

## Gamified web-based learning to improve evaluation skills in teacher professional education courses

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### ABSTRACT

Education is a key pillar in the development of individuals and society. In this digital era, technology has revolutionized learning by expanding access and improving the quality of the learning process. One of the recent innovations is the use of web-based learning (WBL), which, although flexible, often lacks interaction elements, thus reducing user engagement. To address this, this research proposes a platform, “Meja Guru Academy,” that integrates gamification elements in WBL to improve the learning evaluation skills of Teacher Professional Education (PPG) students. This research utilizes the Design Thinking approach, which involves the stages of empathy, problem definition, idea development, prototyping, and evaluation—the data collection method through questionnaires produced quantitative and qualitative data for system validation. Content experts rated the platform's educational material at 85.33%, indicating exceptional alignment with learning objectives, while media experts provided a score of 89.60%, highlighting effective usability. User testing with PPG students yielded a strong System Usability Scale (SUS) score of 79, suggesting the platform is highly user-friendly. Additionally, the User Experience Questionnaire (UEQ) results indicated positive user perceptions across multiple aspects, with high ratings in pragmatic quality attributes such as perspicuity and efficiency, and hedonic qualities including stimulation and novelty. Overall, Meja Guru Academy presents an innovative and effective solution for advancing PPG students' evaluation competencies, fostering engagement and self-directed learning through gamified WBL.



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## INTRODUCTION

In the digital age, the rapid advancement of technology has significantly transformed the landscape of education, providing new opportunities for enhancing the learning process. One notable innovation is web-based learning (WBL), which offers students flexible access to educational content, including text, images, animations, audio, and video. Despite its advantages, a major challenge in WBL platforms is maintaining student engagement and activity levels. Learners often

experience low interactivity and limited motivation, particularly when the platform only serves as a passive information delivery system without incorporating dynamic and interactive elements (Dichev & Dicheva, 2017). Addressing this challenge is critical, especially in higher education settings where active participation plays a pivotal role in shaping learning outcomes.

To overcome this issue, gamification has emerged as an effective strategy that enhances WBL by integrating game-like elements to foster student engagement and success. Gamification refers to the application of game design components such as points, badges, leaderboards, challenges, and narrative-driven experiences into non-game contexts like education. Research has shown that incorporating gamification in online learning environments can significantly improve student learning outcomes. For instance, Aljraiwi (2019) demonstrated that students exposed to gamified learning environments outperformed those in conventional settings by an average difference of 5.4 points on academic tests. Furthermore, gamification not only enhances motivation but also creates a more interactive and emotionally engaging learning experience, particularly when combined with immediate feedback and storytelling elements (Huang & Wang, 2025).

In addition to addressing motivational challenges, gamification aligns with the ongoing shift in educational paradigms, which emphasizes the development of essential skills beyond factual knowledge acquisition. Modern education increasingly prioritizes critical skills such as learning evaluation, which are vital for assessing knowledge comprehension and fostering lifelong learning (Cetin et al., 2023; Fatima & Sme, 2023). In this context, the Professional Teacher Education (PPG) program serves as a pivotal initiative aimed at preparing prospective teachers to become competent educators. The PPG program emphasizes the mastery of learning evaluation skills, which are essential for designing and implementing effective assessments. However, many PPG students struggle to develop these skills due to limited exposure to diverse assessment methods and insufficient practical training opportunities (Sari et al., 2023).

To address these gaps, the “Meja Guru Academy” platform has been designed as a gamified web-based learning environment that supports PPG students in developing their learning evaluation skills. The platform introduces interactive challenges, scenario-based assessments, and reflective activities tailored to the domains of teaching and assessment. By integrating gamification elements such as points, badges, leaderboards, and real-time feedback, “Meja Guru Academy” aims to create an engaging and motivating learning experience. What sets this platform apart is its emphasis on experiential learning, where users are actively involved in applying theoretical knowledge to practical assessment scenarios. This unique approach not only enhances student engagement but also fosters a deeper understanding of learning evaluation concepts.

The integration of gamification into teacher training programs represents a promising strategy for improving both teaching quality and student outcomes. Effective use of educational technology by teachers can significantly increase students' interest in learning (Indriyansyah et al., 2023). By leveraging gamification, “Meja Guru Academy” aspires to bridge the gap between theory and practice, equipping future educators with the skills necessary to design and implement high-quality learning assessments. This platform represents a significant step toward creating a more interactive, engaging, and effective teacher training experience that aligns with the evolving demands of modern education. This study aims to evaluate the results of the development of Meja Guru Academy in terms of material quality, media display, and usability. This is very important to ensure the acceptance of the platform by PPG students so that it can stimulate motivation and improve Learning Evaluation Skills.

## METHOD

This study adopts the Design Thinking model, a user-centered approach aimed at understanding user experiences, pinpointing challenges, and developing innovative ideas to design features that align with user needs and preferences (Saefudin et al., 2023; Wira et al., 2024). The Design Thinking model includes five stages: Empathize, Define, Ideate, Prototype, and Test.

### 1. Empathize

The initial stage of Design Thinking, known as Empathize, focuses on building empathy to thoroughly understand the issues requiring solutions. This user-centered approach allows

researchers to set aside personal biases and gain a clear understanding of user needs. During this phase, data collection is conducted by exploring user challenges, often through interviews. The insights gathered in this phase serve as the foundation for identifying key user requirements, which later become the basis for designing the system's initial features and evaluation criteria.

2. Define

The second stage of Design Thinking, called the Define phase, concentrates on clearly identifying the main problem based on observations of users. As noted by [Kuzmina & Pavlovskaya \(2024\)](#), this phase involves gathering key information about the features and functionalities users need, which is crucial for designing an effective system. By synthesizing insights gathered during the Empathize phase and gaining an in-depth understanding of the user experience, designers are better equipped to precisely outline the issues that need to be addressed. The outcomes of this stage significantly influence the design framework and serve as the basis for formulating the questionnaire items used in the SUS and UEQ testing methods to evaluate usability and user experience.

3. Ideate

The ideation stage is essential for discovering creative solutions and examining different viewpoints on the problem at hand. By brainstorming, a wide range of ideas is generated, serving as the groundwork for system development and often leading to the creation of low-fidelity prototypes or wireframes. This adaptable approach aligns well with evolving trends and user demands, making it a favored method in design fields for encouraging innovative and relevant solutions ([Dewi et al., 2024](#)). The selected ideas are translated into system features that directly address the problems defined in the previous stage. These features are later tested through the Likert scale method to assess their perceived usefulness and functionality.

4. Prototype

In this phase, the ideas and concepts generated during brainstorming are brought to life through a test application or product. This involves building prototypes intended for direct user interaction, typically as mockups or high-resolution prototypes that offer a closer representation of the actual user experience. The initial prototypes undergo expert validation from media experts and subject matter experts, who provide qualitative feedback on the interface design and content quality. This feedback is used to refine the prototype before testing with users.

5. Test

At this stage, the product is implemented and validated by media experts and subject matter experts. The media experts evaluate the media development, while the subject matter experts assess the learning content, specifically for the course on Principles of Teaching and Assessment. The product trial involves PPG students from Universitas Negeri Malang who are studying the Principles of Teaching and Assessment course. The user experience is measured using the System Usability Scale (SUS) to evaluate overall usability, the User Experience Questionnaire (UEQ) to assess the user experience, and the Likert scale to measure user satisfaction regarding the platform's usefulness. Feedback gathered during this phase serves as an essential reference for further prototype improvements, completing the iterative process of Design Thinking.

In developing the learning materials for PPG students at Universitas Negeri Malang, several tests were conducted to ensure the quality and effectiveness of the content. The research was carried out at Universitas Negeri Malang. Expert testing involved two content experts and three media experts who assessed the accuracy of the content and the suitability of the media. User testing involved 30 PPG students from Universitas Negeri Malang, class of 2024, to evaluate user responses to the material. This testing aimed to identify strengths and weaknesses and guide improvements in alignment with student needs and learning standards.

The primary feature evaluated in this study is gamification embedded within the provided learning materials. The gamification elements include interactive quizzes, point-based rewards, and progress tracking, designed to increase student engagement and motivation during the learning process.

This research uses a Likert scale-based questionnaire to measure satisfaction or suitability, with scores ranging from 5 for "Very Good/Suitable" to 1 for "Not Good," to standardize the statistical data analysis (Kusmaryono et al., 2022). The five variables analyzed include interviews for qualitative data related to needs analysis, as well as media and content expert validation using interval-scaled questionnaires, which produce both quantitative and qualitative data.

User testing used the System Usability Scale (SUS), the most widely used standardized questionnaire for assessing perceived usability. This review of SUS covers its early history from its inception in the 1980s through recent research and its prospects (Lewis, 2018). Using the User Experience Questionnaire (UEQ) for user testing. The User Experience Questionnaire (UEQ) method is used as a testing method using six assessment scales, namely attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty, which have aesthetic and functional quality evaluation aspects (Maulidya et al., 2024).

This study collected both quantitative and qualitative data. The quantitative data, represented numerically, were gathered from questionnaires completed by participants (Randi & Corno, 2022). In contrast, the qualitative data included textual information, descriptive words, and images derived from feedback, critiques, comments, and interviews with media and content experts concerning the product's feasibility.

Data analysis was carried out by calculating the average score and percentage for each aspect of the assessment, as well as calculating the total score and overall percentage. After the data was collected, to evaluate the weight of each response and calculate the average score, the following is an example of Formula 1:

$$\tilde{x} = \frac{\sum x}{n} \quad (1)$$

Description:

$\tilde{x}$  = Average Score  
 $\sum x$  = Number of Appraisers  
 $n$  = Total Score for Each

Then, for the percentage formula, the result can be calculated with the following Formula 2:

$$Total\ Score = \frac{Total\ Value}{Max\ Score} \times 100\% \quad (2)$$

The processed data results will be evaluated against media feasibility criteria, as adapted from (Vicente & Camocho, 2024) and shown in Table 1. The media feasibility criteria are assessed based on six aspects: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. These aspects represent key dimensions of user experience and media quality, which play a crucial role in determining the platform's overall feasibility. However, the specific connection between each aspect and the final media feasibility score should be explicitly explained to provide a more comprehensive understanding of the evaluation process.

Table 1. Media Feasibility Criteria

| No. | Percentage (%) | Feasibility Level | Description                             |
|-----|----------------|-------------------|-----------------------------------------|
| 1   | 90% - 100%     | Very Good         | Very good and no need for revision      |
| 2   | 75% - 89%      | Good              | Feasible and needs little revision      |
| 3   | 65% - 74%      | Fair              | Less feasible and revised sufficiently  |
| 4   | 55% - 64%      | Not Good          | Not feasible and needs more revision    |
| 5   | 0% - 54%       | Very Not Good     | Not suitable for use and needs revision |

In this data collection process, researchers used questionnaires to collect feedback from experts and users. A total of two material experts and three media experts participated to evaluate the validity of the gamified quiz website, focusing on the feasibility of content, interface, and effectiveness of learning media. In addition, a SUS test was also conducted to obtain direct responses from PPG students at Universitas Negeri Malang, involving 30 students as samples.

## RESULTS AND DISCUSSION

This study employed the Design Thinking model, which consists of five stages: Empathize, Define, Ideate, Prototype, and Test, to develop and evaluate the Meja Guru Academy platform as a gamified web-based learning tool for PPG students. Through a combination of expert validation, user testing, and standardized usability assessments, the effectiveness of the platform was examined. The following section discusses the detailed findings and their implications.

### Results

Meja Guru Academy platform, aimed at enhancing professional educators' competencies with a focus on teaching principles and assessment practices for vocational high schools.



Figure 1. Landing Page

Here is the overview of the landing page Meja Guru Academy website, as shown in Figure 1. There is a landing overview and a login button for the user. Each new user can register an account on the login page to access the features.



Figure 2. Dashboard Page

The dashboard page in Figure 2 displays the dashboard overview, motivational banner, material section, points and progress tracking, and the leaderboard. The material section shows learning topics with progress indicators, while points and progress tracking display accumulated points. The leaderboard ranks users by points, fostering competition and motivation through gamification.



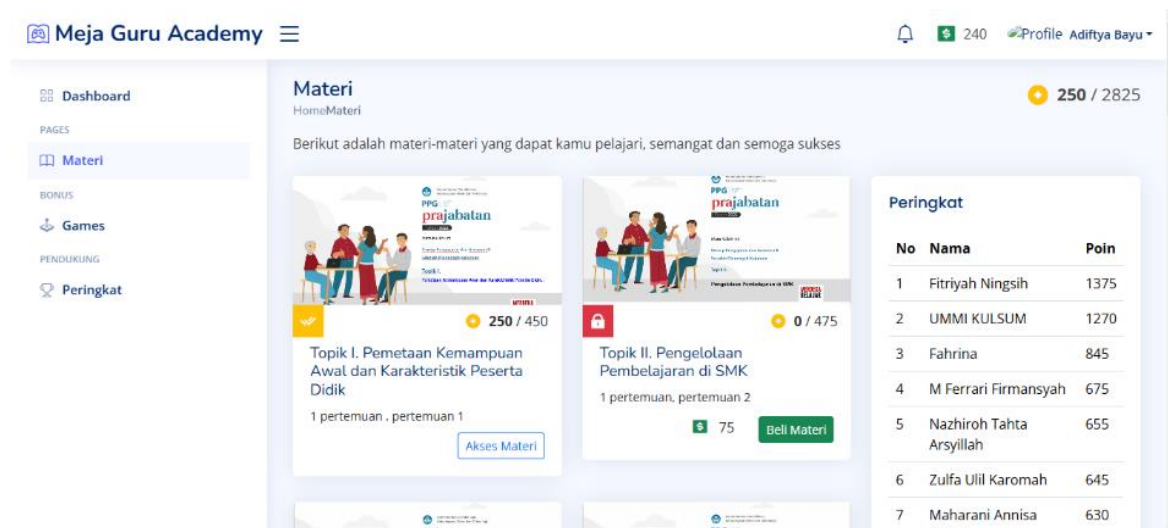


Figure 3. Material Page

The Material Page shown in Figure 3 provides an organized view of available learning resources for students on the Meja Guru Academy platform. The first material is free to open and get points by completing the material. Students must purchase the next material from the points earned to gain access. On this page also displays the leaderboard.

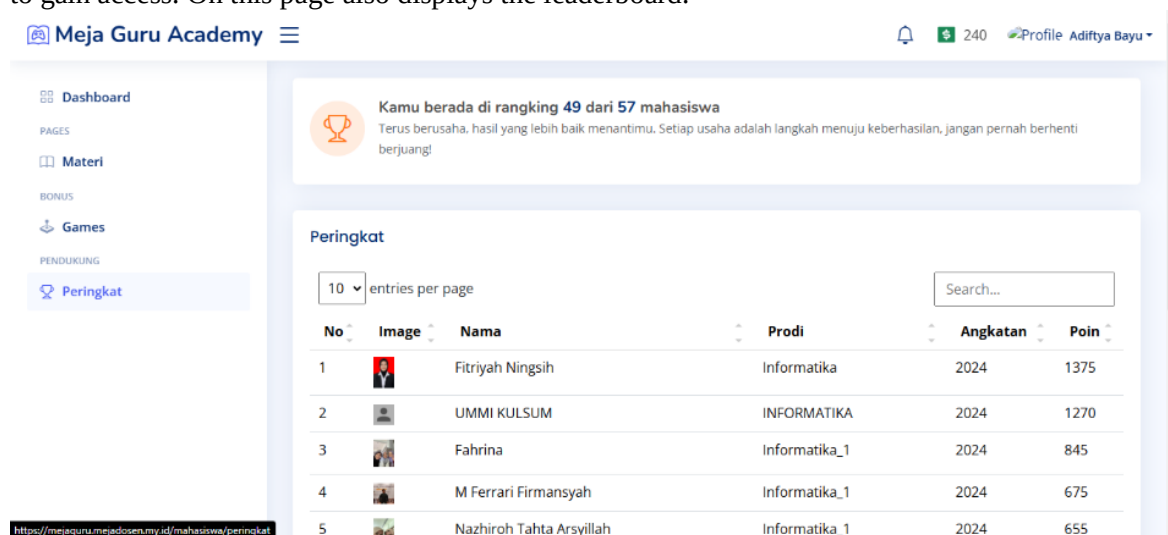


Figure 4. Leaderboard Page

Figure 4 shows the Meja Guru Academy platform leaderboard, displaying student rankings by name, study program, class, and total points earned from completing the task in the material page.

The validation results from the material experts include an assessment from a lecturer of Electrical Engineering and Informatics at Universitas Negeri Malang. This analysis provides important insights regarding the quality of the material and the relevance of the website as a learning medium. Details of the results of this validation are presented in Table 2 below.

Table 2. Meja Guru Academy Material Validation Data

| No.          | Aspect       | Score     | Max Score | Validation (%) | Criteria    |
|--------------|--------------|-----------|-----------|----------------|-------------|
| 1.           | Content      | 13        | 15        | 86.67          | Good        |
| 2.           | Language     | 13        | 15        | 86.67          | Good        |
| 3.           | Presentation | 22        | 25        | 88.00          | Good        |
| 4.           | Evaluation   | 16        | 20        | 80.00          | Good        |
| <b>Total</b> |              | <b>64</b> | <b>75</b> | <b>85.33</b>   | <b>Good</b> |

Table 2 demonstrates that the Meja Guru Academy materials developed for the “Principles of Teaching and Assessment II in Vocational High Schools” course for PPG students meet the validation criteria exceptionally well, achieving a total validation score of 85.33%, which falls within the good category.

The results of validation by media experts conducted by lecturers of Electrical Engineering and Informatics at the Universitas Negeri Malang, and one teacher who has experience teaching PPG Students, which can be seen in Table 3.

Table 3. Meja Guru Academy Media Validation Data

| No.          | Aspect         | Score      | Max Score  | Validation (%) | Criteria    |
|--------------|----------------|------------|------------|----------------|-------------|
| 1.           | Attractiveness | 13         | 15         | 86.67          | Good        |
| 2.           | Perspicuity    | 27         | 30         | 90.00          | Very Good   |
| 3.           | Efficiency     | 19         | 20         | 95.00          | Very Good   |
| 4.           | Dependability  | 23         | 25         | 92.00          | Very Good   |
| 5.           | Stimulation    | 14         | 15         | 93.33          | Very Good   |
| 6.           | Novelty        | 16         | 20         | 80.00          | Good        |
| <b>Total</b> |                | <b>112</b> | <b>125</b> | <b>89.60</b>   | <b>Good</b> |

As shown in Table 3, the Meja Guru Academy media on the developed website meets a high standard, with a total media validation score of 89.60%, categorized as good. The score indicates that the gamified website media is suitable for use and ready for the trial stage.

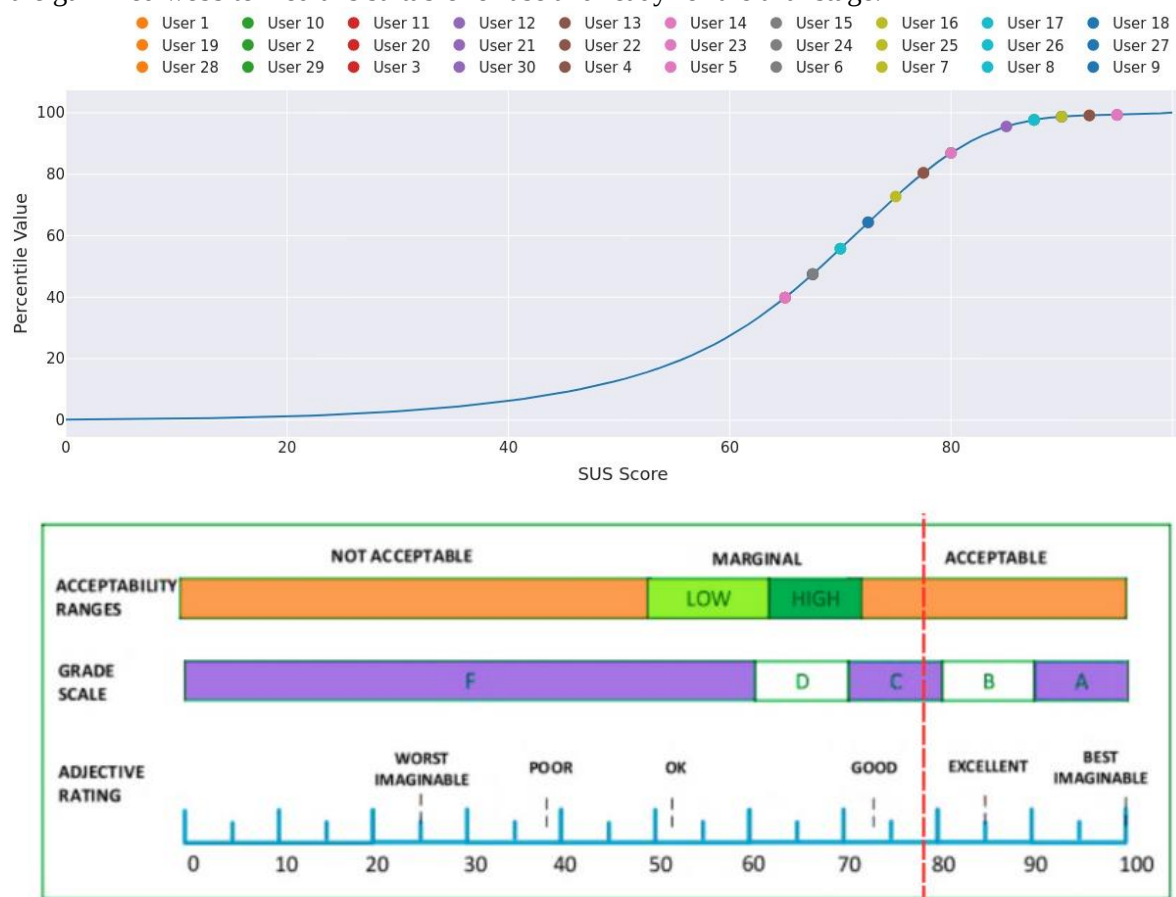


Figure 5. SUS Score Diagram

Based on the results from the System Usability Scale (SUS) testing presented in Figure 5, it can be concluded that the average SUS score across 30 respondents is 79. This score indicates that the system is rated well in terms of usability and is generally perceived as user-friendly and effective. According to SUS interpretation guidelines, scores between 70 and 80 are considered "Good," while

scores above 80 are in the "Excellent" range. Therefore, with an average score of 79, this system is close to the excellent threshold, suggesting that users find it easy to use and functional.

And based on the SUS Score Diagram result in Figure 5. shows a range of user scores from low (around 20) to high (near 100), with most users scoring above 60, indicating generally positive usability feedback. The percentile axis reveals that users with scores below 40 fall in the lower percentiles (<25%), while those scoring above 80 are in the top percentiles (>75%), reflecting excellent satisfaction. A SUS score above 68 is typically considered above average. However, some users scored below this threshold, suggesting areas for improvement. Further analysis may help identify specific issues affecting lower-scoring users.

Overall, it can be concluded that the system is well-designed to support its intended purpose, making it suitable for use as a usability-focused learning tool in vocational school environments.

Table 4. UEQ Test Data

| No. | Scale             | Mean        | Comparison to Benchmark | Interpretation                       |
|-----|-------------------|-------------|-------------------------|--------------------------------------|
| 1   | Pragmatic Quality | 2.175       | Excellent               | In the range of the 10% best results |
| 2   | Hedonic Quality   | 2.016666667 | Excellent               | In the range of the 10% best results |
| 3   | Overall           | 2.10        | Excellent               | In the range of the 10% best results |

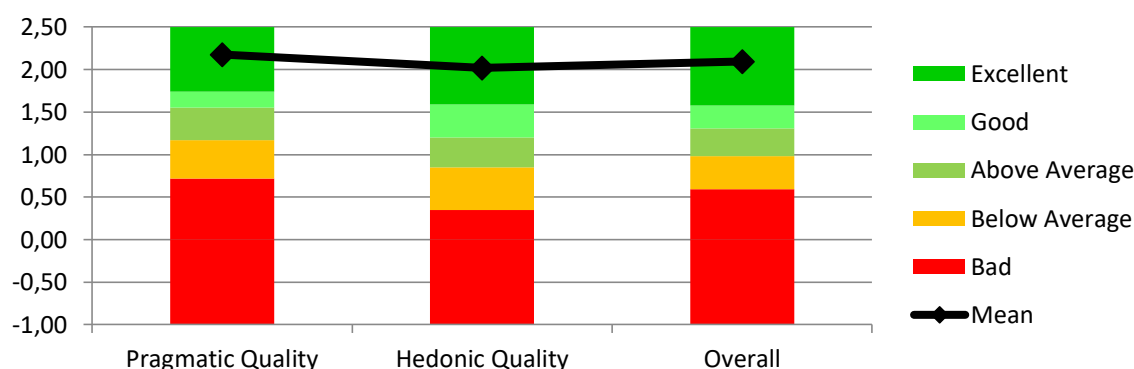


Figure 6. Benchmark UEQ Diagram

Based on Table 4 and Figure 6 results from UEQ testing, suggested that while the system generally has satisfactory usability in terms of pragmatics, there are areas in both pragmatic and hedonic quality that could be enhanced. Improvements in efficiency, clarity, excitement, and innovativeness could lead to a more engaging and effective user experience.

The User Experience Questionnaire (UEQ) results shown in Figure 6 from 30 PPG Student Respondents showed that the pragmatic and hedonic qualities of the platform were rated Excellent, with an overall average score of 2.10. All aspects were within the top 10% of benchmark results, indicating an excellent user experience, both in terms of usability (pragmatic) and emotional satisfaction (hedonic).

## Discussion

The use of gamified web-based learning platforms like Meja Guru Academy shows a positive impact on learning motivation and evaluation skills of Teacher Professional Education (PPG) students. The platform's design, aligned with Design Thinking principles, effectively enhances the engagement of learners through interactive elements such as points, leaderboards, and badges (Dichev & Dicheva, 2017). By incorporating gamification into web-based learning, students experienced higher engagement, which is crucial for developing skills necessary for effective teaching and assessment.

Results from the validation of educational content and usability testing, as illustrated in Tables 2 and 3, underscore the platform's effectiveness. The material experts gave a high validation score of 85.33%, with the presentation aspect getting the highest score of 88.00% indicating that the content



is well structured to fulfil the learning objectives. Similarly, the media expert's validation score of 89.60%, with the efficiency apparatus scoring 95.00% made the aspect with the highest score, reflecting the usefulness and attractiveness of the platform in engaging students in learning (Hidayat et al., 2022; Wang et al., 2024).

Pragmatic Quality, with a score of 2.175, rated Excellent, highlights the platform's functionality in helping students achieve their learning objectives effectively. And the Hedonic Quality aspect scored 2.016, assessing the enjoyment and emotional satisfaction gained from using the platform creates a positive user experience, strengthening student engagement.

Moreover, the SUS test results, with an average score of 79 from Figure 5, suggest that users find the platform highly user-friendly. This score places Meja Guru Academy near the threshold of excellent usability, suggesting that students can efficiently navigate the platform, which promotes independent learning. Frequent feedback, coupled with competitive elements, further enhances user engagement and motivation, as observed in the increase in student motivation and learning satisfaction (Huang et al., 2019; Mandouit, 2018).

Despite the positive results, some weaknesses were identified, such as the Novelty Aspect getting a score of 80.00%. Although the platform integrates common gamification features, the lack of innovative elements may limit long-term engagement. Some users scored below 40 on the SUS score, indicating that certain technical aspects or usability issues may hinder the learning experience for a minority of students. Even though the hedonic quality was rated as very good, further improvements in terms of fun and innovative features could increase user enjoyment.

The platform helps PPG students develop essential skills for their future careers, including independent learning habits, mastery of evaluation methods, motivation to engage in continuous professional development, and familiarity with digital learning platforms, which are increasingly used in vocational education settings, as well as motivation through points and leaderboards. The points and leaderboard system utilises both intrinsic and extrinsic motivations, such as students feeling satisfaction for mastering the content and outperforming their previous grades. As well as competitive elements, such as leaderboards, reward high-achieving students with recognition, thus encouraging further participation.

The use of gamification elements in educational contexts effectively enhances student motivation by aligning with Self-Determination Theory (SDT) and other motivational frameworks. The integration of elements such as leaderboards, feedback, and collaborative challenges fosters autonomy, competence, and relatedness, which are crucial for intrinsic motivation. This approach not only engages students but also promotes active learning through interaction and feedback (Deci et al., 2017; Howard et al., 2021).

## CONCLUSION

The findings of this study show that the Meja Guru Academy platform, with integrated gamification elements, effectively improves learning motivation and evaluation skills among Teacher Professional Education (PPG) students. The validation results from material and media experts, as well as the high user experience scores (SUS: 79, UEQ: Excellent), indicate that the platform is usable and fits the learning objectives. However, while these validation scores are important, reflective conclusions must go beyond the numerical results to address broader implications.

In a broader educational context, the success of Meja Guru Academy highlights the potential of gamified learning tools in vocational education and teacher training programs. The platform's ability to foster engagement through game mechanics suggests that similar strategies could be applied to other professional learning environments. The integration of points, leaderboards, and challenges not only increases motivation but also aligns with lifelong learning principles, encouraging self-directed skill development. Future research should explore how gamification specifically supports lifelong learning skills, such as critical thinking, adaptability, and self-regulated learning.

While this study provides promising results, it has limitations that must be acknowledged. The relatively small sample size of 30 PPG student respondents from Universitas Negeri Malang means

that the findings may not be generalizable to other contexts. In addition, further validation is needed to assess the scalability, accessibility, and adaptability of this platform to diverse learning styles. Future studies should consider expanding the number of participants and testing the platform in different educational environments to refine its effectiveness.

One promising direction for future development is the incorporation of narrative-based challenges, which could further enhance engagement and provide deeper contextual learning experiences. While the platform already includes gamification elements such as points, leaderboards, progress tracking, and interactive quizzes, the Novelty aspect received a score of 80%, indicating room for innovation. Future iterations could integrate scenario-based assessments or story-driven challenges that align with the Principles of Teaching and Assessment II course to increase immersion. Additionally, while the Hedonic Quality score (2.016) from the UEQ test suggests a positive user experience, further research could examine how narrative elements influence long-term engagement, motivation, and knowledge retention. Testing these features with a larger and more diverse user group could provide valuable insights into optimizing gamified learning environments for teacher training programs.

Finally, the study's methodology was based on the Design Thinking model, but the conclusion does not explicitly tie the findings back to this framework. Future discussions should examine how each stage of Design Thinking (Empathize, Define, Ideate, Prototype, Test) influenced the platform's success and what aspects might still require refinement. In conclusion, Meja Guru Academy demonstrates the potential of gamified web-based learning to enhance teacher training, but further research is needed to explore its long-term impact, address its limitations, and refine its design for wider educational adoption.

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