THE DOMINO GAME "RESERVOIRS OF THE REGION" AS AN EDUCATIONAL TOOL TO DEEPEN THE KNOWLEDGE OF PRIMARY SCHOOL STUDENTS

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Abstract

Gamification makes the learning process accessible and exciting, and the assimilation of knowledge becomes better and more durable. The need of game-based learning in primary schools has gained the relevance of the studied problem. The purpose of the research is to make a domino game "Reservoirs of the Region" and to interest classmates in this game. The theoretical significance of the study lies in expanding the knowledge of primary school students about the nature of their native land. The practical significance of the study is that primary school students will be able to use the acquired game-based knowledge in their further education. When playing dominoes, students learn attentiveness, develop logical thinking and broaden their horizons. The methodological basis of the study was the creation of the domino game "Reservoirs of the Region", consisting of 28 knuckles-dominoes in the form of a rectangle with a perpendicular dividing line. On one side of the dividing line is an answer option, on the other side is a task. For example, [The Tobol River | The largest enclosed body of water on Earth], [The Caspian Sea | Right tributary of the Volga River in Tatarstan], [The Sviyaga River | Sudden river-level rise], [Flooding | Depression through which a river flows], [Channel | River, which flows out of Lake Baikal]. 2-5 students participate in the game. Before the game begins, the participants determine who starts the game first. Each player is given four knuckles. The first player chooses any knuckle and makes a move. The other participants, if available and in turn, deliver the knuckles with the correct answer. If the participants are missing a required knuckle, they start using unused knuckles one by one until the required option is found. The participants can substitute not only answers, but also tasks (questions). The game goes on until one of the participants runs out of knuckles. He is declared the winner. The experiment was conducted in gymnasium No. 96 in Kazan city, Republic of Tatarstan, Russia with the 2nd grade primary school students. Twenty-eight students participated in the game. The experiment consisted of several stages. Stage 1 - themes about reservoirs of the region, the history and rules of the game "Domino" were studied in detail. Stage 2 – the input diagnostics of primary school students' knowledge on the studied themes was carried out. The input diagnostics consisted of test tasks and included 28 multiple choice questions with one correct answer. Stage 3 - students were provided with information about regional rivers and lakes. Stage 4 – after an explanation of the rules the domino game "Reservoirs of the Region" was played several times. Stage 5 - the output diagnostics of primary school students' knowledge was conducted. Stage 6 - a comparative analysis of students' knowledge was carried out before (the input diagnostics) and after (the output diagnostics) playing the domino game. The results of the research showed that game-based learning made it possible to double the quality of students' knowledge on the studied themes (from 32% to 60.7%). In conclusion, the use of the developed domino game "Reservoirs of the Region" promotes easy and interesting learning of important educational information about water resources and deepening the knowledge of primary school students. Materials of the article can be useful for experts working in educational institutions and researchers who are connected with pedagogy.

Keywords: Education, game-based learning, domino game, student, primary school, diagnostics.

1   INTRODUCTION

Gamification makes the learning process accessible and exciting, and the assimilation of knowledge becomes better and more durable. It is easier to teach a student basic concepts through a game as it organically combines entertainment and learning activity. The game stimulates, develops attention, mental activity of students and cognitive interest in the subject. The game that is properly organized trains memory and helps students develop speech skills [1-3]. The need of game-based learning in primary schools has gained the relevance of the studied problem.

The purpose of the research is to make the domino game "Reservoirs of the Region" and to interest classmates in this game.

Hypothesis: If you use the domino game "Reservoirs of the Region", you can easily (in the game) study important information on the regional water resources.

Based on the purpose and the hypothesis, we have identified the following research objectives:

- To study themes about reservoirs of the region, the history and rules of the game "Domino";
- To make a presentation on the studied themes and provide students with information about regional rivers and lakes;
- To create the domino game "Reservoirs of the Region";
- To conduct the input and output diagnostics of primary school students' knowledge on the studied themes;
- To make a comparative analysis of the survey before and after the experiment;
- To determine the impact of the domino game "Reservoirs of the Region" on deepening the knowledge of primary school students about the world around them.

The theoretical significance of the study lies in expanding the knowledge of primary school students about the nature of their native land.

The practical significance of the study is that primary school students will be able to use the acquired game-based knowledge in their further education. When playing dominoes, students learn attentiveness, develop logical thinking and broaden their horizons.
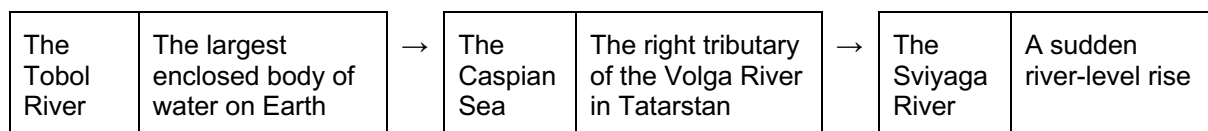
2   METHODOLOGY

The methodological basis of the study was the creation of the domino game "Reservoirs of the Region", consisting of 28 knuckles-dominoes in the form of a rectangle with a perpendicular dividing line. On one side of the dividing line is an answer option, on the other side is a task [4-7]. They are presented in Table 1.

Table 1. Designed knuckles-dominoes for the game "Reservoirs of the Region".

The Tobol River	The largest enclosed body of water on Earth	Taimyr	River flowing into the Caspian Sea
The Caspian Sea	The right tributary of the Volga River in Tatarstan	River mouth	What are Lena, Angara, and Yenisei?
The Sviyaga River	A sudden river-level rise	The Kazanka River	The longest river in the country
Flooding	Depression through which a river flows	Ladoga	The deepest river in the country
Channel	A river, which flows out of Lake Baikal	Ponds	The place of confluence with another water body
Oceans	The largest lake in Tatarstan	The Volga River	The deepest lake in the country
Yenisei	A tributary of the Irtysh River	Lena	The planet's watery shell
Blue	Which strait connects the Black and Azov Seas?	Irtysh	The most capacious water bodies
The Laptev Sea	The largest freshwater lake in Europe	The Azov Sea	The main reserves of fresh water on Earth
The river source	Colour in geographical maps indicating water resources	Lake Baikal	Which sea does the Lena River flow into?
Glaciers	The left tributary of the Volga River, on which Kazan is located	Kerch	The largest northern lake in the world
Lake	Non-natural water bodies	The Ob River	A large river in the Asian part of the country
Hydrosphere	Starting point of a river	Angara	A river flowing in the permafrost region
Rivers	A closed basin filled with water	Lake Kaban	The sea that is farthest from the oceans

2-5 students participate in the game. Before the game begins, the participants determine who starts the game first. Each player is given four knuckles. If there are unused knuckles-dominoes, they are placed in a pile with the tasks and answers down.

The first player chooses any knuckle and makes a move. The other participants, if available and in turn, deliver the knuckles with the correct answer. For example,

The Tobol River	The largest enclosed body of water on Earth	→	The Caspian Sea	The right tributary of the Volga River in Tatarstan	→	The Sviyaga River	A sudden river-level rise

If the participants are missing a required knuckle, they start using unused knuckles one by one until the required option is found. The participants can substitute not only answers, but also tasks (questions). The game goes on until one of the participants runs out of knuckles. He is declared the winner.

3   RESULTS

The experiment was conducted in gymnasium No. 96 in Kazan city, Republic of Tatarstan, Russia with the 2nd grade primary school students. Twenty-eight students participated in the game.

To determine the learning level of 2nd grade students in the section "Reservoirs of the Region", before conducting an experiment on using the developed domino game, the input diagnostics of primary school students' knowledge on the studied themes was carried out, using various sources [8-13]. The input diagnostics consisted of test tasks and included 28 multiple choice questions with one correct answer. The results are shown in Table 2.

Table 2. The results of the input diagnostics of primary school students' knowledge on the studied themes "Reservoirs of the Region".

Student	Input diagnostics completion points	Input diagnostics completion %	Student	Input diagnostics completion points	Input diagnostics completion %
1.	12	43	15.	11	39
2.	12	43	16.	5	18
3.	8	28	17.	12	43
4.	11	39	18.	10	36
5.	10	36	19.	10	36
6.	5	18	20.	4	14
7.	10	36	21.	7	25
8.	6	21	22.	7	25
9.	9	32	23.	6	21
10.	4	14	24.	10	36
11.	11	39	25.	7	25
12.	8	28	26.	7	25
13.	16	57	27.	9	32
14.	12	43	28.	13	46
Average value of the input diagnostics by class				**9 points**	**32%**

Developing reading literacy, after the input diagnostics, the students were provided with information about the region's water resources. The students listened to the presentation on regional rivers and lakes and studied the information in the handout. The students had to use the material provided to prepare for the game in which they could consolidate their knowledge of the region's water resources. After the rules of the domino game "Reservoirs of the Region" were explained, the students began to play. It is important that they played this game several times.

At the end of the experiment the output diagnostics of primary school students' knowledge was conducted. It is necessary to note that the output diagnostics consisted of the test tasks used for the input diagnostics. The results are shown in Table 3.

Table 3.The results of the output diagnostics of primary school students' knowledge on the studied themes "Reservoirs of the Region".

Student	Output diagnostics completion points	Output diagnostics completion %	Student	Output diagnostics completion points	Output diagnostics completion %
1.	26	93	15.	10	36
2.	21	75	16.	9	32
3.	13	46	17.	17	61
4.	15	54	18.	22	79
5.	10	36	19.	19	68
6.	13	46	20.	20	71
7.	11	39	21.	23	82
8.	10	36	22.	21	75
9.	22	79	23.	20	71
10.	21	75	24.	17	61
11.	14	50	25.	8	28
12.	9	32	26.	23	82
13.	26	93	27.	19	68
14.	21	75	28.	16	57
Average value of the output diagnostics by class				**17 points**	**60,7%**

Comparing and analyzing the test results before (the input diagnostics) and after (the output diagnostics) playing the domino game "Reservoirs of the Region" (Fig. 1), it was found that the use of game forms of learning made it possible to double the quality of students' knowledge on the studied themes (from 32% to 60.7%).
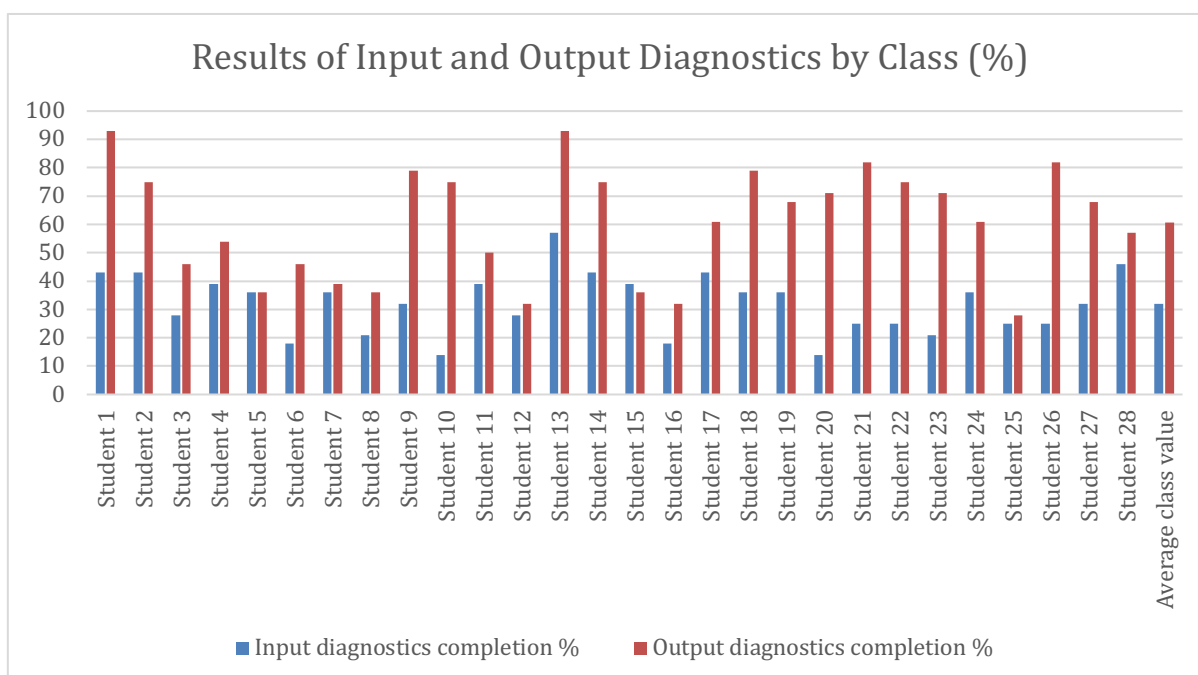

Figure 1. The results of the input and output diagnostics of primary school students' knowledge on the themes "Reservoirs of the Region".

The diagram clearly shows that the lowest result of the input diagnostics was 14%, and the lowest result of the output diagnostics increased to 28%, i.e. 2 times. The highest result of the input diagnostics was 57%, which in the output diagnostics was equal to 93%.

At the beginning of the experiment, student 10 had the lowest level of knowledge on the studied themes "Reservoirs of the Region" (4 point out of 28). At the end of the experiment, his knowledge increased to 21 points, i.e. from 14% to 75%. Student 13 had the highest level of knowledge and answered correctly 16 out of 28 questions. Finally, student 13 answered correctly 26 out of 28 questions, i.e. he made only 2 mistakes.

Thus, the results obtained show the possibility of using the domino game to study the natural world.

4   CONCLUSIONS

To sum up it should be noted that the experiment consisted of several stages. Stage 1 - themes about reservoirs of the region, the history and rules of the game "Domino" were studied in detail. Stage 2 – the input diagnostics of primary school students' knowledge on the studied themes was carried out. Stage 3 – the students were provided with information about regional rivers and lakes. Stage 4 – after an explanation of the rules the domino game "Reservoirs of the Region" was played several times. Stage 5 - the output diagnostics of primary school students' knowledge was conducted. Stage 6 - a comparative analysis of students' knowledge was carried out before and after playing the domino game.

In conclusion, the use of the developed domino game "Reservoirs of the Region" promotes easy and interesting learning of important educational information about water resources and deepening the knowledge of primary school students about the native region. It can be assumed that making dominoes in other sections of the curriculum will improve the level of students' knowledge.

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