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GAMES AS A TOOL FOR DEVELOPING COMPETENCIES

Abstract. The aim of this work is to present games as a teaching tool for developing the competencies of future employees. A literature review and participant observation were used to achieve this goal. The first part of the work presents the competencies of the future that employers will expect. The second part presents the theoretical foundations of using games in the learning process, examples of their applications in various fields, and the challenges associated with their implementation.

The analysis shows that games, especially those designed for educational and training purposes, are today an important tool supporting the development of competencies – from cognitive, through social, to technical. Despite many advantages, the use of games in education also poses challenges – both technological and methodological. Therefore, their conscious and thoughtful implementation, based on a thorough analysis of educational needs and goals, is necessary.

The added value of this work is the presentation of examples of games in relation to the competencies suggested by The Future of Jobs Report research.

Keywords: games, competences, formation.

1. Introduction

Technological changes and the development of artificial intelligence are causing machines and robots to increasingly replace human labor. This is true not only for repetitive tasks, but also for individual tasks. Technological progress is also rapidly influencing changes and the needs of the labor market. This raises the question: what competencies will be important in the future, and how can they be acquired? To enable people to choose a profession they will pursue with satisfaction and passion, as well as to have employment opportunities in the labor market, they must develop specific skills and expand their knowledge. Knowledge and skills can be acquired through

education, which, together with learning, shapes social and economic development. Changes driven by technological progress are taking place not only in the economy but also in the educational process. The development of digitalization allows for the use of materials available in virtual resources wherever there is internet access. Changing educational needs, and traditional teaching methods are increasingly giving way to modern, interactive forms of communication, are making games – both computer games, board games, and simulations – increasingly important. It should be noted that acquiring knowledge has become a defining aspect of professional careers, which is why so many teaching solutions are used in education. These are adapted to the level and needs of learners. Games are one of them. They are used not only in education and higher education, but also during training and coaching sessions.

The aim of this work is to present games as a teaching tool for shaping the competencies of future employees. The specific goal is to identify which competencies can be developed through games.

The work is theoretical in nature, based on the literature on the subject. A review and critical analysis of existing scientific publications directly related to the topic of educational games and the development of future competencies was based on the Scopus database.

To deepen the theoretical considerations, participant observation was also conducted during teaching sessions using educational games in economics and finance subjects. The observation was qualitative in nature and served to identify practical aspects of implementing games in the academic environment, including student reactions, engagement levels, and knowledge acquisition. The rationale for addressing this issue is the development of games, primarily computer games as a form of entertainment, as well as the increasingly widespread use of game mechanisms (gamification) in organizing teaching activities at various levels of education. It is also important to determine which competencies will be valued by employers of the future, in order to adequately prepare for the upcoming changes.

2. Competences of the future expected on the labour market

The educational process is nowadays considered in the context of the idea of lifelong learning. It presupposes the need, or even the necessity, of learning both in school and academic institutions (formal education) and in courses, training courses, workshops of various types and levels (non-formal education) and during work and relationships with other people (informal

education). The idea in question has been known for hundreds of years, but it has taken on a new meaning in today's times, characterized by an unprecedented acceleration of civilization, encompassing all spheres of modern human life (Kompetencje, 2018: 16). The learning outcomes in all the forms distinguished above are competences, which include:

- knowledge, i.e. a set of facts, laws, theories, principles and experiences acquired or independently constructed,
- skills, i.e. the ability/readiness to use knowledge in the performance of various tasks,
- social competence, i.e. the ability to design and shape one's own development and to participate autonomously and responsibly in social and professional life (cf. Ślawinski, 2013: 50, 52, 54).

The term competence of the future is naturally associated with foreseeable directions of civilizational change. These changes will affect all spheres of life. They can be predicted on the basis of analyses of the dynamics of development of selected fields of technology and engineering, observed, for example, in the last decade. It is technology and the resulting re-evaluation in the field of production and services that make us consider the necessary competences of employees – considered in the perspective of several years. The impact of technology is not limited to the field of professional work. It also plays an important role in modifying people's daily functioning in both their personal and social lives (Kompetencje, 2018: 23). Many factors ranging from social, economic to political shape the labour market. However, the labour market is expected to be most strongly influenced in the coming years by processes related to increasing automation, robotization and artificial intelligence.

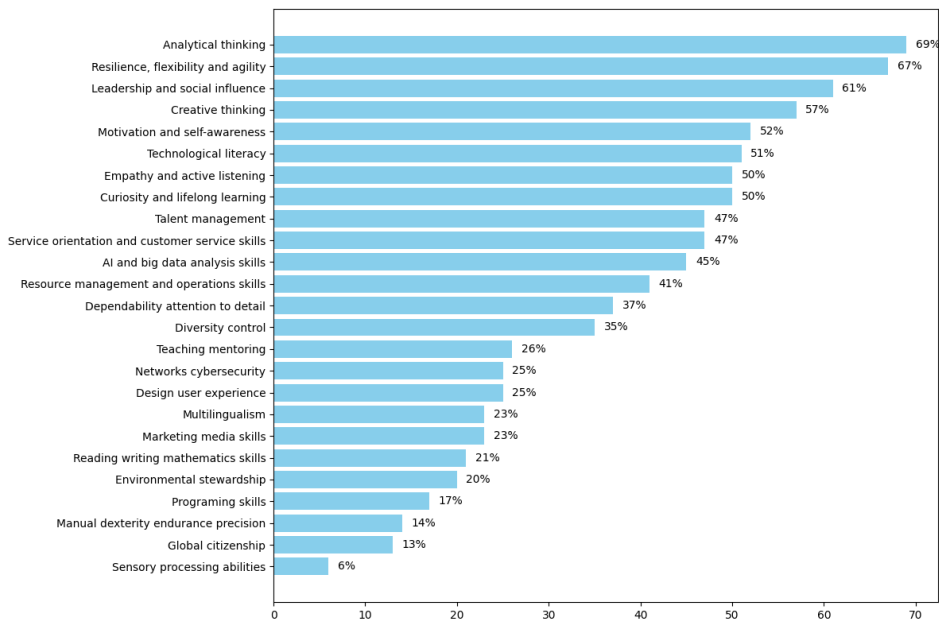
According to the “Future of Jobs Report 2025” published by the World Economic Forum, there are several key trends shaping the skills of the future:

- Technological changes: Technologies such as artificial intelligence, information processing, robotics, and automation are expected to have the greatest impact on the labor market. Therefore, skills related to AI, big data, networking and cybersecurity, and technological literacy will be in greatest demand.
- Green transformation: Climate change and mitigation efforts will drive demand for specialists in fields such as renewable energy engineering, environmental engineering, and electric and autonomous vehicle specialists.
- Demographic changes: The aging population in high-income countries and the growing number of working-age people in lower-income countries will have a significant impact on global labor markets.

- Economic uncertainties: The rising cost of living and the economic slow-down will require greater flexibility, creativity, and adaptability from workers.
- Access to technology: Expanding access to digital technologies is considered the most transformative trend that will impact businesses by 2030 (The Future 2025).

The “Future of Jobs Report 2025” is based on extensive research conducted by the World Economic Forum. The report is based on data collected from over 1,000 leading global employers, representing over 14 million employees in 22 industry sectors and 55 economies worldwide (The Future 2025). This research includes an analysis of the labor market and the competencies (Figure 1) preferred by employers.

Figure 1. Core skills in 2025 (Share of employers who consider the stated skills to be core skills for their workforce %)



Source: The Future of Jobs Report 2025, World Economic Forum, 2025: 35

Analyzing the data, several significant trends can be observed:

- Analytical thinking (69%) and resilience, flexibility, and agility (67%) occupy the highest positions, indicating the growing importance of analytical skills and adaptability in a dynamically changing work environment.

- Leadership and social influence (61%) and creative thinking (57%) emphasize the importance of leadership skills and creativity, which are key in team management and innovation.
- Motivation and self-awareness (52%) and technological literacy (51%) indicate the need for self-motivation and awareness of one's own skills, as well as proficiency in using modern technologies.
- Empathy and active listening (50%) and curiosity and lifelong learning (50%) emphasize the importance of soft skills, such as empathy and active listening, as well as continuous lifelong learning.
- Talent management (47%) and service orientation and customer service skills (47%) indicate the growing need for talent management and customer service skills.
- AI and big data analysis skills (45%) and resource management and operations skills (41%) emphasize the importance of skills related to Data analysis and resource management,
- Environmental stewardship (21%) and global citizenship (13%) indicate the growing importance of ecological responsibility and global awareness.

This chart shows that the future of work will require a wide range of skills, both technical and soft. Employees will need to be flexible, creative, capable of data analysis and resource management, as well as environmentally and globally aware.

In the case of the study of Polish enterprises conducted by the Future Industry Platform, competences are defined as broadly understood abilities to undertake specific activities and perform tasks using learning outcomes (knowledge, skills and social competences) and own experiences, which abilities have been acquired by a given employee. The Future Competences Observatory team assumed that, in accordance with the typology used by the European Center for the Development of Vocational Education, competences consist of three interdependent competence areas: (Standardy, 2021: 8)

- cognitive competence (theoretical knowledge related to the professional specialization),
- functional competences (practical skills related to the professional specialization in question and necessary for the performance of tasks),
- social competence (attitudes and behavior in interaction and the ability to acquire knowledge, acquisition of new competences and self-development).

From a labour market perspective, potentially competences – are formed for two purposes. Firstly, in order to meet the needs of the labour market

(i.e. for a utilitarian purpose), and secondly for personal self-development (i.e. for an autotelic purpose). The list of competencies of the Future Industry Platform Foundation Experts is presented in Table 1.

Table 1

List of competences created by the experts of the Future Competence Observatory of the Future Industry Platform Foundation

Competence group	Exemplifications
Cognitive competences	Inference (the ability to find deeper meaning and sense of phenomena, to notice and assign meanings that are not visible at first glance).
	Out-of-the-box thinking and creative adaptation of solutions (ability to create solutions other than those already existing or based on known principles and patterns, ability to quickly respond to changes).
	Data analysis related to the use of technology (the ability to process large data sets to obtain information and knowledge, allowing for argumentation based on numbers, the ability to reason and draw conclusions based on data).
	Interdisciplinarity (proficiency in understanding and combining concepts and concepts from various fields).
	Design thinking (the ability to adapt the way of perceiving and thinking to the tasks performed, the ability to translate complex tasks into a series of simple, interrelated actions, the implementation of which leads to the desired effects).
	Ability to analyze and assess risks (e.g. environmental risk, financial risk, occupational safety risk, etc.).
	Responsible decision-making (knowledge of ethical and legal aspects of business activities, ability to identify ethical problems in business activities, ability to critically analyze and evaluate business activities, taking into account aspects such as respect, responsibility, honesty, care and social good).
Technical competences as well as in the use and management of information and knowledge	Proficiency in using new media (ability to create and use new forms of media, e.g. online videos, blogs, presentations, portals; ability to critically evaluate content presented in the media, including social media, ability to create visually stimulating presentations that engage and convince recipients) .
	Managing information overload (the ability to filter important information, the ability to work in the so-called information noise, the ability to maximize cognitive abilities using available tools and techniques).
	Ability to integrate robotic stations, ability to work on the human-machine line (cooperation with machines, robotics – cooperative robotics).
	Programming (creating algorithms and programs for industrial devices, computers and mobile devices, as well as managing databases using various programming languages).

Competence group	Exemplifications
Social competence	Lifelong learning (improving qualifications and further education after completing formal education, the ability to increase one's own competence resources and, consequently, one's own attractiveness and value on the labor market).
	Social intelligence (the ability to build deep, trust-based relationships with other people, the ability to understand their needs, empathy, sensitivity and stimulation of desired interpersonal and social interactions).
	Working in a multicultural team (ability to operate in a culturally diverse environment based on, among others, knowledge of foreign languages; ability to adapt to changing conditions, ability to sense a diverse cultural context and respond to it).
	Effective work in virtual teams (ability to build commitment, be a leader of a virtual team, motivate spatially dispersed employees, ability to work effectively using instant messengers, virtual platforms, etc.).
	Social entrepreneurship (the ability to design social enterprises, the ability to notice social problems and propose innovative solutions aimed at solving them, combining business activities with public benefit activities).

Source: Standardy 2021: 13

The overview shows that employers are betting on specific skills and the title competences of the future, which will enable effective work at a high level of risk. Each of the analysis presented points to similar areas of future competencies. Employers of the future will value people who can think logically, cooperate with others and, at the same time, use the latest technological solutions.

3. Games as simulators of skills, knowledge and attitudes

We live in a world of games. Ken Binmore (2017: 11) wrote “[...] play appears whenever people interact.” Games are most often a form of entertainment. But not only that, they are a popular teaching tool that allows you to practice in simulated situations that may occur in reality. People participate in games for internal reasons, while in the case of games used in education and teaching, external factors also influence them. The technological revolution meant that board, battle and card games were also transferred to the Internet. Many people play computer games, but many

people also play board games. Nowadays, computer games are becoming more popular because they are an easily accessible form of entertainment and spending free time.

The game is also one of the most important contemporary methods of active training and improvement of management staff in decision-making. Game participants “focus” on the decision-making process, their analysis and assessment of effects (Zawadzki, 2003: 12).

In the literature on the subject, games are indicated as the most effective teaching method. They are a very effective teaching tool that triggers emotions and gives a lot of pleasure and satisfaction. They are most effective in teaching consensus-building skills. They provide the opportunity to quickly assess the effectiveness of participants’ actions and compare the results achieved with those of other game participants (Falecki, 2015: 9). When a game is used in teaching or continuing education, we are talking about a didactic game. Game play is also one of the most important contemporary methods of active training and development of managers in decision-making. Participants “focus” on the decision-making process, their analysis, and the evaluation of its consequences (Zawadzki, 2003: 12). In the literature, games are cited as the most effective teaching method. They are a highly effective teaching tool, triggering emotions and providing a great deal of pleasure and satisfaction. They are most effective in teaching the skill of reaching consensus. They provide the opportunity to quickly assess participants’ performance and compare their results with those of other participants (Falecki, 2015: 9).

Games, especially in the context of education and competencies, can be classified according to various criteria. Games can be classified according to their goals (educational, serious, recreational with educational value) and the competencies they develop (cognitive, socio-emotional, professional and technical, universal). This classification helps understand the diverse applications of games in educational and professional contexts, ensuring that the appropriate type of game is used to achieve specific learning outcomes (see: Sailer, Homner, 2020; Hamari, Koivisto, Sarsa, 2014, Metera, Pańków, Wach, 1983; Armstrong, Hobson, 1974; Balcerak, Pelch, 2000, Simmons, 2025, Becker, 2021, Zhai, Gao, 2024). Given continuous technological progress, the use of such games addresses contemporary trends in education, such as digital game-based learning, which in turn reflects “learning by doing” (experiential learning). The needs of new generations of students, for whom computers and virtual environments are completely “natural,” are also important (Awdziej & Tkaczyk 2016: 92–93).

4. Examples of games that support learning

Games are a versatile and flexible tool. As an educational technique, they require significant involvement from both the player and the teacher. This makes the learning process creative and discovery-based. Games are also popular as a training tool during training sessions. What makes games such an excellent tool for motivating participants is the immediate system response to player actions, the opportunity to assume roles that are normally unavailable, and the opportunity to experiment with ideas or situations that would be dangerous in everyday life (Symulacje 2012: 16, Szara 2021: 27–28). Table 2 presents selected games that contribute to the development of competencies in economics and finance.

Table 2

Examples of games that shape competencies in economics and finance

Game example	Developed Competencies	Source
Lemons-Market Game	Adverse selection due to information asymmetries	https://www.moblab.com/edu/games/lemon-market-buyer
Virtonomics	Knowledge, teamwork and individual decisions based on computer models	https://virtonomics.com/business-games-list/
HeadsUp! Econ	Students practice identifying, recalling, and understanding important economic concepts	Moryl, Gabriele, Desvira (2019)
Finanzmars	Students manage resources on Mars, involving construction, upgrading, and research to optimize profits	Josiek et al., (2020)
VALU-E Game	Entrepreneurial economic principles, game designed to teach the basics of establishing a sustainable enterprise, focusing on economic principles and environmental awareness Team building	https://value.games/business-games
Marketplace	Direct competition between players. By building their companies, students create a unique market. They conduct analyses, make decisions, and take risks.	https://www.marketplace-simulation.com/
Gorączka złota	Communication and teamwork skills	https://mindlab.pl/gry-szkoleniowe/
CasFlow	Analytical, negotiation, planning, and confidence-building skills	https://www.richdad.com/products/cashflow-classic
Capitalism II	Social and cognitive competencies	https://www.gry-online.pl/gry/capitalism-ii/zfc9c

Source: own elaboration

The presented examples of economics-themed games emulate real-world scenarios and challenges faced by entrepreneurs, managers, students, teachers, players, and anyone interested in business. These games can help develop strategic thinking and planning skills, decision-making and problem-solving, creativity and innovation, leadership and teamwork. They can develop knowledge in marketing and sales, finance and accounting, production, negotiation, and communication. Games can also help students discover new possibilities, test ideas, experiment with different strategies, and learn from mistakes. Games can be fun, engaging, and rewarding because they allow them to track progress, achievements, and feedback. Games that can be used in other disciplines are also presented below.

Thanks to their flexibility and ability to engage users, games can be adapted to different age groups, skill levels, and learning objectives (e.g., *Minecraft: Education Edition*). In formal education in schools and universities, games are used to support the learning process in an interactive and engaging way. Language games (e.g., *Duolingo*) are popular for supporting vocabulary and grammar learning. Mathematical games (e.g., *Matific*) develop logical thinking and numeracy skills. Historical simulations (e.g., *Civilization*) allow students to better understand historical and social processes. In vocational education, games are used to realistically replicate the workplace. For example, medical simulators (e.g., *Touch Surgery*) enable training in surgical procedures and teamwork in clinical settings. Military and emergency training utilize games to practice crisis response, such as virtual battlefields or evacuation simulations. Games are also an effective tool for educational activities outside of the school system. Examples include environmental games (e.g., *Climate Challenge*) that increase ecological awareness and teach environmental responsibility. Civic games (e.g., *Democracy*) support understanding of the mechanisms of democracy.

5. Discussion

When it comes to building future competencies, games can serve as tools for teaching and understanding basic concepts, laws, relationships, and functional dependencies. A game can be thematically selected based on the nature of the competencies being learned. Games vary in their underlying problem-solving approach, and depending on the topic, they are always designed to achieve a specific learning goal. Games often present participants with various problems and puzzles to solve. This requires log-

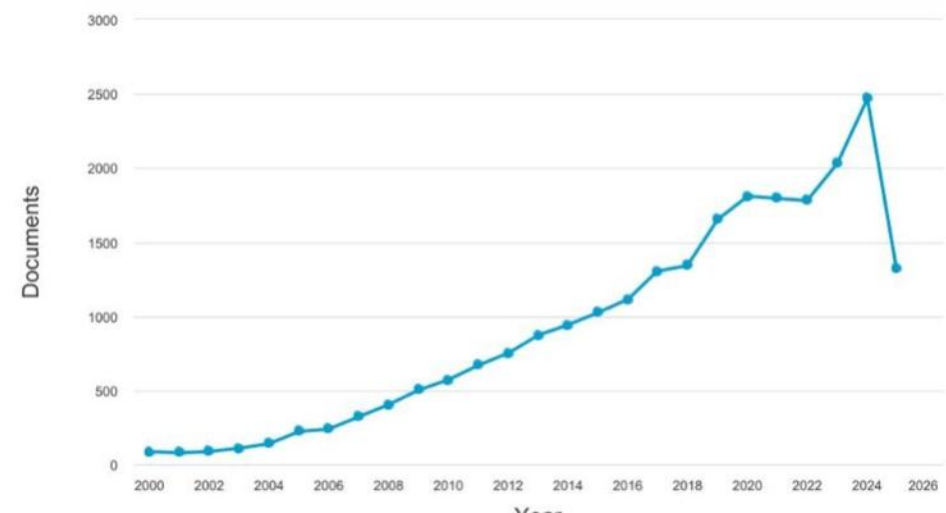
ical thinking, creativity, and teamwork skills. For example, the goal of a game might be to improve communication, customer service, develop strategies, etc.

Games teach problem-solving through a storyline. After completing the game, players can review their attitude, value system, and approach to the problem. The results obtained during the game provide the starting point for determining needs (game goals). The results also serve as information, control, and the assessment of players' skills, knowledge, and attitudes. Decision-making games allow for the development of decision-making skills (operational, tactical, strategic). In the case of a game with a specialized theme, narrow skills can be developed, such as forecasting, the use of heuristic, socio-psychological, and computer science methods, and problem-solving in mathematics, physics, and other areas.

Games also develop the ability to make various types of decisions. They allow players to acquire the skills of managing teams. Games can be an excellent opportunity to develop leadership skills. Participants can take on the role of a leader who organizes activities, motivates others, and makes decisions. Many educational games focus on building teamwork skills. Players must collaborate, share tasks, and make collaborative decisions. This is an excellent exercise for developing teamwork and relationship-building skills. Games enable the development of communication skills, both verbally and nonverbally. Participants must communicate effectively, express their needs, and listen to others. Games can cover selected fragments of reality in detail (e.g., marketing games). Players can learn to solve problems based on stochastic or probabilistic choices to achieve a goal. In this framework, games foster analytical and creative thinking. A game based on props, plot, and mechanics causes the player to become emotionally engaged in the game. Gameplay creates stressful situations and requires time management. Participants must navigate limited time, make quick decisions, and control their emotions.

The popularity of gaming is growing. It's worth noting the growing interest in educational games, which has translated into the number of studies on the use of games in education. This has increased significantly in recent years, especially since 2000, when the internet became widespread (Ekin, Polat, Hopcan, 2023; Videnovik, Vold, Kiønig, et al. 2023; Chugh, Turnbull, 2023). Approximately 70% of all research in this field was conducted in the last 10 years (Ekin et al. 2023). This is confirmed by the number of publications in the Scopus database. Analysis according to the criteria (TITLE-ABS-KEY (game) AND TITLE-ABS-KEY (skills)) allowed us to distinguish 23,698 documents (including 1,322 published in 2025) – Figure 2.

Figure 2. Document by year



Source: Scopus database

The popularity of games is highlighted by authors Paneva-Marinova, Pavlov (2018), Tan, Lau, Liaw (2017), Sandí-Delgado, Sanz, Lovos (2022), Brandl, Schrader (2024), and Baptista et al. (2024). Many authors also provide information on competencies developed through games (Table 3).

Table 3
Literature examples presenting selected competencies developed through games

Description	Source
Cognitive competencies (knowledge acquisition, reasoning, critical thinking, problem-solving, decision-making, creativity, communication, teamwork)	Sumiyana, Fajri, Saputra, Hadi, (2022), Richter, Kickmeier-Rust, Tschirky, (2024), Kassenkhan, Moldagulova, Serbin, (2025), Serrano, McGowan, Burgos, Moreno-Ger, (2023), McGowan, López-Serrano, Burgos, (2023), Serrano, McGowan, Burgos, Moreno-Ger, (2023), McGowan, López-Serrano, Burgos, (2023), Barr, (2018), Hall, Pais, Morando, Spreafico (2024), Martín-Hernández, et al. (2021).
Social competencies (communication, commitment, motivation, perseverance, tolerance)	Martín-Hernández, et al. (2021), Barajas, Álvarez, Muñoz, Oviedo, (2016), Zhong et al. (2025), Kim, Miklasz, (2021), Antonopoulou, et al. (2022)
Technical competencies (software development skills, adaptive learning, simulators, e.g., medical)	Maturana-González, et al. (2024)

Source: own study

Properly designed games can effectively support the development of a wide range of competencies. These can include the main groups of cognitive, social, and technical competencies, as presented in the table.

It should also be noted that in computer science education, games are primarily used to develop computational thinking and programming skills (Videnovik et al. 2023, Uskov, Sekar, 2014, Sousa, et al. 2014, Arosquipa Lopez et al. (2023), Zourmpakis, Kalogiannakis, Papadakis, 2023). Games are also used to assess student competencies, especially in the context of STEM (science, technology, engineering, mathematics) and soft skills (Gomez, Ruipérez-Valiente, Clemente, 2023, Abbas, Mahrishi, 2025, Dahalan, Alias, Shaharom, 2024).

Despite the growing interest in games, challenges and barriers to their use are worth mentioning. Integrating games into education is a significant challenge due to the lack of standardized methodology and resistance from teachers (Videnovik et al. 2023, Sandi-Delgado 2022). Furthermore, high academic qualifications, professional experience, and concerns about technology may influence teachers' acceptance of educational games (Sandi-Delgado 2022). These are some of the limitations to game use (Table 4).

Table 4
Advantages and disadvantages of games in competence building teaching

Advantages	Disadvantages
Player Engagement	Integrating games into the curriculum
Games Motivate Action	Competence in game-based teaching
They Allow You to Develop Knowledge and Skills	Cost of acquiring an educational game
Learning Without the Risk of Loss	Access to technical infrastructure
Receiving Feedback	Game quality (not all games can be used in teaching)
Interdisciplinary Learning	Difficulties in assessing learning outcomes using games
Learning Through Experience	Risk of excessive entertainment at the expense of educational content.

Source: own study

The benefits of using games are versatile. This is largely due to the dynamic nature of games, as the course of the same game never plays out exactly the same way. It depends on the specifics of the team, the interac-

tions between players, and the way the game's goals are achieved. Therefore, it can be assumed that each game brings different aspects of learning, in particular, opportunities to learn new concepts and practice new skills (Łodyga, 2013: 409).

Future research on this topic should focus on developing more specialized algorithms for assessing competencies through games (Gomez, Ruiperez – Valiente, Clemente 2023). There is also a need for research on the effectiveness of games in teaching (Hung et al., 2018). Using games in teaching competencies is an area that offers many opportunities but also poses numerous challenges for practitioners. However, serious games, gamification, and games in competency assessment are key trends shaping the future of education. Attention should also be paid to the development of technologies (VR, AR, AI), personalization of learning through games, integration with educational systems and e-learning platforms (Kucher, 2021, Hirani, Varin, 2022, Lucas, 2014, Hong, Shen, 2020, Lee, Shim, Kim, 2022).

6. Conclusion

Despite the changes brought about by technological progress, a person with knowledge and skills will always find their place in the job market. We don't need to fear artificial intelligence, but rather engage in self-reflection about what we know and what we need to learn to be competitive in the job market. The Future of Jobs Report highlights the duality of future competencies. Technological competencies are based on theoretical knowledge and practical skills. On the other hand, we have soft skills. Technological changes will require employees to learn to control their emotions and mental balance in the face of increasingly advanced devices, robots, and artificial intelligence. The competencies of the future analyzed in this work, in terms of cognitive, technical, and social competencies, can be created through the education process. Teaching tools and methods vary. One such approach is educational games. While not an alternative for everyone, games can always be considered a complementary solution.

The limitations of the presented content stem from the subjective perspective adopted, stemming from the use of games as teaching tools in the fields of economics and finance. The selection of examples was based on the literature available at the time of the analysis, which can serve as a starting point for further, in-depth research. A systematic literature review was not conducted, given the preliminary and cross-sectional nature of the study. It is also worth noting that, despite projected technological develop-

ments, employee expectations, particularly regarding specialized competencies, may change. Despite these limitations, the following recommendations for teachers and trainers should be noted:

- Games, especially those designed for educational and training purposes, are now an important tool supporting the development of various competencies – from cognitive, through social, to technical.
- Thanks to their interactive and engaging nature, they enable experiential learning, which promotes the lasting acquisition of knowledge and skills.
- Despite their many advantages, the use of games in education also presents challenges – both technological and methodological. Therefore, their conscious and thoughtful implementation, based on a thorough analysis of educational needs and goals, is essential.
- In the future, with the development of technologies such as virtual reality or artificial intelligence, games may become an integral element of learning systems, offering personalized and effective paths to competence development.

R E F E R E N C E S

- Abbas A., Mahrishi M., (2025). Contemplating and Visualizing Gameful Experience (GAMEX) in Education Through Bibliometric Analysis of Literature, 22nd International Learning and Technology Conference (L&T), jeddah, Saudi Arabia, 2025, 13–18, DOI: 10.1109/LT64002.2025.10940878.
- Antonopoulou H., Halkiopoulou C., Gkintoni E., Katsimpelis A. (2022). Application of Gamification Tools for Identification of Neurocognitive and Social Function in Distance Learning Education, *International Journal of Learning Teaching and Educational Research* 21(5):367–400, DOI: 10.26803/ijlter.21.5.19.
- Armstrong R., Hobson M., (1974). “Where All Else Fails” – An Approach to Defining the Possible Uses of Gaming-simulation in the Decision-making Process. In: *Simulation and Gaming*. Proceedings of the 12th Annual Symposium National Gaming Council and the 4th Annual Conference International Simulation and Gaming Association, 204–217.
- Arosquipa Lopez J., Nuñoncca Huaycho R., Yallercco Santos F., Mendoza F., Rucano Paucar F. (2023). The Impact of Serious Games on Learning in Primary Education: A Systematic Literature Review. *International Journal of Learning, Teaching and Educational Research*, 22(3), 379–395. <https://doi.org/10.26803/ijlter.22.3.23>.
- Awdziej M., Tkaczyk J., (2016). Wykorzystanie symulacyjnych gier decyzyjnych w badaniach eksperymentalnych w marketingu. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 459.

- Balcerak A., Pelech A., (2000). Pojęcia i definicje do nanomodelowania symulacyjnego [w:] *Symulacja systemów gospodarczych*. Prace Szkoły Antałówka 99 – suplement. Warszawa: Wyższa Szkoła Przedsiębiorczości i Zarządzania i Politechnika Wrocławska, 9–23.
- Baptista R., Coelho A., Vaz de Carvalho C. (2024). Training and Certification of Competences through Serious Games. *Computers*, 13(8), 201. <https://doi.org/10.3390/computers13080201>.
- Barajas A., Álvarez F. J., Muñoz J. y Oviedo A. C. (2016). Process for modeling competencies for developing serious games. *Revista Electrónica de Investigación Educativa*, 18(3), 146–160. <http://redie.uabc.mx/redie/article/view/1071>.
- Barr M. (2018). Student attitudes to games-based skills development: Learning from video games in higher education, *Computers in Human Behavior*, Vol. 80, 283–294. <https://doi.org/10.1016/j.chb.2017.11.030>.
- Bavelier D., Green C., (2016). *Nie takie gry akcji straszne*, Scientific American. Polska Edycja, nr 8(300).
- Becker K. (2021). What's the difference between gamification, serious games, educational games, and game-based learning? *Academia Letters*. <https://www.academia.edu/45044609>.
- Binmore K., (2017). *Teoria gier*. Tłum. Konarzewska I. Wydawnictwo Uniwersytetu Łódzkiego, Łódź.
- Brandl L., Schrader A. (2024). Serious Games in Higher Education in the Transforming Process to Education 4.0-Systematized Review. *Education Sciences*, 14(3), 281. <https://doi.org/10.3390/educsci14030281>.
- Chugh, R., Turnbull, D. (2023). Gamification in education: A citation network analysis using CitNetExplorer. *Contemporary Educational Technology*, 15(2), ep405. <https://doi.org/10.30935/cedtech/12863>.
- Dahalan F., Alias N., Shaharom M. (2024). Gamification and Game Based Learning for Vocational Education and Training: A Systematic Literature Review. *Educ Inf Technol* 29, 1279–1317 (2024). <https://doi.org/10.1007/s10639-022-11548-w>.
- Ekin C., Polat E., Hopcan S. (2022). Drawing the big picture of games in education: A topic modeling-based review of past 55 years. *Computers & Education*, 194, 1–15. <https://doi.org/10.1016/j.compedu.2022.104700>.
- Gomez M., Ruipérez-Valiente J., Clemente F., (2023). A Systematic Literature Review of Game-Based Assessment Studies: Trends and Challenges, *IEEE Transactions on Learning Technologies*, vol. 16, no. 4, pp. 500–515, doi: 10.1109/TLT.2022.3226661.
- Hall A., Pais S., Morando P., Spreafico M.L, (2024). Fun and Functional: Using Non-Digital Games to Promote Maths Engagement in Pre-service Teachers, *Proceedings of the European Conference on Games-based Learning* Vol. 18 No. 1, <https://doi.org/10.34190/ecgbl.18.1.2675> E-Book ISSN: 2049-100X.

- Falecki J., (2015). *Organizacja gier decyzyjnych w zarządzaniu kryzysowym*. Wyższa Szkoła Humanitas, Sosnowiec.
- Hamari J., Koivisto J., Sarsa H. (2014). Does gamification work? – A literature review of empirical studies on gamification. In *Proceedings of the 47th Hawaii International Conference on System Sciences* pp. 3025–3034. IEEE. <https://www.researchgate.net/publication/256743509>.
- Hirani C., Varin C. (2022). *Supporting Adult Learners through Games and Interactive Teaching: a Practical Guide*, Routledge, London, <https://doi.org/10.4324/9781003230120>.
- Hong J.-L., Shen H.-Y. 2020. “Game playing” and “Game making”: Gamified applications of topical education, ICCE 2020 – 28th *International Conference on Computers in Education*, Proceedings, <https://library.apsce.net/index.php/ICCE/article/view/4027/3902>.
- <https://apgcexperience.weebly.com/the-blog-professional-reflection--journal/the-learning-pyramid>
- <https://apps.microsoft.com/detail/9nblggh4r2r6?hl=pl-pl&gl=PL>
- <https://mindlab.pl/gry-szkoleniowe/>
- <https://value.games/business-games>
- <https://virtonomics.com/business-games-list/>
- <https://www.marketplace-simulation.com/>
- <https://www.moblab.com/edu/games/lemon-market-buyer>
- <https://www.richdad.com/products/cashflow-classic>
- <https://www.marketplace-simulation.com/>
- <https://www.gry-online.pl/gry/capitalism-ii/zfc9c>
- Hung H.-T., Yang J., Hwang G.-J., Chu H.-Ch., Wang C.-C. (2018). A scoping review of research on digital game-based language learning, *Computers and Education*, Vol. 126, 89–104.
- Josiek S., et al., (2020). Game-Based Learning Using the Example of Finanzmars, *2020 6th IEEE Congress on Information Science and Technology (CiSt)*, Agadir – Essaouira, Morocco, pp. 7–14, doi: 10.1109/CiSt49399.2021.9357296.
- Kassenkhan A., Moldagulova N., Serbin V., (2025). Gamification and Artificial Intelligence in Education: A Review of Innovative Approaches to Fostering Critical Thinking, *IEEE Access*, vol. 13, pp. 98699–98728, 2025, doi: 10.1109/ACCESS.2025.3576147.
- Kim Y., Miklasz K. (2021). What We Learned: From Games to Make Assessment Playful in Teaching in the Game-Based Classroom, New York, Routledge 152–161, https://www.researchgate.net/publication/356189212_What_We_Learned_From_Games_to_Make_Assessment_Playful.
- Kompetencje przyszłości*, (2018). red. Kwiatkowski S., Fundacja Rozwoju Systemu Edukacji, Seria Naukowa, t. 3, Warszawa.

- Kucher T. (2021). Principles and best practices of designing digital game-based learning environments. *International Journal of Technology in Education and Science (IJTES)*, 5(2), 213–223. <https://doi.org/10.46328/ijtes.190>.
- Lee W.-H., Shim H.-M., Kim H.-G. (2022). Effect of Game-based Learning using Live Streaming on Learners' Interest, Immersion, Satisfaction, and Instructors' Perception, *International Journal of Serious Games*, Vol. 9, Issue 2, <http://dx.doi.org/10.17083/ijsg.v9i2.457>.
- Łodyga O., (2013). Gryfikacja w edukacji ekonomicznej. *Edukacja. Magazyn Edukacji Elektronicznej*, 2(6).
- Lucas M., (2014). Learning from Gaming: Teachers' and Students' Perceptions, *Journal of Mobile Multimedia*, vol. 10, no. 3–4, pp. 206–217, doi: JMM/JMM.2014.11076144.
- Magova L, (2020). *The Development of Ethical Education through Digital Games, The Butterfly Effect. Implementation*, vol. 3, issue 1, 32–45.
- Martín-Hernández, P., Gil-Lacruz, M., Gil-Lacruz, A. I., Azkue-Beteta, J., Lira, E., Cantarero, L., (2021). Fostering University Students' Engagement in Teamwork and Innovation Behaviors through Game-Based Learning (GBL). *Sustainability*, 13(24), 13573. <https://doi.org/10.3390/su132413573>.
- Maturana-González G., Durango-Vanegas C., Zapata-Jaramillo C., Zapata-Rueda C. (2024). COMPETENT: A Game for Teaching Competencies Related to Software Development Teams, *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje*, PP(99):1–1 DOI: 10.1109/RITA.2024.3497832.
- McGowan N., López-Serrano A., Burgos D. (2023). Serious Games and Soft Skills in Higher Education: A Case Study of the Design of Compete!. *Electronics*, 12(6), 1432. <https://doi.org/10.3390/electronics12061432>.
- Metera, A., Pańków, J., Wach, T., (1983). *Teoretyczne i metodyczne zagadnienia symulacyjnych gier kierowniczych*. Warszawa: Instytut Organizacji i Doskonalenia Kadr.
- Moryl R., Gabriele F., Desvira J. (2019). HeadsUp! Econ: Making exam review sessions fun and effective. *The Journal of Economic Education*, 50(4), 388–397. <https://doi.org/10.1080/00220485.2019.1654953>.
- Paneva-Marinova D., Pavlov R., (2018). Mini-symposium on Future Trends in Serious Games for Cultural Heritage, Digital Presentation and Preservation of Cultural and Scientific Heritage 8:241–244, DOI: 10.55630/dipp.2018.8.25.
- Richter K., Kickmeier-Rust M.D., Tschirky D. (2024). Mastering the Game: How Level Structure and Game Elements Shape Competency Acquisition, *Proceedings of the European Conference on Games-based Learning* Vol. 18 No. 1, <https://doi.org/10.34190/ecgbl.18.1.2695>.
- Sailer M., Homner L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review*, 32, 77–112. <https://doi.org/10.1007/s10648-019-09498-w>.

- Sandí-Delgado J., Sanz C., Lovos E. (2022). Acceptance of Serious Games to Develop Digital Competencies in Higher Education, *Electronic Journal of e-Learning*, 20(3): pp. 351–367 DOI: 10.34190/ejel.20.3.2181.
- Serrano A.L., McGowan N., Burgos D., Moreno-Ger P. (2023). New Digital Tools to Teach Soft Skills and Sustainability for the Labor Market: Gamification as a Tool for Competency Acquisition in Realistic Contexts. In: González-González, C.S., et al. *Learning Technologies and Systems*. ICWL SETE 2022 2022. Lecture Notes in Computer Science, vol. 13869. Springer, Cham. https://doi.org/10.1007/978-3-031-33023-0_6.
- Simmons J. (2025). *Educational games vs. serious games: Understanding the distinction*. <https://stepofweb.com/difference-between-games-educational-games-serious-games/>.
- Sławiński S. (red.) (2013). *Słownik podstawowych terminów dotyczących krajowego systemu kwalifikacji*, Wydawnictwo Instytutu Badań Edukacyjnych, Warszawa.
- Sousa L., Figueiredo M., Monteiro J., José B., Rodrigues J., Cardoso P. (2016). Developments of Serious Games in Education. In *Handbook of Research on Human-Computer Interfaces, Developments, and Applications*; IGI Global: Hershey, PA, USA, pp. 392–419.
- Standardy kompetencji przyszłości, (2021). red. Strojny P., Nowak P., Hetmańska M., Malaki J., Skrzek K., *Platforma przemysłu przyszłości 2021*, https://przemyslprzyszlosci.gov.pl/uploads/2022/06/raport062022_fppp.pdf.
- Sumiyana S., Fajri F.A., Saputra M.A., Hadi C. (2022). Enhancing cognitive combat readiness: Gamers' Behaviours concentrating on convergent learning style, tacit-latent, and kinetic-active knowledge acquisitions, *Sec. Digital Education*, Volume 7, <https://doi.org/10.3389/feduc.2022.1062922>.
- Symulacje menedżerskie i studia przypadków. Szklenia biznesowe w oparciu o symulacje menedżerskie i studia przypadków – najlepsze praktyki*, (2012). Wyd. Uniwersytetu Gdańskiego, Gdańsk.
- Szara K., (2021). *Gry w procesie decyzyjnym. Wybrane problemy*, Bogucki Wydawnictwo Naukowe, Poznań.
- Tan A., Lau C., Liaw S. (2017). Serious games in nursing education: An integrative review, 9th International Conference on Virtual Worlds and Games for Serious Applications, VS-Games 2017 – *Proceedings*, Athen, Greece, pp. 187–188, doi: 10.1109/VS-GAMES.2017.8056599.
- The Future of Jobs Report* (2025). World Economic Forum.
- Uskov A., Sekar B. (2014). Serious games, gamification and game engines to support framework activities in engineering: Case studies, analysis, classifications and outcomes. In *Proceedings of the IEEE International Conference on Electro/Information Technology*, Milwaukee, WI, USA, 5–7 June 2014; pp. 618–623.

- Videnovik M., Vold T., Kiønig L. et al. (2023). Game-based learning in computer science education: a scoping literature review. *IJ STEM* Ed 10, 54. <https://doi.org/10.1186/s40594-023-00447-2>.
- Zawadzki W., (2003). *Gry kierownicze*. Akademia Obrony Narodowej, Warszawa.
- Zhai J., Gao J., (2024). Adapting and validating a game-based testing instrument for measuring nature connectedness in children, *Journal of Environmental Psychology*, 99, 2024, 102439, DOI: 10.1016/j.jenvp.2024.102439.
- Zhong Y., Fryer L., Zheng S. et al. (2025). The power of play: integrating competitive sandbox game for experiential learning to foster twenty-first century skills. *Int J Educ Technol High Educ* 22, 34. <https://doi.org/10.1186/s41239-025-00528-y>.
- Zourmpakis, A.-I., Kalogiannakis M., Papadakis S. (2023). Adaptive Gamification in Science Education: An Analysis of the Impact of Implementation and Adapted Game Elements on Students' Motivation. *Computers*, 12(7), 143. <https://doi.org/10.3390/computers12070143>.