JOURNAL OF INFORMATION TECHNOLOGY AND ITS UTILIZATION, VOLUME 8, ISSUE 2, DECEMBER 2025
EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

Gamification-Driven Management Information System: A Design Approach for Enhancing Students' Final Project Supervision

Troy[1*], Ginanjar Setyo Nugroho[2], Kathryn Widiyanti[3]

[1,2,3]Animation Study Program, Institut Seni Indonesia Yogyakarta, Indonesia
troy@isi.ac.id[1*], ginanjar@isi.ac.id[2], kathryn@isi.ac.id[3]
*Corresponding author

***Abstract*--This study aims to design a gamification-based Management Information System (MIS) interface to enhance the effectiveness and engagement of students during final project supervision. The research background is based on literature findings regarding the potential of gamification in education that can encourage motivation, participation, and transparency in the learning process. The research method used is Research through Design (RtD), emphasizing the integration of gamification elements into the MIS framework, including features for recording progress, awarding points, levels, and badges related to guidance activities. The research results is a student final project MIS interface that combines managerial functions with gamification-based motivational mechanisms. This system is expected to increase student engagement, provide more transparent monitoring for supervisors, and create a more attractive and interactive guidance ecosystem. The direction of further research is directed at the development of a complete MIS prototype, limited trials, and evaluation of effectiveness through case studies.**

***Keywords*: Final project supervision; Gamification; Human-Computer Interaction (HCI); Management Information System (MIS); Research through Design (RtD).**

I. INTRODUCTION

The final project supervision process is a crucial stage in higher education, particularly in vocational study programs, as it not only determines the quality of students' final work but also reflects overall learning outcomes [1], [2]. In practice, supervision often faces various obstacles, such as low student motivation, delays in completion, and ineffective communication between students and supervisors. These issues negatively impact the quality of the work produced and the rate of on-time graduation [3], [4]. Therefore, a new approach is needed to create a more interactive, efficient, and goal-oriented supervision process.

One innovative approach is gamification, defined as the application of game elements in non-game contexts [5], [6]. Gamification has been proven in numerous studies to increase student engagement, motivation, and discipline by implementing elements such as points, levels, challenges, badges, and leaderboards [7], [8], [9], [10]. Furthermore, Management Information Systems (MIS) play a crucial role in supporting the administration, monitoring, and documentation of academic activities, including final project supervision [11], [12].

MIS used in higher education generally focuses on administrative aspects and does not fully accommodate the interaction needs that can sustainably boost student motivation [13], [14]. This gap underpins the importance of this research. Few studies specifically integrate gamification into MIS for the context of final project supervision, particularly in arts education environments that demand both creativity and managerial precision. Therefore, this research aims to explore relevant gamification elements and develop a preliminary design for a gamification-based MIS that meets the needs of vocational students' final project supervision.

The research problem focuses on how to design a gamification model that can be implemented in an MIS interface to improve the quality and effectiveness of students' final project guidance. This research aims to identify appropriate gamification elements, organize them into a system design framework, and propose a preliminary design for a gamification-based MIS. Thus, the expected benefits include academic contributions in the form of enriching the literature on gamification integration in MIS in arts universities, as well as practical contributions

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

in the form of user interface designs that can serve as the basis for developing system prototypes.

II. METHOD

This research employs the Research through Design (RtD) approach, a method that places the design process at the heart of knowledge production [15], [16]. Through this approach, the system design is not merely a final output but also an instrument for exploring, understanding, and formulating solutions to the challenges of final project supervision within a project-based arts education environment [17]. RtD enables an iterative process that integrates critical reflection, form exploration, and design evaluation through gradually evolving prototypes [18], [19].

The research process consists of five main stages (Fig. 1). The first stage is a wicked problem or problem framing, which defines the context and needs of users (students and supervisors) through an analysis of guidance activities and the characteristics of the project-based curriculum. The second stage is grounding or multidisciplinary investigation, where diverse perspectives are gathered to build a holistic understanding of the context, specifically covering the scope of MIS, gamification, and student motivation. The third stage is ideation or conceptualization, which generates creative solution ideas through brainstorming or sketching, reframing the problem if necessary. The fourth stage is prototyping or generative design, which formulates the system concept, determines the most relevant gamification elements, and compiles design requirements for the MIS interface design. The user interface was developed during this stage. The fifth stage was design evaluation, which assessed the prototype for usability, clarity of interaction flow, and the suitability of gamification elements to pedagogical objectives. The evaluation was conducted using an expert walkthrough method involving the supervisor as the evaluator.

The primary output of this research is a gamification-based MIS interface design that reflects the findings from the iterative design process. Through the RtD approach, this research not only produced a design artifact but also contributed to knowledge regarding how gamification elements can be effectively integrated into a final project supervision management system in an arts college environment.

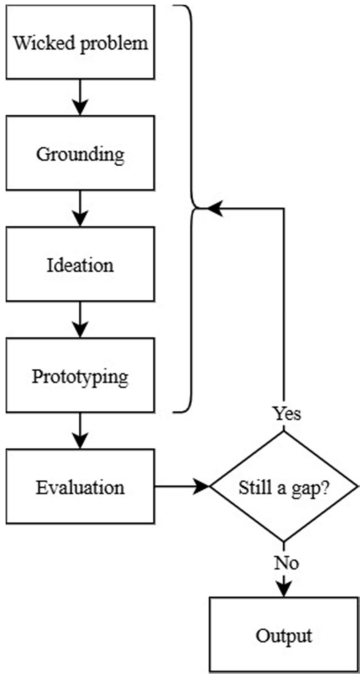

Fig. 1. Research through Design Flow Diagram (adaptation of [15], [16], [19])

III. RESULTS AND DISCUSSION

A. Gamification in Education

An analysis of existing research indicates that integrating game design elements (Table I) into education has been proved to be a useful teaching method for enhancing students' drive, involvement, and dedication to their studies. Prior research consistently highlights that the effectiveness of gamification strategies depends on the skillful use of essential components that have a significant effect on how students learn [20], [21], [22], [23], [24].

The systematic application of these elements creates a learning environment that resembles a game-like experience, encouraging students to be more active and consistent in their participation throughout the academic process. Effective gamification design using the elements in Table 1 is not merely aesthetic; it profoundly impacts the quality of learning. The first principle is a continuous feedback loop (Fig. 2), providing direct feedback on student achievement to foster self-awareness regarding their progress and areas for improvement [25], [26].

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

TABLE I
Game Design Element

Element	Function
Points	Indicators of quantitative achievement.
Badges or trophies	Mark success in certain achievements and serve as symbols of quality achievement.
Leaderboards	Present a competitive aspect by comparing progress between participants.
Challenges or quests	In the form of specific challenges that encourage students to complete tasks in stages.
Levels or progress bar	Reflect on skill development or academic progress.
Rewards	Serve as a form of appreciation, both intrinsic and extrinsic.

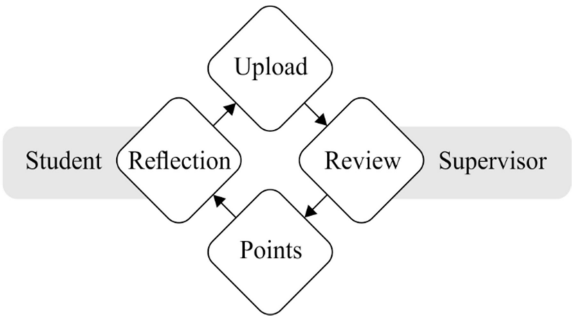

Fig. 2. Feedback Loop

The second principle is creating intrinsic and extrinsic motivation, where the system not only provides external rewards such as points or rewards but also fosters a sense of internal satisfaction through personal achievement, autonomy, and skill mastery [27], [28], [29]. The third principle is instilling a sense of progress and continuity in the learning journey, so that students feel that each step they take brings them closer to their ultimate goal [30]. The integration of these three principles is considered crucial because it ensures that gamification not only motivates in the short term but also encourages sustained engagement and supports the achievement of meaningful learning outcomes.

B. Gamification-based MIS

The integration of gamification elements into a MIS to support the final project guidance process should be developed as an extension of administrative functionality. Administratively, the student's final project lifecycle consists of seven stages (Fig. 3): submission of the final project proposal, final project proposal examination, pre-production guidance and reporting of the final project, production guidance and reporting of the final project, post-production guidance and reporting of the final project, including the manuscript, the final examination, and post-examination for revisions and filing.

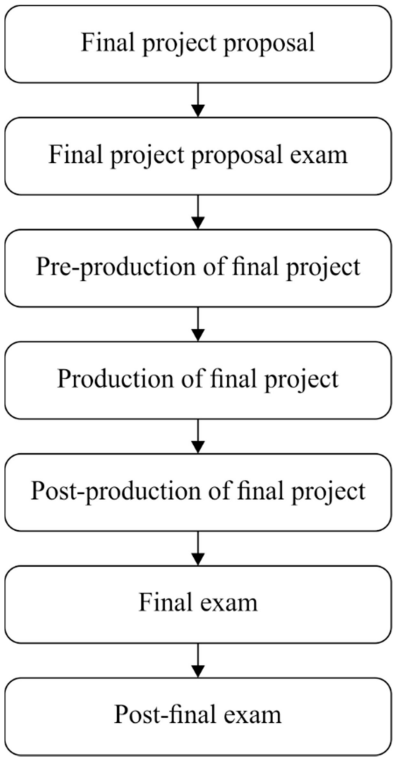

Fig. 3. Final Project Steps

Based on the administrative functions mentioned above, the MIS interface (without gamification) is shown in Fig. 4.

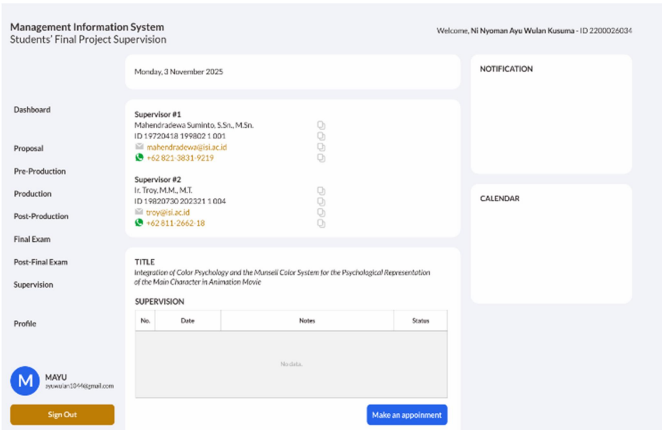

Fig. 4. MIS Interface without Gamification

Gamification is then applied to managing the guidance schedule, recording revisions, and monitoring progress with the aim of activating a feedback loop, a sense of progress, and a balance between intrinsic and extrinsic motivation, which have been identified as gamification design principles. Operationally, the schedule management feature can be linked to automated

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

point awards for students attending consultation sessions on schedule or uploading materials by the deadline. These accumulated points map to levels representing the student's final project progress.

The MIS dashboard, enhanced with gamification, displays clear and continuous progress indicators (Fig. 5). Badges are designed as discrete rewards for achieving qualitative milestones; such as, completing a chapter draft, finalizing a major revision, completing a project, or completing a proposal or final exam. Beyond serving as external signals, they can also be linked to students' digital portfolios to support internal motivation (professional competence and recognition).

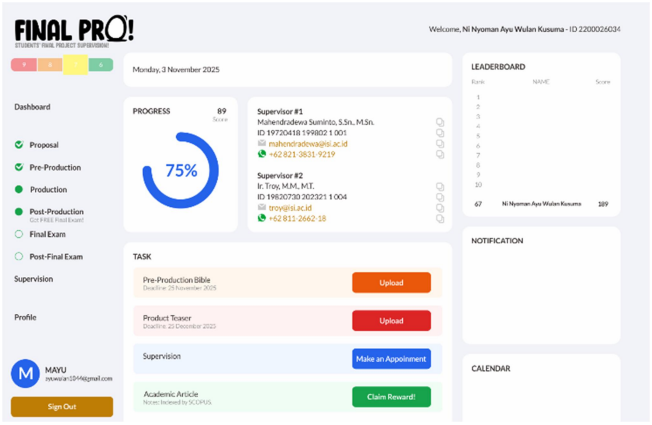

Fig. 5. Gamification-based MIS Interface

Meanwhile, leaderboards can include modules displaying aggregate metrics; for example, consultation frequency and deadline adherence. By utilizing anonymization or clustering mechanisms to avoid demotivating effects, users are given the freedom to choose their participation, ensuring that the competitive aspect does not undermine academic collaboration. Challenges are implemented as gamified micro-tasks or weekly sprints, accompanied by structured feedback from supervisors with the aim of improving the quality of output integrated into MIS notifications, effectively closing the feedback loop.

That design requires attention to the alignment of gamification indicators with learning outcomes, transparency of point/badge awarding rules, data protection, and access roles (lecturer, student, coordinator, administrator), and evaluation mechanisms to measure their effects on engagement, completion time, and revision quality. Thus, the integration of gamification into an MIS is not simply adding a layer of "game," but rather redesigning the supervision flow to be measurable, reflective, and supportive of long-term motivation in the context of final project guidance in arts-based higher education.

C. System Design

The conceptual design of a gamification-based Management Information System (MIS) is formulated as an integration of established guidance administration modules within a gamification engine that operationalizes game elements (points, levels, badges, leaderboards, challenges, and rewards) to create a continuous feedback loop and sense of progress. It is shown in Fig. 6.

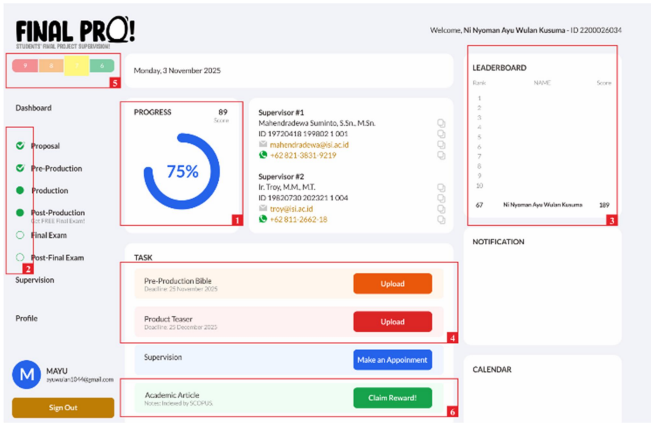

Fig. 6. Gamification aspect in MIS

The interface design meets the gamification aspects of the information system (Table 1). These elements include:

1. Points, which are quantitative indicators of achievement. The dashboard displays them as a percentage of achievement, along with total score obtained for each stage and the value of each guidance.
2. Badges, which mark success at specific milestones (final project milestones) and serve as symbols of quality achievement.
3. Leaderboard, which provides a competitive aspect by comparing student progress.
4. Challenges, specific assignments that encourage students to complete tasks incrementally within a deadline.
5. Levels, which are indicated by four color blocks that reflect the final project progress stage per semester.

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

6. Rewards are given as a form of appreciation for student achievement. Students who successfully publish their research in the form of a scientific article and have it published in a SCOPUS-indexed journal are entitled to graduate without a final project exam.

In terms of components, this model consists of:

1. User Management: (Actors: students, supervisors, coordinators, administrators),
2. Scheduler & Calendar: For managing consultation session and deadlines,
3. Document Repository & Revision Log: For draft storage and revision tracking.
4. Gamification Engine: Translates system events (e.g., uploading drafts, attending consultations, completing major revisions) into points, levels, and badges according to configurable weighting logic,
5. Challenges Module: For issuing periodic micro-tasks or sprints,
6. Dashboard & Progress Visualization: Displays personal indicators (progress bars, milestones achieved) and optionally relative indicators (anonymized or clustered leaderboard),
7. Notification & Feedback Channel that delivers structured feedback from supervisors,
8. Analytics & Reporting: For monitoring deadline adherence, consultation frequency, and revision quality. The rules for awarding points and earning badges are designed to align with learning outcomes, ensuring that rewards are not only quantitative but also incorporate account qualitative aspects such as the supervisor's assessment score on draft quality.

In the flow representation, the system is depicted through several key interactions, as shown in Fig. 7. The administrator can adjust point weights, define challenges, and set privacy policies or leaderboard participation options. This framework implements a feedback loop, a gamification design principle in MIS.

After students upload their progress (which can be in the form of writing, work, or completion of a task), the supervisor reviews it and assigns a grade, which is then converted into badges, rewards, or even punishments. Students then reflect, which can be interpreted as a process of revision or follow-up based on the consultation results. Students then repeat the process of uploading their progress, and so on, until the final assignment is completed.

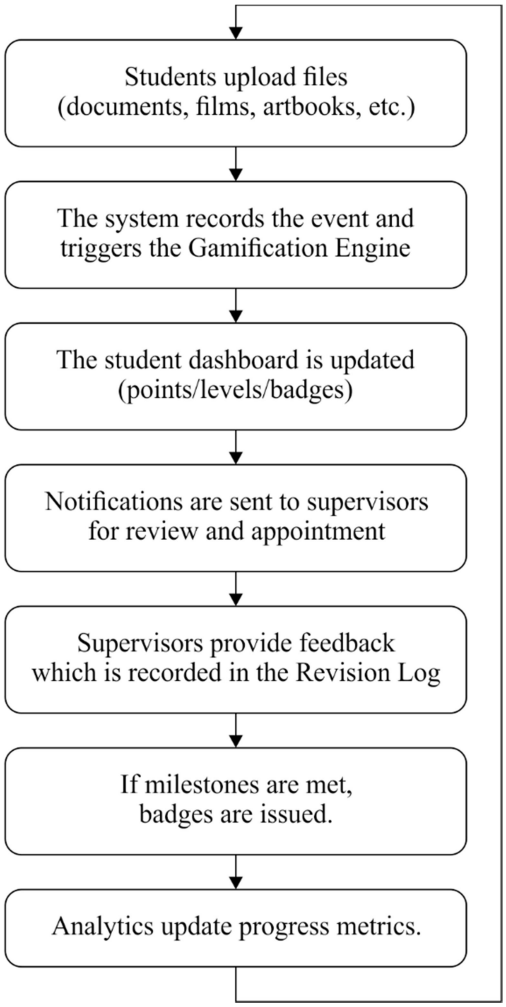

Fig. 7. Key interactions of gamification-based MIS

D. Evaluation

Explanation of the design's advantages: First, this design increases engagement by providing visual indicators and rewards that motivate repeated actions (attending consultations, uploading corrections), thus aligning with literature finding suggesting that gamification encourages active participation. Second, monitoring becomes more transparent because all guidance activities are digitally recorded. Dashboard notifications and analytics results make it easier for guidance counselors and coordinators to detect stagnation or delays easly, allowing for early intervention. Third, student motivation is enhanced through a combination of external rewards (badges, points) and competency recognition (levels, portfolios). This, when

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

designed with attention to the intrinsic needs for autonomy and competence, this approach foster long-term engagement.

Furthermore, this design also explores potential obstacles and mitigation strategies. First, user resistance (lecturers or students) may arise due to changes in practice; mitigation through training, workshops, and administrators facilitating the transition is highly recommended. Second, a balance between competition and collaboration must be maintained. Leaderboards are optionally designed with anonymity or clustering features and collaborative challenges to prevent competition from diminishing cooperation. Third, the risk of over-focusing on the quantity of points rather than the quality of work is addressed by incorporating qualitative assessments from supervisors as a determining factor in awarding points and badges, as well as a peer-review mechanism. Fourth, technological and resource limitations are addressed through a phased approach: moving from simple prototype to a lightweight web application, and eventually integration with LMS or campus portal, while ensuring data privacy and system maintenance aspects are defined in the governance plan.

Overall, this initial design practically applies common threads from the literature and maps out implementation and risk mitigation steps that will be tested in the subsequent prototyping and pilot study phases.

IV. Conclusion

The design of a gamification-based MIS for the final project guidance process for vocational students is a significant initial step in creating a more interactive, transparent, and effective final project guidance ecosystem. This system is designed to address the need to manage academic processes that are often monotonous and unmotivating for students. By integrating gamification elements-such as points, levels, and badges-into the guidance mechanism, this design has the potential to increase student engagement while facilitating systematic monitoring of academic progress.

This research presents a novel approach through the systemic integration of gamification into a Management Information System (MIS) specifically designed for the final project guidance process. The final project guidance process is a context rarely studied in the educational gamification literature. Using a Research through Design (RtD) approach, this study produced not only an interface prototype but also design insights that map how gamification elements can enhance motivation, progress, and the quality of interactions between students and supervisors in a project-based arts education environment. Furthermore, this research offers a replicable design framework, contributing to the development of a more adaptive digital ecosystem to support creative project management in arts universities.

This research still requires direct field implementation to empirically test and verify the effectiveness of the designed system, so the claimed benefits remain hypothetical. This limitation opens up opportunities for further, more applicable research, particularly in testing the validity and reliability of the design.

Future research directions should focus on several key stages. First, developing the gamification-based MIS interface into an operational system. Second, conducting a limited trial with vocational students to assess usability and user acceptance. Third, evaluating the system's effectiveness through an empirical case study that measures the impact on student motivation, engagement, and academic achievement. With these steps, it is hoped that gamification-based MIS can be realized as a tangible solution that contributes to digital transformation in higher education.

V. References

[1] W. Nuis, M. Segers, and S. Beausaert, “Conceptualizing mentoring in higher education: A systematic literature review,” *Educ Res Rev*, vol. 41, p. 100565, Nov. 2023, doi: 10.1016/j.edurev.2023.100565.

[2] G. Nabi, A. Walmsley, M. Mir, and S. Osman, “The impact of mentoring in higher education on student career development: a systematic review and research agenda,” *Studies in Higher Education*, vol. 50, no. 4, pp. 739–755, Apr. 2025, doi: 10.1080/03075079.2024.2354894.

[3] S. Miske and O. Sogunro, “Effects of a Mentorship Program on High Need College Students: Reflections from Mentors and Mentees,” *Journal of Educational Research and Practice*, vol. 14, no. 1, Apr. 2024, doi: 10.5590/JERAP.2024.14.1.06.

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

[4] H. Foster, A. Ooms, and D. Marks-Maran, "Nursing students' expectations and experiences of mentorship," *Nurse Educ Today*, vol. 35, no. 1, pp. 18–24, Jan. 2015, doi: 10.1016/j.nedt.2014.04.019.

[5] J. Krath, L. Schürmann, and H. F. O. von Korflesch, "Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning," *Comput Human Behav*, vol. 125, p. 106963, Dec. 2021, doi: 10.1016/j.chb.2021.106963.

[6] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness," in *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, New York, NY, USA: ACM, Sep. 2011, pp. 9–15. doi: 10.1145/2181037.2181040.

[7] D. Albertazzi, M. G. G. Ferreira, and F. A. Forcellini, "A Wide View on Gamification," *Technology, Knowledge and Learning*, vol. 24, no. 2, pp. 191–202, Jun. 2019, doi: 10.1007/s10758-018-9374-z.

[8] J. Koivisto and J. Hamari, "The rise of motivational information systems: A review of gamification research," *Int J Inf Manage*, vol. 45, pp. 191–210, Apr. 2019, doi: 10.1016/j.ijinfomgt.2018.10.013.

[9] L.-M. Putz, F. Hofbauer, and H. Treiblmaier, "Can gamification help to improve education? Findings from a longitudinal study," *Comput Human Behav*, vol. 110, p. 106392, Sep. 2020, doi: 10.1016/j.chb.2020.106392.

[10] M. Sailer and L. Homner, "The Gamification of Learning: a Meta-analysis," *Educ Psychol Rev*, vol. 32, no. 1, pp. 77–112, Mar. 2020, doi: 10.1007/s10648-019-09498-w.

[11] Chanda Chansa Thelma, Bernice Anowa Welbeck, Zohaib Hassan Sain, Daniel L Mpolomoka, Chisebe Sylvester, and Edwin Vinandi Phiri, "The effect of management information system on student academic performance: A case of selected higher learning institutions in Lusaka District, Zambia," *World Journal of Advanced Research and Reviews*, vol. 24, no. 3, pp. 118–129, Dec. 2024, doi: 10.30574/wjarr.2024.24.3.3669.

[12] X. Cheng, W. Mo, and Y. Duan, "Factors contributing to learning satisfaction with blended learning teaching mode among higher education students in China," *Front Psychol*, vol. 14, Jun. 2023, doi: 10.3389/fpsyg.2023.1193675.

[13] M. K. Rohman, "Analysis of Management Information System Utilization for Learning Outcome Evaluation and Student Welfare Enhancement," *Education and Sociedad Journal*, vol. 1, no. 1, pp. 32–41, Dec. 2023, doi: 10.61987/edsojou.v1i1.526.

[14] K. S. S. Musti, "Management Information Systems for Higher Education Institutions," 2020, pp. 110–131. doi: 10.4018/978-1-5225-9829-9.ch006.

[15] J. Zimmerman, J. Forlizzi, and S. Evenson, "Research through design as a method for interaction design research in HCI," in *Conference on Human Factors in Computing Systems - Proceedings*, 2007. doi: 10.1145/1240624.1240704.

[16] J. Zimmerman, E. Stolterman, and J. Forlizzi, "An analysis and critique of research through design: Towards a formalization of a research approach," in *DIS 2010 - Proceedings of the 8th ACM Conference on Designing Interactive Systems*, 2010. doi: 10.1145/1858171.1858228.

[17] R. B. Robinson, A. Osborne, C. Ji, J. C. Fey, E. Dagan, and K. Isbister, "'That's Not Good Science!': An Argument for the Thoughtful Use of Formative Situations in Research Through Design," in *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems*, New York, NY, USA: ACM, May 2024, pp. 1–8. doi: 10.1145/3613905.3644063.

[18] E. Giaccardi, "Histories and futures of research through design: From Prototypes to Connected things," *International Journal of Design*, vol. 13, no. 3, 2019.

[19] R. Maher, M. Maher, S. Mann, and C. A. McAlpine, "Integrating design thinking with sustainability science: a Research through Design approach," *Sustain Sci*, vol. 13, no. 6, pp. 1565–1587, Nov. 2018, doi: 10.1007/s11625-018-0618-6.

[20] R. Kadirbayeva, "Applying Gamification Technology to Enhance Student Engagement in High School Mathematics," *International Journal of Information and Education Technology*, vol. 15, no. 7, pp. 1398–1409, 2025, doi: 10.18178/ijiet.2025.15.7.2341.

[21] I. Srivastava, H. Sachdeva, and S. Tyabji, "Integrating gamification in design research: a pedagogical approach for design education in India," *Discover Education*, vol. 4, no. 1, p. 239, Jul. 2025, doi: 10.1007/s44217-025-00685-2.

[22] I. Rahmi, T. Rimenda, and T. D. Ariyanti, "Gamification as an alternative to increase students' motivation: a scoping review," *Journal of Education and Learning (EduLearn)*, vol. 19, no. 2, pp. 1125–133, May 2025, doi: 10.11591/edulearn.v19i2.21771.

[23] S. M. Seeletse, L. M. Wijayanti, S. Muqorrobin, and A. Abdurahman, "Gamification in Education: Enhancing Student Engagement in the Digital Age," *Assoeltan: Indonesian Journal of Community Research and Engagement*, vol. 2, no. 2, pp. 21–32, Sep. 2024, doi: 10.70610/edujavare.v2i2.796.

[24] C. J. Hellín, F. Calles-Esteban, A. Valledor, J. Gómez, S. Otón-Tortosa, and A. Tayebi, "Enhancing Student Motivation and Engagement through a Gamified Learning Environment," *Sustainability*, vol. 15, no. 19, p. 14119, Sep. 2023, doi: 10.3390/su151914119.

[25] J. Willis, A. Gibson, N. Kelly, N. Spina, J. Azordegan, and L. Crosswell, "Towards faster feedback in higher education through digitally mediated dialogic loops," *Australasian Journal of Educational Technology*, pp. 22–37, Jan. 2021, doi: 10.14742/ajet.5977.

[26] D. Carless, "Feedback loops and the longer-term: towards feedback spirals," *Assess Eval High Educ*, vol. 44, no. 5, pp. 705–714, Jul. 2019, doi: 10.1080/02602938.2018.1531108.

[27] R. M. Ryan and E. L. Deci, "Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," *Contemp Educ Psychol*, vol. 61, p. 101860, Apr. 2020, doi: 10.1016/j.cedpsych.2020.101860.

[28] E. D. Mekler, F. Brühlmann, A. N. Tuch, and K. Opwis, "Towards understanding the effects of individual gamification elements on intrinsic motivation and performance," *Comput Human Behav*,

EISSN 2654-802X ; PISSN 2985-4067
DOI: https://doi.org/10.56873/jitu.6.2.6038. SUBMITTED: SEPTEMBER 17, 2025; REVISED: DECEMBER 1, 2025; ACCEPTED: DECEMBER 7, 2025

vol. 71, pp. 525–534, Jun. 2017, doi: 10.1016/j.chb.2015.08.048.

[29] M. D. Hanus and J. Fox, "Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance," *Comput Educ*, vol. 80, pp. 152–161, Jan. 2015, doi: 10.1016/j.compedu.2014.08.019.

[30] M. Matus, I. Ružić, and I. Balaban, "The Effect of Progress Indicators on Students' Engagement, Learning Experience and Final Grade," *Ubiquity Proceedings*, p. 18, Aug. 2024, doi: 10.5334/uproc.140.