

Appendix

Gamification in Higher Education: A PRISMA-Based Systematic Review of Motivation and Engagement Outcomes

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Motivation and Engagement through Gamification: A Systematic Literature Review in Higher Education Contexts

Table S1. Supplementary_Table_Studies

	Authors	Year	Title	DOI
1	Borrás-Gené, O; Díez, RM	2025	Improving Motivation In Future Teachers: Flipped Classroom And Gamification Using Digital Badges	10.28945/5634
2	Buenadicha- Mateos, M; Sánchez- Hernández, MI; González- López, OR; Tato- Jiménez, JL	2025	From Engagement to Achievement: How Gamification Impacts Academic Success in Higher Education	10.3390/educsci15081054
3	Loor, JV; Gracia, EP; Jimenez, JC	2025	Design And Validation Of An Instrument To Evaluate A Gamified Strategy In E-Learning Environments In Higher Education	10.28945/5521
4	Bilro, RG; Loureiro, SMC; Angelino, FJD	2021	The Role of Creative Communications and Gamification in Student Engagement in Higher Education: A Sentiment Analysis Approach	10.1177/0973258621992644

5	Campillo-Ferrer, JM; Miralles-Martínez, P; Sánchez-Ibáñez, R	2020	Gamification in Higher Education: Impact on Student Motivation and the Acquisition of Social and Civic Key Competencies	10.3390/su12124822
6	Soria-Vílchez, A; Palazón- Herrera, J	2023	Effects of gamification on preservice primary music teachers' academic performance, motivation and technology acceptance	10.1386/jmte_00069_1
7	Sanzana, MR; Abdulrazic, MOM; Wong, JY; Karunagharan, JK; Chia, J	2024	Gamified virtual labs: shifting from physical environments for low-risk interactive learning	10.1108/JARHE-09-2022-0281
8	Pelumi, I; Gordon, N	2025	SmartRead: A Multimodal eReading Platform Integrating Computing and Gamification to Enhance Student Engagement and Knowledge Retention	10.3390/mti9100101
9	Carrion Candela, E; De-La- pena, C; Chaves-Yuste, B	2025	A Gamified Digital Framework In Higher Education: Impact On Learning And Motivation	10.17718/tojde.1556533
10	Durgungoz, A; Durgungoz, FC	2025	Exploring effortless AI-generated gamified quizzes in an online special education module: evaluating question quality, student engagement, and its potential to identify at-risk students	10.1007/s10639-025-13765-5
11	Ferriz-Valero, A; Osterlie, O; Martínez, SG; García- Jaén, M	2020	Gamification in Physical Education: Evaluation of Impact on Motivation and Academic Performance within Higher Education	10.3390/ijerph17124465
12	Torres-Tellez, J	2025	The Code of Thrones: Gamifying Criminal Law to Rule Student Motivation	10.1080/10511253.2025.2565822
13	Zainuddin, Z	2024	Integrating ease of use and affordable gamification-based instruction into a remote learning environment	10.1007/s12564-023-09832-6
14	Chan, SL; Fung, JTC; Wong, MS; Cheng, CCW; Lee, JJJ; Choi,	2025	Educational technology enhanced interprofessional E-learning for engaging	10.1016/j.ijnsa.2025.100404

	HR; Wan, WH; Withrow, H; Sirirat, SI; Tse, WH; Poon, RPW; Lam, CF; Lam, HCY; Chan, CK; Lin, CC		cross-institutional and cross- border healthcare students: A mixed-methods study	
15	Mellado, R; Cubillos, C	2024	Gamification improves learning: Experience in a training activity of computer programming in higher education	10.1111/jcal.13000
16	Montero-Benavides, P; Albort-Morant, G; Masero-Moreno, IC	2025	Evaluating a gamified assessment model to enhance performance and engagement in finance education: A quasi-experimental study	10.1016/j.ijme.2025.101266
17	Hsu, WS	2025	Analyzing Student Engagement and Learning Outcomes in a Gamified Blended Cybersecurity Course Using LMS- Based Behavioral Data	10.3991/ijep.v15i6.57015
18	Tsay, CHH; Kofinas, AK; Trivedi, SK; Yang, Y	2020	Overcoming the novelty effect in online gamified learning systems: An empirical evaluation of student engagement and performance	10.1111/jcal.12385
19	Wuyts, S; Everaert, P; Opdecam, E	2025	From Intention to Action: Nudging Initial Adoption and Subsequent Use of Gamified E-Learning Tools in Higher Education	10.1007/s10758-025-09925-8
20	De la Peña, D; Lizcano, D; Martínez-Alvarez, I	2021	Learning through play: Gamification model in university- level distance learning	10.1016/j.entcom.2021.100430
21	Aibar-Almazan, A; Castellote-Caballero, Y; Carcelen-Fraile, MD; Rivas-Campo, Y; Gonzalez-Martin, AM	2024	Gamification in the classroom: Kahoot! As a tool for university teaching innovation	10.3389/fpsyg.2024.1370084
22	Del Moral-Pérez, ME; López-Bouzas, N; Castañeda-Fernández, J	2024	Transmedia skill derived from the process of converting films into educational games with augmented	10.1007/s44322-024-00015-8

			reality and artificial intelligence	
23	Ramesh, G; Azzah, A; Habiba, MSA; Pauline, SM	2025	Gamification and students' engagement in accounting courses - an experimental study	10.1108/LTHE-12-2020-0063
24	Duggal, K; Gupta, LR; Singh, P	2021	Gamification and Machine Learning Inspired Approach for Classroom Engagement and Learning	10.1155/2021/9922775
25	Khanchai, S; Worragin, P; Ariya, P; Intawong, K; Puritat, K	2025	Toward Sustainable Digital Literacy: A Comparative Study of Gamified and Non-Gamified Digital Board Games in Higher Education	10.3390/educsci15080966
26	Mellado, R; Cubillos, C; Vicari, RM; Gasca-Hurtado, G	2024	Leveraging Gamification in ICT Education: Examining Gender Differences and Learning Outcomes in Programming Courses	10.3390/app14177933
27	Madero, C; Vazquez-Hernandez, J	2025	The impact of gamification on undergraduate students' motivation during the COVID-19 pandemic	10.1108/TQM-12-2024-0508
28	Wang, CC; Chang, SC; Yu, YH	2025	Using gamification to enhance learning: A college course case study	10.1016/j.entcom.2025.100942
29	Schürmann, L; Quaiser-Pohl, C	2022	Digital badges affect need satisfaction but not frustration in males in higher education	10.1016/j.compedu.2022.104484
30	Tsang, YP; Lee, CKM; Wu, CH; Li, YL	2024	Gamified Blockchain Education in Experiential Learning: An Analysis of Students' Cognitive Well-Being	10.1109/TE.2024.3395617
31	Vergara-Borge, F; López-de-Ipiña, D; Emaldi, M; Olivares-Rodríguez, C; Khan, Z; Soomro, K	2025	Gamifying Engagement in Spatial Crowdsourcing: An Exploratory Mixed-Methods Study on Gamification Impact Among University Students	10.3390/systems13070519

32	Nascimento, LRD; Palácios, RHC; Mendonça, M; de Souza, LB; Fabri, JA	2025	Prog-Poly: A Board Game for Project-Based Learning in Programming and Software Engineering	10.1109/RITA.2025.3582716
33	Ng, LK; Lo, CK	2022	Flipped Classroom and Gamification Approach: Its Impact on Performance and Academic Commitment on Sustainable Learning in Education	10.3390/su14095428
34	Yang, QF; Lian, LW; Zhao, JH	2023	Developing a gamified artificial intelligence educational robot to promote learning effectiveness and behavior in laboratory safety courses for undergraduate students	10.1186/s41239-023-00391-9

Excluded Studies with Reason

	Authors	Year	Title	DOI	Reason for Exclusion
1	Gaggioli, C; Gabbi, E; Ranieri, M	2025	Gamification to Foster Student Engagement: A Mixed Methods Study in Higher Education	10.30557/QW00007 6	Did not meet Option intervention/comparison criteria
2	Oliver, LA; Manning- Stanley, A; Bridge, P	2024	Implementing gamification within interprofessional learning: perspectives of Higher Education staff and students	10.1080/2331186X.2 024.2423717	Did not meet Option intervention/comparison criteria
3	Song, S; Lai, YC	2025	Blended learning in vocational education: benefits, challenges, and student engagement	10.1080/2331186X.2 025.2548348	Review / Non-empirical study
4	Nguyen-Viet, B; Minh, HDN	2025	How Gamification Enhances Learning Effectiveness Through Blended Learning and Intrinsic Motivation: The Moderating Effects of Self-Regulation	10.1177/215824402 51385846	Did not meet Option intervention/comparison criteria
5	Wang, JX; Chee, CS; Samsudin, S	2024	Enhancing University Students' Motivation in Basketball Courses through Tactical Games Model	10.3390/bs14070515	Did not meet Option intervention/comparison criteria

6	Nair, BB	2022	Endorsing gamification pedagogy as a helpful strategy to offset the COVID-19 induced disruptions in tourism education	10.1016/j.jhlste.2021.100362	Serious games / Game-based learning (not pure gamification)
7	González-Yubero, S; Mauri, M; Cardoso, MJ; Palomera, R	2023	Learning through Challenges and Enigmas: Educational Escape Room as a Predictive Experience of Motivation in University Students	10.3390/su151713001	Not an intervention/comparative study (predictive/correlational)
8	Zia, T; Khan, MU; Hossain, MB	2025	Impact of Gamification on Student Engagement and Behavior Moderated by Public Policy in Higher Education Institutions	10.1155/hbe2/9026903	Did not meet Option intervention/comparison criteria
9	Li, N	2025	Fostering creative thinking through gamified intercultural communication: innovative pedagogical strategies in higher education English programs	10.1080/2331186X.2025.2489271	Did not meet Option intervention/comparison criteria
10	Killam, LA; Timmermans, KE; Shapiro, SJ	2021	Motivation and Engagement of Nursing Students in 2 Gamified Courses A Mixed-Methods Study	10.1097/NNE.0000000000001065	Did not meet Option intervention/comparison criteria
11	López-Martínez, A; Meroño, L; Cánovas-López, M; García-de-Alcaraz, A; Martínez-Aranda, LM	2022	Using Gamified Strategies in Higher Education: Relationship between Intrinsic Motivation and Contextual Variables	10.3390/su141711014	Did not meet Option intervention/comparison criteria
12	Allehaidan, AF; Zainon, WMNW	2024	Gamification and student engagement in higher education: The moderating role of concentration	10.34069/AI/2024.79.07.5	Did not meet Option intervention/comparison criteria
13	Fortuna, JM; de la Fuente, G; Velasco, P	2023	Does gamification mediate the relationship between digital social capital and student Performance? A survey-based study in Spain	10.1016/j.ijme.2023.100846	Did not meet Option intervention/comparison criteria

14	García-López, IM; Acosta-Gonzaga, E; Ruiz-Ledesma, EF	2023	Investigating the Impact of Gamification on Student Motivation, Engagement, and Performance	10.3390/educsci13080813	Did not meet Option intervention/comparison criteria
15	Nguyen-Viet, B; Nguyen-Viet, B	2025	Gamification in Vietnamese education: Assessing psychological need satisfaction, intrinsic motivation, and learning effectiveness.	10.1016/j.lmot.2025.102101	Did not meet Option intervention/comparison criteria
16	Martín-Lara, MA; Altmajer, D; Vicaria, JM; Muñoz-Batista, MJ	2025	Boosting engagement and learning in the economic analysis of chemical processes through gamification	10.1016/j.ece.2025.02.004	Did not meet Option intervention/comparison criteria
17	Zmazneva, O; Pitelinsky, K; Makovey, S; Panchenko, D	2025	GAME-BASED LEARNING AND DIGITAL CREATIVITY AS FOUNDATIONS FOR STUDENT ENGAGEMENT	nan	Serious games / Game-based learning (not pure gamification)
18	Kovács, T; Kovács, S; Várallyai, L	2025	ADAPTING TO THE DIGITAL AGE: GAMIFICATION'S ROLE IN REVOLUTIONIZING EDUCATION FOR YOUTH STUDENTS	10.14254/1795-6889.2025.21-2.5	Did not meet Option intervention/comparison criteria
19	Zitha, I; Mokganya, G; Sinthumule, O	2023	Innovative Strategies for Fostering Student Engagement and Collaborative Learning among Extended Curriculum Programme Students	10.3390/educsci13121196	Did not meet Option intervention/comparison criteria
20	Rivera, ES; Garden, CLP	2021	Gamification for student engagement: a framework	10.1080/0309877X.2021.1875201	Did not meet Option intervention/comparison criteria
21	Conde, A; Blanco, C; Serrano, N; Reina, E	2025	FIUMLand: A Gamification Approach for Engineering Higher Education	10.1109/RITA.2025.3639482	Did not meet Option intervention/comparison criteria
22	Das, T; Kondamudi, SG; Babakerkhell, MD; Pal, D; Roy, R; Funilkul, S	2024	Intention for enhancing metaverse-based learning using gamification among university students: a study using Delphi and structural equation	10.1080/23311975.2024.2380016	Did not meet Option intervention/comparison criteria

			modelling approaches		
23	Khan, S; Srivel, V; Wong, M	2025	Enhancing Engagement in a Learning Management System through a Raffle Ticket System	10.20343/teachlearninq.13.27	Did not meet Option intervention/comparison criteria
24	González-López, OR; Buenadicha-Mateos, M; Tato-Jimenez, JL; Sánchez-Hernández, MI	2025	Adaptive Gamification in Higher Education: Tailoring Game Elements to Player Profiles and Gender Differences	10.1177/21582440251377738	Did not meet Option intervention/comparison criteria
25	Pinter, R; Cisar, SM; Balogh, Z; Manojlovic, H	2020	Enhancing Higher Education Student Class Attendance through Gamification	10.12700/APH.17.2.2020.2.2	Did not meet Option intervention/comparison criteria
26	Ahmed, HMM; El-Sabagh, HA; Elbourhamy, DM	2025	Effect of Gamified, Mobile, Cloud-Based Learning Management System (GMCLMS) on student engagement and achievement	10.1186/s41239-025-00541-1	Did not meet Option intervention/comparison criteria
27	Rozycka, A	2026	The performance-satisfaction paradox in online assessment: comparing synchronous and asynchronous entrepreneurship courses	10.1080/02602938.2025.2588387	Did not meet Option intervention/comparison criteria
28	Gupta, S; Priyanka	2022	Gamification and e- learning adoption: a sequential mediation analysis of flow and engagement	10.1108/VJIKMS-04-2022-0131	Did not meet Option intervention/comparison criteria
29	Chans, GM; Castro, MP	2021	Gamification as a Strategy to Increase Motivation and Engagement in Higher Education Chemistry Students	10.3390/computers10100132	Did not meet Option intervention/comparison criteria
30	Weijnsfeld, FGJ; Sarmah, K	2025	Gamifying cybersecurity: A narrative-driven approach to teaching steganography	10.1016/j.caeo.2025.100288	Serious games / Game-based learning (not pure gamification)

31	Shah, Z; Kennedy-Clark, S; Xie, YC; Rahim, MS; Mahdavi, M; Levula, A	2022	Teacher Views on Teaching Sustainability in Higher Education Institutes in Australia	10.3390/su14148431	Did not meet Option intervention/comparison criteria
32	Moon, J; McNeill, L; Edmonds, CT; Banihashem, SK; Noroozi, O	2024	Using learning analytics to explore peer learning patterns in asynchronous gamified environments	10.1186/s41239-024-00476-z	Did not meet Option intervention/comparison criteria
33	Alonso-Sánchez, JA; Alonso, JLN; Santana-Monagas, E	2025	Gamification in Higher Education: A Case Study in Educational Sciences	10.1007/s11528-025-01056-2	Did not meet Option intervention/comparison criteria
34	Azevedo, BF; Pacheco, MF; Fernandes, FP; Pereira, AI	2024	Dataset of mathematics learning and assessment of higher education students using the MathE platform	10.1016/j.dib.2024.110236	Did not meet Option intervention/comparison criteria
35	Dodoo, PD; Yawson, DE	2024	Towards an understanding of multi-generational higher education cohorts in gamified entrepreneurship education	10.1016/j.heliyon.2024.e31689	Did not meet Option intervention/comparison criteria
36	Baah, C; Govender, I; Subramaniam, PR	2024	Enhancing Learning Engagement: A Study on Gamification's Influence on Motivation and Cognitive Load	10.3390/educsci14101115	Did not meet Option intervention/comparison criteria
37	Murillo, I	2021	Revising while playing: development and evaluation of the newly created Microbial Pursuit game as a pedagogical tool in higher education	10.1093/femsle/fnab101	Not higher education context
38	Nguyen-Viet, B; Nguyen-Viet, B	2023	Enhancing satisfaction among Vietnamese students through gamification: The mediating role of engagement and learning effectiveness	10.1080/2331186X.2023.2265276	Did not meet Option intervention/comparison criteria
39	Rojas, E; Hülsmann, X; Estriegana, R; Rückert, F; Garcia-	2023	Students' Perception of Metaverses for Online Learning in Higher Education: Hype or Hope?	10.3390/electronics12081867	No measurable motivation/engagement outcome

	Esteban, S				
40	Santos-Villalba, MJ; Olivencia, JLL; Navas- Parejo, MR; Benítez-Márquez, MD	2020	Higher Education Students' Assessments towards Gamification and Sustainability: A Case Study	10.3390/su12208513	Did not meet Option intervention/comparison criteria
41	Cigdem, H; Oncu, S	2025	Flipping the Odds: Using Learner Readiness, Engagement, and Gamification to Predict Student Success in a Flipped Course	10.1007/s11528-024-01031-3	Not an intervention/comparative study (predictive/correlational)
42	Bucea-Manea-Tonis, R; Martins, OMD; Bucea-Manea-Tonis, R; Gheorghita, C; Kuleto, V; Ilic, MP; Simion, VE	2021	Blockchain Technology Enhances Sustainable Higher Education	10.3390/su132212347	Review / Non-empirical study
43	Addas, A; Naseer, F; Tahir, M; Khan, MN	2024	Enhancing Higher-Education Governance Through Telepresence Robots and Gamification: Strategies for Sustainable Practices in the AI-Driven Digital Era	10.3390/educsci14121324	Did not meet Option intervention/comparison criteria
44	Calderón, MSC; Jara, CMR	2025	Gamification in Nursing Students Through the Game Pasapalabra	10.6018/edumed.647951	Did not meet Option intervention/comparison criteria
45	Ojonuba, SE; Türkmen, G; Toker, S	2025	Enhancing Web Development Education With Game-Based and Gamification Learning: A Study of Engagement, Motivation, and Performance	10.1109/ACCESS.2025.3595510	Serious games / Game-based learning (not pure gamification)
46	Grey, S; Gordon, NA	2023	Motivating Students to Learn How to Write Code Using a Gamified Programming Tutor	10.3390/educsci13030230	Did not meet Option intervention/comparison criteria
47	Fitz-Walter, Z; O'Donnell, N; Hall, J; Sun, HY; Carter, J	2025	A Model for Running Effective Educational Scavenger Hunts During	10.63608/ssj.3786	Did not meet Option intervention/comparison criteria
			Campus Orientation to Onboard new University Students. A Practice Report		

48	Luo, JJ	2024	Validating the impact of gamified technology-enhanced learning environments on motivation and academic performance: enhancing TELEs with digital badges	10.3389/feduc.2024.1429452	Did not meet Option intervention/comparison criteria
49	Ewelt-Knauer, C; Herrmann, F; Mai, SPN; Pleger, A; Schuetz, H	2025	Keeping the balance: the impact of an instructional edutainment-based video series on students' motivation and performance	10.1080/09639284.2025.2482690	Did not meet Option intervention/comparison criteria
50	Aguilos, V; Fuchs, K	2022	The Perceived Usefulness of Gamified E-Learning: A Study of Undergraduate Students With Implications for Higher Education	10.3389/feduc.2022.945536	No measurable motivation/engagement outcome
51	Gironella, F	2023	Gamification pedagogy: A motivational approach to student-centric course design in higher education	10.53761/1.20.3.04	Did not meet Option intervention/comparison criteria
52	Ng, LK; Lo, CK	2023	Enhancing Online Instructional Approaches for Sustainable Business Education in the Current and Post-Pandemic Era: An Action Research Study of Student Engagement	10.3390/educsci13010042	Did not meet Option intervention/comparison criteria
53	Binh, ADT; Hoang, TH; Quang, HT	2025	Designing Effective Hybrid Course Curriculum: A Design Science Approach to Gamification and Student Outcomes Validation	10.1177/0193841X241291752	Did not meet Option intervention/comparison criteria
54	Hmoud, AYR; Salah, OH; Altalib, RAH	2024	The adoption of gamification in higher education and its impact on academic performance: empirical evidence from Jordan and Palestine	10.1080/2331186X.2024.2428907	Did not meet Option intervention/comparison criteria

55	Gumbi, NM; Sibaya, D; Chibisa, A	2024	Exploring Pre-Service Teachers' Perspectives on the Integration of Digital Game-Based Learning for Sustainable STEM Education	10.3390/su16031314	Serious games / Game-based learning (not pure gamification)
56	Rajcsanyi- Molnar, M; Andras, I; Czifra, S	2025	Integrating Serious Games and Gamification for Diverse Learner Groups: Lessons from the GeoGecko Project	10.3390/educsci15040440	Serious games / Game-based learning (not pure gamification)
57	Hu, Y	2024	Kahoot! in the classroom: Examining the impact of a game-based student response system on pre- service teachers' academic achievement and perceptions	10.1080/14703297.2023.2250757	Did not meet Option intervention/comparison criteria
58	Zaki, HO; Omar, NA; Hashim, S; Kamarulzaman, Y; Lada, S	2024	Talk to engage: The influence of smartphone voice assistants on consumers' brand engagement	10.1080/21639159.2024.2362660	Did not meet Option intervention/comparison criteria
59	Fraguas-Sánchez, AI; Serrano, DR; González-Burgos, E	2022	Gamification Tools in Higher Education: Creation and Implementation of an Escape Room Methodology in the Pharmacy Classroom	10.3390/educsci12110833	Did not meet Option intervention/comparison criteria
60	Galan-Elvira, J; Palau- Irisarri, P	2025	Who's Who in Zoology: transversal application of gamification and new technologies in university teaching	10.3389/fvets.2025.1596906	Did not meet Option intervention/comparison criteria
61	Rincon-Flores, EG; Mena, J; López-Camacho, E	2022	Gamification as a Teaching Method to Improve Performance and Motivation in Tertiary Education during COVID-19: A Research Study from Mexico	10.3390/educsci12010049	Did not meet Option intervention/comparison criteria
62	Lívero, FAD; da Silva, GR; Amaral, EC; de Souza, ANV; Baretta, IP; Diegues, MEM; Arpini, E;	2021	Playfulness in the classroom: Gamification favor the learning of pharmacology	10.1007/s10639-020-10350-w	Did not meet Option intervention/comparison criteria

	Lovato, ECW				
63	Gracia, CAM; García, RAH	2024	Descriptive and Parametric Analysis of Gamification with Augmented Reality as a Strategy to Enhance Student Motivation in a Higher Education Course	10.15517/revedu.v48i2.55969	Did not meet Option intervention/comparison criteria
64	Zainuddin, Z; Farida, R; Keumala, CM; Kurniawan, R; Iskandar, H	2022	Synchronous online flip learning with formative gamification quiz: instruction during COVID- 19	10.1108/ITSE-01-2021-0002	Did not meet Option intervention/comparison criteria
65	Koch, GGV; Moosa, H; Smith, J; Davidson, FE	2026	Learning through play: Educators and students reflect on a gamified assessment	10.1016/j.jmir.2025.102139	Did not meet Option intervention/comparison criteria
66	Castillo, D; Carrión, J; Chamba, C; Jiménez-Gaona, Y; Rodríguez-Alvarez, MJ; Lakshminarayanan, V	2025	Didactic strategies for conceptual understanding and motivation in university mathematics: a systematic review	10.3389/feduc.2025.1536470	Review / Non-empirical study
67	Escandon-Barbosa, D; Salas-Paramo, J	2025	Virtual reality in business management education: Evaluating through the TPACK (technological pedagogical content knowledge) lens	10.1016/j.chbr.2025.100634	Did not meet Option intervention/comparison criteria
68	Barbosa, PLS; do Carmo, RAF; Gomes, JPP; Viana, W	2024	Adaptive learning in computer science education: A scoping review	10.1007/s10639-023-12066-z	Review / Non-empirical study
69	Gejandran, P; Abdullah, N	2025	Developing a model to explain teacher effectiveness: the mediating role of gamification	10.1080/2331186X.2025.2521154	Did not meet Option intervention/comparison criteria
70	Gill, A; Irwin, D; Mareta, S; Towey, D; Wang, A; Zhang, YH	2024	Virtual educational environments: an investigation into interactive immersive learning in higher education	10.1504/IJMLO.2024.139723	Did not meet Option intervention/comparison criteria
71	Hellberg, AS; Moll, J	2023	A point with pointsification? clarifying and separating pointsification from gamification in	10.3389/feduc.2023.1212994	Did not meet Option intervention/comparison criteria

			education		
72	Morgan, N; Yaqoob, M; Jones, MA	2025	Using digital escape rooms to enhance data analysis skills and student experience in a higher education human physiology module	10.1016/j.crphys.2025.100165	Did not meet Option intervention/comparison criteria
73	Martínez, GS; Sánchez-López, C; Martínez-Saura, HF	2024	The methodological usefulness of Woodclap: a study on university student motivation and	10.4995/redu.2024.20878	Did not meet Option intervention/comparison criteria
74	García-López, IM; Ramírez-Montoya, MS; Molina-Espinosa, JM	2025	Generative artificial intelligence in education: a systematic analysis of opportunities, challenges, and responses	10.1080/10494820.2025.2519133	Review / Non-empirical study
75	Hoter, E; Abu Ahmad, MY; Azulay, H	2025	Enhancing spoken English skills through an immersive virtual world: a pilot study focusing on motivation, confidence and teacher presence	10.1080/09571736.2025.2552375	Did not meet Option intervention/comparison criteria
76	Slamet, T; Brush, T; Kwon, K	2025	The Effects of Competition in Gamified Online Discussions on Learners' Behavioral and Cognitive Engagement	10.1007/s10758-024-09740-7	Not higher education context
77	Fernandez-Antolin, MM; del Río, JM; Gonzalez-Lezcano, RA	2021	The use of gamification in higher technical education: perception of university students on innovative teaching materials	10.1007/s10798-020-09583-0	Did not meet Option intervention/comparison criteria
78	Law, V; Jimenez, MJ; Kittinger, L; Lopez, B	2024	A meta-analysis of digital badges in learning environments in educational settings	10.30191/ETS.202407_27(3).RP02	Review / Non-empirical study
79	Jayanta, INL; Suprianti, GAP; Ganing, NN; Utami, IGALP	2025	Digital Learning Innovation: Gamification- Based Smart System Adaptive Mobile Learning Needs Analysis Using the Tri Kaya Parisudha Approach for English Language Learning	10.26858/ijole.v1i2.75116	Did not meet Option intervention/comparison criteria

80	Fernandez, K	2025	Utilising game-based learning in first year undergraduate contract law	10.1080/03069400.2025.2521197	Serious games / Game-based learning (not pure gamification)
81	Portela, F	2022	Towards an Engaging and Gamified Online Learning Environment-A Real CaseStudy	10.3390/info13020080	No measurable motivation/engagement outcome
82	Navarro-Castillo, Y; Pablo-Lerchundi, I; Morales-Alonso, G	2025	Kahoot! as a tool to enhance learning for engineering students in economics & management courses	10.1016/j.ijme.2025.101173	Did not meet Option intervention/comparison criteria
83	Rafiq, R; Matthews, H; Abedalreza, D; Yahya, F; Jones, MA	2025	Card games are effective tools to enhance foundation year health and safety inductions	10.1002/2211-5463.70140	Did not meet Option intervention/comparison criteria
84	Hernanz, V; Latorre-Coscolluela, C; Suárez, C; Lanchares-Sancho, E	2024	Revitalising learning in three university contexts: Unleashing the power of the Quizizz app to increase self-efficacy, intrinsic motivation, satisfaction and performance	10.1007/s10639-024-12779-9	Did not meet Option intervention/comparison criteria
85	Samala, AD; Ricci, M; Rueda, CJA; Bojic, L; Ranuharja, F; Agustiarimi, W	2024	Exploring Campus through Web-Based Immersive Adventures Using Virtual Reality Photography: A Low-Cost Virtual Tour Experience	10.3991/ijoe.v20i01.44339	Did not meet Option intervention/comparison criteria
86	Lee, JY; Pyon, CU; Woo, J	2023	Digital Twin for Math Education: A Study on the Utilization of Games and Gamification for University Mathematics Education	10.3390/electronics12153207	Did not meet Option intervention/comparison criteria
87	Schöbel, S; Saqr, M; Janson, A	2021	Two decades of game concepts in digital learning environments - A bibliometric study and research agenda	10.1016/j.compedu.2021.104296	Serious games / Game-based learning (not pure gamification)
88	Arias-Calderón, M; Castro, J; Gayol, S	2022	Serious Games as a Method for Enhancing Learning Engagement: Student Perception on Online Higher Education During COVID-19	10.3389/fpsyg.2022.889975	Serious games / Game-based learning (not pure gamification)

89	Wardani, NA; Saefurrohman ; Balinas, ES	2025	Gamified Flipped Classroom for Teaching EFL Productive Skills: Exploring Teachers' Practices and Challenges in an Islamic University	10.18326/register.v18i2.286-318	Did not meet Option intervention/comparison criteria
90	Vázquez-Vílchez, M; Garrido-Rosales, D; Pérez-Fernández, B; Fernández-Oliveras, A	2021	Using a Cooperative Educational Game to Promote Pro-Environmental Engagement in Future Teachers	10.3390/educsci11110691	Serious games / Game-based learning (not pure gamification)
91	Argelagós, E; López-Melendo, M; Privado, J	2024	Enriched videos and the flipped classroom: learning and satisfaction multipliers during an escape room in Primary Education	10.13042/Bordon.2024.100692	Not higher education context
92	Puerta, LG	2024	Exploring if Gamification Experiences Make an Impact on Pre-Service Teachers' Perceptions of Future Gamification Use: A Case Report	10.3390/soc14010011	Did not meet Option intervention/comparison criteria
93	Yuan, G	2025	Synergistic Integration of Artificial Intelligence and Gamification in University Finance Trading Simulation Labs	10.1177/10468781251377585	Review / Non-empirical study
94	Truskowska, E; Emmett, Y; Guerandel, A	2023	Digital badges: An evaluation of their use in a Psychiatry module	10.29060/TAPS.2023-8-2/OA2869	Did not meet Option intervention/comparison criteria
95	Bueno-Baquero, A; del Olmo-Muñoz, J; González-Calero, JA; Cózar-Gutiérrez, R	2024	Gamified approaches to computational thinking in teacher training	10.4438/1988-592X-RE-2024-405-628	Did not meet Option intervention/comparison criteria
96	Beranic, T; Hericko, M	2022	The Impact of Serious Games in Economic and Business Education: A Case of ERP Business Simulation	10.3390/su14020683	Serious games / Game-based learning (not pure gamification)

97	Carrillo-Nieves, D; Clarke-Crespo, E; Cervantes-Avilés, P; Cuevas-Cancino, M; Vanoye-García, AY	2024	Designing learning experiences on climate change for undergraduate students of different majors	10.3389/feduc.2024.1284593	Did not meet Option intervention/comparison criteria
98	Singh, M; Sun, DE; Yang, Y	2025	Design and implementation of Math City: An inquiry-based metaverse platform for mathematics education	10.1016/j.caeai.2025.100462	Did not meet Option intervention/comparison criteria
99	Cao, ZT; Tan, WH	2025	A Bibliometric and Content Analysis of Gamified Learning Strategies in University Music Education	10.1111/ejed.70412	Did not meet Option intervention/comparison criteria
100	Anderson, SL; Miller, LMJ; Jolly, L; Hunt, JA	2025	Implementation of an Elective Micro-credentialing Badging Program in a Doctor of Veterinary Medicine Program	10.3138/jvme-2024-0113	Did not meet Option intervention/comparison criteria
101	Shatila, K; Martínez-Climent, C; Enri-Peiró, S; Perez-Ruiz, P	2025	The impact of gamification on academic performance: the case of digital marketing in Lebanon	10.1108/EJIM-04-2024-0411	Did not meet Option intervention/comparison criteria
102	Kulkarni, RV; Choudhari, G; Bhavik, M; Bura, R; Bhosale, V	2025	GAMIFYING EARLY MATH EDUCATION: AN INNOVATIVE AI GAME FOR CHILDREN	10.28945/5595	Serious games / Game-based learning (not pure gamification)
103	Mirmotahari, O; Grun, HN; Berg, Y	2025	Gamification as a transferable pedagogical innovation for technology education: developing 21st-century skills through collaborative game-based learning	10.3389/feduc.2025.1684459	Serious games / Game-based learning (not pure gamification)
104	Hauzel, R; Pattnaik, T; Ranjani, V; Mandela, SP	2024	INVESTIGATING FACTORS CONTRIBUTING TO STUDENT DISENGAGEMENT AND OWNERSHIP IN LEARNING: A CASE STUDY OF	10.28945/5336	Did not meet Option intervention/comparison criteria

			UNDERGRADUATE ENGINEERING STUDENTS		
105	Li, QL; Yin, XF; Yin, WL; Dong, X; Li, QQ	2023	Evaluation of gamification techniques in learning abilities for higher school students using FAHP and EDAS methods	10.1007/s00500-023-08179-9	Serious games / Game-based learning (not pure gamification)