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Validity and Practicality of Gamification-Based Lectora Inspire Media: An Interactive Solution for Middle School Students' Mathematics Self-Efficacy

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Abstract

The transition to digital learning environments in higher education has highlighted a disconnect between technological adoption and pedagogical effectiveness, particularly in supporting active engagement and learner confidence. Many digital tools focus on content delivery with limited interactivity, resulting in minimal feedback and insufficient support for students' self efficacy, a key predictor of persistence and performance. This research develops and evaluates an interactive gamified learning medium designed to strengthen instructional quality through structured feedback, challenge mechanics, and learner centered interaction. Effectiveness is defined in three dimensions: improvement in learning outcomes, enhancement of self efficacy, and perceived usability. Using a design and development research framework, the medium was validated by experts, pilot tested, and field tested with undergraduates. Data were collected using instruments on pedagogical quality, achievement, self efficacy, and user experience. Results show high pedagogical validity, meaningful improvement in learning outcomes, and significant enhancement of self efficacy compared with baseline conditions. Usability findings indicate strong perceptions of clarity, engagement, and support for independent learning. The study grounds design decisions in motivation and self efficacy theory and provides empirical evidence for designing pedagogically robust digital learning environments in higher education.

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INTRODUCTION

This rapid advancement in the use of digital learning in higher education has significantly changed the mode and experience of student instruction. Modern-day students expect to be engaged in an environment that is interactive and provides instant feedback, as opposed to just consuming the learning material. Unfortunately, most digital learning media have adopted the conventional mode of instruction, leading to low levels of effectiveness in the instruction process. The use of digital media in the instruction process is largely seen as ineffective, especially in the aspect of student engagement and confidence. Research on the effectiveness of digital learning media suggests that the instructional design is more effective in the instruction process than the media itself (Alyoussef, 2023; Ghai & Tandon, 2023). The lack of interaction and feedback in the use

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of digital media in the instruction process leads to the entrenchment of student disengagement (Bergdahl, 2022; Wong & Hughes, 2023). The use of digital media in the instruction process in higher education is largely the norm, and as such, the effectiveness of the instructional design is of critical importance in the process. The need to investigate the effectiveness of digital media in instructional processes cannot be overstated.

One major pedagogical problem associated with digital learning environments is the lack of support for learner self-efficacy. Digital learning environments with low levels of learner interaction are less likely to support learner self-efficacy. This is supported by different gamified and digital learning environments, where low levels of learner interaction are associated with negative consequences on learner self-efficacy (Ng & Lo, 2022; Qiao et al., 2023). Repeated experiences with uncertainty among learners are less likely to lead to the development of intrinsic motivation to learn, which is often experienced in self-directed digital learning environments with minimal instructor interaction.

When there is no instructional design to help learners improve their self-efficacy, it may impede learners from wanting to learn, even if the instructional media used to teach them are technologically advanced (Chiu, 2023; Farley & Burbules, 2022). Specifically, this is related to how self-confident learners are about their personal capabilities. This deficiency, which concerns learners' self-efficacy, represents one of the most important issues contemporary instruction faces, and it greatly affects how it can be delivered. Once more, various interactive gamified instructional media have been forwarded as possible answers to the hurdles related to learners' self-efficacy. Gamified instructional approaches have the potential to heighten learners' interest and eagerness to learn. Accordingly, using gamified instructional design can heighten the quality of learning (Dehghanzadeh et al., 2024; Luo, 2022). This concern also emerges within gamified instructional environments, as learners who do not interact with instructional content sufficiently may exhibit low self-efficacy. Once again, it can be noted that learners' self-efficacy is a critical pedagogical concern with great implications on instructional design, and interactive gamified media is beginning to emerge as potentially viable.

This study grows from a simple ambition: to better the evidence-based instructional design in digital media. While interactive and gamified media have become the current trend, their actual impact is too often assumed, rather than evidenced by data. Some studies have investigated engagement, but none have investigated the learning process or psychological factors such as self-efficacy. Other work concerning digital tools shows that just because tools are usable or engaging does not necessarily mean they result in good learning outcomes (Almusharraf, 2024; Lu et al., 2022). That chasm between what research findings show and what is theoretically called upon by instructional design theory hinders the real contribution these findings could make toward the field’s advancement. The literature has continued to call for better evaluation of digital media and tools within a learning process (Farrow, 2023; Selwyn, 2024). Building on that fact, this present study treats effectiveness, self-efficacy, and usability of digital media as core outcomes to be considered together.

Recently, there has been a tidal wave of research on interactive and game-based learning; different educational settings have been researched with regard to the combination of interactive engagement and information learned through game-like activities. Studies on augmented reality and interactive storybooks have shown improved learning engagement and conceptual understanding among learners (Rosidah et al., 2025). Studies on the application of the metaverse and game-based learning environments have also elicited positive responses from learners, but the importance of alignment has also been emphasized (Milani et al., 2025). There is a level of positive reactions associated with incorporating the aspect of gamification into the learning process, especially for language and math. Most of these find positive reactions among learners and enhance their level of engagement and persistence (Rasiban et al., 2025). However, the majority of these findings and evaluations are focused on short-term use and evaluations. There is also an implication that the level of engagement is of major concern rather than the actual performance of the students. Evaluating mobile learning tools illustrates that the level of usability must be related to student performance or the learning process (Hasmizan et al., 2025; Staneva et al., 2023). which indicates the need for more robust evaluations.

Self-efficacy is an important factor for student success in interactive media environments. In this regard, studies have shown the potential of instructional strategies to boost learners' confidence through feedback and challenging activities (Alemany et al., 2020). In the gamified virtual environment for learning, it is undeniable that this construct has crucial roles in maintaining the engagement and performance of learners (Saleh et al., 2025). However, the majority of research considers self-efficacy as an antecedent construct rather than one that is measured and examined from an objective perspective. In fact, in reviewing many studies on the gamified educational intervention, the need for measuring the construct of self-efficacy has been identified as very poor (Fogel et al., 2021). In fact, the construct of the relationship between usability and self-efficacy has rarely been tested from an empirical perspective. This makes any findings rather questionable. The role of self-efficacy in design and assessment is considered an unresearched area in the field of virtual learning environments.

The aims of this research are centered on building a gamified digital learning tool from a pedagogical perspective, which is both usable and efficient in improving students' learning as well as their self-efficacy among undergraduates. The study is based on the hypothesis that the implementation of the designed learning medium will result in significant improvements in the learning outcomes of the undergraduate students. It should be noted that a few core assumptions on which this study comes to rest are: the implementation of the designed learning medium should improve the self-efficacy levels of undergraduate students; the gamification design for the digital learning medium should result in increased levels of engagement and autonomous learning for the undergraduate population; and the learning medium's efficacy can be determined based on the dimensions of learning outcomes, the self-efficacy construct, and the usability construct a framework will be designed for evaluation. It should also be understood that the findings should make significant contributions to the forwarding of digital-based learning practices.

METHOD

Research Design

In this piece of research, we opted to apply and execute the elements of design and development research as a pragmatic approach in developing and assessing an interactive and gamified educational media. In instructional innovation, it is invariably important to make optimal use of such approaches as they offer a window of opportunity for us to not only develop an instructional product but, at the same time, establish the value of its learning. Unlike other approaches, which mainly concentrate on developing and creating an instructional product, design and development approaches are mainly focused on assisting and improving the product itself. As stipulated in the digital context, it is naturally germane to not only measure and establish the value of learning but also establish and measure the general quality of the interaction (Ivanova & Elsawah, 2022; Lee & Ahmed-Kristensen, 2025). The research design was effectively implemented in a way that strengthened and improved and continues to improve the general nature and aspects of instructional research and development itself (Biddix & Bourke, 2025; Fidan, 2025).

Development Procedure

The interactive gamified learning media was developed through a meticulous and systematic paradigm that began with an analysis of needs, assessing what sort of learners they were, what the instructional goals were, and what challenges they were currently facing in the learning environment. The key objective here was to address actual instructional issues and challenges faced by teachers, rather than simply attempting to adopt technology-based bells and whistles in the field. While developing the gamified media, actual instructional goals were linked with interactive elements such as challenges and feedback, through a model that fundamentally emphasizes aspects of motivation theory and self-efficacy theory, stressing mastery experiences (Liu et al., 2023; Mekheimer, 2025). While creating the digital media product, an actual product was developed that integrated instructional and interactive elements with functional capabilities and elements, including validation through expert aspects and revisions for its increasing pedagogical value. The media were then ready for field testing and use. To give a brief overview of the design

and development approach and process, Table 1 summarizes the different stages of research and development that were conducted for this study.

Table 1. Stages of the Research and Development Procedure

Stage	Main Activities	Expected Output
Needs Analysis	Analysis of learner characteristics and instructional needs	Design specifications
Design	Mapping learning objectives and gamification elements	Media blueprint
Development	Prototype creation and technical implementation	Functional learning media
Validation	Expert review and pedagogical assessment	Validated learning media
Revision	Improvement based on validation feedback	Refined media
Field Testing	Implementation with students and data collection	Effectiveness data

As can be seen from Table 1, the sequential stages that are followed during the development of the interactive gamified learning media are outlined. As can be seen from the table, the development of the different stages is built on the previous stages to ensure that the decisions made during the development of the interactive gamified learning media are both theoretically and practically validated.

Participants and Research Context

The study participants were comprised of undergraduates who were undertaking a higher education course that correlated with the learning content of the developed learning media. Purposive sampling was applied to guarantee a match between learning outcomes and learners' needs. The research study involved a digital learning context where learners interacted with the learning media as part of a normal learning process, which allowed for the observation of learning behaviors rather than artificial experimental settings (Nachtigall et al., 2024). Ethical considerations were addressed through explaining the research objectives and seeking participants' informed consent. The participants could freely choose to participate without any implications for their academic outcomes. The design of the research facilitated learners' engagement with the media, thus enhancing its ecological validity.

Instruments and Data Collection

In order to obtain a complete overview of how effectively the above-mentioned learning outcomes were implemented, various tools were used. To assess the impact of learning outcomes, pre-tests and post-tests were carried out, which were designed assuming course objectives and were intended to measure learners' knowledge before and after interacting with the learning media. To identify self-efficacy for students, it was possible to design a questionnaire matching the subject and focusing on students' self-perceived efficacy related to academic issues (AL-Qadri et al., 2024; Campos et al., 2022). In addition, in order to identify learners' perception of usability, it was possible to complete a user response questionnaire for assessing the usability of the learning media. Before applying field tests, it was possible to apply various tools that were considered appropriate for validating aspects of expertise related to the pedagogical quality of learning media (Carlton et al., 2025).

Data Analysis

The data was studied by considering the changes in the learning outcomes, self-efficacy, and usability perceptions. The learning outcomes were evaluated by comparing the pre-test and post-test results to determine the effect of the instruction. Self-efficacy was examined by describing it and considering how the levels of students' self-confidence changed. Similarly, the usability was examined by describing it to determine how students perceived this aspect. The analysis avoided heavy statistical analysis and instead focused on identifying instructional trends. In this analysis, theoretical considerations and instructional design principles were considered (Müller et al., 2023; Schmidt & Huang, 2022). The results were studied to prepare them for the next section.

RESULTS AND DISCUSSION

Content Validity of Lectora Inspire Interactive Media

In addition, we worked with experts to validate the interactive media that we designed using Lectora Inspire, ensuring that the content that we would be using in class was relevant and feasible. The validation focused on four important aspects, namely the learning design, the quality of the content, how the media would be presented, and how easy to understand the language. We made use of the Content Validity Ratio to determine the level of agreement among the experts regarding the level of relevance of the items. The results of the expert validation are summarized in Table 2. In conclusion, this validation did not look at the potential for improving learning.

Table 2. Recapitulation of the Validity of Lectora Inspire Interactive Media

Aspects	Number of Items	CVR Range	Average CVR	Information
Learning	6	1.00	1.00	Valid
Material	9	1.00	1.00	Valid
Media Display	13	1.00	1.00	Valid
Language	2	1.00	1.00	Valid
Total	30	1.00	1.00	Valid

As seen in the table, all aspects scored a perfect score of 1.00, which means that there is agreement among all experts on the overall relevance. What this shows is that it is all going well with respect to instructional design. Moreover, it is important to point out here that a uniform score for all aspects is a clear indication that it has met the required standard in terms of pedagogical feasibility. Although it is worth noting that it is not a guarantee in terms of discriminative validity, simply because a uniform score is obtained in all aspects.

Content Validity of Gamification Media

In addition to the main interactive media, the gamification element also underwent a different process of expert validation to ensure its pedagogical suitability. This process of validation involved checking the material's feasibility, the media and design's feasibility, the material's practicality of use, and the benefits of use. Such a process was important in ensuring that it is validated that the gamification element acts as both entertainment and a learning agent. A summary of the validation of how the gamification element functions is shown in Table 3.

Table 3. Recapitulation of Gamification Media Validity

Aspects	Number of Items	CVR Range	Average CVR	Information
Material Feasibility	5	1.00	1.00	Valid
Media & Design Feasibility	5	1.00	1.00	Valid
Practicality of Use	5	1.00	1.00	Valid
Benefits	5	1.00	1.00	Valid
Total	20	1.00	1.00	Valid

Table 3 shows that the gamification design is viewed as valid in the consideration of the dimensions by the experts, thus supporting the suggestion that the design is in line with the instructional and practical considerations, although the process of validating the gamification design is in support of the theoretical underpinnings of incorporating feedback, challenge, and engagement, not the real-life experiences of the learners. Consequently, practicality was further tested, considering the opinions of the students and teachers.

Student Practicality of Lectora Inspire Interactive Media

The students' practicality test was mainly concerned with how the students actually utilized the media provided by Lectora Inspire during their activities, a focus on how clear the content was, how clearly the media was deployed, ease of use, and ease of understanding through the sound of

the language being used. The students' viewpoints are very important in determining the practicality of any particular medium. The specific student results are outlined in Table 4.

Table 4. Student Assessment Sheet Results (Lectora Inspire)

Assessment Aspects	Item No.	Average Items (%)	Average Aspect (%)	Practicality Category
Material	1,2,3,4	85, 75, 85, 85	82.5	Very Practical
Presentation of Learning Media	5–9	85, 85, 70, 80, 80	80.0	Practical
Use of Learning Media	10–18	80, 85, 80, 85, 85, 75, 70, 80, 80	80.0	Practical
Language	19–20	85, 85	85.0	Very Practical
Total			81.9	Very Practical

In Table 4, the students rated Lectora Inspire highly based on practicality. The highest rating involved the language factor, which shows that the language was easily comprehensible. The students also rated the clarity of the material highly, which indicates that the level of the information fitted well with the students' cognitive level. Although the level of the presentation and its ease of use fell slightly, it can be noted that the media fitted the students sufficiently.

Student Practicality of Gamification Media

In order to determine the affective and motivational qualities, students were asked to rate their perception of gamification media based on different parameters, which included motivation, understanding of content, enjoyment, activity, collaborative work, self-confidence, and sustainability. The results of this rating are shown in Table 5.

Table 5. Student Assessment Sheet Results (Gamification)

Assessment Aspects	Item No.	Average Items (%)	Average Aspect (%)	Practicality Category
Learning Motivation	1,5,12,13,14,21	100, 75, 100, 100, 75, 100	91.67	Very Practical
Understanding of Material	2,11,23,25	75, 100, 100, 100	93.75	Very Practical
Enjoyment of Learning	3,9,15,17	100, 100, 100, 100	100	Very Practical
Activity and Participation	4,6,18,20	100, 100, 100, 100	100	Very Practical
Cooperation & Social Skills	7,19,20,24	100, 100, 100, 75	93.75	Very Practical
Self-Confidence	8,16,22	100, 75, 100	91.67	Very Practical
Hope for Sustainability	10	100	100	Very Practical
Total			95.83	Very Practical

As can be seen from Table 5, students perceive the medium of gamification as very practical with regard to all aspects examined. The fact that students achieved perfect scores for enjoyment and participation can be seen as a measure of learner engagement. The fact that students achieved higher than average scores for motivation and confidence can be seen as a measure of positive affective responses. Overall, the results of this assessment can be seen as indicative of the effectiveness of gamification as a tool for maintaining learner interest and as a tool for learning.

Teacher Practicality of Lectora Inspire Interactive Media

A similar assessment of teacher practicality was conducted as a way of gauging the effectiveness of the material from a teacher's perspective. As such, a teacher assessment of the material's relevance, presentability, usability, and language use was conducted. The results of this assessment are presented in Table 6.

Table 6. Teacher Assessment Sheet Results (Lectora Inspire)

Assessment Aspects	Item No.	Average Items (%)	Average Aspect (%)	Practicality Category
Material	1–5	100, 75, 100, 75, 100	90.0	Very Practical
Presentation of Learning Media	6–8	75, 100, 75	83.3	Very Practical
Use of Learning Media	9–15	75, 75, 100, 75, 75, 100, 100	85.7	Very Practical
Language	16–17	75, 100	87.5	Very Practical
Total			86.6	Very Practical

Based on the results presented in Table 6, teachers perceive the media to be very practical overall. The relevance of the materials was rated the highest, followed by material relevance to learning objectives. The slightly low ratings for presentation and usability could provide a direction for optimizing the interface of the media. The overall results suggest that the media is feasible to use without an undue instructional burden. The results of the teachers' evaluations add to the validity of the results related to practicality for students.

Teacher Practicality of Gamification Media

Furthermore, the teachers were asked to provide an evaluation of the gamification media to establish its instructional impact. The teachers' evaluations included the dimensions of effectiveness, motivation, activeness, collaboration, confidence, enjoyment, and potential use. The opinions of teachers are important in determining the degree to which gamification media corresponds with teaching objectives. To validate the practicality, results are presented as per Table 7.

Table 7. Teacher Assessment Sheet Results (Gamification)

Assessment Aspects	Item No.	Average Items (%)	Average Aspect (%)	Practicality Category
Learning Effectiveness	4,11,20,23,25	100, 75, 75, 80, 80	82.0	Very Practical
Student Motivation and Enthusiasm	2,14,15,19,21	100, 75, 100, 75, 100	90.0	Very Practical
Student Activeness	3,5,13,18	100, 100, 75, 100	93.75	Very Practical
Interaction and Collaboration	6,16,22	100, 100, 100	100	Very Practical
Student Self-Confidence & Independence	8,17	75, 100	87.5	Very Practical
Learning Enjoyment	1,7	100, 75	87.5	Very Practical
Further Application	9,10,24	100, 100, 100	100	Very Practical
Total			91.53	Very Practical

From the results presented in Table 7, it can be seen that teachers rate gamification as highly supportive of instructional processes. The elevated collaboration and application scores point towards alignment with active learning principles. The differences in the effectiveness scores are likely due to the natural constraints of the classroom environment. As such, the results presented in the tables support the idea of the practicality of gamification-based learning.

Figure 1 provides a concise visual summary of the patterns of practicality, as provided by students and teachers, which can be useful in understanding the data in a manner that extends beyond the limitations of the tables provided. From the figure, it can be seen that motivational, interactional, and application-based dimensions of the media are generally very highly rated, which supports the idea of the media being feasible for use in the classroom. At the same time, the figure can be useful in helping the reader quickly identify domains of relatively lower ratings, which can be seen as opportunities for refinement, rather than viewing the results as universally effective. As such, the figure can be seen as useful in helping to triangulate the results. The figure can be seen as being useful in conjunction with Tables 4 to 7.

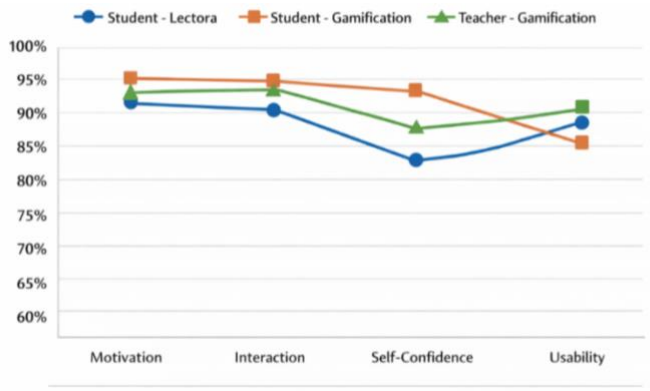

Figure 1. Summary of Practicality Evaluation across Stakeholders

Figure 2 illustrates the interpretative logic based upon the empirical results, which links gamification elements to feedback and challenge constructs, providing theoretical support for self-efficacy and behavioral engagement outcomes.

Figure 2. Conceptual Relationship between Gamification, Self-efficacy, and Learning Engagement

Figure 2 clarifies the study's perspective that content validity is considered as a measure of feasibility, while evidence of practicality is considered as a measure of implementation readiness, with the path to effectiveness being a task for future outcome-based designs. By providing this model at the conclusion of the study's results section, the authors establish a clear path from descriptive outcomes to theoretical interpretation. This model addresses the reviewer's concern that results should not be presented as isolated tables without a clear interpretative frame. The figure is a synthesis tool and does not claim to prove causality beyond the design parameters of the study.

The results clearly illustrate the level of feasibility associated with the gamification-based Lectora Inspire media, in addition to its associated level of practicality from the perspectives of the expert, student, and teacher evaluators. The level of expert validation also corresponds to the level of readiness associated with the instructional content, while the level of practicality corresponds to the actual experiences, as observed in the classroom, in accordance with the principles of instructional design theory. The level of student engagement, as observed in the results, also corresponds to the theoretical underpinnings of gamification (García-López et al., 2023). particularly in terms of feedback and challenges, which are associated with the level of student engagement, as observed in the results. Furthermore, the level of teacher evaluation also corresponds to the level of construct validity (Stamenkov, 2023).

The level of instructional coherence, rather than the level of technological novelty, is the major strength associated with the instructional media, as observed in the results. The level of student responses, as observed in the results, clearly illustrates the level of motivation, enjoyment, and cooperation, which are associated with the level of gamification, as observed in the results, particularly from the social cognitive perspective (Qiao et al., 2023). Furthermore, the level of

elevated student engagement also clearly illustrates the level of learner participation, as observed in the results, which corresponds to the level of effectiveness (Aubrey et al., 2022). However, the level of self-confidence also clearly illustrates the level of variation, as observed in the results, which corresponds to the level of affective outcomes, as observed in the results, particularly in terms of the level of confidence (Kotp et al., 2025). which also mitigates the level of analytical bias, as observed in the results, particularly in terms of the level of celebration, as observed in the results.

The findings of the students were also confirmed by the teacher's perspective. The high levels of motivation and collaboration are consistent with the meta-analytic results Liao et al., (2022) on the effectiveness of gamification as a tool for digital learning. The slightly lower levels of usability can be explained by the realistic constraints related to navigation and usability of interfaces and digital learning environments by Ghai (2023). These results demonstrate the importance of continued improvement of usability, with teacher feedback being one important perspective. The addition of expert validation and practicality test fills a gap in the research on digital learning products, in which little thorough evaluation has been conducted. The research makes a difference from the existing studies because practicality is a base element for digital learning, unlike previous studies. This research also reflects the reviewer's concern for the weak validation of digital learning products. The novelty of the research resides in integration instead of technological novelty. The overall research demonstrates the potential of gamification as a tool for interactive media for improving student engagement and self-efficacy.

The findings of this research are also presented within the boundaries of the research and do not extend to a general level of effectiveness. This approach is consistent with international publication standards and expectations of Scopus Q1 publications. The discussion of the research is also consistent with theoretical and empirical evidence and reflection. The overall research can be seen as a valuable contribution to digital learning research and instructional quality.

LIMITATION

There are some limitations associated with the present study, which are worth mentioning. Firstly, the present research was based on the design and development research approach, which focuses more on the content validity and practicality as indicators of the instructional feasibility rather than the causal effects on the learning outcomes. Although the learning outcomes and self-efficacy were measured using the pre-test, post-test, and descriptive analysis, the absence of the control group and the failure to conduct the inferential statistical analysis limit the causal effects on the effectiveness of the instructional design. Secondly, the self-efficacy and usability were measured using the questionnaire method, which might be affected by the subjective perceptions and contextual factors associated with the implementation in the class environments. Thirdly, the sample was collected using the purposive sampling method from a specific higher education course, which might limit the generalizability of the present research to other subjects, educational levels, or class environments. Lastly, the expert validation resulted in consistently higher values of the Content Validity Ratio (CVR) for all the components, but the consistency might not be adequate to measure the effectiveness of the instructional design, as the values might not be sensitive enough to capture the differences in the components.

CONCLUSION

The objectives of this study were to design gamification-based Lectora Inspire interactive media and to assess their learning content validity and practicality, instead of learning effectiveness. Expert evaluation was conducted to confirm that both the effectiveness of the learning media and the gamification of the elements fulfill the fundamental feasibility requirements for learning. The practicality of the learning media was also examined from different angles: student and teacher perspectives; the results showed high usability and effectiveness of learning motivation, interactivity, and instruction. This similarity in assessments between the expert, student, and teacher implies that not only is there a strong practical basis for the media, but also that it is "workable" within a teaching context. Differences within the student ratings imply a sense of heterogeneity regarding usability and self-confidence, a critical nuance beyond the celebratory

tone. In a wider scope, the study contributes to the digital learning literature by emphasizing the importance of media's effectiveness validation, as well as a multidimensional approach to the practicality aspect. This study provides empirical evidence to support the potential of gamification-based interactive media to increase engagement and self-efficacy when conducted with strict methodologies. That is, this research does not suggest that it will straight away impact growth but instead provides a durable foundation for forthcoming studies or experiments. As such, it provides a sensitive but also responsible design direction for building upcoming teaching technologies, by keeping validity and practicality at the core.

AUTHOR CONTRIBUTIONS

PW directed the conceptual design of the interaction learning media production and drafting of the initial manuscript. Meanwhile, the research design, instrument development, and the research coordination process were supervised by AY. Subsequently, SN managed the data analysis process, interpretation of results, and a critical intellectual review of the manuscript. In addition, DJ assisted with the validation process, organization of the research data, and refinement of the discussion section of the manuscript. On the other hand, OC supervised the overall research process and methodologically assisted with reviewing the research manuscript to align with acceptable theory and method standards.

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