The use of simulation games as a supporting tool in determining career paths for vocational high school students

Tiara Nazwa Nurazizah*, Agus Juhana

Universitas Pendidikan Indonesia, Dr. Setiabudi Street No.229, Bandung, 40154, Indonesia
*Corresponding author, email: tiaranazwa56@upi.edu

Article history
Submitted: 10 June 2026
Revised: 15 July 2026
Accepted: 25 July 2026
Published: 5 August 2026

Keywords
Game simulator
Gamification
Prisma
SLR
Vocational school

Abstract
Vocational education, as one of the contributors to work-ready graduates in Indonesia today, is facing a considerable challenge, namely a lack of student motivation to learn due to the absence of adequate information media to help them determine their career path after graduation. Therefore, this study was created with the aim of identifying learning media such as simulation and role-play gamification that are relevant to help introduce career paths to vocational high school students. This study used the SLR method by analyzing and synthesizing 60 filtered articles. The results show that the use of gamification in learning can increase student motivation, engagement, and skill competence. Good gamification is gamification that has been personalized with student characteristics and is able to improve traditional learning media. Role play used in gamification is also able to provide a realistic picture of the world of work so that it can increase players' awareness to prepare themselves for the world of work and college.

1. Introduction

Economic development and human resource development are intertwined; strong economic growth creates opportunities for human resource development, and a qualified workforce, in turn, drives sustainable economic growth (Rohmah et al., 2025). Vocational education serves as a key source for producing competent human resources for the workforce. This is because the curriculum in vocational education is designed to provide the technical skills and practical knowledge required by the future workforce. The objectives of vocational education consist of four main dimensions, namely: (1) developing basic human qualities, including intellectual, emotional, and physical abilities; (2) developing instrumental/functional qualities, namely mastery of science, technology, the arts, and sports; (3) strengthening national identity as Indonesians; and (4) ensuring the survival and development of the world (Slamet PH., 2009)

However, in practice, vocational high school educators still face numerous challenges in achieving this goal, particularly for students who have multiple options such as wanting to continue their education while also working. One of the challenges is students' confusion stemming from uncertainty about their post-graduation career paths due to a lack of adequate information regarding career tracks and relevant college majors, leaving students unsure of how to choose a major that aligns with their interests and potential. This problem is not limited to vocational high school students but also affects college students. According to Irene Guntur, an educational psychologist at Integrity Development Flexibility (IDF), as many as 87 percent of college students in Indonesia are in the wrong major (Zalfikar, 2021). This phenomenon occurs because students do not take the process of selecting a major seriously enough. Most college students choose a major because they are following their friends, receiving too much advice and input, being offered scholarships for certain majors, or simply to fulfill their parents' wishes (Ad'ha, 2024).

This issue has a direct impact on students' interest and motivation to learn, due to a lack of understanding of the learning objectives they are pursuing and how these will benefit them personally in the future. As a result, they are unwilling to engage fully in the learning process. On the other hand, technological advancements have successfully created various new innovations that present opportunities and can boost productivity in the global market, particularly in the fields of education and research (Ghoulam & Bouikhalene, 2024). These technological advancements have transformed the way students learn. The availability of technology that facilitates the search for new knowledge has made the current generation eager to discover knowledge independently through reading books, using the internet, digital learning, and even workshops (Kladchuen & Srisomphan, 2021). The use of technology in education is no longer limited to simply using the internet to search for information; it has now expanded to include various learning media, such as gamification and Game-Based Learning (GBL), which serve as tools to support the learning process.

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

According to a survey conducted by Youthmanual in 2020, more than 45% of college students felt uncertain about the major they had chosen, and 27% stated that they wanted to switch majors after completing one to two semesters of college. Aware of the persistently high rate of students in high school choosing the wrong college major, the author was motivated to conduct a literature review for this study with the aim that the results may serve as part of an effort to provide more concrete and in-depth information regarding game development for career guidance in schools, as well as to offer a clearer perspective on the benefits, challenges of use, and best practices for implementing games as a learning medium. The research questions (RQs) for this study are as follows:

a. How can games be used as a guidance tool in determining career paths?

b. How can simulation games help students visualize the environment and competencies required in the industrial world?

c. How can the phenomenon of choosing the wrong major be addressed?

d. What components need to be developed to increase student motivation and produce graduates with career paths that match their abilities?

2. Method

This study employs a Systematic Literature Review (SLR) method aimed at mapping previous research on gamification and simulation games in learning. A Systematic Literature Review (SLR) is defined as the process of identifying, evaluating, and interpreting all available research evidence with the aim of answering specific research questions (Latifah & Ritonga, 2020).

The Systematic Literature Review (SLR) in this study was conducted in three stages: planning, implementation, and reporting of the literature review. During the planning stage, various requirements for conducting the systematic review were identified. The next stage implementation involved identifying the research question (RQ), formulating a data search strategy, selecting studies that met the inclusion and exclusion criteria, assessing quality, and finally extracting and synthesizing the data. In the final stage, the results of the collected data are reported by writing up the research findings based on the literature reviewed in the previous two stages; the findings are then presented in the research report and summarized.

The data for this study were retrieved on October 3, 2025, from the Google Scholar database. This study relied on Google Scholar as its primary source of information because it offers broader coverage compared to other databases. In this study, the relevant documents were collected using the Publish or Perish (PoP) application and subsequently analyzed using the PRISMA method.

The researcher collected various journal article data by searching for keywords such as “Gamification” OR “Simulation Game” OR “Vocational High School” OR “Major” OR “SMK” OR “Skills Acquisition” OR “Competence” in the PoP application. The selected variables were the language used in the articles, the year of publication, the subject level studied, and the type of learning medium studied. The variable criteria are shown in Table 1.

Table 1. Inclusion and exclusion criteria for the screening process.

INCLUSION	EXCLUSION
Publication range in 2015-2025	Publications before 2015
Journal articles	Review articles, books, book chapters, review paper proceedings
English language	Languages other than English
Contains the keyword Gamification	Serious games, game-based learning
Specifications for vocational school (SMK) and universities	Elementary schools, primary education, high school
Role-playing and simulation games	VR, AR, XR

After the variables were identified, the author then extracted the frequencies for each variable. To facilitate mapping, the indices were analyzed quantitatively using a mapping analysis procedure based on the PRISMA guidelines, as shown in Figure 1.

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

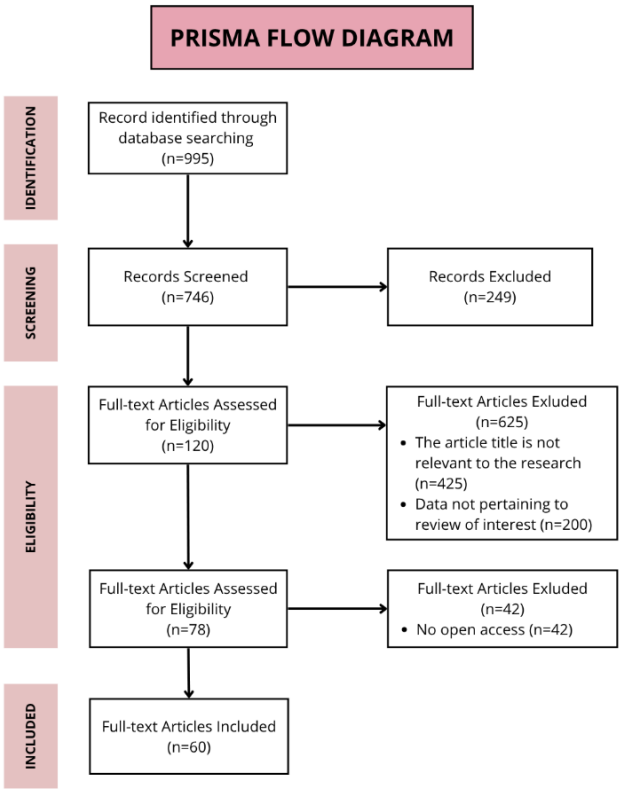

Figure 1. The PRISMA flowchart for this study

In this analysis, a total of 995 articles were identified from Google Scholar; these were subsequently filtered out because they did not meet the initial criteria, such as publication year, language, and article type. After the filtering process, 747 articles remained for further analysis. A subsequent filtering process, based on variable criteria, was then conducted, leaving 78 articles. A total of 18 articles were excluded because the data and topics discussed were similar to those in other articles. The final result of this analysis was 60 new study articles included in this research.

3. Results and Discussion

Vocational education is a level of education designed to prepare students for the workforce. However, it is not uncommon for vocational high school students to want to continue their education through higher education. This can sometimes pose a challenge for both students and schools due to the lack of adequate information to help students focus on their interests. As a result, vocational high school students who aspire to enter the workforce while simultaneously pursuing higher education often feel confused and lack reliable information regarding these two options. This is compounded by the fact that many of them struggle to decide on the career path that best suits their interests and talents, as they lack a deep understanding of the available career options. Consequently, many make hasty decisions, which ultimately cause them to lose motivation to pursue their future and tend to create an overwhelming mental burden.

This loss of motivation often leads vocational high school graduates to continue their education or work reluctantly and sub optimally. In higher education, this loss of motivation can make it difficult for students to understand the material, ultimately causing them to feel stressed and burned out, which may lead to them dropping out or discontinuing their studies.

As a result, the use of games in education as a supplementary medium for learning has begun to emerge and is currently growing rapidly. This initiative was developed in response to the need to address issues of demotivation and burnout among students, particularly as an effort to create a more innovative learning environment that fosters active participation. Game-based learning is not a substitute for traditional learning but rather a supplementary tool that can be used effectively to convey the core of fundamental knowledge (Chan et al., 2020; Häusler et al., 2023). Various types of games have been developed, such as gamification, serious games, and game-based learning (GBL). Gamification itself is a learning technique that uses games as a supplementary medium in learning activities, so the presence or absence of games does not alter the learning objectives. Meanwhile, serious games are a learning technique that uses games as the primary medium to

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

support the achievement of learning objectives. Thus, the presence or absence of serious games can influence the achievement of learning objectives (Watsjold et al., 2022).

The use of educational games in vocational schools as a medium for competency development can capture users' attention, demonstrate relevance, and instill confidence, thereby directly influencing their positive attitudes toward developing their competencies (Galbis et al., 2017). Didactic gamification can be used as a medium to improve the quality of education, promote social integration, and provide career guidance for students (Soboleva et al., 2018). The well-known game Minecraft is one of the most popular educational games because it creates a unique and enjoyable learning experience, helping to improve skills in evaluating problem-solving, analyzing various perspectives, and finding creative and collaborative solutions to problems. Minecraft also enhances research skills, fosters resourcefulness, improves multitasking abilities, and develops social skills through teamwork (Hewett et al., 2020).

The use of this game also offers many other benefits, one of which is helping to foster constructive pedagogical values, including: (1) the development of cognitive knowledge in the form of perception, understanding of the material, forming opinions, and drawing conclusions; (2) the development of higher-order cognitive skills, (3) the development of strategic thinking, (4) the development of group decision-making skills, and (5) the creation of a more realistic and diverse learning environment (Lengyel, 2022). Gamification in learning can enhance collaboration skills, the ability to respect others' opinions, independent learning skills, the application of knowledge in practice, analytical skills, and the ability to synthesize acquired information (Murillo-Zamorano et al., 2021). In addition to fostering constructive pedagogical values, the use of gamification and Game-Based Learning (GBL) in learning activities can also create a stronger learning environment between teachers and students in the classroom. These two learning methods can improve academic performance, engagement, and student motivation (Ascione & Tafuri, 2024). According to J Jayalath (2016), the use of gamification in vocational education has proven effective in fostering student engagement in understanding the material presented and in stimulating students' competitive spirit in learning. Similarly, Janaka, Velaora (2022); Okariz (2023); and Stafford & Vaci (2022) also state that, in addition to fostering students' motivation to learn, the use of gamification in learning can also sustain intrinsic motivation and maintain engagement over the long term.

Currently, the use of simulation games as a learning medium is growing rapidly. This is because simulation games can help illustrate real-world industrial scenarios, facilitate experiential learning and skill development, and expose students to challenges they may face, thereby preparing them to compete in the professional world (Dotsenko, 2021; Ragavan et al., 2021). Simulation or role-playing games can serve as an option for introducing career paths and higher education majors to vocational high school students. The combination of game-based and simulation-based learning enables students to develop and apply the technical knowledge and practical competencies they have previously acquired through authentic activities in a supportive environment (Titova et al., 2025). Role-playing and simulation games in gamification can enhance professional training and improve one's communication skills and knowledge (Ivanova, 2021). Decision-making-based simulation games can be implemented in schools using a more engaging curriculum that integrates theory and practice within a single game session. This type of game can facilitate students in the process of knowledge transfer in a unique and engaging way, teach them how to solve problems creatively, spark their interest, and allow them to gain new experiences in various areas, including interpersonal skills (STOMA et al., 2020). Teamwork-oriented simulation games can enhance life skills and proficiency in mastering learning material (Scheuring & Thompson, 2025). Emotional engagement in simulation games significantly influences higher-order thinking skills (HOTS), while behavioral engagement can affect problem-solving abilities, and cognitive engagement can influence a person's critical thinking and creativity (Huang et al., 2023).

Cognitive and affective learning that contributes to the improvement of users' critical thinking skills can also be fostered through these simulation games. Furthermore, the use of simulation games in learning has a more profound impact by influencing an individual's attitudes and skills when applied to continuous learning (Gatti et al., 2019). For example, a study by Novoseltseva (2022) analyzing nursing students' habits after using simulation games showed that these simulation games increased students' awareness of the importance of scheduling and work organization. The students realized that a nurse's role encompasses providing care, developing care plans, and managing a team. This demonstrates that simulation games are indeed an effective option for accurately depicting the professional environment.

The application of simulation techniques must be realistic, authentic, and engaging so that their use can be optimized and enhance students' motivation to learn (Hope et al., 2021). In addition, creating gamification that is personalized according to students' abilities can also foster critical thinking and decision-making skills among vocational high school students in workplace simulations (Zhu Jin et al., 2024). Effective gamification is that which provides students with the freedom to understand their goals through features personalized to their needs (Dichev et al., 2014; Masharova et al., 2020). Adjustments to the curriculum, learning materials, and mastery of learning are also elements that must be prioritized when creating an educational game (Dichev et al.,

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

2014). The use of games can also serve as a reference for future curriculum adjustments, as competency assessment data provides valuable insights into curriculum effectiveness (Willig et al., 2021).

The use of games in learning has been proven effective in enhancing motivation, student engagement in the learning process, and critical thinking skills (Folomieieva et al., 2024; Alshammari, 2020; Antón-Solanas et al., 2022; Altomari et al., 2023; Campillo Ferrer et al., 2020; Velaora et al., 2022; Lampropoulos et al., 2023; . To effectively utilize it as a supportive medium for providing information related to academic majors and career paths, a thorough understanding of how to implement gamification is necessary for it to be considered successful. Digital-based learning or e-learning can be successful if, during its implementation, it is able to enhance students' motivation and learning competencies (J Jayalath, 2016). In addition, gamification is also expected to provide a learning experience that is enjoyable, stress-free, competitive, and self-directed (Samah & Ismail, 2021). According to Zakaria (2020), users of mobile gamification prioritize a learning environment that is enjoyable, engaging, and satisfying over differences in user competence or experience. Attention, active engagement, feedback, and consolidation are the four key factors determining this success (Lamrani & Abdelwahed, 2020). Other challenges that must be overcome include limited internet access, service costs, and the availability of electronic devices and teachers, as well as balancing entertainment and education to implement simulation-based gamification (Omar et al., 2023) (Piki et al., 2020).

To create effective gamification that fosters student motivation and learning competencies, game designs must be relevant, effective, and tailored to educational needs. Such gamification should also provide a learning experience that is enjoyable, functional, innovative, and realistic, while promoting users' personal growth (Altomari et al., 2023). Gamification design based on Self-Determination Theory (SDT) can trigger active behavior supported by meaningful emotions (García et al., 2016). There are four game mechanics that must be implemented to enhance algorithmic thinking, including: (1) Progressive challenges, such as increasingly complex levels. (2) Iterative feedback, such as feedback to refine students' algorithmic solutions. (3) Rule-based systems, such as game mechanics that use explicit rules. (4) Goal-oriented objectives, such as well-defined game objectives that provide motivation and context for students to solve algorithmic problems. (5) Systematic thinking, such as careful and strategic planning and reasoning in game development, taking into account the systematic approach essential for algorithmic thinking (Kovtaniuk et al., 2025). In addition, control and meaning-making are also key factors in increasing user motivation (Chen et al., 2024). Practice, achievements, reward systems, community engagement, and transparency of results are key elements of innovative gamification design capable of fostering critical thinking skills (Dangprasert, 2023). The use of scoring and leaderboard features in gamification can be tailored to the needs and characteristics of the game, as some users prefer to focus on the learning material rather than on winning the game (Ángeles Hernández-Prados et al., 2021) (Michelet et al., 2020). Like Hermandez and Michelet, García (2016) also states that the use of scores and rankings in gamification design can sometimes lead to behaviors that fuel competition, thereby obscuring reflection during mission completion. However, according to López-Jiménez (2021) and Gaonkar (2022), the inclusion of badge features allows instructors to provide rewards without causing stress, feelings of inferiority, or negatively impacting the fulfillment of competence needs issues that can arise from competitive ranking systems.

4. Conclusion

The results of this systematic literature review, based on research published in journals from 2015 to 2025, indicate that the use of gamification in learning is an effective strategy for leveraging technology in education. Gamification has been shown to successfully foster students' motivation to learn and foster long-term student engagement. In addition to fostering learning motivation, the integration of games with simulations also helps develop students' technical knowledge and practical competencies because the learning process is personalized, making it more realistic and authentic to real life. A solution to the problem of how games can be used as a guidance tool in determining career paths and what components need to be developed to increase student motivation and produce graduates with career paths that match their abilities is the creation of simulation games that are personalized based on students' characteristics and the objectives of the game. Through this simulation game, students can experience the process of knowledge transfer by focusing on factors such as learning and mastery, attention, active engagement, feedback, and consolidation. The implementation of feedback and the selectivity of the game's design have a direct impact on the development of users' skills (Yang et al., 2022). The use of engaging game design is also a key factor in creating effective simulation games that remain relevant over the long term.

Author Contributions

All authors have equal contributions to the paper. All the authors have read and approved the final manuscript.

Funding

No funding support was received.

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/ or publication of this article.

Data Availability

The datasets generated during and/ or analysed during the current study are available from the corresponding author on reasonable request.

Declaration on AI Use

The authors declare that no artificial intelligence (AI) or AI-assisted tools were used in the preparation of this manuscript.

References

Ad'ha, D. (2024, November 19). *87% mahasiswa salah jurusan: begini cara jitu pilih jurusan sesuai minat dan bakat*. Diambil kembali dari Satu Persen: https://satupersen.net/blog/87-mahasiswa-salah-jurusan-begini-cara-jitu-pilih-jurusan-sesuai-minat-dan-bakat

Alshammari, E. (2020). Implementing Educational Game in Pharmacy. *International Journal of Pharmaceutical Quality Assurance*, *11*(1), 32–37. https://doi.org/10.25258/ijpqa.11.1.5

Altomari, L., Altomari, N., & Iazzolino, G. (2023). Gamification and Soft Skills Assessment in the Development of a Serious Game: Design and Feasibility Pilot Study. *JMIR Serious Games*, *11*, 1–16. https://doi.org/10.2196/45436

Ángeles Hernández-Prados, M., Luisa Belmonte, M., & Manzanares-Ruiz, J. C. (2021). How to run your own online business: A gamification experience in ESL. *Education Sciences*, *11*(11). https://doi.org/10.3390/educsci11110697

Antón-Solanas, I., Rodríguez-Roca, B., Urcola-Pardo, F., Anguas-Gracia, A., Satústegui-Dordá, P. J., Echániz-Serrano, E., & Subirón-Valera, A. B. (2022). An evaluation of undergraduate student nurses' gameful experience whilst playing a digital escape room as part of a FIRST-year module: A cross-sectional study. *Nurse Education Today*, *118*(August). https://doi.org/10.1016/j.nedt.2022.105527

Ascione, A., & Tafuri, G. (2024). *Learning, Play and Gamification at School*. *2*, 1–11.

Campillo Ferrer, J., Miralles Martínez, P., & Sánchez Ibáñez, R. (2020). Gamificación en la Educación Superior: Impacto en la motivación de los estudiantes y en la adquisición de competencias sociales y cívicas clave. *Sustainability*, *12*(12), 4822. https://www.mdpi.com/2071-1050/12/12/4822

Chan, C. S., Chan, Y. hang, & Fong, T. H. A. (2020). Game-based e-learning for urban tourism education through an online scenario game. *International Research in Geographical and Environmental Education*, *29*(4), 283–300. https://doi.org/10.1080/10382046.2019.1698834

Chen, Y., Xie, Z., & Chiu, D. K. W. (2024). Analytics of motivational factors of educational video games: LDA topic modeling and the 6 C's learning motivation model. *Education and Information Technologies*, *29*(16), 22023–22056. https://doi.org/10.1007/s10639-024-12726-8

Dangprasert, S. (2023). the Impact of Gamification on Creative and Innovative Skills of Graduate Students. *Journal of Theoretical and Applied Information Technology*, *101*(8), 3077–3087.

Dichev, C., Dicheva, D., Angelova, G., & Agre, G. (2014). From gamification to gameful design and gameful experience in learning. *Cybernetics and Information Technologies*, *14*(4), 80–100. https://doi.org/10.1515/cait-2014-0007

Dotsenko, N. A. (2021). Technology of application of competence-based educational simulators in the informational and educational environment for learning general technical disciplines. *Journal of Physics: Conference Series*, *1946*(1). https://doi.org/10.1088/1742-6596/1946/1/012014

Folomieieva, N., Pelekh, V., Haidamashko, I., Sivak, N., & Koriakin, O. (2024). Gamification in the educational process of higher education institutions. *Revista Amazonia Investiga*, *13*(73), 331–343. https://doi.org/10.34069/ai/2024.73.01.28

Galbis, A., Martí, J., & Currás, R. (2017). Higher Education Students' Use of Gamification for COMPETENCIES DEVELOPMENT. *Journal of E-Learning and Knowledge Society*, *13*(1), 129–146.

Gaonkar, D. S., Khan, D. D., Manisha, M., & Singh, A. (2022). Impact of Gamification on Learning and Development. *Journal of Advances in Education and Philosophy*, *6*(2), 63–70. https://doi.org/10.36348/jaep.2022.v06i02.003

García, O., Serra, J., Membrives, J., & Juarez, J. J. (2016). Waypass: A gamified self-knowledge quest for teenagers. *2016 8th International Conference on Games and Virtual Worlds for Serious Applications, VS-Games 2016*, 0–3. https://doi.org/10.1109/VS-GAMES.2016.7590380

Gatti, L., Ulrich, M., & Seele, P. (2019). Education for sustainable development through business simulation games: An exploratory study of sustainability gamification and its effects on students' learning outcomes. *Journal of Cleaner Production*, *207*, 667–678. https://doi.org/10.1016/j.jclepro.2018.09.130

Ghoulam, K., & Bouikhalene, B. (2024). Evaluating the impact of gamification on cognitive skills development in higher education: A case study electronics and sensors learners Evaluating the impact of gamification on cognitive skills development in higher education: Case study electronics. *International Journal of Technology and Management Research*, *4*(2), 96–109. https://doi.org/10.5281/zenodo.12730409

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

Häusler, R., Rathjens, M., Staegemann, D., & Turowski, K. (2023). Towards an Evaluation Concept for Business Simulation Games: Preliminary Work and Piloting in SAP ERP Teaching. *ICSBT International Conference on Smart Business Technologies*, *2023-July*(Icsbt), 94–103. https://doi.org/10.5220/0012144300003552

Hewett, K. J. E., Zeng, G., & Pletcher, B. C. (2020). The Acquisition of 21st-Century Skills Through Video Games: Minecraft Design Process Models and Their Web of Class Roles. *Simulation and Gaming*, *51*(3), 336–364. https://doi.org/10.1177/1046878120904976

Hope, D. L., Grant, G. D., Rogers, G. D., & King, M. A. (2021). Integration of an extended, immersive, gamified pharmacy simulation as a capstone event. *Pharmacy Education*, *21*, 656–669. https://doi.org/10.46542/PE.2021.211.656669

Huang, Y. M., Silitonga, L. M., Murti, A. T., & Wu, T. T. (2023). Learner Engagement in a Business Simulation Game: Impact on Higher-Order Thinking Skills. *Journal of Educational Computing Research*, *61*(1), 96–126. https://doi.org/10.1177/07356331221106918

Ivanova, N. (2021). *Role Play Technology in the Future Lawyers' Professional Training*. 146–153. https://doi.org/10.15405/epsbs.2021.05.02.18

J Jayalath, V. E. (2016). Gamification-embedded eLearning courses for the learner success of competency-based education: Case of Technical and Vocational Education and Training. *8th Pan-Commonwealth Forum on Open Learning*, *November*, 27–30.

Kladchuen, R., & Srisomphan, J. (2021). The Synthesis of a Model of Problem-Based Learning with the Gamification Concept to Enhance the ProblemSolving Skills for High Vocational Certificate. *International Journal of Emerging Technologies in Learning*, *16*(4), 4–21. https://doi.org/10.3991/ijet.v16i14.20439

Kovtaniuk, M. S., Shokaliuk, S. V., & Stepanyuk, A. N. (2025). Game simulators as educational tools for developing algorithmic thinking skills in computer science education. In *CTE Workshop Proceedings* (Vol. 12). https://doi.org/10.55056/cte.926

Lampropoulos, G., Keramopoulos, E., Diamantaras, K., & Evangelidis, G. (2023). Integrating Augmented Reality, Gamification, and Serious Games in Computer Science Education. *Education Sciences*, *13*(6). https://doi.org/10.3390/educsci13060618

Lamrani, R., & Abdelwahed, E. H. (2020). Game-based learning and gamification to improve skills in early years education. *Computer Science and Information Systems*, *17*(1), 339–356. https://doi.org/10.2298/CSIS190511043L

Latifah, L., & Ritonga, I. (2020). Systematic Literature Review (SLR): Kompetensi Sumber Daya Insani Bagi Perkembangan Perbankan Syariah di Indonesia. *Al Maal: Journal of Islamic Economics and Banking*, *2*(1), 63. https://doi.org/10.31000/almaal.v2i1.2763

Lengyel, P. S. (2022). Can the Game-Based Learning Come? *Virtual Classroom in Higher Education of 21st Century*, 112–126.

López-Jiménez, J. J., Fernández-Alemán, J. L., García-Berná, J. A., González, L. L., Sequeros, O. G., Ros, J. N., Carrillo de Gea, J. M., Idri, A., & Toval, A. (2021). Effects of gamification on the benefits of student response systems in learning of human anatomy: Three experimental studies. *International Journal of Environmental Research and Public Health*, *18*(24). https://doi.org/10.3390/ijerph182413210

Masharova, T., Nimatulaev, M., Kharunzheva, E., & Perevozchikova, M. (2020). Formation of highly-demanded soft skills in the game environment of educational WebQuest. *CEUR Workshop Proceedings*, *2861*, 332–341.

Michelet, D., Barre, J., Truchot, J., Piot, M. A., Cabon, P., & Tesniere, A. (2020). Effect of computer debriefing on acquisition and retention of learning after screen-based simulation of neonatal resuscitation: Randomized controlled trial. *JMIR Serious Games*, *8*(3). https://doi.org/10.2196/18633

Murillo-Zamorano, L. R., López Sánchez, J. Á., Godoy-Caballero, A. L., & Bueno Muñoz, C. (2021). Gamification and active learning in higher education: is it possible to match digital society, academia and students' interests? *International Journal of Educational Technology in Higher Education*, *18*(1). https://doi.org/10.1186/s41239-021-00249-y

Novoseltseva, D., Lelardeux, C. P., & Jessel, N. (2022). Examining Students' Behavior in a Digital Simulation Game for Nurse Training. *International Journal of Serious Games*, *9*(4), 3–24. https://doi.org/10.17083/ijsg.v9i4.543

Okariz, A., Huebra, M., Sarasola, A., Ibarretxe, J., Bidegain, G., & Zubimendi, J. L. (2023). Gamifying Physics Laboratory Work Increases Motivation and Enhances Acquisition of the Skills Required for Application of the Scientific Method. *Education Sciences*, *13*(3). https://doi.org/10.3390/educsci13030302

Omar, M., Ali, D. F., & Kamaruzaman, F. M. (2023). Challenges and Gender Differences in Implementing Gamification Approach Among Vocational College Lecturers in Malaysia. *Journal of Nusantara Studies (JONUS)*, *8*(2), 123–140. https://doi.org/10.24200/jonus.vol8iss2pp123-140

Piki, A., Ștefan, I. A., Stefan, A., & ... (2020). Mitigating the Challenges of Mobile Games-Based Learning Through Gamified Lesson Paths. *World Conference on …*, 73–80. https://www.learntechlib.org/p/218890/

Ragavan, N. A., Balasubramanian, K., & Francis, R. S. (2021). Rethinking the Learning Space to Build 21st Century Learning Skills: Bringing Simulation-Based Gamification to the Hospitality Higher Education. *Asia-Pacific Journal of Innovation in Hospitality and Tourism*, *10*(2), 95–101.

Rohmah, J., Ully Aryawati, N., & Putri Wahyunintyas, S. (2025). Peran Pembangunan Ekonomi dalam Membentuk Sumber Daya Manusia yang Unggul di Indonesia. *Jinu)*, *2*(3), 70–87. https://doi.org/10.61722/jinu.v2i3.4403

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557

Samah, L. A., & Ismail, A. (2021). Enhance Motivation and Engagement in Blended e-Learning for TVET Using Gamification. *Proceedings of the International Conference on Electrical Engineering and Informatics*. https://doi.org/10.1109/ICEEI52609.2021.9611100

Scheuring, F., & Thompson, J. (2025). Enhancing graduate employability–exploring the influence of experiential simulation learning on life skill development. *Studies in Higher Education*, *50*(2), 256–270. https://doi.org/10.1080/03075079.2024.2334837

Slamet PH. (2009). Peran pendidikan vokasi dalam pembangunan ekonomi. *Cakrawala Pendidikan*, *2*, 189–203.

Soboleva, E. V., Galimova, E. G., Maydangalieva, Z. A., & Batchayeva, K. K. M. (2018). Didactic value of gamification tools for teaching modeling as a method of learning and cognitive activity at school. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(6), 2427–2444. https://doi.org/10.29333/ejmste/89843

Stafford, T., & Vaci, N. (2022). Maximizing the Potential of Digital Games for Understanding Skill Acquisition. *Current Directions in Psychological Science*, *31*(1), 49–55. https://doi.org/10.1177/09637214211057841

STOMA, M., DUDZIAK, A., & RYDZAK, L. (2020). Simulation decision games and effectiveness of their use for higher education – theoretical view. *Scientific Papers of Silesian University of Technology. Organization and Management Series*, *2020*(149), 657–666. https://doi.org/10.29119/1641-3466.2020.149.54

Titova, L. O., Korniienko, S. S., Zahorodko, P. V., Moiseienko, M. V., & Donchev, I. I. (2025). Gamification as a tool for developing digital competence in higher education: Theory, practice, and implementation guidelines. *CTE Workshop Proceedings*, *12*, 78–107. https://doi.org/10.55056/cte.927

Velaora, C., Dimos, I., Tsagiopoulou, S., & Kakarountas, A. (2022). A Game-Based Learning Approach in Digital Design Course to Enhance Students' Competency. *Information (Switzerland)*, *13*(4), 1–25. https://doi.org/10.3390/info13040177

Watsjold, B. K., Cosimini, M., Mui, P., & Chan, T. M. (2022). Much ado about gaming: An educator's guide to serious games and gamification in medical education. *AEM Education and Training*, *6*(4), 2–5. https://doi.org/10.1002/aet2.10794

Willig, J. H., Croker, J., McCormick, L., Nabavi, M., Walker, J., Wingo, N. P., Roche, C. C., Jones, C., Hartmann, K. E., & Redden, D. (2021). Gamification and education: A pragmatic approach with two examples of implementation. *Journal of Clinical and Translational Science*, *5*(1). https://doi.org/10.1017/cts.2021.806

Yang, Q., Zhang, Y., & Lin, Y. (2022). Study on the Influence Mechanism of Virtual Simulation Game Learning Experience on Student Engagement and Entrepreneurial Skill Development. *Frontiers in Psychology*, *12*(January), 1–11. https://doi.org/10.3389/fpsyg.2021.772157

Zakaria, N. S., Iqbal Saripan, M., Subarimaniam, N., & Ismail, A. (2020). Assessing ethoshunt as a gamification-based mobile app in ethics education: Pilot mixed-methods study. *JMIR Serious Games*, *8*(3), 1–13. https://doi.org/10.2196/18247

Zhu Jin, Zhou Yue, Gao Chao, & Peng Yuanqiu. (2024). The Influence of Gamification Teaching Strategies to Skills Acquisition of Students among Selected Vocational School in China. *Journal of Computer Science and Technology Studies*, *6*(3), 115–135. https://doi.org/10.32996/jcsts.2024.6.3.11

doi: 10.62672/gbl.v3i1.36
© 2026 The Author(s)
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License
ISSN: 3110-2557