The Effect of Board Games on the Academic Achievement and Learning Motivation of Fourth-Grade Elementary Student

Nima Asemani Barekat

Education Department, Elementary Education, Farhangian University, Karaj, Iran

Email address:

nimaac1380@gmail.com

Abstract: Nowadays, due to the advancement of technology, students can no longer produce new cognitive structures and take an active part in their learning process with traditional teaching methods such as lectures. Therefore, teachers should use teaching methods that attract students to learning. Therefore, one of the effective teaching methods for this demand is teaching with the help of various games. For this purpose, the present study investigated the effect of board games on the academic achievement and learning motivation of fourth-grade elementary students. This research is quantitative. The results of this study were collected from experiments on control and experimental groups. The statistical population, at first, all male students in the sixth grade of primary school in the city of Karaj were considered for the academic year 2022-2023. Then, by cluster sampling, it was reduced to one school and finally, randomly, to two classes of 30 people. The control group was trained by the usual method of the teacher`s explaining and then answering the questions in the book. The training of the experimental group was done by a board game. In the end, students of both groups were given a questionnaire to evaluate their teaching method and learning rate. Then, the same test was taken from both groups, and the average scores of both groups were calculated. The mean for the control group was equal to 12.23 and for the experimental group, equal to 16.53. According to the results of the surveys of the questionnaires and also the results of the tests of the two groups, the result showed that educational games, specifically board games, increase the learning rate of students and increase their interest in learning.

Keywords: Board Game, Game Based Teaching Methods, Academic Achievement

1. Introduction

1.1. Research Problem

In the 21st century, where science is developing rapidly, teachers are not able to keep up with science and convey it to students. Therefore, students should be taught the technique of "how to learn" so that they can become self-sufficient and learn it whenever they need knowledge. Today, students should learn how to produce new knowledge and teachers should look for ways to teach them "how to think".

From another point of view, today`s world is full of people who don`t use mental powers due to reliance on various machines. Therefore, little by little, some abilities and skills are weakening. For this reason, teachers and educational coaches should understand the importance of using different

skills and strengthening some skills in children. Skills such as teamwork, mutual understanding, how to think and come to a conclusion for a problem, and so on. Because in today's social life, just working and living are not the criterion of success; Rather, how to walk the path of life is the criterion of success. One of the characteristics of this success is the skills that a person uses to overcome difficulties and challenges. Therefore, recognizing and strengthening skills is very important in the success path.

There are many methods that can activate the student in the class and make the class interesting for the student to produce knowledge and learn. The purpose of implementing these methods is to revive the student`s motivation to study and increase the sense of cooperation, interaction, and mutual understanding. To decide to use appropriate teaching methods and choose the right educational content, teachers

should consider factors such as key concepts, social needs, individual interests of students, facilities, space, time, number of learners, and so on [1]. In addition, although each method has its own approach, its elements and components can be used in combination, which requires creativity, experience, and the professional skills of teachers.

On the other hand, due to the development of technology, children in the technology age are no longer interested in traditional learning methods such as the lecture method, and it does not create new cognitive structures for students. Therefore, teachers should use attractive learning methods in their teaching process that can lead children to active learning. One of the best and most effective methods is learning through games.

Educational games allow children to easily express their personality and learn educational materials. Besides playing is the most enjoyable activity for children, it is also the most logical way for them to learn. Therefore, it is easy to combine education with play. Through the game-based teaching method, teachers can pursue several educational goals in the shortest time with the highest number of students. Gamification as an educational method means incorporating game elements, such as points, badges, levels, roles, and leaderboards, into teaching to engage students with content, motivate action and influence behavior to promote learning [7]. Educational games can be used in the classroom at three main times. Different educational games can be used at the beginning of teaching to attract students' attention, during the teaching process to provide various experiences, and at the end of teaching for summarizing or final evaluation [2].

Applying the appropriate methods will also determine the effectiveness and efficiency of learning [12]. In addition, game-based learning has abundant characteristics, such as Representation, Fun, Play, Goals, Outcomes and feedback, Win states, Competition/Challenge, Problem-solving, Task, Story, and so on, to increase the learning motivation of students. Games are used to improve dull and hard courses, where course content corresponds to game levels, making the knowledge and skill of the course teaching available through game-based learning [4]. Game-content integration aims to create a fun learning atmosphere without neglecting the subject that students must learn. Given that fun learning, approaches have a positive impact on learning, it seems reasonable to use a game application as a learning facility. A game application can be designed in various ways to create a fun playing experience using challenging activities, competition and goals, rules, and choices [12].

As a result, educational games are often one of the solutions for the teacher to create more active and creative learning activities. Some experts say that using the game in learning is often stirred up students to be more interested in what they learn [15]. Therefore, the use of educational games makes teaching and learning interesting but the type of games is also important. According to the content of the course, which can be math, science, social studies, literature, and so on, teachers can use computer games, motion games, interactive games such as board games, and so on. So, In the

research method section, the choice of educational content and game type has been examined.

On the other hand, considering that people start analyzing everyday issues from the age of 10 [14]. Therefore, it is better for teachers to start strengthening all kinds of skills in students from this age. Because children express their personalities more easily in game situations and also, from the age of 10 onwards, children are interested in playing games like adults; thus, it becomes easier for teachers to teach educational content through games.

1.2. Literature Review

In the past decades, attention to the influence of various games in the field of education has increased significantly. But most researchers, teachers, and curriculum planners have sought to use movement games or computer games. Therefore, fewer people have entered the field of games that required the creation of a game according to the content of textbooks. Although board games can be used in the education of people of any age, few people have gone to investigate the effect of this type of game on education. On the other hand, most of the research results in this field indicate that movement games and computer games improve students' academic progress. For example:

Kebritchi in a survey under the title «Effects of A Computer Game on Mathematics Achievement and Class Motivation: An Experimental Study» said that the results indicated significant improvement in the mathematics achievement of the experimental versus the control group [9]. No significant improvement was found in the motivation of the experimental versus control group. However, a significant improvement was found in the motivation scores of the students who played the games in their school labs and classrooms compared to the ones who played the games only in the school labs.

Khanzadeh and partners in the article entitled "The effect of teaching through movement games on learning concepts and interest in the mathematics of late learners" have stated that teaching math through movement games has improved the learning of math concepts and increased interest in math among late learners [10].

Many articles and research have been done on the effect of movement games and computer games on children's education, and two of them were discussed in this research. But as mentioned earlier, little research has been done in the field of teaching educational content to children using interactive games such as board games.

Findings by Sala and Gobet under the title «Do the benefits of chess instruction transfer to academic and cognitive skills? A meta-analysis» stated that the results show (a) a moderate overall effect size (b) a tendency for a stronger effect on mathematical than reading skill, and (c) a significant and positive effect of duration of treatment. However, no study used an "ideal design" including pre and post-test, full random allocation of participants to conditions, and, most importantly, both a do-nothing control group and an active control group - a problem common in education

research. Directions for further research are discussed [13].

Sulistianingsih, and partners in their article entitled «The Effect of Interactive Board Games (IBG) on Vocabulary Achievement» acknowledged that the result indicated that there was a significant difference between the students who were taught using Interactive Board Games and the students who were not taught using Interactive Board Games [15].

Karbownik and partners in a survey under the title «Board game versus lecture-based seminar in the teaching of the pharmacology of antimicrobial drugs—a randomized controlled trial» said that A group of 124 students was randomized to board game and control groups. Short-term knowledge retention was assessed by comparing differences in post- and pre-tests scores, and long-term knowledge retention by comparing final examination scores. Both didactic methods seem to improve short-term knowledge retention to a similar extent. Long-term knowledge retention of board game seminar participants was higher than those who attended the lecture-based seminar [8].

Findings by Martins and partners under the title «Effect of the board game as educational technology on Schoolchildren's Knowledge of Breastfeeding» stated that there was no statistically significant difference between the groups in the pretest. In the follow-up, when comparing the groups, there were higher means in the intervention group, on the 7th and on the 30th days, with statistically significant differences [6].

Noda and partners in their article entitled «The effectiveness of intervention with board games: a systematic review» acknowledged that the results showed that, as a tool, board games can be expected to improve the understanding of knowledge, enhance interpersonal interactions among participants, and increase the motivation of participants. However, because the number of published studies in this area remains limited, the possibility of using board games as a treatment for clinical symptoms requires further discussion [11].

Cheng in a survey under the title « The Effect of Using Board Games in Reducing Language Anxiety and Improving Oral Performance» said that we found a significant relationship between sufficient board games and the improvement of oral performance. From the reports of the questionnaire, the participants perceived that they did not feel anxious while speaking English during board games. Moreover, the results of the post-test showed that the participants' oral proficiency improved while their language anxiety level was lower [4].

According to the research and the results, it can be concluded that practical research in the field of the effect of board games on the learning of elementary school students in the age group of 10 to 11 years has not been done in relation to the curriculum.

1.3. Research Purpose

The purpose of this study is to investigate the effect of board games on students' performance in learning; Specifically, to determine the level of learning of Fourth-grade students when board games are used in the learning process. Due to the importance of games in the learning process, in most cases, the performance of the age group of 10 and 11 years in the face of educational games has not been addressed. Therefore, the existence and conduct of research on the performance results of this group of students are also of great importance. Accordingly, in the present study, the following questions have been examined:

Q1: How effective are game-based learning methods in fourth-grade students' learning?

Q2: Does use board games increase students' motivation and interest in learning and searching for more about the subject matter?

Q3: Will the use of board games in the teaching process make the class and teacher's teaching method more attractive?

To provide answers to these questions, the research has the following structure. First, the research method and research findings are presented. Finally, it discusses the results and suggests ideas for future use on the subject.

2. Method

2.1. Content Selection

According to the students' feedback that the school course`s content such as mathematics, social studies, and literature is inflexible, the teacher should choose a teaching method except lectures and solving book exercises to teach these courses. Also, according to the content analysis carried out on the content of elementary school books, mathematics, social studies, and literature have the least attention to the motivation to progress and activate students in their learning process [3].

On the other hand, due to the observation of behaviors such as increased violence among students, inability to work in groups, and lack of mutual understanding towards each other, social life skills should be taught in addition to curriculum content. During the coronavirus epidemic, students had little interaction with each other, therefore, they could not strengthen many skills; Because learning some skills requires the child to be with friends and play with his peers. Therefore, in order to strengthen the mentioned skills, increase the level of students' learning, and also to investigate the effect of modern teaching methods, one of the lessons of the fourth-grade social studies book, from the history section, was selected for teaching. On the other hand, teaching the history section in social studies books is one of the most difficult sections; Because most teachers use the lecture method to teach history. This makes learning the history and civilization of a country boring for students. Therefore, it also has to be considered "how to teach history to students in a way that makes them eager to learn more".

Even though the country of Iran has a history and civilization of several thousand years and the Iranian empire is considered one of the most powerful empires in the history of the world, but due to insufficient attention to this issue in the textbooks and also, the teachers' use of traditional teaching

methods such as The lecture has made students reluctant to know about historical information about Iran. Therefore, the target group was considered to be fourth-grade students, because in this grade, the teacher should strengthen students' teamwork and teach students empathy and interaction.

2.2. Game Selection

So far, the reasons for using different games in education were discussed and it was concluded that the use of different games is essential in the learning process of children. Because children accept education that is accompanied by games more easily and can create new cognitive structures in their minds more easily.

As discussed in the literature review, extensive research has been done on the effects of movement games and computer games on children's education. But considering points such as the high number of students in the class or the unavailability of computers for all students, it is not possible to use all types of games in school classes. In some countries such as Iran, the number of students in a class is usually more than 30 people. Therefore, teachers often have to choose activities that involve large groups of students. On the other hand, due to the lack of facilities such as the lack of computers, tablets, and smartphones for all of the students in the class, such tools cannot be used much. From another point of view, due to the small classrooms and the schoolyard, extensive movement games cannot be performed.

Therefore, teachers should have the most efficiency with the least facilities. So, they have to teach course materials, and social life skills in a short time to a large number of students. Therefore, the idea of using "board games" came up. Board games are very suitable for use in crowded classes because they require several players. In the past few decades, many board games have been designed and produced, such as the Monopoly game, which was developed to improve the economic literacy of children. But most of the games produced are only for entertainment and so far, the game has not been developed according to the educational content of the school books.

Therefore, a board game with the theme of Iran's history was designed and produced based on the content of the textbook in order to use the new teaching method in the classroom. In addition, the game is designed to teach students social skills such as interaction, respecting each other's rights, and obeying the rules. The intended board game was designed using Adobe Illustrator and Adobe Photoshop software based on features such as age, number, gender, and interest of 10 and 11-year-old students. For this game, some taw and dice are needed so that the players start the game from the first house, roll the dice and move forward. In the course of the game, cards with explanations have been developed to add interest to the game and also have an educational aspect. Curriculum content was taught to students by cards that have a deterrent or incentive role. In addition to this game, an attempt was made to teach the history of Iran or the so-called "Empire of Iran" to the students. Because the game was developed based on the history and civilization of Iran.

2.3. Collecting Information

The present study is quantitative in nature. The collected materials have been obtained from two types of field and library methods. The library method has been used to study various sources to design learning activities and then compile the research text. Also, the field method has been used to prepare the training methods and also to conduct exams and questionnaires. Available data were collected from experiments on control and experimental groups. The statistical population, at first, all male students in the fourth grade of primary school in the city of Karaj were considered for the academic year 2022-2023. Then, by cluster sampling, it was reduced to one school and finally, randomly, to two classes of 30 pupils. None of the classes had students with a range of disorders. For both groups, the same subject matter (the history and civilization of Iran) was selected. It should be noted that the environmental conditions of both groups are explained equally.

2.3.1. Control Group

The control group was trained by the usual method of the teacher`s explaining and then answering the questions in the book. In two selected sessions, the teacher explained the content of the lesson orally and then, in the second session, answered the questions in the book.

2.3.2. Experimental Group

The training of the experimental group was done by a board game. In the first session, the teacher divided the students into 5 groups of 6 and gave each group a copy of the game along with dice. The way the students sit has also changed, from two by two, facing the board, to sitting in a circle and in groups. Then, the students spent the first session playing the game and reading the cards, which were the same information as the textbook. Each student rolled the dice once and moved his taw. Every player who went to the house with a card had to read the information of that card to all the players and then execute the order of the card to go back or forward or to be deprived of throwing dice. In the second session, the contents of the textbook were reviewed and an animation related to the content of the lesson was shown to the students.

In the end, students of both groups were given a questionnaire to evaluate their teaching method and learning rate. Questionnaire questions were designed based on the qualitative method and the scales were divided into very high, high, medium, low, and very low categories.

The first question of the questionnaire: In your opinion, how interesting was the content?

The second question of the questionnaire: How do you rate your learning?

The third question of the questionnaire: Choose your level of interest to further research the topics in this lesson.

The fourth question of the questionnaire: At what level do you rate the attractiveness of the method used by the teacher?

Eventually, the same test was taken from both groups, and the average scores of both groups were calculated.
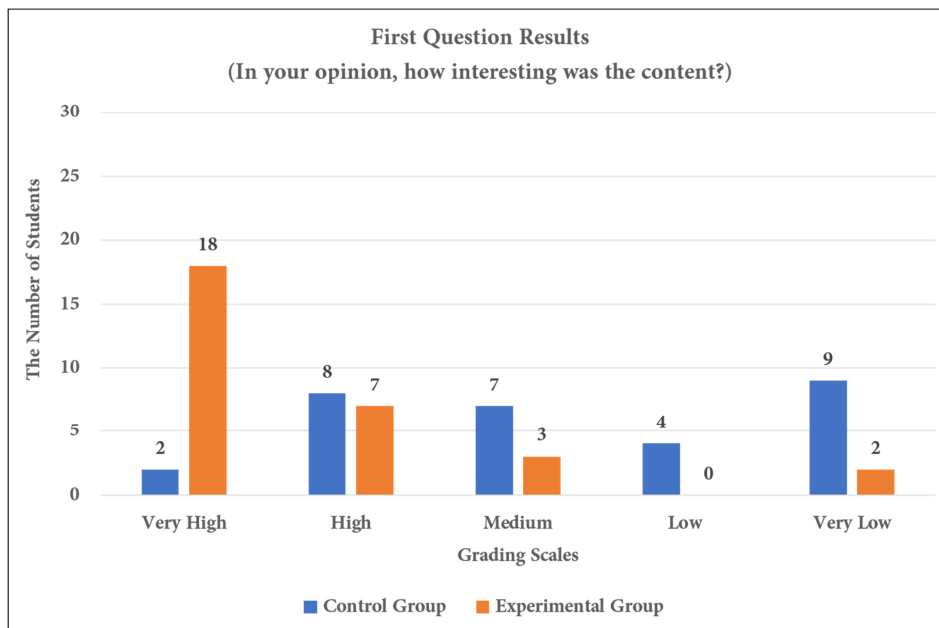
3. Results

3.1. Questionnaire

The results and the number of people in both the control and experimental groups, who answered each question, are shown in the graphs below.

The first question of the questionnaire: In your opinion, how interesting was the content?
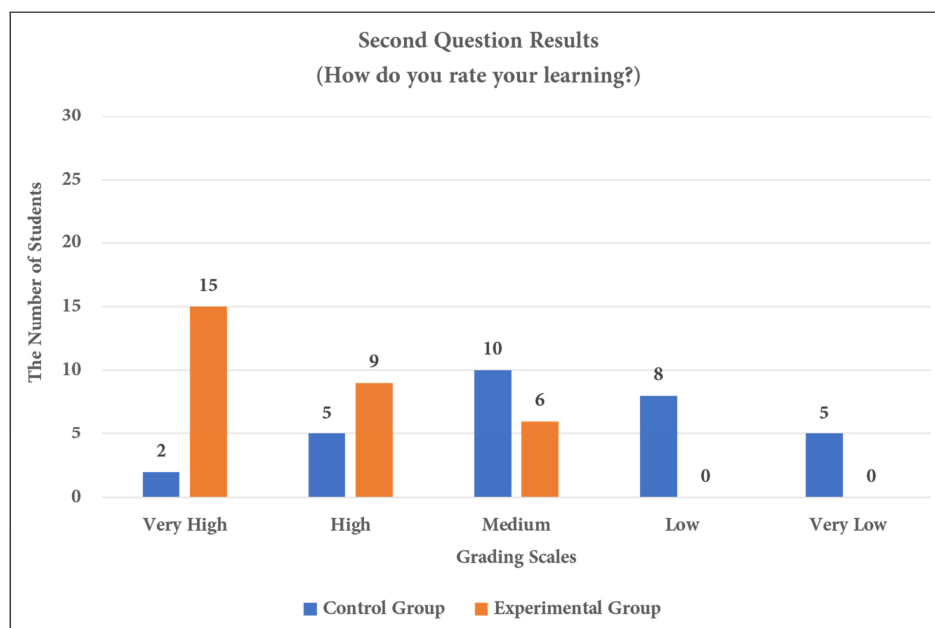

Figure 1. First Question Results.

Analysis of the first chart: The graph of the first question shows that the students of the experimental group find the taught content interesting and attractive, while the students of the control group have chosen a low level of attractiveness for the taught content. Because out of 30 students in the experimental group, 18 people chose the very high option and 10 people chose the high and medium options. Out of 30 students in the control group, 20 students have chosen medium, low, and very low options, which indicates that the taught content was not interesting for the students in the control group.

The second question of the questionnaire: How do you rate your learning?

Figure 2. Second Question Results.

Analysis of the second chart: The graph of the second question shows that the students of the experimental group

have considered a higher level of learning than the students of the control group for themselves, and besides that, the students of the control group believe that they did not learn the content as they should. This is because 24 out of 30 students in the experimental group chose very high and high options, while 23 out of 30 students in the control group have chosen medium, low, and very low options which shows that the students in the control group are not satisfied with their learning level.

The third question of the questionnaire: Choose your level of interest to further research the topics in this lesson.
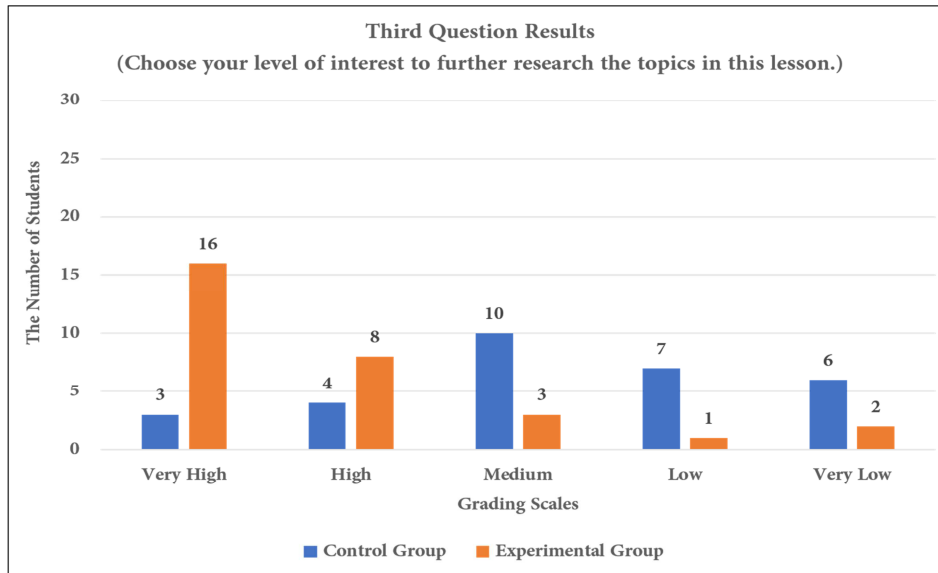

Figure 3. Third Question Results.

Analysis of the third chart: According to the results of the third graph, almost half of the students in the experimental group have given a high-level score to further research on the taught subject (Iranian history and civilization). While more than half of the students in the control group did not show much interest in continuing to learn or do more research in this field. As can be seen in the graph, 16 students of the experimental group have chosen the very high option, and in the next stage, 8 students of the experimental group have chosen the high option, so it can be concluded that students in this group are interested in further research on the subject.

But on the other hand, in the control group, the largest number of students, i. e. 10 people, have chosen the medium option, which means that it does not matter to these students to learn more about the lesson. For the control group, low and very low options have the largest number of students in the next grades, therefore, this means that 13 out of 30 students in the control group do not want to do more research in the field of Iranian history and civilization.

The fourth question of the questionnaire: At what level do you rate the attractiveness of the method used by the teacher?
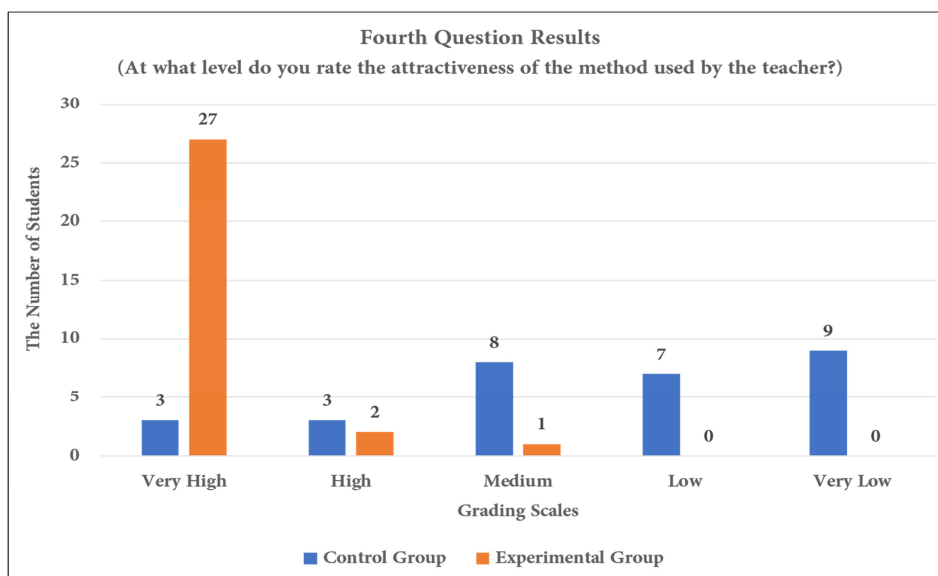

Figure 4. Fourth Question Results.

Analysis of the fourth chart: Examining the fourth diagram shows that the teaching method used is highly attractive for most of the students in the experimental group; but, the students of the control group did not find their teacher's teaching method so interesting and attractive. Because, 27 out of 30 students in the experimental group have chosen the very high option for the attractiveness of this teaching method, which means that for most students, learning with the help of board games is attractive. While 24 out of 30 students in the control group have chosen medium, low, and very low options. Therefore, the teaching method used by the teacher, which was the usual lecture method, was not attractive to the students of the control group.

As a result, according to the graphs, it can be concluded that the use of board games in education not only increases the academic motivation of students; It also increases the self-confidence and academic progress of students.

3.2. Test

A comparison of statistics and the average of the obtained data are presented in Table 1. Based on the research and also, according to the obtained results, it is understood that the use of board games in teaching has a positive effect on students' learning and academic achievement.

Table 1. *Comparison of the results of the control and experimental groups through the mean of the tests.*

Groups	Number	Sum of class points	Mean
Control	30	367	12.23
Experimental	30	496	16.53

Table 1 shows the sum and average scores obtained from the control and experimental groups. Comparing the results of these two groups shows that the average score of the experimental group in the final test is higher than the control group.

Q1: How effective are game-based learning methods in fourth-grade students' learning?

Findings about Q1: According to the results as well as the average scores, it can be concluded that combining teaching with educational games increases students' learning levels. Therefore, the use of game-based learning methods has a positive effect on the academic achievement of fourth-grade students.

Q2: Does use board games increase students' motivation and interest in learning and searching for more about the subject matter?

Findings about Q2: According to the results of the questionnaires, which were completed by the students of both groups, it can be concluded that the use of board games makes teaching and learning more interesting. Also, if the game used includes characteristics such as the age, gender, and interest of students, it will attract students to the content and make them active in their learning process; The result of this issue is to encourage the students to do more research on the subject.

Q3: Will the use of board games in the teaching process make the class and teacher's teaching method more attractive?

Findings about Q3: According to the test results of both groups, the average scores of the experimental group were higher than the average scores of the control group, and also, according to the analysis of the questionnaire data, it can be concluded that the use of board games makes the class process, teacher's teaching method, and student`s learning more attractive. Because, if the classroom is not attractive for the students, they will not show the desire to learn and as a result get high marks on the tests. On the other hand, the average scores of both groups in the test, as well as the feedback in the questionnaires, are proof of this issue.

4. Conclusion

In the 21st century, due to the advancement of technology and children's easy access to a huge stream of information, teaching methods such as lectures will no longer meet the student's learning needs. Therefore, creative teachers should make many innovations in education and change their classes from teacher-centered to student-centered. In that case, students are motivated to learn and become active in their learning process.

One of the most effective methods by which this goal can be achieved is the game-based teaching method. Games, because they provide a stress-free environment for children, are considered a suitable factor for the formation of children's personalities and the development of their talents. Therefore, teachers can use this feature and combine different games with education and create "educational games". Educational games allow teachers to teach the most content to the largest number of students in the shortest time. For this reason, the current research investigated the effect of board games on students' learning, academic motivation, self-confidence, etc.

According to the results of the surveys of the questionnaires and also the results of the tests of the two control and experimental groups, the result was that educational games, specifically board games, increase the learning rate of students and increase their interest in learning. On the other hand, according to the students' feedback through questionnaires, it can be concluded that the use of board games or educational games makes learning attractive for students and increases their self-confidence in their learning level. Also, it increases students' interest in researching more about the taught subject. On the other hand, due to the fact that the way students sit was also changed interactively (in a circle), as a result, more friendly conversations were formed between students and increased intimacy among students. Therefore, according to the analysis of research data, it can be claimed that the use of board games increases students' learning.

5. Recommendations

According to the results of this research, the use of board games has positive effects on students' learning; so, teachers, curriculum planners, and parents can incorporate such games into their curriculum. In the following, suggestions for using board games in education are provided:

1. As much as possible, teachers should use educational games such as board games in their teaching process.
2. Curriculum planners can choose the contents of textbooks according to children's interests so that the learning process becomes more attractive for students.
3. As much as possible and according to the conditions, teachers should not use traditional teaching methods such as lectures and start to make educational innovations.
4. Considering that the design of some educational games requires working with computers, teachers should keep themselves up-to-date as much as possible in terms of familiarity with computers or new software.
5. Considering that today's students learn more by seeing, teachers can use educational media such as pictures, animations, and various games in their teaching.

References

[1] Adibnia, Asad (2010). Teaching methods and techniques of social sciences in elementary school. Khuzestan: Islamic Azad university.

[2] Aghazadeh, Moharam (2007). Guide to new teaching methods. Tehran: Aeizh.

[3] Arizi, Hamidreza, & Abedi, Ahmad (2003). Analysis of the content of elementary school textbooks according to the construct of achievement motivation. Educational innovations quarterly, 2003, 5 (2), 29-52.

[4] Cheng, Ching-Hsue, & Su, Chung-Ho (2012). A Game-based learning system for improving student's learning effectiveness in system analysis course. Procedia - Social and Behavioral Sciences 31 (2012) 669–675.

[5] Cheng, Yi-Chun (2018). The Effect of Using Board Games In Reducing Language Anxiety And Improving Oral Performance. Electronic Theses and Dissertations. 899.

[6] Demutti Pimpão Martins, Fernanda, & Pedrosa Leal, Luciana, & Pereira Linhares, Francisca Márcia, & da Silva Santos, Alessandro Henrique, & de Oliveira Leite, Gerlaine, & Pontes, Cleide Maria (2018). Effect of the board game as educational technology on schoolchildren's knowledge on breastfeeding. Rev. Latino-Am. Enfermagem 2018; 26: e3049.

[7] Jˇaˇaskˇa, Elina, & Aaltonen, Kirsi (2022). Teachers' experiences of using game-based learning methods in project management higher education. Project Leadership and Society, 2022, 100041.

[8] Karbownik, Michal S., & Wiktorowska-Owczarek, Anna, & Kowalczyk, Edward & Kwarta, Paulina, & Mokros, Lukasz, & Pietras, Tadeusz (2016). Board game versus lecture-based seminar in the teaching of pharmacology of antimicrobial drugs a randomized controlled trial. FEMS Microbiology Letters Vol. 363, No. 7.

[9] Kebritchi, Mansureh (2008). Effects of A Computer Game on Mathematics Achievement And Class Motivation An Experimental Study. Electronic Theses and Dissertations. (2008), 3555.

[10] Khanzadeh, Hossein, & Ebrahimi, Shahrbanoo, & Khodakarami, Faezeh, & Ehya, Hosseinchaman (2019). The effect of teaching through movement games on learning concepts and interest in the mathematics of late learners. Journal of Psychological Sciences, 2019, 18 (79), 797-806.

[11] Noda, Shota, & Shirotsuki, Kentaro, & Nakao, Mutsuhiro (2019). The effectiveness of intervention with board games: a systematic review. Noda et al. BioPsychoSocial Medicine. (2019) 13: 22.

[12] Pratama, L D, & Setyaningrum, W (2018). Game-Based Learning: The effects on student cognitive and affective aspects. IOP Conf. Series: Journal of Physics, 1097 (2018) 012123.

[13] Sala, Giovanni, & Gobet, Fernand (2016). Do the benefits of chess instruction transfer to academic and cognitive skills? A meta-analysis. Educational Research Review, 2016, 46-57.

[14] Seif, Aliakbar (2015). Modern educational psychology (learning and teaching psychology). Tehran: Doran.

[15] Sulistianingsih, Endang, & Febriani, Rizka, & Pradjarto, JCS. (2019). The Effect on Interactive Board Games (IBG) on Vocabulary Achievement. Langkawi Journal of The Association for Arabic and English. 5 (2), 127-139.