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Project-based learning (PjBL) strategies with gamification

Putri Fadilla Azzahra Fazarini[1], Yerry Soepriyanto[2], Henry Praherdhiono[3]
[1,2,3]Universitas Negeri Malang, Malang, Indonesia
putrifadilla03@gmail.com[1], yerry.soepriyanto@fip.um.ac.id[2], henry.praherdhiono.fip@um.ac.id[3]

ABSTRACT

This research aims to develop and test the effectiveness of the Project-Based Learning (PjBL) learning model integrated with gamification (G-PJBL) to increase student engagement and learning outcomes in Graphic and Visual Media courses. The background to this research is the low graduation rate of students in this course due to the diverse backgrounds and abilities of students. PjBL research with Gamification activities uses the ASSURE development model, which contains six stages. Construction is carried out sequentially according to the plans that have been made. Research data was obtained from validation by learning design experts, observations during learning, and student learning outcomes. The development of PjBL with gamification activities has had a positive impact on increasing student engagement and motivation. The research results show that the well-structured G-PJBL syntax follows student needs. Validation by learning design experts shows that the learning design is feasible. In addition, the research results show that G-PJBL can increase student engagement and learning motivation and improve their learning achievement. This model can be applied to other courses that require student involvement and creativity.

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan dan menguji efektivitas model pembelajaran Project-Based Learning (PjBL) yang diintegrasikan dengan gamifikasi (G-PJBL) untuk meningkatkan keterlibatan dan hasil belajar mahasiswa pada mata kuliah Media Grafis dan Visual. Latar belakang penelitian ini adalah rendahnya tingkat kelulusan mahasiswa pada mata kuliah tersebut karena beragamnya latar belakang dan kemampuan mahasiswa. Penelitian PjBL dengan kegiatan Gamification menggunakan model pengembangan ASSURE yang berisi 6 tahapan yang digunakan. Pembangunan dilakukan secara berurutan sesuai dengan rencana yang telah dibuat. Data penelitian diperoleh dari validasi ahli desain pembelajaran, observasi selama pembelajaran, dan hasil belajar mahasiswa. Pengembangan PjBL dengan kegiatan gamification memberikan dampak positif terhadap peningkatan engagement dan motivasi mahasiswa. Hasil penelitian menunjukkan bahwa sintaks G-PJBL yang dikembangkan telah sesuai dengan kebutuhan mahasiswa dan terstruktur dengan baik. Validasi ahli desain pembelajaran menunjukkan bahwa desain pembelajaran layak untuk diterapkan. Selain itu, hasil penelitian menunjukkan bahwa G-PJBL mampu meningkatkan keterlibatan dan motivasi belajar mahasiswa, serta meningkatkan prestasi belajar mereka. Model ini dapat diterapkan pada mata kuliah lain yang membutuhkan keterlibatan dan kreativitas mahasiswa.

Kata Kunci: *berbasis proyek; gamifikasi; PjBL; strategi pembelajaran; teknologi pendidikan*

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INTRODUCTION

In the 21st century, students are expected to be able to achieve several skills. In the 21st century, there are four skills that students must master, called 4C (Critical Thinking, Creativity and Innovation, Collaboration and Communication) (Septikasari & Frasandy, 2018). These skills cannot be obtained instantly; instead, they can be obtained through practice and a learning process (Grant & Smith, 2018). The learning method commonly used by students is the Project-Based Learning method (PjBL). Seeing students' different learning styles, project-based learning allows students to explore material (content) using various methods and conduct experiments collaboratively (Pratiwi et al., 2024). Even though PjBL has been implemented in Graphic and Visual Media courses, student graduation rates are still low. This shows the urgent problem in current learning methods, especially in the difficulties of students from different educational backgrounds. Many students experience obstacles in producing 3-dimensional products due to a lack of experience and the necessary technical knowledge. Therefore, there is a need for innovation in learning strategies to overcome these challenges and improve student learning outcomes.

The PjBL mainly focuses on developing students' problem-solving skills when completing a project so that they can produce something tangible. This strategy emphasizes creativity in students' thinking patterns, problem-solving abilities, and communication skills (Karnando et al., 2021). Students' understanding is built through the environment around them. It is realized through contextual problems, which are solved independently or in groups through creative and innovative work (Suryaningsih & Nisa, 2021). Students gain more knowledge through design and presentation activities (Sari & Angreni, 2018). In project-based learning, students will experience a learning process that starts from reading various sources of information, finding problems, designing projects, and presenting project results to solve these problems. In addition, PjBL involves students in determining the project design that will be implemented in the problem-solving process so that they will gain meaningful experience and knowledge (Gómez Puente et al., 2013; Simanjuntak et al., 2019). The problem-solving process carried out by students will involve cognitive conflict to find the right solution for their existing needs (Pramana et al., 2018). To produce these solutions, students are expected to be able to study and analyze the scope and context of the problem, explore solutions, anticipate further problems, develop products, and test their validity (Graesser et al., 2018).

Technology-based PjBL innovation is believed to provide optimal results in achieving learning goals (Wijayanti et al., 2022). The symbiosis between learning strategies and technology will produce more productive learning (Mahmud et al., 2023). Additionally, implementing PjBL integrated with technology provides many benefits, including training students to solve problems using products after receiving information from various sources (Ardianti et al., 2017). One of these project-based learning processes is implemented in the Graphic & Visual Media course, where students will produce products as three-dimensional media that can be used as learning media. However, using project-based learning models in Graphic and Visual Media courses still does not produce maximum student output. Not a few students fail to complete three-dimensional products, which is caused by differences in student backgrounds. Many came from public schools and had no experience making three-dimensional products. This background makes students experience difficulties in completing the project assignments given. Many students are also unfamiliar with the applications to create three-dimensional products, so they find it difficult and less involved in the learning process.

From these problems, it can be concluded that using project-based learning models in Graphic and Visual Media courses is inappropriate. Learning innovations are needed that can be a solution to this problem, one of which is the use of more effective learning strategies. One strategy that is considered capable of solving this problem is gamification. Gamification learning strategies can increase student motivation and learning outcomes because the gamification process uses game elements in the learning process (Arifudin

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et al., 2021). Game components or elements used include levels, points, badges, awards, rankings, progress, to-do lists, narratives, avatars, and social graphics. These game elements' presence is why non-game systems use gamification designs (Soepriyanto et al., 2022; Takdir, 2017). In education, many problems require students to develop appropriate learning strategies. One of the frequent problems that appears in education is motivation. Study students who lack and do not have their soul are competitive in studying. This matter can influence the study results, as fewer students are satisfied. One possible strategy for finishing problem learning is a gamification strategy; gamification is a promising strategy for increasing the spirit of student competition (Ananda et al., 2024).

Results of interviews show that students are not involved enough in learning, especially during the development process task assigned to the project. Moreover, students who have not mastered graphic media and 3D visual objects also have minimal knowledge, so students do not have enough motivation to study. This matter aligns with students still in semester one and new to entering the world of education. This differs from method learning during school to method lectures, where method learning tends to be more independent, which means students still need more adaptation. See the problem: The usage element of games in gamification can grow the spirit of learning from students. Using element games in a way, gamification can improve collaboration between students (Sari & Alfiyan, 2023). Therefore, gamification as a learning strategy for awakening the motivation and engagement of students is one way to reach objective eye learning through graphic and visual media lectures. This research fills the gap in the literature by developing a learning model that integrates PjBL with gamification (G-PjBL) for Graphic and visual Media learning. While previous research has explored the use of technology in PjBL, this research emphasizes the integration of gamification elements to increase student engagement and learning outcomes, which has not been studied much before.

Gamification uses non-game deep game components (Marisa & Akhriza, 2020). Some game elements can become why non-gaming systems use design gamification (Rumianda et al., 2020; Takdir, 2017). Besides that, gamification is used to interest users in using products with design gamification, and now gamification is used to influence behavior man. In education, gamification is an approach to learning that uses purposeful video games to motivate students in the learning process (Jusuf, 2016). Malone and Lepper analyzed the impact that emerges when element games are implemented in activity learning. Principle or element frequent games used, namely levels, points, badges, rewards, feedback, task lists, and social graphs implemented in learning (Rumianda et al., 2020). The proposed hypothesis is that integration gamification in PjBL will increase engagement and results in Study students in a significant way.

This research aims to develop and test the effectiveness of the Project-Based Learning (PjBL) learning model integrated with gamification (G-PjBL) to increase student engagement and learning outcomes in Graphic and Visual Media courses. Using game elements in learning is expected to increase student involvement by enhancing motivation, promoting active participation, and fostering a more enjoyable learning experience. By integrating challenges, rewards, and interactive activities within the PjBL framework, this approach seeks to create a dynamic and immersive educational environment that captures students' interest and sustains their engagement throughout the learning process.

LITERATURE REVIEW

Project-Based Learning (PjBL) Learning Model

In education, it is crucial to create a design that can describe the process of creating details and environmental situations that allow students to interact with each other so that changes or developments occur in students. This will be used as a guide in planning future learning (Karnando et al., 2021). Something that is no less important in the process of improving the quality of education is media and

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learning models (Niswara et al., 2019). According to Joyce and Weil, a learning model is a plan or pattern that can be used to create a curriculum (long-term learning plan), create materials, and direct learning in the classroom or elsewhere. Students can choose a suitable and effective learning model to achieve their educational goals (Guinibert, 2019). The learning model used can be seen in the learning environment and student characteristics. The learning model commonly used by students is the Project-Based Learning model (PjBL) (Sari & Angreni, 2018). Seeing students' different learning styles, project-based learning allows students to explore material (content) using various methods (Amanda et al., 2014). It can carry out experiments collaboratively (Ahwan & Basuki, 2023). The PjBL allows students to explore material using various methods and conduct experiments collaboratively. This model can be the right choice to improve the quality of education and meet students' different learning needs.

PjBL is a learning strategy that emphasizes the creativity of students' thinking patterns, problem-solving, and communication skills (Karnando et al., 2021). Judging from the process, this project-based learning model is learner-centered, while the learner acts as a motivator during the learning process in class (Noorhalida et al., 2023). Students' understanding is built through the things around them, and they are realized in contextual problems and solved independently or in groups through creative and innovative work (Nisa & Nugraheni, 2021). Apart from that, the project-based learning model aims to apply existing knowledge and train various skills, attitudes, skills, and concrete thinking, which in complex problems requires learning through collaboration, experimentation, and investigation in creating a project (Fatah, 2023). This learning model aims to apply your knowledge and train various skills, attitudes, and concrete thinking through collaboration, experimentation, and investigation in creating a project.

Gamification in Learning

There are many problems in education in achieving learning goals, and students need to develop appropriate learning strategies. One of the problems that often arises in the world of education is students' lack of learning motivation and lack of a competitive spirit in learning. Low student learning achievement is not caused by an inability to understand the material provided but rather due to a lack of motivation among students (Nurfitriyanti, 2016). This can influence unsatisfactory student learning outcomes. One strategy that can be used to solve these learning problems is the gamification strategy. Gamification strategies are one solution to increase student learning motivation. Gamification can generate a spirit of competition and make learning more exciting and fun. Gamification can increase students' learning motivation by bringing up interactions between students and teachers (Fadilla & Nurfadhilah, 2022).

Gamification is a promising strategy for increasing students' competitive spirit (Permata & Kristanto, 2020). Gamification uses game components in a non-game system (Ristiana & Dahlan, 2021). Game components or elements used here include levels, points, badges, awards, feedback, leaderboards, progress, to-do lists, narratives, avatars, and social graphics. These game elements can be why non-game systems use gamification designs (Rumianda et al., 2020; Takdir, 2017). Apart from that, gamification is used to attract users' interest in using products with gamification designs, and now gamification is used to influence human behavior. The main goal of gamification is to foster student motivation and stimulate student interest in the learning process outside and inside the classroom (Hadihabibi et al., 2023).

PjBL Carries Out Gamification Activities

PjBL gamification activities combine learning models and strategies that can increase student involvement in the learning process. The project-based learning model with gamification activities was better or positively impacted, increasing students' understanding than the traditional PjBL model (Rosa et al., 2024).

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Apart from increasing student understanding, using a PjBL model with gamification activities also shows that this model can effectively increase student motivation and involvement in learning.

The project-based learning model with gamification activities improves 21st-century learning by increasing student creativity and encouraging students to be more confident in realizing their visible potential from the results of projects that have been created. In the learning process, in the project-based learning model with gamification activities, the learner is a facilitator and guide to assist the learner in working on the given project (Wanglang & Chatwattana, 2023). Applying game elements to gamification-based learning can increase student engagement and maximize student skills and creativity (Huang et al., 2023). This happens because the game elements used in project-based learning can motivate students to complete the given project.

PjBL with gamification can also be used in various innovative online learning platforms such as LMS. This significantly contributes to the world of education, especially in efforts to improve the quality of online learning. This platform can be a reference for developing similar learning platforms in other fields of study (Sanova et al., 2023).

METHODS

This study employed the ASSURE instructional design model to develop a PjBL framework integrated with gamification activities. The ASSURE model, introduced by Smaldino, provides a systematic approach for organizing learning procedures and conducting authentic assessments (Kim & Downey, 2016; Sari et al., 2018). This model was selected due to its detailed guidelines for planning and implementing instructional activities, ensuring the design aligns with specific educational goals.

The steps implemented in this study are based on the framework proposed by Smaldino et al. in "*Instructional Technology and Media for Learning*" which include: 1) analyzing learners; 2) stating objectives; 3) selecting methods, media, and materials; 4) using methods, media, and materials; 5) requiring learner participation; and 6) evaluating and revising.

1. Analyzing Learners: In this stage, student competencies, including knowledge, skills, and attitudes relevant to the Graphic and Visual Media course, were identified.
2. Stating Objectives: Learning objectives were formulated based on course goals, focusing on the specific competencies to be achieved.
3. Selecting Methods, Media, and Materials: Instructional methods, media, and materials were selected to align with the learning objectives and ensure that they support the PjBL approach with gamification.
4. Utilizing Methods, Media, and Materials: The selected resources were integrated into the instructional process, facilitating effective learning experiences.
5. Requiring Learner Participation: Active student engagement was emphasized throughout the activities, ensuring that learners were directly involved in implementing the PjBL approach.
6. Evaluating and Revising: The effectiveness of the instructional design was evaluated using both formative and summative assessments. Necessary revisions were made based on the evaluation results to improve the design.

The research was conducted on 135 undergraduate students from the Educational Technology program at the State University of Malang, selected through purposive sampling. This technique selected a sample with relevant characteristics aligned with the research objectives. The instructional intervention spanned 16 sessions, with the PjBL model incorporating gamification activities introduced in the 9th session, following the midterm examination (UTS). The timing was adjusted to align with the practice phase of the Graphic and Visual Media course, which begins after the UTS.

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Before full implementation, the learning design was validated by instructional design experts to ensure feasibility. The validation process involved both qualitative and quantitative data analysis. Qualitative data consisted of expert comments and suggestions, which were analyzed descriptively and used to refine the design. Quantitative data obtained through expert evaluations using a 5-point Likert scale were analyzed to calculate the mean scores across various assessment criteria. This mixed-method approach provided a comprehensive evaluation of the design, offering both numerical insights and qualitative feedback essential for improving the overall quality of the instructional design.

RESULTS AND DISCUSSION

The results presented in this chapter are quantitative and qualitative data. Quantitative data is in the form of project-based learning syntax with gamification strategies in the Graphic and Visual Media course, as depicted in **Table 1**, and validation by learning design experts, as depicted in **Table 2**. The syntax created and used has been adapted to student needs (Khuluq et al., 2023).

Table 1 outlines the syntax of the G-PjBL model, detailing each phase of the instructional process and the corresponding activities carried out by both students and facilitators. The phases described include determination, planning solution steps, implementation scheduling, facilitation and monitoring, presentation of project results, and evaluation and revision. Each phase is designed to guide students through the project development process while incorporating gamification elements to increase motivation and engagement. The table serves as a comprehensive guide to understanding the structured approach used in this learning model, highlighting the interactions and responsibilities at each stage of project completion.

Table 1. G-PjBL Syntax

Phase	Student Activities	Student Activities
Determination	Students convey the rules of gamification learning and the graphic and visual media products they will create.	Students ask about rules, projects being developed, determining titles, and setting completion times.
Planning Solution Steps	If designing projects is challenging, students provide learning resources such as demonstrations, articles, video tutorials, and facilities.	Students understand demonstrations and read literature to help analyze project requirements.
Implementation Scheduling	Learners assign deadlines to each project, allowing four days per project.	Students determine when to start work and try to complete the project as quickly as possible.
Facilitate Settlement and Monitoring	Learners and assistants accompany the project's development and monitor progress through a database containing chapters, grades, and deadlines. If the project is delayed, the assistant investigates the cause and helps if there are any difficulties in project development.	Students check project progress and compete with themselves to prove whether they can complete the project well and on time. If there are problems, students can consult with colleagues or companions.
Presentation/Publication of Project Results	Students or assistants assess graphic and visual media products created by students.	The top 3 students present their graphic and visual media products to their peers, while students outside the top 3 present to assistants.
Evaluation and Revision	Students or assistants evaluate the development of graphic and visual media products. Students provide revisions or validate products by giving grades or stars. The assistant will update the results in the database.	If there are revisions, students are given time to revise. If not, students can move on to the next project. Learners can track their progress in a database.

Source: Research 2023

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The table explains the application of the G-PjBL model, which consists of six phases: determination, planning solution steps, implementation schedule, facilitating settlement and monitoring, presentation/publication of project results, and evaluation and revision. In the determination phase, students are given an understanding of the rules of gamification learning and the graphic and visual media projects they will develop. Students actively ask about rules, projects, determining titles, and deadlines, which reflects the two-way interaction between facilitators and students. The planning solution steps phase involves providing learning resources such as demonstrations and articles to assist students in designing projects. Students then analyze the project requirements by understanding the materials provided.

Next, in the implementation scheduling phase, the facilitator determines the project work schedule by giving a time limit of four days for each stage. Students can set when to start and finish projects, encouraging independence and responsibility. The facilitate settlement and monitoring phase involves monitoring project progress by the facilitator through a database, while students also check their progress and consult if they encounter obstacles. In the presentation/publication of project results phase, the facilitator assesses graphic and visual products, with the best students getting the opportunity to present their work to classmates. This stage provides appreciation for outstanding students and fosters healthy competition. Finally, the evaluation and revision phase focuses on project evaluation and revision, where students get feedback and the opportunity to improve their work. Evaluations are conducted using a score-based or star-based grading system that is updated in a database, allowing students to track their progress continuously. The G-PjBL model creates a structured, collaborative, and interactive learning environment incorporating gamification to increase student motivation to complete projects.

Expert assessment of learning designs is essential in ensuring that the developed models meet quality standards and can be implemented effectively. In this research, a learning design expert validated several critical aspects of PjBL learning design combined with gamification (G-PjBL). The aspects assessed include identity, systematics, the substance of learning plans, time allocation, gamification guidelines, and evaluation. The results of this assessment are presented in the following table to provide an overview of how well the learning design meets the established criteria.

Table 2. Learning Design Expert Assessment

Validator		Rated aspect	Results
Instructional Design Expert		Identity	100%
		Systematic	100%
		Lesson Plan Substance	100%
		Time Allocation	93.4%
		Gamification Guidelines	80%
		Evaluation	80%
		Average	95.5 %

Source: Research 2023

Table 2 displays the results of assessments by learning design experts on several essential aspects of learning design that combine PjBL with gamification elements (G-PjBL). Assessment is based on six main aspects: identity, systematic, lesson plan substance, time allocation, gamification guidelines, and evaluation. From the results displayed, the aspects of identity, systematics, and substance of the learning plan each received a perfect score of 100%, indicating that the learning design has met very high standards in determining identity, systematic organization, and material following the learning plan. The time allocation aspect received a score of 93.4%, which is still very good. However, slight adjustments may be required to ensure that the time allocated is genuinely optimal for implementing learning.

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The score obtained was 80% for gamification and evaluation guidelines, which shows that although these aspects are pretty good, there is still room for improvement, especially in strengthening the gamification guidelines and evaluation methods used to assess learning outcomes. Overall, this learning design received an average score of 95.5%, which shows that the G-PjBL model is of very good quality and worthy of implementation. However, certain aspects still require a slight improvement.

Observation results also show that most students do not experience project submission delays. Student involvement in learning has increased, as evidenced by almost all students completing the 3-dimensional object media project within the specified time.

The stages of the ASSURE model that have been implemented include:

1. Student Analysis
   At this stage, students' skills are analyzed. Students who take Graphic & Visual Media courses have diverse characteristics, including different educational backgrounds. Most do not have basic knowledge or experience in creating 3-dimensional objects. They are also not familiar with applications for creating 3D objects, such as Blender and Anim8or. This happens because the majority of students come from public schools.

2. Determining Goals
   The Graphic & Visual Media course aims to equip students to create and develop 3-dimensional media useful for learning. Students are expected to be able to create and develop 3-dimensional media using Blender or Anim8or software. The graphic and visual media produced are useful in supporting learning according to the specified topic. This media can present difficult or impossible objects to bring into the classroom or school.

3. Selecting Models, Media and Materials
   The selection of models, media, and learning materials is adjusted to the learning objectives that have been determined previously. The strategy used is individual project learning, which trains students to compete with themselves. The material chosen is tailored to the project to be worked on and uses media in applications to create 3D images, videos, and simulations.
4. Using Models, Media and Materials
   Models, media, and materials designed and prepared are applied in the learning process.
5. Involving Student Participation
   Student participation in implementing the model design is carried out by giving project assignments following the rules and designs that have been made previously.
6. Evaluation and Revision
   Evaluation is done through direct observation during learning, assessing the final results of student projects, observing student activities during learning, and analyzing project results. Revisions to the learning module are carried out based on the evaluation results.

In the learning process for the Graphic and Visual Media course, the application of the ASSURE model has shown positive results. Observations show that most students completed the three-dimensional object media project within the specified time without experiencing delays. This reflects increased student involvement in the learning process. The first stage, student analysis, revealed that students had diverse educational backgrounds, and most had no prior knowledge or experience in creating 3D objects. Many of them are unfamiliar with applications such as Blender and Anim8or, considering their background in public schools. At the goal-setting stage, this course is designed to equip students with skills in creating

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and developing three-dimensional media useful in a learning context. Using software such as Blender and Anim8or allows students to create graphic and visual media that supports learning topics and enriches the learning experience with complex objects to bring to class.

In the model, media, and material selection stage, individual project-based learning strategies are applied to train students to compete with themselves. The materials and media used are adjusted to the project to be worked on, including applications for creating 3D images, videos, and simulations. Using models, media, and materials facilitates students in a structured way so they can complete the project effectively. Student involvement in implementing model designs is carried out by providing project assignments following predetermined rules and designs. This active participation motivates students and increases their involvement in the learning process.

Evaluation is carried out through direct observation, assessment of final project results, and analysis of student activities. Based on the evaluation results, revisions to the learning module were carried out to increase the effectiveness and relevance of the material. The ASSURE model effectively increased student engagement and prevented project submission delays. This approach ensures that learning is more structured and valuable and can be adapted to student needs and desired outcomes.

Discussion

The first validation includes the identity of the course being implemented, including the name of the course, credits, lecture schedule, course code, offer, and the name of the teaching lecturer registered in the *Rencana Pembelajaran Semester* (RPS) that is created. This makes it easier for students to identify the courses they are taking. RPS provides a detailed explanation of the course, including the topics discussed, the skills students will develop, and the theories the lecturer will teach. RPS helps students understand the material and what they will learn during lectures.

The RPS systematics used are well structured. The language used in writing RPS follows *Ejaan yang Disempurnakan* (EYD), and the text used meets applicable grammar and spelling rules. This allows students to read and understand the RPS fluently and clearly. Apart from that, the competencies explained are also clear, containing the abilities that students must have after completing their studies. The substance of the RPS based on the project learning model is following the expected competencies. This learning model supports and integrates the competencies expected in the course. The validation test results show that the RPS-based project learning model follows the expected competencies.

The strategy used in the context of the proposed learning model is a gamification learning strategy. The validation test results show that the gamification learning strategy in RPS follows the proposed learning model. The gamification elements applied in the learning strategy follow the project-based learning model. The choice of learning media used also supports achieving the expected competencies. The validation test results show that the choice of learning media listed in the RPS can support and strengthen the competencies that students want to achieve. The learning media chosen follows the needs of the Graphic and Visual Media course.

The learning resources used and selected support the achievement of the expected competencies. The validation test results show that the learning resources listed in the RPS are relevant and useful for helping students learn and achieve the expected competencies. The learning scenario for the Graphic and Visual Media course in RPS has been detailed, including the introduction, content, and conclusion. Scenario details clearly describe the steps in the learning process that will be carried out, including activities, assignments, or discussions that students will carry out both in and outside of class. The scenarios created help students connect theory with practice and develop 3D media products. The time allocation in the project-based learning model using gamification activities follows the applicable curriculum. The time

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allocated for each activity follows the provisions in the course curriculum, ensuring students can achieve the expected competencies.

In the gamification guide aspect, results were obtained of 80%. The use of game elements in gamification activities in the Graphic and Visual Media course has been implemented well. The game elements' design considers efficiency and effectiveness in achieving learning objectives. The game elements used are proven to motivate, attract, and encourage student involvement during the learning process. However, the learning rules do not explain some gamification elements in detail. The assessment results also obtained a result of 80% because the evaluation only included an assessment of students' project assignments.

The qualitative data in this study is in the form of comments, and observation results in narrative form. There were 15 assistants in the ongoing learning activities. Assistants directly help students deal with confusion and problems in the projects they are working on. These project assistants have proven to be very effective because apart from being sufficient in number, they can also solve problems during student project work. Based on the responses and results of student studies using project-based learning designs with gamification activities, this design can be said to be suitable for use as a learning design with output in the form of projects carried out by students. In the learning process, students become more active, and their motivation to learn increases.

To create an active learning environment to support the learning process, students must be interested, motivated, and involved in the learning process (Kurniasari & Wathon, 2019; Zafar et al., 2022). G-PjBL can encourage learning and motivate students, assuming that students' cognitive processing of educational content is guaranteed (Rumianda et al., 2020). Game-Based Learning Solutions can create reflective, experiential, and engaging learning environments (Bygstad et al., 2022; Shaliha & Fakhzikril, 2022), making them suitable for project-based learning. According to project management educators, the GPjBL method can provide an impressive learning experience by influencing students' emotions (Jääskä et al., 2023). Satisfactory results for students and assistants prove this because students feel more challenged and focused on studying the material and completing projects as quickly as possible. The project-based learning method with a gamification approach provides more space for students to improvise as much as possible.

Syntax is usually used in linguistics, but here, it is defined as an orderly system or arrangement based on the order in which things must be done (Magdalena & Vebrianto, 2018). Six sequences must be implemented in this G-PjBL syntax. The first sequence is determination. Namely, students convey the rules of gamification learning and determine the graphic and visual media products that will be made in general. Students can ask about the rules of the game, the project being developed, the project theme, and the completion time so that they know what will be done in the learning process in the following semester.

The second sequence is the planning and completion step. In this phase, students provide learning resources through demonstrations, articles, video tutorials, and facilities if project design obstacles exist. Students understand demonstrations and read literature that can help analyze project planning needs. The demonstration and literacy process guides students to carry out projects systematically, from planning, implementation, or investigation to communicating results (Suryaningsih & Nisa, 2021).

The next step is to create a completion schedule. Students are required to complete each project within four days. However, if they can complete it in less than four days, students will be awarded a star badge, which means their grades will improve, and they will be allowed to continue the project to the following material. Students determine when to start work and how quickly they can complete the project. Next, settlement and monitoring is carried out. Students and assistants help complete projects and track progress through a database containing chapters, grades, and deadlines. If it is late, the assistant will identify the reasons and help if there are problems in project development.

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Creating a completion schedule in G-PjBL has several significant benefits (Leung & Pluskwik, 2018), including 1) providing a time frame; 2) encouraging independence; 3) overcoming delays; 4) providing structure; 5) evaluating progress; 6) providing orientation; 7) manage complexity; and 8) facilitate collaboration. In other words, the completion schedule in G-PJBL is an administrative tool essential in developing students' time management, independence, and collaboration skills. It also helps create a structured and efficient learning environment.

In the presentation or publication stage, students or assistants assess the graphic and visual media products created using performance assessment criteria, final product results, and completion time. Students who get the best grades present their graphic and visual media products to friends and lecturers, while participants who do not get the best grades present them to assistants. Presentations transfer knowledge effectively and efficiently, motivate, foster cooperation, learn to be responsible in data discovery, and create a more enjoyable learning process (Marpaung, 2018).

In learning, there is a cause-and-effect process. Students who undergo the learning process are the leading cause of the learning actions. However, not every learning action carried out by students is the result of the students themselves (Kustiawan et al., 2016). The final stage of the entire learning process is evaluation and revision. Students will validate the product by giving grades or stars to students with good product results and completion times. The characteristics of gamification learning models include challenge, satisfaction, reward, and interest. Product assessment is also a form of motivation and appreciation for students. Evaluation also includes product reflection to determine whether the learning process and product comply with the expected competencies. This evaluation helps improve product quality and the effectiveness of the learning process (Rembulan & Putra, 2018).

CONCLUSION

Using PjBL strategies for gamification activities in graphic and visual media courses can encourage students' learning motivation. Use project learning activity gamification on the eye graphic and visual media lectures in workmanship graphic media products and 3-3-dimensional visual objects; students succeed in making graphic media products and 3-dimensional visual objects following the objective of the learning you want to achieve. Students can make graphic media products and 3-dimensional visual objects following the characteristics of graphic media, and visual 3-dimensional objects in the future can be used as a learning medium in the future. Project-based learning activities that involve gamification activities received positive feedback from validators and students as research respondents. PjBL, with a gamification approach in Graphic and Visual Media courses, brings many benefits. Learners are actively involved in projects based on real experiences, increasing their motivation and focus.

This approach increases student engagement and helps address problems associated with low student graduation rates. Assistants' participation in the learning process provides opportunities for students to consult, while grades, badges, and competitions create an inspiring and motivating environment. The results achieved a passing presentation rate of 98%, and students positively assessed this G-PJBL.

This research design shows that project-based learning can be used individually. However, the literature regarding G-PJBL is still limited, and respondents still criticize its implementation, such as the duration being too fast, making students vulnerable to burnout and unwillingness to participate in learning. Continue their project.

Based on the findings study Here, some suggestions for the study are 1) Gamification activities can be used in other models, such as PjBL, blended learning, and so on, for future researchers who will apply them; 2) PjBL model can be used for gamification activities in courses or other subjects by changing the game elements contained in the gamification activities according to the desired learning objectives; 3)

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Further research was carried out on the effectiveness of game elements in PjBL. With further study and suggestions, expected results related to implementing PjBL activity will be more optimal and better gamification.

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