

Chapter 5

Empowering All Students: Revolutionizing Education with Gamification, Project-Based Learning, and Inclusive Support

Maria Efstratopoulou

United Arab Emirates University, UAE

Zubaida Shraim

United Arab Emirates University, UAE

Hadeel Saleh

 <https://orcid.org/0000-0001-5602-4851>

United Arab Emirates University, UAE

ABSTRACT

This chapter focuses on innovative teaching strategies for students of determination in UAE. Gamification, project-based learning, and innovative use of technology in special education promise to revolutionize how we educate and support students with special needs in the schools today providing new opportunities for these students. Education nowadays is moving away from rote learning towards dynamic, interactive, and enjoyable educational experiences. Interactive educational approaches have gained considerable momentum not only in mainstream education but also as an important tool in special education. By infusing fun and engagement into learning, teachers have the potential to unlock the talents of students with special educational needs or the gifted and talented. It is the collective responsibility of educators of the future to ensure an inclusive and supportive educational environment for all students, meeting their needs, and supporting them to reach their potential regardless of their abilities or challenges.

DOI: 10.4018/979-8-3693-0880-6.ch005

INTRODUCTION

This chapter explores the transformative potential of gamification, project-based learning, and technology in revolutionizing education and providing inclusive support for students with determination. The aim is to highlight how these innovative approaches can create engaging and empowering learning experiences for all students, regardless of their abilities or challenges.

First, the authors delve into the concept of gamification and its application in educational settings. This part of the chapter embarks on an exploration of the profound impact of gamification on education, with a specific emphasis on its ability to cater to the unique requirements of students facing diverse challenges. We delve into the fundamental principles of gamification, touching on its benefits for students with special needs or determination, and discuss the tools, technologies, and best practices for its successful implementation.

Next, the chapter explores the power of project-based learning as a pedagogical approach that nurtures critical thinking, collaboration, and problem-solving skills. The authors discuss how project-based learning can be tailored to accommodate the diverse needs of students with determination, enabling them to actively engage in meaningful projects that align with their interests and strengths.

Additionally, the chapter examines the pivotal role of technology in enhancing educational experiences for all students through gamification and project-based learning. By harnessing the potential of technology, the aim is to create inclusive learning environments where students with determination can thrive and reach their full potential.

Throughout the chapter, the authors emphasize the importance of addressing the unique concerns and challenges faced by students with determination. This chapter highlights strategies for inclusive instructional design, teacher training, and collaboration between educators, parents, and support professionals.

By the end of this chapter, readers will gain a comprehensive understanding of how gamification, project-based learning, and the use of technology can be harnessed to create inclusive, engaging, and empowering educational experiences that meet the needs of all students, including those with determination. The authors provide practical insights and recommendations to guide educators and policymakers in implementing these approaches effectively and inclusively, fostering a future of education that leaves no student behind.

REVOLUTIONIZING SPECIAL EDUCATION WITH GAMIFICATION

Gamification in an Inclusive Learning Environment

Education, a potent force for empowerment and personal growth, frequently presents formidable obstacles to students with special needs or determination (Corbett & Barton, 2018). The rigid structure and standardized curricula of conventional classrooms often hinder rather than nurture these individuals (Sawyer, 2011). To address this challenge and create more inclusive and engaging learning environments, educators have embraced an innovative strategy known as gamification (Alejandro & David, 2018). Gamification in education represents a significant departure from conventional teaching methods (Kapp, 2012). It shifts the focus away from rote learning and towards dynamic, interactive, and enjoyable educational experiences (Licorish et al., 2018). This approach has gained considerable momentum not only in mainstream education but also as an important tool in special education (Khaitova, 2021).

By infusing fun and engagement into learning, gamification holds the potential to unlock the talents of students with special needs or determination, equipping them with essential skills for navigating an ever-evolving world (Swargiary & Roy, 2023).

Gamification, an innovative educational strategy, incorporates principles from game design into non-game settings, notably educational contexts (Dichev & Dicheva, 2017). The primary objective of gamification is to enhance educational experiences by leveraging individuals' innate desires for achievement, competition, and rewards (Chou, 2019). This distinguishes it from traditional teaching methods, which often rely on lectures, textbooks, and standardized assessments (Lee et al., 2016), offering a more interactive and dynamic approach to learning (Nieto-Escamez & Roldán-Tapia, 2021).

To gain a deeper understanding of gamification, it is essential to implement its fundamental components. Gamification transforms the learning experience by incorporating gaming elements such as points, badges, leaderboards, quests and challenges, progression, and levels, creating a more interactive and engaging educational environment (Zichermann & Cunningham, 2011). Its capacity to tap into intrinsic motivators like achievement and competition (Qiao et al., 2022) positions it as a potent tool for enhancing education, particularly benefiting students with special needs or determination.

Gamification Supporting Students With Special Needs

Gamified learning environments offer numerous advantages for special needs students. One of the most significant distinctions between gamification and traditional teaching approaches lies in their capacity to engage and motivate students (Kim & Lee, 2015). Gamification leverages competition and achievement as motivators, encouraging individuals to excel, including special needs students who may struggle with motivation in traditional settings (Burke, 2016). Conventional classrooms often struggle to maintain students' interest and enthusiasm, particularly those with special needs. Gamification addresses this challenge by introducing elements such as challenges, competition, and rewards, inherently making the learning process more engaging and motivating (Kiryakova et al., 2014). Additionally, it promotes active learning, transforming students into active participants rather than passive recipients of information (Brull & Finlayson, 2016). This stands in contrast to traditional teaching methods, which often rely on passive listening and rote memorization. Moreover, gamification allows for a higher degree of personalization, adapting to individual learning preferences, strengths, and weaknesses; gamification tools prioritize accessibility, accommodating various needs, which can be particularly advantageous for students with special needs (Rodrigues et al., 2022). It allows tailored activities that accommodate each student's specific needs and learning styles, ensuring they receive the necessary support and challenges (Benton et al., 2014). Additionally, students receive instant feedback, fostering self-assessment and a sense of accomplishment (Rahayu & Purnawarman, 2019). They reduce anxiety, creating a non-judgmental space for experimentation and learning (Sajjad, 2017). Collaborative elements improve social skills, while sustained engagement and progression foster independence and self-confidence (Papanastasiou et al., 2017). In essence, gamification empowers special needs students, providing a supportive and accessible platform to conquer educational challenges and achieve their full potential (Jandigulov et al., 2023).

Challenges of Gamification in Special Education

Although gamification in special education offers significant advantages but also comes with various challenges. Challenges in implementing gamification techniques for students with special needs include

time constraints, workload, teacher training, teacher perceptions and attitudes, and the availability of resources and support (Karunamoorthy & Tahar, 2020). Accessibility is a major hurdle, with many gamification tools lacking consideration for special needs students (Smith & Abrams, 2019). Additionally, heavy reliance on technology can exacerbate the digital divide (Chan et al., 2022). Moreover, customization can be daunting for educators besides other challenges (Xiao & Hew, 2023). Addressing these challenges necessitates collaboration among educators, administrators, developers, and policymakers to create an inclusive and effective gamified learning environment that meets the diverse needs of all students, including those with special needs (Ismail et al, 2023).

Gamification Tools, Technologies, and Practices in Special Education

Technology-enhanced learning has ushered in a new era of opportunities for education, including special education (Rose & Meyer, 2002). The rapid advancements in educational technology offer innovative tools and resources that can be tailored to meet the unique needs of students with special needs or determination (Bates & Sangra, 2011). These technologies provide a platform for personalized learning experiences, allowing educators to adapt content and teaching methods to individual learning styles (Grant & Basye, 2014). Assistive technologies, adaptive software, and augmented reality applications can transform abstract concepts into tangible and accessible experiences (Bouck & Yadav, 2022; Yenioglu et al., 2021). Moreover, technology bridges geographical barriers, enabling students to access specialized resources and expertise beyond the confines of traditional classrooms (Dede, 1996). As technology continues to evolve, it holds the potential to revolutionize special education, making learning more inclusive, engaging, and empowering for every student (Grant & Basye, 2014).

Gamification has emerged as a powerful tool in special education, revolutionizing the way students with diverse needs engage with learning (Hussein et al., 2023). Through the integration of various tools and technologies, educators can create engaging and effective gamified learning experiences tailored to the specific requirements of their students (Kiryakova et al., 2014, October). Gamification in special education encompasses various innovative approaches, including educational games, apps, and platforms. Educational games, as a direct application, blend learning with engaging gameplay to facilitate interactive knowledge acquisition (Chaidi & Drigas, 2022). These games cover a wide range of subjects and cater to diverse disabilities, providing solutions for mathematics (Bakker et al., 2016), language (Charlton et al., 2005), and social interaction (Hussein et al., 2023). Gamified apps leverage mobile technology for personalized learning, adapting to individual levels and supporting communication development (Fernández-López et al., 2013). Learning Management Systems (LMS) incorporate gamification tools, allowing educators to design tailored courses for students with disabilities, aligning with individualized education plans (IEPs) (Sitra et al., 2017). Augmented Reality (AR) and Virtual Reality (VR) immerse students in interactive environments, aiding those with mobility or sensory challenges (Frasson, 2021). Accessible game controllers ensure inclusivity, while customizable learning platforms empower educators to adapt gamified content to meet unique student needs, effectively revolutionizing special education (Ali, 2023).

Overall, gamification tools and technologies have revolutionized special education, making learning more engaging, interactive, and accessible for students with diverse needs. Educational games, gamified apps, learning management systems, augmented and virtual reality, accessible game controllers, and customizable learning platforms offer a wealth of options for educators to create customized and inclusive gamified learning experiences. As technology continues to advance, the potential for gamification to empower special education students to reach their full potential remains boundless (Darawsheh et al, 2023).

Implementing gamification in special education necessitates careful consideration of best practices. Firstly, it is crucial to align gamified activities with individualized education plans (IEPs) to cater to specific student needs and goals (Akperov et al., 2022). Secondly, educators should select gamification tools and platforms that offer accessibility features, ensuring inclusivity for all students, regardless of disabilities (Santórum et al., 2023; Haleem et al., 2022). Additionally, maintaining a balance between fun and learning is key; gamification should enhance engagement without compromising educational objectives (Manzano-León et al., 2021). Regular assessments and data tracking can help tailor gamified content to each student's progress and needs (Rodrigues et al., 2021). Lastly, continuous professional development for educators ensures they are well-equipped to effectively integrate gamification techniques into their teaching methods, promoting a more inclusive and engaging special education experience (Manzano-León et al., 2022).

Conclusion

In conclusion, the future of gamification in special education promises to revolutionize how we educate and support students with special needs or determination. Technology advancements, a commitment to inclusivity, and personalized learning will shape this future, providing new opportunities for these students. It is our collective responsibility to ensure gamification creates an inclusive and supportive educational environment for all students, regardless of their abilities or challenges.

PROJECT-BASED LEARNING: FOSTERING CRITICAL THINKING AND COLLABORATION

Project-Based Learning in an Inclusive Learning Environment

Project-based teaching and learning have become increasingly prominent as support to challenges schools face for students with different abilities in the 21st Century (Filippatou & Kaldi, 2010). Project-based learning is simply an educational approach, that is a student-centered model that organizes learning around projects to actively engage in the real world (e.g., hands-on projects that engage students to collaborate and problem-solve) (Du & Han, 2016). According to Mkrttchian (2018), project-based learning actively involves learners in investigating real-world issues and answering related questions. Moreover, the active project-based learning process considers students' various learning styles and preferences (Bell, 2010). As an instructional method, project-based learning has been proven to support students with intellectual disabilities in an inclusive environment (Mkrttchian, 2018). Furthermore, a study conducted by Kee and Lai (2022) found that project-based learning can contribute to inclusive education and empower the socioeconomically disadvantaged community in the process. Kee and Lai (2022), also stated that despite facing challenges in conducting community engagement due to the COVID-19 pandemic, including closures of community centers and the need for social distancing, the project-based learning format can be extended to other inclusive education initiatives. Project-based learning serves to integrate design theory and practice, enabling students to develop a heightened awareness of inclusivity and drive social innovation (Kee & Lai, 2022). Project-based learning purposefully tackles challenges of diversity and equity in both curricular content and classroom methodologies, which would hold significant potential for students with disabilities (Boardman & Hovland, 2022).

Project-Based Learning Supporting Students With Special Needs

It is crucial that students who have special requirements are educated in a way that equips them to tackle learning obstacles using critical thinking abilities (Eldiva & Azizah, 2019). Sriram (2018), stated that project-based learning allows special education teachers to enhance student motivation and social interaction, align with individualized education plans (IEPs), integrate cross-curricular concepts into a single project, and initiate IEP transition services to better equip students for life beyond school. Instilling critical thinking skills in students with special needs can facilitate their comprehension of differing viewpoints and enable them to make choices; this proficiency, with consistent practice, can eventually empower them to lead independent lives within society (Suryani & Dewiana, 2016). As a result, the approach of project-based learning necessitates that students actively engage in addressing challenges through tasks, fostering research, and employing effective strategies for critical thinking either individually or in cooperation with peers (Eldiva & Azizah, 2019; Abdallah & Alkaabi, 2023). When educators offer innovative learning prospects that encourage students to construct knowledge actively, their students develop creativity and higher-order thinking (Amponsah et al., 2019). Project-based learning is seen as an effective approach when working with diverse and exceptional students. However, although teachers may be familiar with project-based learning as an instructional strategy, practitioners might have a limited grasp of the methodology involved in project-based learning (Hovey et al., 2014). In a study conducted by Purnomo et al. (2022), they found that project-based learning at inclusive primary schools during the COVID-19 pandemic effectively helped students with special needs to be active, participatory, and motivated to solve learning problems.

Project-Based Learning Challenges

The implementation of PBL is frequently met with challenges. According to Condliffe (2017), project-based learning requires a shift in the role of teachers, transitioning from being directors to becoming facilitators of learning. This shift also requires a willingness to embrace not only ambiguity but also increased levels of activity and movement within the classroom. Condliffe (2017) also states that teachers must acquire new classroom management techniques and understand how to effectively support their students in their learning endeavors, and incorporate technology as needed. Above all, they must have faith in their students' capability to excel through this approach (Condliffe, 2017). Moreover, Habók & Nagy (2016) argue, that thoughtful planning is necessary for the success of project-based learning, which can potentially feel like a burden to educators. Habók & Nagy (2016) also state that the planning and implementation of a project is notably time-consuming and requires great attention to detail from the learners. In a study conducted by Campbell (2012), challenging themes that emerged in the study were device distractions, missing directions, attendance, wasted time, class size, vocabulary instruction, follow-through, differentiation, percentage of ELL and special needs students, and student confidence and ability to continue their project (Ismail et al,2023; Ramadan, & Ismail2023).

Project-Based Learning and the Use of Technology

According to research conducted by Eskrootchi and Oskrochi (2010), it is proposed that students achieve optimal learning outcomes when they actively build knowledge through a blend of firsthand experiences, interpretation, and well-organized interactions with both peers and instructors, espe-

cially when technology is incorporated into the process. Beckett and Slater (2018), also mention that the use of technology in project-based teaching and learning can cultivate decision-making abilities, promote self-reliance, and bolster collaborative work skills. It also stimulates students' creativity, nurtures their capacity for creative thinking, and refines their problem-solving capabilities (Beckett & Slater, 2018). Furthermore, students tend to find project-based learning enjoyable when centered around technology. However, Bell (2010) argues that while students demonstrate remarkably advanced computer skills, it's crucial to remember that they are still young and require proper guidance to utilize technology safely and efficiently, thus unlocking the creative potential that technological engagement can provide. Furthermore, the utilization of technology during the COVID-19 pandemic demonstrated its effectiveness in facilitating project-based learning. In a study conducted by Hira and Anderson (2021), they found that to effectively conduct project-based teaching and learning online, it's crucial that activities and projects align with students' interests and cultivate skills that they can independently excel in. They also stated that students should be motivated to assume responsibility for their own learning, and activities should facilitate interactions between peers and mentors, even in virtual environments (Hira & Anderson 2021). Ultimately, technology should serve as a tool, and not the goal, allowing students to explore various technological resources throughout all facets of project-based learning. When technology is integrated authentically, it captivates students' interest, capitalizing on their proficiency with devices (Bell, 2010). Moreover, incorporating technology into project-based learning can provide learning support in an inclusive classroom, especially for students with specific learning disabilities as well as sensory-impaired disorders (Obradovic et al., 2015).

Conclusion

In recent times, the demands of the 21st century, encompassing both knowledge and skills, have reshaped the requirements and functions of both learners and educators. Currently, Project-Based Learning represents an innovative teaching approach that mirrors real-life scenarios for students. It caters to the learners' requirement for chances to apply their knowledge and skills, enabling them to expand their understanding and enhance their proficiency through hands-on activities (Habók & Nagy, 2016; Abdallah & Alkhrabsheh, 2019). Children with learning difficulties can engage in learning experiences through project-based learning at their own level to meet their social and academic goals. Habók & Nagy (2016), also state that the use of modern technology is essential for ELL and special needs students to increase independence, simplify communication with teachers and peers, and make learning more personalized. Additionally, students with special needs participating in project-based learning benefit from prior instruction on cooperative work. This preparation helps them grasp the significance of working together as a group and reinforces the importance of aiding and supporting one another's learning. (Filippatou & Kaldi, 2010). Moreover, it is important to understand that projects require a considerable amount of preparation and planning from teachers and learners (Campbell, 2012). In all, incorporating project-based learning into inclusive education not only promotes active engagement and personalized learning experiences for all students but also cultivates essential life skills and a deeper understanding of diverse perspectives, ultimately fostering a more inclusive and equitable learning environment (Boardman & Hovland, 2022).

CHAPTER CONCLUSION

In conclusion, the chapter on gamification, project-based learning, and innovative technology use in special education highlights the transformative power of gamification, project-based learning, and innovative technology usage in special education. These initiatives are not only transforming the educational landscape, but they are also causing a paradigm shift in how we see and support students with special needs.

The traditional rote learning approach to education is rapidly giving way to a more dynamic, interactive, and entertaining educational experience. This transformation is occurring not only in mainstream education but is also becoming an important tool in special education.

Educators are discovering untapped potential in kids with specific educational needs, as well as those who are smart and talented, by incorporating elements of pleasure and engagement into the learning process.

The essence of this chapter lies in the recognition that education is not a one-size-fits-all endeavor. Regardless of talents or challenges, every student needs a welcoming and encouraging learning environment. It is incumbent upon us, the future educators, to accept this communal obligation. By doing so, we can unlock each student's unique talents and potential, ensuring that no one falls behind.

The promise of innovative teaching practices offers hope for a brighter and more inclusive educational future in the UAE and beyond. We are not only revolutionizing education by continuing to research and apply these techniques; we are also nurturing a culture in which diversity is embraced and every individual has the opportunity to grow. The journey towards inclusive education is ongoing, and we can pave the way for a brighter future for all kids, regardless of their ability, through commitment and ingenuity.

REFERENCES

- Abdallah, A. K., & Abdallah, R. K. (2023). Achieving academic excellence: The intersection of teacher development, quality education, and entrepreneurship. In S. Chakravarti (Ed.), *Innovations in Teacher Development, Personalized Learning, and Upskilling the Workforce* (pp. 136–158). IGI Global. doi:10.4018/978-1-6684-5518-0.ch007
- Abdallah, A. K., & Al-Kaabi, A. M. (2023). Induction Programs' Effectiveness in Boosting New Teachers' Instruction and Student Achievement: A Critical Review. *International Journal of Learning, Teaching and Educational Research*, 22(5), 493–517.
- Abdallah, A. K., & Alkhrebsheh, A. (2019). The Best Leadership Styles for Preventing the Educational Crisis. *Option Journal*, 35, 90–105.
- Akperov, G. I., Artamonova, A. G., Khramov, V. V., & Sakharova, L. V. (2022, October). Mathematical Models and Algorithms of an Intelligent Platform for the Implementation of an Individual Learning Trajectory. In *International Conference on Intelligent Information Technologies for Industry* (pp. 424–436). Cham: Springer International Publishing.
- Aldabbus, S. (2018). Project-based learning: Implementation & challenges. *International Journal of Education, Learning and Development*, 6(3), 71–79.

Alejandro, P., & David, I. (2018). *Educational Research and Innovation Teachers as Designers of Learning Environments The Importance of Innovative Pedagogies: The Importance of Innovative Pedagogies*. OECD Publishing.

Ali, A. (2023). Exploring the Transformative Potential of Technology in Overcoming Educational Disparities. *International Journal of Multidisciplinary Sciences and Arts*, 2(1). doi:10.47709/ijmdsa.v2i1.2559

Amponsah, S., Kwesi, A. B., & Ernest, A. (2019). Lin's creative pedagogy framework as a strategy for fostering creative learning in Ghanaian schools. *Thinking Skills and Creativity*, 31, 11–18. doi:10.1016/j.tsc.2018.09.002

Bakker, M., van den Heuvel-Panhuizen, M., & Robitzsch, A. (2016). Effects of mathematics computer games on special education students' multiplicative reasoning ability. *British Journal of Educational Technology*, 47(4), 633–648. doi:10.1111/bjet.12249

Bates, A. T., & Sangra, A. (2011). *Managing technology in higher education: Strategies for transforming teaching and learning*. John Wiley & Sons.

Beckett, G. H., & Slater, T. (2018). Project-Based Learning and Technology. The TESOL Encyclopedia of English Language Teaching, 1–7. doi:10.1002/9781118784235.eelt0427

Bell, S. (2010). Project-Based Learning for the 21st Century: Skills for the Future. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 83(2), 39–43. doi:10.1080/00098650903505415

Benton, L., Vasalou, A., Khaled, R., Johnson, H., & Gooch, D. (2014, April). Diversity for design: a framework for involving neurodiverse children in the technology design process. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems* (pp. 3747–3756). ACM. 10.1145/2556288.2557244

Boardman, A. G., & Hovland, J. B. (2022). Student perceptions of project-based learning in inclusive high school language arts. *International Journal of Inclusive Education*, 1–16. doi:10.1080/13603116.2022.2091170

Bouck, E. C., & Yadav, A. (2022). Providing access and opportunity for computational thinking and computer science to support mathematics for students with disabilities. *Journal of Special Education Technology*, 37(1), 151–160. doi:10.1177/0162643420978564

Brull, S., & Finlayson, S. (2016). Importance of gamification in increasing learning. *Journal of Continuing Education in Nursing*, 47(8), 372–375. doi:10.3928/00220124-20160715-09 PMID:27467313

Burke, B. (2016). *Gamify: How gamification motivates people to do extraordinary things*. Routledge.

Campbell, S. A. (2012). The Phenomenological Study of ESL students in a project-based learning environment. *The International Journal of Interdisciplinary Social Sciences: Annual Review*, 6(11), 139–152. doi:10.18848/1833-1882/CGP/v06i11/52187

Chaidi, I., & Drigas, A. (2022). Digital games & special education. *Technium Soc. Sci. J.*, 34, 214. <https://heinonline.org/HOL/LandingPage?handle=hein.journals/techssj34&div=16&id=&page=>

- Chan, G. L., Santally, M. I., & Whitehead, J. (2022). Gamification as technology enabler in SEN and DHH education. *Education and Information Technologies*, 27(7), 9031–9064. doi:10.1007/s10639-022-10984-y PMID:35345601
- Charlton, B., Williams, R. L., & McLaughlin, T. F. (2005). Educational Games: A Technique to accelerate the acquisition of reading skills of children with learning disabilities. *International Journal of Special Education*, 20(2), 66–72. <https://files.eric.ed.gov/fulltext/EJ846936.pdf>
- Chou, Y. K. (2019). *Actionable gamification*. Packt Publishing.
- Condliffe, B. (2017). *Project-Based Learning: A Literature Review*. (Working Paper). MDRC.
- Corbett, J., & Barton, L. (2018). *A struggle for choice: Students with special needs in transition to adulthood* (Vol. 8). Routledge. doi:10.4324/9780429489716
- Darawsheh, S. R., Al-Shaar, A. S., Alshurideh, M., Alomari, N. A., Elsayed, A. M., Abdallah, A. K., & Alkhasawneh, T. (2023). The Relation Between Creative Leadership and Crisis Management Among Faculty Members at Imam Abdulrahman Bin Faisal University in Light of the Corona Pandemic from the Perspective of Department Heads. The Effect of Information Technology on Business and Marketing Intelligence Systems (Vol. 1056). Springer. doi:10.1007/978-3-031-12382-5_83
- Dede, C. (1996). The evolution of distance education: Emerging technologies and distributed learning. *American Journal of Distance Education*, 10(2), 4–36. doi:10.1080/08923649609526919
- Dichev, C., & Dicheva, D. (2017). Gamifying education: what is known, what is believed and what remains uncertain: a critical review. *International Journal of Educational Technology in Higher Education*, 14(1), 1–36. doi:10.1186/s41239-017-0042-5
- Du, X., & Han, J. (2016). A Literature Review on the Definition and Process of Project-Based Learning and Other Relative Studies. *Creative Education*, 07(07), 1079–1083. doi:10.4236/ce.2016.77112
- Eskrootchi, R., & Oskrochi, G. R. (2010). A Study of the Efficacy of Project-based Learning Integrated with Computer-based Simulation - STELLA. *Journal of Educational Technology & Society*, 13(1), 236–245.
- Fernández-López, Á., Rodríguez-Fórtiz, M. J., Rodríguez-Almendros, M. L., & Martínez-Segura, M. J. (2013). Mobile learning technology based on iOS devices to support students with special education needs. *Computers & Education*, 61, 77–90. doi:10.1016/j.compedu.2012.09.014
- Filippatou, D., & Kaldi, S. (2010). The Effectiveness of Project-Based Learning on Pupils with Learning Difficulties Regarding Academic Performance, Group Work and Motivation. *International Journal of Special Education*, 25(1), 17–26.
- Frasson, C. (2021, September). *A framework for personalized fully immersive virtual reality learning environments with gamified design in education*. In *Novelties in Intelligent Digital Systems: Proceedings of the 1st International Conference (NIDS 2021)*, Athens, Greece.
- Grant, P., & Basye, D. (2014). *Personalized learning: A guide for engaging students with technology*. International Society for Technology in Education.

- Grant, P., & Basye, D. (2014). *Personalized learning: A guide for engaging students with technology*. International Society for Technology in Education.
- Habók, A., & Nagy, J. (2016). In-service teachers' perceptions of project-based learning. *SpringerPlus*, 5(1), 83. doi:10.1186/s40064-016-1725-4 PMID:26844030
- Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3, 275–285. doi:10.1016/j.susoc.2022.05.004
- Hira, A., & Anderson, E. (2021). Motivating Online Learning through Project-Based Learning During the 2020 COVID-19 Pandemic. *IAFOR Journal of Education*, 9(2), 93–110. doi:10.22492/ije.9.2.06
- Hovey, K. A., & Ferguson, S. L. (2014). Teacher perspectives and experiences: Using project-based learning with exceptional and diverse students. *Curriculum and Teaching Dialogue*, 16(1/2), 77A.
- Hussein, E., Kan'an, A., Rasheed, A., Alrashed, Y., Jdaitawi, M., Abas, A., Mabrouk, S., & Abdelmo-neim, M. (2023). Exploring the impact of gamification on skill development in special education: A systematic review. *Contemporary Educational Technology*, 15(3), ep443. doi:10.30935/cedtech/13335
- Ismail, A. O., Alriyami, R., & Alhosani, M. (2023). The art of assuring quality education: Internal approaches and best practices. In A. K. Abdallah & A. M. Ahmed (Eds.), *Restructuring Leadership for School Improvement and Reform* (pp. 182–201). IGI Global. doi:10.4018/978-1-6684-7818-9.ch010
- Jandigulov, A., Abdallah, A. K., Tikhonova, Y., & Gorozhanina, E. (2023). Management and leadership in online learning. *Education and Information Technologies*, 28(10), 13423–13437. doi:10.1007/s10639-023-11699-4
- Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. John Wiley & Sons.
- Karunamoorthy, R., & Tahar, M. M. (2020, March). A Gamification Approach to Teaching and Learning for Pupils with Special Needs in Primary Schools. In *International Conference on Special Education In South East Asia Region 10th Series 2020* (pp. 359-366). Redwhite Press.
- Kee, T., & Lai, A. (2022). Learning motivation and psychological empowerment of socioeconomically disadvantaged learners – an empirical study on inclusive project-based learning during Covid-19. *International Journal of Inclusive Education*, 1–20. doi:10.1080/13603116.2022.2112771
- Khaitova, N. F. (2021). History of gamification and its role in the educational process. *International Journal of Multicultural and Multireligious Understanding*, 8(5), 212–216. doi:10.18415/ijmmu.v8i5.2640
- Kim, J. T., & Lee, W. H. (2015). Dynamical model for gamification of learning (DMGL). *Multimedia Tools and Applications*, 74(19), 8483–8493. doi:10.1007/s11042-013-1612-8
- Kiryakova, G., Angelova, N., & Yordanova, L. (2014, October). Gamification in education. In *Proceedings of 9th international Balkan education and science conference* (Vol. 1, pp. 679-684). Research Gate.

- Lee, J., Lee, Y., Gong, S., Bae, J., & Choi, M. (2016). A meta-analysis of the effects of non-traditional teaching methods on the critical thinking abilities of nursing students. *BMC Medical Education*, 16(1), 1–9. doi:10.1186/s12909-016-0761-7 PMID:27633506
- Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' perception of Kahoot!'s influence on teaching and learning. *Research and Practice in Technology Enhanced Learning*, 13(1), 9. doi:10.1186/s41039-018-0078-8
- Manzano-León, A., Aguilar-Parra, J. M., Rodríguez-Moreno, J., & Ortiz-Colón, A. M. (2022). Gamification in initial teacher training to promote inclusive practices: A qualitative study. *International Journal of Environmental Research and Public Health*, 19(13), 8000. doi:10.3390/ijerph19138000 PMID:35805658
- Manzano-León, A., Camacho-Lazarraga, P., Guerrero, M. A., Guerrero-Puerta, L., Aguilar-Parra, J. M., Trigueros, R., & Alias, A. (2021). Between level up and game over: A systematic literature review of gamification in education. *Sustainability (Basel)*, 13(4), 2247. doi:10.3390/su13042247
- Mkrttchian, V. (2018). Project-Based Learning for Students With Intellectual Disabilities. *Advances in Early Childhood and K-12 Education*, (pp. 196–221). IGI Global. doi:10.4018/978-1-5225-3111-1.ch007
- Nieto-Escamez, F. A., & Roldán-Tapia, M. D. (2021). Gamification as online teaching strategy during COVID-19: A mini-review. *Frontiers in Psychology*, 12, 648552. doi:10.3389/fpsyg.2021.648552 PMID:34093334
- Obradović, S., Bjekić, D., & Zlatić, L. (2015). Creative Teaching with ICT Support for Students with Specific Learning Disabilities. *Procedia: Social and Behavioral Sciences*, 203, 291–296. doi:10.1016/j.sbspro.2015.08.297
- Papanastasiou, G., Drigas, A., Skianis, C., & Lytras, M. D. (2017). Serious games in K-12 education: Benefits and impacts on students with attention, memory and developmental disabilities. *Program*, 51(4), 424–440. doi:10.1108/PROG-02-2016-0020
- Purnomo, H., Karim, A., Mansir, F., & Valero-Matas, J. A. (2022). Covid-19 Pandemic: Project-Based Learning as Interprofessional Learning Model to Improve Student With The Special Needs' Self Efficacy. *Sociología y Tecnociencia*, 12(2), 284–306. doi:10.24197/st.2.2022.284-306
- Qiao, S., Chu, S. K. W., Shen, X., & Yeung, S. S. S. (2022). The impact of an online gamified approach embedded with self-regulated learning support on students' reading performance and intrinsic motivation: A randomized controlled trial. *Journal of Computer Assisted Learning*, 38(5), 1379–1393. doi:10.1111/jcal.12684
- Rahayu, I. S. D., & Purnawarman, P. (2019, June). The use of Quizizz in improving students' grammar understanding through self-assessment. In *Eleventh Conference on Applied Linguistics (CONAPLIN 2018)* (pp. 102–106). Atlantis Press.
- Ramadan, R. S., & Ismail, O. A. (2023). Building a better future: The role of school inspection in driving educational excellence. In A. K. Abdallah, & A. M. AlKaabi, *Restructuring Leadership for School Improvement and Reform* (pp. 202–221). IGI Global. doi:10.4018/978-1-6684-7818-9.ch011

- Rodrigues, L., Palomino, P. T., Toda, A. M., Klock, A. C., Oliveira, W., Avila-Santos, A. P., & Isotani, S. (2021). Personalization improves gamification: Evidence from a mixed-methods study. *Proceedings of the ACM on Human-Computer Interaction*, 5(CHI PLAY), 1-25. 10.1145/3474714
- Rodrigues, L., Toda, A. M., Oliveira, W., Palomino, P. T., Vassileva, J., & Isotani, S. (2022). Automating gamification personalization to the user and beyond. *IEEE Transactions on Learning Technologies*, 15(2), 199–212. <https://ieeexplore.ieee.org/abstract/document/9743207/>. doi:10.1109/TLT.2022.3162409
- Rose, D. H., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning*. Association for Supervision and Curriculum Development. ASCD. <http://www.ascd.org>
- Sajjad, S. (2017). *Psychotherapy based game design for healing brain tumor in children*. Utm.My. <http://eprints.utm.my/id/eprint/79498/1/SadafSajjadPFC2017.pdf>
- Santórum, M., Carrión-Toro, M., Morales-Martínez, D., Maldonado-Garcés, V., Araujo, E., & Acosta-Vargas, P. (2023). An accessible serious game-based platform for process learning of people with intellectual disabilities. *Applied Sciences (Basel, Switzerland)*, 13(13), 7748. doi:10.3390/app13137748
- Sawyer, R. K. (2011). *What makes good teachers great? The artful balance of structure and improvisation. Structure and improvisation in creative teaching*. Cambridge University Press.
- Sitra, O., Katsigiannakis, V., Karagiannidis, C., & Mavropoulou, S. (2017). The effect of badges on the engagement of students with special educational needs: A case study. *Education and Information Technologies*, 22(6), 3037–3046. doi:10.1007/s10639-016-9550-5
- Smith, K., & Abrams, S. S. (2019). Gamification and accessibility. *The International Journal of Information and Learning Technology*, 36(2), 104–123. doi:10.1108/IJILT-06-2018-0061
- Sriram, S. (2018). Engaging the Student: Redesigning Classrooms for Project-Based Learning. *Dynamic Learning Spaces in Education*, 89–104. doi:10.1007/978-981-10-8521-5_5
- Suryani, Y., & Dewiana, S. (2016). Penggunaan metode PEMBELAJARAN BERBASIS PROYEK (Project based learning) PENGARUHNYA TERHADAP KEMAMPUAN BERPIKIR KRITIS SISWA (Studi Eksperimen Pada mata Pelajaran Ekonomi Siswa Kelas X IIS Di SMA Negeri 1 Kuningan). *Equilibrium: Jurnal Penelitian Pendidikan dan Ekonomi*, 13(1). doi:10.25134/equi.v13i1.526
- Swargiary, K., & Roy, K. (2023). *Transforming Education: Innovative Teaching Methods for Empowering Students in India*. Scholar Press.
- Xiao, Y., & Hew, K. F. (2023). A systematic literature review on personalized gamification: Algorithms and techniques. *EdMedia+ Innovate Learning*, 1318-1325.
- Yenioglu, B. Y., Ergulec, F., & Yenioglu, S. (2021). Augmented reality for learning in special education: A systematic literature review. *Interactive Learning Environments*, 1–17. doi:10.1080/10494820.2021.1976802
- Zainuddin, Z., Shujahat, M., Haruna, H., & Chu, S. K. W. (2020). The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system. *Computers & Education*, 145, 103729. doi:10.1016/j.compedu.2019.103729

Zichermann, G., & Cunningham, C. (2011). *Gamification by design: Implementing game mechanics in web and mobile apps*. O'Reilly Media, Inc.

KEY TERMS AND DEFINITIONS

Gamification: The process of transforming typical academic components into gaming themes

Inclusion: Ensuring students with physical, behavioral, or learning disabilities are integrated into general education classrooms and are provided with support and accommodation to succeed alongside their peers

Project-Based Learning: An instructional approach designed to give students the opportunity to develop knowledge and skills through engaging projects set around challenges and problems they may face in the real world.

Special Needs: Educational requirements arising from a physical or intellectual disability or behavioral difficulties.