. We laughed a lot with our friends during this process.
- S6. I was already interested in space, this application has increased my interest even more. It was very nice work. It was a very enjoyable and exciting application.
- S9. This application has greatly increased my interest in space. I had a lot of fun in this process. It was fun playing with friends.
- S10. It further fueled my existing good interest in astronomy.
- S11. We had a lot of fun with our friends, we laughed a lot.
- S12. I already had an interest in space. After this study, I will investigate the things I wonder about space.
- S16. It was a very enjoyable application. Also, my motivation towards space has increased more.

S24. That was so fun. I enjoyed playing color siege, treasure chest, submarine team, classic mode that we played in this application.

S26. I was already an astronomy enthusiast. With this application, my curiosity towards space increased even more.

S29. It was so much fun and so beautiful. I came first in all competitions.

S33. I had so much fun playing. I especially liked the diving game that we all played together.

S39. It was beautiful. That was so fun. It was perfect.

It is clearly seen that the students have very positive views regarding application. We are able to understand this by focusing on their views as given above. Another theme created as a result of the analysis of the students' answers is the theme of "Removal of Misconceptions".

The theme of Eliminating Misconceptions and the codes included in this theme are given in Table 4. When Table 4 is examined, 26 of the students learned the age of the universe they had previously misunderstood, 24 of them the phases of the Moon, 22 of them about artificial satellite-natural satellite, 20 of them about meteor, 15 of them about stars and planets, 15 of them about big stars. They stated that they correctly learned the concepts of bang and nebula, 12 of them learned the asteroid belt and wormholes, 10 of them learned the location of the asteroid belt, and 10 of them correctly learned the nebula and supernova. Having misconceptions and trying to remove them from students' minds is not easy. To be able to understand this, it is clear that Ministry of National Education should carry out more efforts within this topic.

Table 4. The theme of eliminating misconceptions and the codes that make up this theme

Theme	Code	f	%
Elimination of Misconceptions	Age of the universe	26	65
	The phases of the moon	24	60
	Artificial satellite and natural satellite	22	55
	Meteor	20	50
	Mixing the concepts of Star and Planet	15	37.5
	Confusing Big Bang and Nebula	15	37.5
	Confusing Wormholes with the Asteroid Belt	12	30
	Location of the asteroid belt	10	25
	Confusing the concepts of Nebula and Supernova	10	25

Some student opinions that created these codes are given below;

S3. I thought the sun was a planet. I thought space was much older, it wasn't.

S5. I did not know the age of the universe, I learned it thanks to this study.

P8. I was mixing up the first four and the last four of the phases of the Moon and it helped me learn them.

S9. With this application, I corrected many of my mistakes about space.

S10. I didn't know the age of the universe, now I do.

P11. For example, I misunderstood the concepts of artificial satellite, natural satellite, last quarter and first quarter. Thanks to this application, I corrected these mistakes.

S12. Did I misunderstand the age of the universe? Turns out he was 13-14 billion years old.

Ö26. I learned that the age of the universe is not 13-14 quadrillion years.

Ö29. I always confused the first four and the last four of the phases of the moon. Thanks to this study, I learned how to distinguish the two with the letter "D".

P33. I was confusing the concepts of nebula and supernova, now I learned the two.

Here, it is seen that all students' views show us they had difficulties in learning those concepts but now they have solved the problem through this application.

Discussion and Recommendations

It is known that some similar studies by using Kahoot platform can be found from the literature. For instance, Zucker and Fischer (2019) stated that with the use of KAHOOT! students who they studied and teachers were able to play their way into substantive and student-centered discussions. Siouli et al. (2018), stated that Technology Enhanced Learning (TEL) in STEM Education is a well-established method for engaging students with challenging concepts such those in space and astronomy. In their study, they studied with 14 children from year 5 to year 6 aged between 11 and 12 years old, every Friday from 1:45 p.m. to 3:15 p.m. They concluded

that by using technology from the constructivist perspective students can do some things such as they can access, select and interpret information. So, they can review and adjust their work to promote the quality. Asa'd and Gunn (2018) used Kahoot in the formal teaching to motivate students within Physics to solve problems they face during the course. So they found their students liked the game and the game motivated them to practise more problems. There is a study that have similar results with the content of the current study. Holbrey (2020), found that the integration of synchronous online learning in lecture theatres gave no technical difficulties and that gaming was successful in enabling active participation and interactive learning. This research was carried out with students who study at Science and Art centers in the province of Van. It is recommended that this study can be applied to a different region with more students. Besides, Kahoot based digital games can be used in any other science and technology based topics placed in science courses.

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