

M.K. Omarova^{1*}, Y. Gelişli²

¹Karaganda Buketov University, Karaganda, Kazakhstan;

²Gazi University, Ankara, Turkey

(*Corresponding author's e-mail: omarchuk-83@mail.ru)

¹ORCID 0009-0005-8745-9328,

²ORCID 0000-0003-2816-3621

Gamification in vocational education: a comparative analysis of existing research frontiers

The modern transformation of education requires teachers to modernize outdated motivational schemes and apply new technologies of interaction with the modern generation of students. One of the innovations that technology has brought to the educational environment is gamification. In the article is current research and publications on gamification in education, including vocational education analyzed. Gamification in vocational education is a relatively new field of research. In recent years, scientific achievements in the field of gamification in education have grown rapidly. The growing number of publications on the application of gamification in education remains insufficient in terms of the development of scientific and methodological approaches to the use of gamification tools in the process of professional education, its use by teachers in the development of courses. In the article, research on the application of gamification in vocational education over the past five years was analyzed by the authors from several aspects. In the conclusion, the results of the conducted research analysis were shared by authors. The need to study the application of gamification in vocational education in Kazakhstan and to consider the possibility of applying gamification tools as an integral part of digital educational platforms of universities was noted by the authors.

Keywords: gamification, gamification tools, game technologies, education, vocational education, frontier, publication, learning motivation.

Introduction

Education is a key area of a country's socio-economic life and a cultural phenomenon that contributes to the accumulation of knowledge and skills as well as to the intellectual development of the individual [1]. This development ensures the growth of intellectual potential for the promotion and dissemination of knowledge, for the practical application and implementation of technical and other innovations. Modern higher vocational education is subject to the requirements of the state (compliance with standards and norms), society (compliance with the goals of social development) and the subjects of the educational process (compliance with needs). The increasing relevance of professional education requires improvement of the quality of teaching and instructional design of educational programs to personalize learning, meet the needs of students, and increase the competitiveness of higher education institutions. The modern professional education system is faced with the task of using modern educational technologies to develop the necessary skills.

One of the means is gamification, which gained popularity 15 years ago and is still an object of interest for researchers from various fields.

Gamification is a multidimensional and multi-layered approach to learning. Gamification keeps learners motivated in the learning process. Back in 2012, K.M. Kapp noted that the purpose of gamification is "to utilize it in a non-gaming situation" [2].

The concept of "gamification" was introduced to the public sphere by N. Pelling in 2002. The ideas of gamification were further developed by researchers J. McGonigal, G. Zikerman, Yu-Kai Chou and K. Werbach.

Yu-Kai Chou defines gamification as "human-centered design, i.e., extracting elements from games that make them entertaining and applying them to real life" [3; 21].

The concept of gamification is mainly used in retail, healthcare, marketing and advertising. In recent years, gamified commercial applications have become an important industry. Gamification is often used to promote a product, service, or application and boost its usage. A service is enhanced with game functions in order to create added value for users [4].

The application of gamification in management practice has shown its significant potential in the professional field.

As early as 2010, there were studies looking at the use of gamification in education. Many researchers note that the use of gamification in education has a positive effect on student motivation, which ultimately improves their learning outcomes [5].

There are a number of reasons for the increasing use of gamification in education by researchers:

- increasing motivation for certain actions or behaviors, increasing their meaning for learners (Li L., Hew K.F. & Du J., 2024; Kam A.H.T. & Umar I.N., 2024) [6, 7];
- improving the assimilation of learning content (Romero Rodríguez L., 2023) [8];
- individualization of learning: the gamification system provides personalized tasks and feedback, that take into account the level of knowledge and learning speed of each learner (Makhovych I., 2024) [9].

According to a comprehensive study of M. Ansar & G. George, “gamification can be beneficial at all academic levels from primary school. Gamified learning can increase learners’ motivation and intellectual performance. Gamification can make learning more fun, which is the first benefit of this type of learning” [10].

There are works by researchers that analyze the negative effects of gamification in education (A. Toda, 2023) [11], including addiction, unwanted competition and off-task behavior [12].

The scientists O.V. Orlova and V.N. Titova distinguish gamification from other game approaches by its systematic nature, which they understand as “not episodic insertions of the game into the structure of the activity, but a holistic process of gamified support for that activity”. Furthermore, the authors state that the scope of gamification can be “any complex and rather routine activity that does not take place in a playful context and leads to discouragement and lower motivation among students” [13].

Lack of a holistic view of the directions and prospects of gamification application in vocational education makes it difficult to adapt the best world practices to the specifics of the Kazakhstani educational system. The results of the analysis of existing studies will highlight the key trends and the most effective approaches in gamification in vocational education. This will provide a basis for the development of strategies aimed at the integration of gamification into vocational education in Kazakhstan, taking into account national characteristics and priorities. The results of the analysis can provide valuable information to researchers and all those who are interested in the state of research related to gamification in vocational education.

Methods and materials

Purpose of the article: to perform a quantitative and qualitative analysis of scientific research, publications on the application of gamification in education, particularly in vocational education; their orientation. In this study, a theoretical, comparative and statistical analysis of dissertation researches in Kazakhstan, Russia and Turkey was conducted. The analysis of studies from different countries allows us to identify similarities and differences in approaches to the study of gamification. The choice is conditioned by the fact that the primary analysis revealed the most profound dissertation research in the field of gamification of vocational education by scientists from these countries over the last 5 years. The study was carried out using online scientific libraries, information retrieval systems. The search was carried out in the databases of the National Scientific Portal of the Republic of Kazakhstan, the National Academic Library of the Republic of Kazakhstan, the Electronic Library of Dissertations and the database of the National Library “Milli Kütüphane” (Ankara, Turkey).

A theoretical, comparative and statistical analysis of publications was also conducted in scientific databases, such as Scopus, Web of Science and Google Scholar in the field of application of gamification in education, including professional education.

The search was also conducted with the keywords “gamification”, “education”, “higher education” and “vocational education” in the period 2020–2024 in the Scopus, Web of Science and Google Scholar databases. Articles were analyzed using qualitative and quantitative analysis methods.

The analysis was conducted according to the following indicators:

- growth in the number of dissertation studies over the last 5 years;
- coverage of gamification application in education in different fields (medicine, business, etc.);
- number of studies of gamification application in online learning;
- key objectives of gamification application in professional education.

The analysis was conducted to determine the extent of research on the application of gamification in vocational education. However, taking into account the relevance of gamification in education in general and

the rapid growth in the number of publications, some of the publications on gamification in vocational education remains unexplored.

Results and Discussion

The analysis of studies was started with dissertation studies on gamification in education. In general, there is a steady increase in the number of dissertation research on gamification in Kazakhstan, Russia and Turkey, including education (Fig. 1).

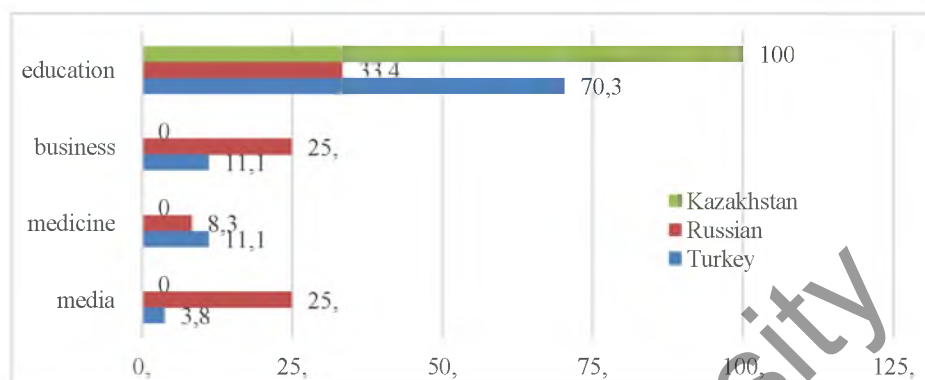


Figure 1. Correlation of studies on gamification by direction

The percentage was calculated from the number of dissertation research within the country. The search for Kazakh dissertation studies with the keyword “gamification” did not yield any clear results. It is possible to identify dissertation studies that include minor aspects of gamification, one of which relates to the direction of professional pedagogical training, namely the training of future chemistry teachers (Medetbayeva S.A., 2023). This study partially highlights the difference between gamification and game-based learning. Two studies refer to the primary and secondary level and reflect the use of game-based learning, games in the classroom, which does not correspond to the essence of the gamification phenomenon.

In Turkey in five years 27 dissertation studies were found in various fields. Thus, studies on the application of gamification in business are 11.1 %, in medicine 11.1 %, in tourism and journalism 3.8 %, in education 70.3 %, of which 10.5 % of studies in school education, 8.3 % in preschool education. 37 % of Turkish studies in education are devoted to the application of gamification in online learning and digitalization or flipped learning. Studies in vocational education account for 51.5 % of all studies on gamification in education.

In general, the purpose of using gamification in vocational education is to increase the involvement and motivation of learners. The effects of gamification on student engagement in online learning environments have been studied quite extensively by researchers in Turkey (E. Özmen, 2024; D. Çınar, 2023; T. Temel, 2022 et al.).

The Russian dissertation research base allowed us to distinguish 12 studies in different areas. Thus, studies on the application of gamification in business account for 25 %, in medicine 8.3 %, in journalism and television 25 %, in education 33.3 %, of which 8.3 % are studies in the field of school education. Studies in the field of vocational training account for 8.3 % of all studies on gamification in education. For other areas, the total number of studies is 8.3 %.

Russian studies of gamification in professional education consider the use of game mechanics as part of an automated interactive software environment that allows to form students’ intrinsic motivation for independent work (Asaulenko E.V., 2020). In addition, gamification is considered as a tool to increase the involvement of the audience of social networks of the university (Prokhorov A.V., 2023).

The dynamics of the number of dissertation studies in the countries is presented in Table 1.

Table 1

Growth of research on gamification over 2020–2024 years

Country	2020	2021	2022	2023	2024
Kazakhstan	0	0	0	1	0
Russia	5	2	2	3	0
Turkey	6	4	6	8	3

It is worth noting the growing interest in foreign dissertations that deal with various aspects of the use of gamification, including in education.

As a result of the search 50 results were found in the Scopus database, 47 publications were obtained in the Web of Science database. Statistical analysis of the search results for the two databases allowed us to see the dynamics of publications (Fig. 2).

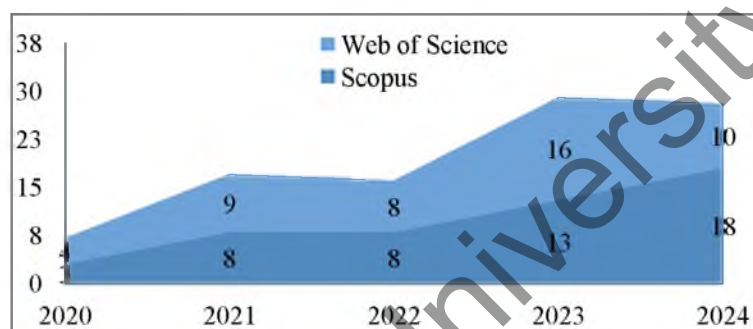


Figure 2. Dynamics of publications number

The search results showed that more often the application of gamification in higher education over the specified period was studied by authors from Spain and Turkey (Scopus), as well as Spain, the USA and Germany (Web of Science). It should be noted that the Web of Science scientific database contains a wider selection of publications according to the selected search criteria.

The content analysis of the most cited articles in both databases generally proves the positive effect of gamification on students' knowledge through the effectiveness of the learning process. Gamification has been proven to improve the relationship between attention, engagement, and student performance. In addition, it contributes to the humanization of the virtual environment created during the pandemic.

The results of the M. Sailer & M. Sailer study, based on the Self-Determination theory, also demonstrate the positive effect of gamification on students' intrinsic motivation and social kinship, but do not significantly affect the satisfaction of the need for competence within the framework of this study [14].

It is noted that there is a sufficient number of reviews, bibliometric studies aimed at determining the current state of the field, research programs, approaches to the concepts of gamification in digital learning. Most of the research examines the application of gamification in higher education in the context of digital and distance learning.

Researchers reveal different approaches to the application of gamification in teaching students using digital technologies. They propose ways to overcome the novelty effect when using computer-based gamified learning systems (CHH. Tsay et al., 2020), reveal the possibilities of using gamified applications that can contribute to the development of motivation for deep learning through the desire of students to demonstrate their academic achievements to friends (L. Aguiar-Castillo et al., 2021). In addition, they highlight in their publications the possibilities of various web programs, virtual reality, and virtual learning environments (J.K. Acosta-Medina, M.L. Torres-Barreto & A.F. Cardenas-Parga, 2021), computer-based gamified learning systems, digital Escape rooms (A. Makri, 2021; F.Yllana-Prieto, 2021) and interactive gamified online modules (M. Do, K. Sanford & K. Fischer, 2023).

Among the analyzed studies, there are attempts to study in detail the emotions and behavior of students in these learning spaces, as well as their impact on learning outcomes, teaching effectiveness, student engagement and enjoyment.

However, the growing number of studies on the topic does not satisfy the need for additional research to identify gamification strategies that are most suitable for vocational education and training, which was also noted in the study by F. Dahalan, N. Alias, M.S.N. Shaharom [15].

Despite the keyword search, the search results revealed articles related to the use of gamification in primary and secondary education, as well as containing the results of using games in the classroom, such as “Kahoot!” and checking their positive impact on student academic performance.

A review of the publications in Google Scholar was also carried out for the term “Gamification in Higher Education”. The total number of publications in Google Scholar by language query was 18,500 in English, 7,200 in Russian, 1,600 in Turkish and 109 in Kazakh. The total number of publications in the above languages shows that the largest number of publications are in English. This is due to the widespread use of English among researchers around the world. In addition, the earlier emergence of gamification and its study abroad is noted. The beginning of gamification research is considered to be the report of J. Hamari, J. Koivisto, H. Sars at the Hawaii International Conference [16].

The dynamics of publications on gamification in higher education are shown in Table 2.

Table 2

Number of publications in Google Scholar by year

Search word	2020	2021	2022	2023	2024
«геймификация/игрофикация в высшем образовании»	1530/194	1930/212	1890/228	1700/160	164/12
«жогары білім берудегі геймификация»	10	5	46	44	5
“gamification in higher education”	323	403	502	573	4170
“yüksek öğretimde oyunlaştırma”	270	418	488	504	57

The results of the publication review show that gamification in education is a vibrant and rapidly growing field of research, with hundreds of new relevant publications appearing every year in different countries.

We can see that the term “gamification” is commonly used in publications of the scientific community of Kazakhstan and Russia as a technology of the virtual educational space or as the technology of motivation to learning activities with game mechanics.

In comparison to a 2014 review of empirical studies on gamification in the fields of management, economics, computer science and education, Hamari J. and other researchers note that “gamification was still relatively new as an academic topic of study at that time and there was little established theoretical framework for its use and the correct application of the terms” [17].

The large number of citations of key articles in this field, as well as a large number of citations co-authored by several authors, show that the research community recognizes the work of other authors on gamification in education.

Based on the context of scientific works, it can be noted that the main areas for the use of gamification tools are business and education, which is also evidenced by the observations of other researchers (Kononova O.V. et al.) [18].

Recently, the number of studies on the application of gamification in online learning environments using online technologies and services has increased.

When analyzing the content of the publications, it can be seen that in some publications, researchers consider the application of gamification simply as games, only from the point of view of interaction with students when using educational computer games, educational computer programs with a game concept, game applications and online courses. This point is already followed less frequently compared to the 2012–2018 publications.

It should be noted that in gamification participants focus on the real goal of their activity. In a game, players achieve a quantitative result by solving a simulated task in accordance with predefined rules. Game elements are integrated into real-life situations in order to motivate certain behaviors and learning activities under given conditions [19; 80].

In vocational education, the main purpose of applying gamification is to increase motivation for learning, to change students' behavior when perceiving information, to increase students' attention to the theoretical part of the course, to develop students' research skills to solve learning problems. Under the condition of common value, joint creativity, empowerment of students, satisfaction of their psychological needs, gamification leads to the creation of effective learning systems without negative impact on student's academic performance, which allows developing relevant skills for today.

The primary direction of gamification application in education is e-learning for distance formats, self-study and continuous learning. A large part of the publications on gamification in education is dedicated to the presentation of new software tools for online learning. Gamification in vocational education is a relatively new field of research. Moreover, research on gamification in education is usually short-lived.

The use of gamification in vocational education and training remains a relevant and growing trend. However, in vocational education, there is a contradiction between the need for teachers to use gamification and their lack of competence in this area and misunderstanding of the essence of gamification.

Conclusion

The results of the research study therefore allow several conclusions to be drawn.

Gamification in vocational education and training has been studied in recent years from the point of view of how it can be used to increase learning motivation and participation in the learning process. Most studies focus on the aspects of gamification in the context of digitalization and online learning. Some studies focus on the potential of gamification for the development of the learner's personality as well as in the context of corporate training.

Foreign studies on the application of gamification in education, including vocational training, predominate due to the earlier appearance of the gamification phenomenon in business.

The results of the analyzed studies and publications need to be more thoroughly systematized to gain a clearer understanding of the current state and to identify promising areas of research in the application of gamification in professional education, including the training of future teachers.

Foreign researchers have characterized the application of gamification in the educational process in universities in terms of didactics, but predominantly through the use of computer technology. In vocational education in Kazakhstan, there is a contradiction between the need for teachers to use gamification in modern conditions and the insufficient level of their competence in this area, as well as the correct understanding of the essence of gamification in comparison with game technologies.

It is necessary to study the application of gamification in vocational education in Kazakhstan, including teacher training. Innovative processes require a new look at professional pedagogical education, the study of the goals, content, and technologies of training future teachers. It is also necessary to study the possibilities of applying gamification tools as part of the LMS learning system of Kazakhstani universities. There is a lack of research papers on the negative impact of applying gamification in professional learning, as well as studies analyzing its potential in the professional development of teachers.

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М.К. Омарова, Ю. Гелишли

Кәсіптік білім беру геймификациясы: зерттеудің қолданыстағы фронтірлеріне салыстырмалы талдау

Білім берудің заманауи трансформациясы оқытушылардан ескірген мотивациялық сызбаларды жанғыртуды, білім алушылардың қазіргі буынымен өзара әрекеттестіктің жаңа технологияларын қолдануды талап етеді. Технологияның білім беру ортасына енгізген жаңалықтарының бірі геймификация. Мақалада білім берудегі, сондай-ақ кәсіптік білім берудегі геймификация бойынша өзекті зерттеулер мен жарияланымдар талданған. Кәсіптік білім берудегі геймификация салыстырмалы түрде жаңа зерттеу саласы. Соңғы жылдары білім беруді геймификациялау саласындағы ғылыми жетістіктердің қарқынды өсуі байқалады. Білім беруде геймификацияны қолдану туралы жарияланымдар санының өсуі кәсіптік білім беру процесінде геймификация құралдарын қолданудың ғылыми-әдістемелік тәсілдерін әзірлеу, оны оқытушылар курстарды әзірлеу кезінде қолдану тұрғысынан жеткіліксіз болып қала береді. Мақалада авторлар соңғы бірнеше жылдағы кәсіптік білім беруді геймификациялау саласындағы зерттеулерге бірнеше аспектілер бойынша шолу жасауға тырысқан. Қорытындылай келе, жүргізілген зерттеулерге талдаудың негізгі бақылауларын бөліп көрсетеді. Қазақстандағы кәсіптік білім беруде геймификацияны қолданылуын зерттеу, сондай-ақ геймификация құралдарын университеттерде оқығудың цифрлық платформаларының құрамдас бөлігі ретінде қолдану мүмкіндігін қарастыру қажеттілігі атап өтілген.

Кілт сөздер: геймификация, геймификация құралдары, ойын технологиялары, білім беру, кәсіптік білім беру, фронтир, жариялау, оқу мотивациясы.

М.К. Омарова, Ю. Гелишли

Геймификация профессионального образования: сравнительный анализ существующих фронтиров исследования

Современная трансформация образования требует от преподавателей модернизации устаревших мотивационных схем, применения новых технологий взаимодействия с обучающимися. Одним из нововведений, появившихся благодаря технологиям в образовательной среде, является геймификация. В статье анализируются актуальные исследования на тему геймификации в образовании. Игровой подход в профессиональном образовании — относительно новая область исследований. В последние годы отмечается стремительный рост научных достижений в области геймификации образования. Рост количества публикаций о применении игровых технологий в образовании остается недостаточным с точки зрения разработки научно-методических подходов к использованию инструментов геймификации в процессе профессионального образования, ее использования преподавателями при разработке курсов. В статье анализируются исследования в области геймификации профессионального образования за последние несколько лет с разных аспектов. В заключении авторы выделяют ключевые наблюдения проведенного обзора исследований. Авторы отмечают необходимость изучения применения геймификации в профессиональном образовании Казахстана, а её интеграции в цифровые образовательные платформы университетов.

Ключевые слова: геймификация, инструменты геймификации, игровые технологии, образование, профессиональное образование, фронтир, публикация, учебная мотивация.

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Information about the authors

Omarova, M.K. — PhD Candidate, Senior Lecturer at the Department of Preschool and Psychological-Pedagogical Preparation, Karaganda Buketov University, Karaganda, Kazakhstan, e-mail: omarchuk-83@mail.ru;

Gelişli, Y. — PhD, Professor, Gazi University, Ankara, Turkey, e-mail: ygelisli@gmail.com.

Buketov University