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To the question of effectiveness of game-based and traditional teaching of biology concepts in English at school

The purpose of the present research is to compare the effectiveness of game-based and traditional teaching in learning and retention of the 7th grade biology concepts. The population of the research consisted of female and male students of the Boarding School for gifted children named after N.Nurmakov. The participants were selected using cluster sampling and were randomly divided into the experimental group and the control group (20 participants in each group). The participants in the experimental group were taught according to game-based teaching and the participants in the control group underwent traditional teaching. The learning test and the retention test were conducted one week and four weeks later after teaching each method. Data description was done and after analyzing the results some conclusions were made.

Key words: Biology concepts, Game-based teaching, Traditional teaching, Comparison, Score, Terminology, Concepts, Retention, Significant difference.

Playing is a child's natural way of learning.

Genevieve Roth [1]

Introduction

Perhaps as busy, responsible, mature adults, we have somehow sadly forgotten what it was like to have fun. If we consider the above quote it is not difficult to realize that playing was once our own «natural way of learning» as well. So we should not look at games as just child's playing, but rather as a tool that can (and should) be used for teaching learners at all ages. Games can be a safe opportunity to practice without fear of ridicule. Due to the competitive nature of many games, they can provide a great sense of accomplishment for many students and their teammates as they watch their progression.

Childhood is characterized by its close link to games. The concept, process and benefits of games have always been considered by researchers. According to Buytendijk [2], games exist because of childhood. Games provide children with opportunities to be creative and increase their abstract thinking; they serve as basis for optimal development of physical, social, emotional, and cognitive aspects in children [3]. By playing games, children have the chance to create a world where they dominate and can thus overcome their anxieties [4]. Games enable children to practice the skills required for facing future challenges; they can be regarded as a part of the educational environment that enable adaptation with school environment and help children learn, develop their emotional and social abilities, and improve their problem solving and abstract thinking [5]. Games are also very useful tools for fluency, as children tend to forget they are learning and so use the acquired knowledge spontaneously. In our own teaching experience, it seems the same can be true for adults. Basically, if you are having fun doing something, you don't have time to be bored or frustrated with it and will get more out of the activity. That's why games can help to make learning as positive and exciting experience, which will be important and motivating to the students. If we keep students motivated and engaged at the lesson, the results can be incredible.

There are teachers and educational policymakers with extreme ideas who believe that games are waste of time that can be devoted to more learning. From this viewpoint, games have no clear educational achievements [6]. Research has shown that reduced time of games and physical activities in schools are often justified by increased time devoted to reading skills and scientific method [7]. To override this opinion we would like to give good reasons for using games in a class:

1. More drilling/ controlled practice. There is a limit to how many times you can repeat the same material before your brain switches off. With some games, however, it is possible to repeat the same concepts many more times in interesting ways and so improve your ability to acquire the theme.

2. Fun and memory. When you are having fun the new concepts and notions that you hear and use are more likely to make an impression on your memory and so be easy to recall in the future.

3. Class spirit. Many classroom games help students to get to know each other and learn to work together. The team spirit this produces improves your motivation to come to class and do your best, and so helps increase your skills.

4. Warmers. Sometimes you need waking up before your brain is ready to absorb new language, and the best way of doing this is usually with a short game.

5. Using different parts of your brain. Normal classroom learning usually uses your memory quite a lot for vocabulary learning etc, and also sometimes uses the logical parts of your brain for things like working out grammar rules. If you can also engage other parts of your brain with things like drawing, hand eye coordination and music, this will help you to learn the subject more fully. The easiest way of bringing these things into class is usually games.

6. Competition and motivation. For some reason, people run much faster when they are running next to someone else. The same is true about games that make these feelings of competitiveness come out and so make you work harder to produce more complex and/or accurate knowledge.

7. Most students like games. It may be that the other students in your class are happy to do games, perhaps because they are less motivated to learn the subject and so tend to lose concentration if they don't have a short term goal like getting points. As long as each game has a serious teaching point, there is no reason why more serious and less serious students can't both gain from playing it.

8. Variety. Just like a sport or martial art, in order to master a language you need to approach it in many different ways. If you rule out any things that could be considered games, this really cuts down on the number of different ways you can try to improve your skills.

Games can be used as an ice-breaker or warm-up at the beginning of class, as an introduction activity for new vocabulary or grammar, or as a review exercise at the end of a lesson, chapter, or before an exam. While the preparation of materials may be time-consuming, «the time and effort it might require to create the materials for each game will be well worth the while, and from then on, you'll always have the materials available to you» [2].

Biology is one of the main subject of science. It plays not only a significant role in different academic stages, but it also helps children to develop comprehending scientific method, awareness of environment, inquiry based thinking. However, the research over the past few decades has shown that children have often had negative attitude toward and poor performance in biology. Although there is no consensus among researchers regarding the reasons for such a negative outcome [8], shortcomings in syllabi, materials and contents, and educational methods, inappropriate course books, inefficient and inexperienced teachers, and lack of motivation in learners are some of the factors that have been highlighted along with gender and ethnic factors as the reasons for negative attitude toward biology course, especially in the Third World countries [9]. The review of Johnson (1998) proves that 168 studies between 1924 and 1997 showed that cooperative learning improves learning, self-assessment, and the quality of interpersonal relationships as compared to individual or competitive learning [3]. The review of 37 studies by Singer (2006) indicates that, compared to individual learning, cooperative learning not only improves the attitude of students, but it also enhances their retention [4]. However, investigation of the 7th grade biology books and teaching methods shows that game has rarely been incorporated into this course and teachers seldom use games for teaching biology concepts. Despite the numerous advantages of games in developing the physical, mental, emotional, and social abilities of children, it has been shown that the time dedicated to games has considerably decreased in recent years, in both schools and kindergartens — conditions in which the time of games has been compromised by course programs [7, 10]. The present research tries to study and compare the effectiveness according to two teaching methods (game-based and traditional) on learning and retention of seven grade biology concepts.

Materials and methods

The present research is experimental with a pretest-posttest design. The population of the research consisted of the 7th grade female and male students of the Nurmakov School who were studying at the period of 2013–2014. The participants were selected using multi-stage random cluster sampling. First, one group was randomly selected from the 7th grade and then the second group was randomly selected. Finally, the teaching method of each group was assigned by chance. The experimental group started learning biology through games and the control group underwent the traditional teaching method. Each classroom included 20 students. During research the experimental group was familiarized with game-based teaching methods and a specific syllabus was created for each biology lesson. This syllabus included the learning and behavioral purposes, the games required for teaching the concepts, and the teaching and learning activities within the

time of each lesson (45 minutes). Besides the biology course book the teaching materials included laboratory equipment, internet, interactive board. The games used for teaching biology concepts included phrases — «who am I, crocodile, cold or hot, If I were», wise fish and flash cards. It must be noted that the research environment was equal for both groups. Assuming that the 7th grade students had not officially learned any biology concept, the learning and retention tests were conducted after teaching each concept. The tests were conducted simultaneously and with the same content for both groups. The tests were designed by the teacher and were based on the concepts of the 7th grade biology book (botany, zoology). The data was analyzed using learning test and retention test averages. Learning tests were consisted of 20 questions and retention tests were consisted of 50 questions.

Results and discussions

The learning and retention tests are presented in Table 1. The results show that there is a significant difference between the two groups in learning and using terminology. The comparison of test scores shows that the game-based learning group obtained higher scores from terminology. There is also a significant difference between the two groups in retention of using terminology with the game based learning group scoring higher than the traditional learning group. Based on the findings, there is no significant difference between the two groups in learning the using laboratory equipment, but a significant difference was observed in the retention of this concept. Comparing the meaning of retention scores shows that the game-based learning group obtained a higher score than the traditional learning group. It was also revealed that there is a significant difference between the two groups in learning the concepts of physiological functions. Comparison of the means indicates the higher score of the game-based learning group. A significant difference was observed between the two groups in retention of the concepts of physiological function, with the game-based learning group scoring higher in the retention test.

The results show that there is a significant difference between the two groups in learning the concepts of anatomical structures, and the game-based learning group has a higher mean score than the traditional learning group. Moreover, the results indicate that there a significant difference between the two groups in retention of the concepts of anatomical structures, with the game-based learning group scoring higher than the traditional learning group.

Table

Comparison of the learning and retention scores of the game-based and the traditional learning group

Statistics Variables	Traditional (N = 20)	Game-Based (N = 20)	Difference (N = 20)
Terminology (Learning)	17.4	18.7	1.3
Terminology (Retention)	39.7	44.5	4.8
Physiological Function (Learning)	16.9	17.8	0.9
Physiological Function (Retention)	39.3	43.7	4.4
Anatomical Structure (Learning)	17.1	18.3	1.2
Anatomical Structure (Retention)	40.3	42.3	2
Using Lab. Equipment (Learning)	18.1	18.6	0.5
Using Lab. Equipment (Retention)	41.5	46.2	4.7

Conclusion

The results of the present research showed that, in comparison to traditional teaching, game-based teaching improves learning and retention of such biology concepts as using terminology, physiological functions and anatomical structures. In terms of the concept of using laboratory equipment, a significant difference was observed only in the retention scores of the two groups. The theoretical basis and empirical evidence that support the advantage of game based learning are as follows: game-based learning can be considered as an active learning method. Active learning is a method of instruction in which learners actively participate in the learning process. In the present research, the students participated in the designated games for each biology concept and then started to work on the exercises of the course book. Therefore, it can be argued that games turn learning into a direct experience and create conditions where the learner is constantly required to make decisions. Games enable students to witness the outcome of their actions. While playing, children can use the data from their errors during the game to create a pattern that will allow them to solve

next problems more easily. The feedback children receive during the game quickly and objectively informs them of their performance.

Moreover, since one of the requirements for effective learning is motivation in the learners, and since studies have shown that lack of motivation is one of the main reasons for poor performance of students in biology, incorporating games and recreational activities into biology course can be a way of piquing the interest of students. Games bring children satisfaction, excitement, and escape from tension and anxiety. Studies have shown that fully structural, teacher-centered methods of instruction put much emphasis on theoretical issues, undermine the motivation and self confidence of students and damage their learning. Chang (2006) and Singer (2006) argued that children's attitudes of curiosity, motivation, and sense of mastery are the key to success in the elementary grades [4]. It can thus be concluded that learning increases when the process is accompanied by joy and amusement. The findings of the present research are consistent with the results of Kagan and Lowenstein (2004) who argued against the polarization of learning and game. Kagan and Lowenstein state that combining systematic instruction methods and game-based learning can increase the effectiveness of the curriculum [11]. In most educational games, students form groups and cooperate for achieving a common goal. Therefore, game-based teaching is not only an active learning method, but also a cooperative and community-based method. Cooperative learning refers to methods of instruction where students work in groups to complete tasks collectively toward academic goals [12]. The present research had certain limitations as well. The research was carried out on female and male students, and further studies can compare the effectiveness of game-based teaching on learning and retention of biology concepts in male and female students. Another limitation of the research was the lack of access to standard tests for seventh grade biology course and the use of tests that were designed by the teacher. Each of these limitations reduces the generalizability of the results and necessary caution in their interpretation. Summing up, considering the results of the research, it can be argued that using educational games in teaching the 7th grade biology concepts is remarkably more effective compared to the traditional teaching methods.

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Мектепте ағылшын тілінде биология пәнін оқытуда дәстүрлі және ойын түрінде оқыту әдістемесін қолданудың тиімділігі туралы

Мақалада Е.А.Бөкетов атындағы ҚарМУ-дың оқытушыларымен және Н.Нұрмақов атындағы дарынды балаларға арналған мектептің мұғалімдерімен бірігіп өткізілген зерттеу тәжірибесі сипатталды. Зерттеудің мақсаты — тәжірибелі оқыту топтарының және дәстүрлі оқыту топтарының нәтижеге жетуінің тиімділігінің салыстырмалы талдау. Тәжірибеге Н.Нұрмақов атындағы дарынды балаларға арналған мектептің 7-сынып оқушылары қатысты. Тәжірибені өткізгеннен кейін биология пәнін оқытуда дәстүрлі және ойын түрінде оқыту әдістемесін қолдану бойынша тиісті қорытындылары жасалды.

О.Зенгин, Ж.С.Калкабекова, А.А.Ганюкова

К вопросу об эффективности применения методики игрового и традиционного обучения в преподавании биологии на английском языке в школе

В статье описано исследование-эксперимент, проведенное учителями Школы для одаренных детей им. Н.Нурмакова и преподавателями КарГУ им. Е.А.Букетова. Цель исследования заключается в сравнительном анализе эффективности достижения результатов обучения экспериментальных групп и групп традиционного обучения. В эксперименте принимали участие ученики 7 класса ШОД им. Н.Нурмакова. После проведения исследования были сделаны соответствующие выводы по применению методики игрового обучения и традиционной методики в преподавании биологии на английском языке.

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Formation of informational competence of university students in a credit system

The article reveals the author's approach to the organization of the process of formation of students informational competence under credit system. In this article the nature, structure, functions, development of informational competence of students were revealed and the methods for designing and pedagogical conditions were provided. The content of process's technological providing, which include the model and pedagogical technologies were proved. It is noted that the credit system of education has been recognized worldwide as one of the most important areas of integration of education with production, and as the essential component of the continuous educational system. And today it is necessary to form the elements of the new informational technologies.

Key words: competence, modern education, skills, technology, professional activity, educational process, professional tasks, system of knowledge, cognitive competence, information.

Important goals of modern education is to develop students' ability to act and to be successful, the formation of such qualities as a professional universalism, the ability to change the scope of activities, methods, activities at a high level. There are such demands as personality traits, mobility, determination, responsibility, ability to acquire and apply knowledge in unfamiliar situations, the ability to build communication with other people. Therefore, the main result of the activities of the educational institution should not become a system of knowledge, skills, and the ability of a person to act in a particular situation. This explains the emergence of many ideas of competency approach in education. Question on key competences has become a subject of discussion worldwide. Particularly relevant this problem sounds now in connection with the transition of Kazakhstan higher education from a linear system to speed the credit system of training of bachelors and graduates. Modernization of Kazakhstan education was a result of the need for understanding the specifics of the learning process in a «knowledge economy». The transition to an informational society requires solutions of fundamentally new problems of training people adapted to the rapidly changing realities that can not only receive, store and reproduce information, but also to produce new and manage information flows and effectively handle them [1].

The modern education, if it really claims to be modern is to create conditions for the formation of the graduates' competencies, which would ensure them success and demand for occupational and psychological comfort in their personal life. One of the key competences, in our opinion, is the informational competence.