

RESEARCH ARTICLE

Interactive gamification-flip-book for developing students' outcomes

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Abstract: This research presents gamification-flip-books in education that can significantly improve students' conceptual understanding due to the actions involved in the learning. However, this approach also presents a problem for "slow learners" and other students who require individualized attention in their classroom's approach to teaching and learning. Many researchers have been drawn to the use of gamification in education as a way to boost engagement and improve learning outcomes. This study aims to show the empirical results of the most recent research on applying gamification in ability learning for slow learners. This research developed an interactive digital gamification-flip-book which meets the criteria for assisting students called slow learners. A 4-D design of research & development was applied, covering four stages: define, design, develop and disseminate. Since the percentage that was produced was more significant than 85%, the validity level of the generated media satisfied very valid requirements, and it could be used without any modifications because the standards were met. The implication proves that the integration with LMS was a practical approach for providing activities to slow learners to support them. This was demonstrated by the fact that the integration was successful. Therefore, the additional study should be encouraged to investigate the usefulness of a digital gamification-flip-book integrated into LMS for slow learners.

Keywords: gamification, flipbooks, slow learners

1 Introduction

Technology is a crucial component in the digital educational environment because it fosters the expansion of scientific knowledge (Sutrisni *et al.*, 2022). The teaching and learning process is based not only on face-to-face meetings in the classroom but also on other media, such as ICT, which can be utilized to spread learning materials because the advancement of technology has reduced the importance of holding in-person meetings for the teaching and learning process (Sulfemi, 2019; Yusri, 2016). Because of this, the development of technology-based learning media as an efficient educational technique that assists students in acquiring sufficient knowledge come about as a result (Manurung & Panggabean, 2020). In order to enhance students' interest in the educational process, it is necessary to keep the various forms of media that are employed up to date (Qumillaila *et al.*, 2017).

It is not sufficient for educational media in the classroom to take the shape of textbooks alone; rather, it should be more comprehensive than that (Xezonaki, 2022; 2023). Some of them do not have textbook media. For example, they are not "dynamic" or "alive". They merely show static images, cannot play sound, and quickly become obsolete (Rasiman, 2014). The process of learning can benefit from the utilization of flipbooks, which are a form of learning material that is based on multimedia (Hidayatullah & Rakhmawati, 2016). Students can read by having the experience be similar to opening a book directly since an animation effect makes it look like opening an actual book physically when moving the pages (Syarif & Rakhmawati, 2016). The software known as flip book maker can be used to create electronic books that are effective in audio-visual in digital books designed (Putri *et al.*, 2020). A kind of animation, a flip book, is created by stacking sheets of paper to resemble a thick book. On each page of the flip book, a procedure is detailed regarding something that, once animated, appears to be moving (Diena & Heri, 2010). One of the most forms of animation is the flip book, which is created from paper masses bound together to resemble thick books. Each flip book page explains a process regarding something later seen moving or animated (Manivannan & Manian, 2011).

There have been showing that many researchers focus on research in developing interactive media or multimedia in flipbooks (for example, Nafi'ah *et al.*, 2019; Putri *et al.*, 2020; Qumillaila & Susanti, 2017). A digital flipbook is reported to be effective in learning activities (Zhao *et al.*, 2021). The students' learning achievement attained the minimum passing criterion,

demonstrating that using learning media based on a flip book maker was a more effective tool for teaching the subject (Hidayatullah & Rakhmawati, 2016). It is considered that a student who can operate the application of flipbook and can run the internet would incline to use flipbooks as a medium to bridge the gap between what is unknown about the subject matter and the student's interest in the subject matter (Nafi'ah et al., 2019). Previous research findings indicate that students' academic performance can benefit from using flip books that incorporate multimedia (Hayati et al., 2015). However, a lack of study has been conducted that focuses on establishing an interactive digital flipbook for specific students, such as those who learn at a relatively slow rate (slow learners). In addition, the concept of designing a flip book still needs to be added to the models offered, such as those based on gamification (Skaraki, 2023). To fill those gaps, in this research, we focused on developing an interactive gamification-flip-book for slow learners assuming that flipbook is a solution as a digital media offered in which it is a challenging endeavour to instruct students classified into slow learners.

Individuals who are considered slow learners perform poorly in school but are not identified as mentally retarded on standardized intelligence tests (Korikana, 2020). It is described that they need help with conceptual and symbolic items like language, numbers, and concepts, and their practical thinking could be better. These students learn slightly differently (Widodo et al., 2022). They need help with complex activities, schoolwork, and simple tasks that require a lot of external stimulus and motivation (Vasudevan, 2017). Suppose the student is determined to be a slow learner. In that case, an appropriate evaluation must be conducted to determine the student's areas of weakness. Then appropriate tactics need to be applied to overcome those areas of weakness. The standard teaching method is inappropriate for all students in the class. The objective of the educator is to make use of a variety of models across the many sessions. It is possible to attract and maintain the interest of all learners by providing teaching in various ways (Sunar et al., 2022). Audio-visual design of interactive media is an approach that could be offered, such as gamification-based (Widodo et al., 2022). The educator can support possibilities for students with varied learning styles to boost their learning process by expanding the teaching styles used in the classroom. Praise and encouragement were given to slow learners at every stage of development to help foster a sense of surprise and delight in the educational process that can be found in the gamification concept (Buckley & Doyle, 2016; Caponetto et al., 2014; Karagiorgas & Niemann, 2017).

It has been noted that gamification has been used frequently in the classroom to boost student engagement, desire, and accomplishment, with variable degrees of success (Hanus & Fox, 2015; Huang et al., 2020; Kapp, 2012). Students can get over their anxiety about making mistakes and become more willing to attempt new things with the help of gamified learning activities, which not only inspire students to explore potential approaches to learning (Kapp, 2012; Palaniappan & Noor, 2022). In addition, it can make learning about a subject more enjoyable and exciting (de Marcos et al., 2014; Landers, 2014). The relationship between instruction, goals, feedback, and engagement is essential to the success and efficiency of practices in the classroom (Seaborn & Fels, 2015). As a result, a strategy that is highly promising and has the potential to establish a new positive learning environment that caters to the routines and interests of students is to incorporate online learning activities that include elements of gamification into the classroom as being an independent learner (Brookfield, 2009; Chu & Tsai, 2009; Shi & Cristea, 2016).

Because STKIP PGRI Sidoarjo is utilizing LMS as a learning environment, integrating an interactive digital gamification-flip-book through the LMS is needed. Integrating such a book provides interactive media employed for slow learners. Related to the background mentioned, it is essential to conduct this research to develop an interactive digital-gamification-flip-book integrated into a learning management system (LMS) for slow learners. The main goal of this systematic review is to give scholars a better understanding of gamification research in developing an interactive digital gamification-flip-book. More precisely, this study attempts to explore what is known from the body of research about the impact of gamification in developing an interactive digital gamification-flip-book on students' motivation and learning compared to non-gamified learning materials.

It is hoped that the students classified as slow learners at STKIP PGRI Sidoarjo can reach their academic performance, especially in General English.

2 Review of Literature

2.1 Gamification

The previous ten years have seen the introduction of gamification, which has concentrated on numerous industries, including education (Papadakis et al., 2022). By "the use of game design elements, game-play mechanics, aesthetics, and game thinking for non-game applications to motivate students", Kapp means "the use of game thinking for non-game applications to

motivate students” (Kapp, 2012). Although there is no single phrase for gamification, most share some common characteristics (Uğraş et al., 2023). However, gamification has recently concentrated on platforms or applications using digital devices like tablets, smartphones, or laptops to engage pupils digitally. Serious games are a concept that is very closely tied to gamification. Both attempt to leverage some characteristics of games to achieve objectives beyond simple amusement. Their environments’ relationships with the educational process are where their most significant differences are found. A serious game’s primary purpose is to persuade the student to “play” the game without having a cap on the amount of game mechanics, with the educational goals frequently being unknown to the players and the environment not necessarily representing reality (Papadakis et al., 2022).

On the other hand, all learning objectives are always evident and known to users from the start in a gamified program. In order to boost the levels of enjoyment, contentment, and motivation of the user who engages with the application by utilizing a specific number of game elements, the environment simulates real-world issues and circumstances. According to Landers, the learning process is where serious games and gamification in education vary most. Serious games directly impact learning because the application’s educational content promotes learning (Papadakis et al., 2022). Though learning is primarily accomplished through indirect means when using gamification, “as the goal of gamification is to alter a contextual learner behaviour or attitude” (Landers, 2014). Every gamification app has two key components. The gamification material specifies the learning goals.

In contrast, the playful goals are connected to the game design components used in the gamification application, their incentive level, type, and the psychological requirements they address. Learning goals and playful goals are not separate, claim Huang and Soman (Huang et al., 2020). The main objective of gamification is to alter motivational elements to influence learning-related behaviours, such as engagement with the educational content, and produce learning outcomes. Gamification’s function is to “affect psychological factors that mediate the learning outcomes”. Despite the rise in engagement and attendance, how the instructional material is given has a similar impact on learning outcomes since it might result in a deterioration in performance or the acquisition of information and skills (Ipek et al., 2023).

2.2 Gaming elements

The fundamental components of gamification are game mechanics, which often represent the application features included in games, such as storytelling, badges, points, ladders, and avatars. Gamification is defined as incorporating game-related design or activity forms into a learning environment, whether digital or not (Papadakis, Zourmpakis & Kalogiannakis, 2023). Recognizing, choosing, and using game design components to influence students’ engagement and motivation is essential to gamification design. There are numerous instances of gamification applications. Nevertheless, that does not adhere to a formal process design. They adhere to processes and apply parts haphazardly, such as employing a leaderboard system, without considering other elements, like pupils’ psychological requirements and demographics (Papadakis et al., 2023).

3 Methods

The phases of defining, designing, developing, and disseminating the model are included in this research’s utilization of the 4D model, which serves as the basis for the development model. In the first step of the Phase Define process, an initial analysis is carried out to identify the fundamental challenges that must be overcome to create instructional media. During this stage, interviews and observations were conducted with one of the “General English” lecturers; next came the task analysis, which consisted of identifying the tasks or critical skills that students do while learning; next came the concept analysis, which aimed at identifying, detailing, and systematically compiling relevant concepts that would be taught; and finally, the specification of learning objectives, which was carried out in order to formulate learning goals.

At this phase in the procedure, the researchers conducted a benchmark reference test as part of the Stage Design process. This test is a crucial phase that closes the gap between the stage of defining the problem and the stage of designing a solution. Following the identification of learning media that are appropriate to the features of the subject matter, the next step is to select the format, which includes the choice of media, the design or design of the contents, the selection of strategies, approaches, learning techniques, and learning resources for a learning media flipbook, and ultimately the preparation of benchmark reference tests.

In the “Develop” stage, the flipbook is shown to media experts and content specialists as part of the learning media validation process. Format, content, and language are all factors in subject matter experts’ evaluations of instructional media. Experts in the media industry

use criteria such as clarity, cohesion, focus, balance, shape, and colour to evaluate educational media. Then, it can be fine-tuned based on the advice and criticism of media professionals to be more precise, practical, user-friendly, and technically sound. Further beta tests will be conducted to incorporate feedback from student and observer reactions and comments into the development process.

Then, in phase dissemination, the interactive digital-gamification-flip-bbook is ready to be integrated into LMS called eLSIDA (e-learning STKIP PGRI Sidoarjo Asistif) that is available on <https://lms.elsida.ac.id>. Furthermore, its product development is implemented in order to gain its effectiveness.

Two media and content experts worked together to study the development of the digital-gamification-flip-book as an interactive media for the “General English” course. In addition, the level of media validity can be established by the following criteria, summarized in Table 1.

Table 1 Constructs’ reliability

Validity Criteria	Level of Validity
85.01% - 100%	Very valid or usable without modification
70.01% - 85.00%	Valid enough, or with small alterations, it can be utilized
50.01% - 70.00%	Less valid or should not be used because it requires extensive revision
01.00% - 50.00%	Invalid or not permitted to be used

Both qualitative and quantitative data were used in this study. Unlike the quantitative data from the first field test, the qualitative information gleaned from the expert team test assessment is more comprehensive. We employed a theoretical validation sheet for this study to record our findings. There were a series of Likert-scale questions on the theoretical validity sheet. The team of experts could only provide checklist (✓) marks on the “1 (invalid)”, “2 (less valid)”, “3 (simply valid)”, “4 (valid)”, and “5 (very valid)” in the available column.

4 Result and discussion

This study aimed to develop an interactive digital-gamification-flip book to address the learning needs of slow learners at STKIP PGRI Sidoarjo. The eligibility requirements for this study were to be met by the interactive digital-gamification-flip book. The following findings from this research activity were discovered for each stage of constructing a digital gamification flip book. These findings, which are illustrated in the following sections.

4.1 Define

The findings of the desired strategic analysis (define phase) showed that lecturers preferred to utilize an interactive digital gamification flip book. As a result of the findings of this study, a product kind of interactive media was developed to meet the requirements of this demand. The teachers had several reasons why they wished there was a suitable online quiz that they could use to evaluate the student’s level of comprehension of the “General English” course topics. It is tough to choose an appropriate online interactive media, first and foremost, due to the limited amount of time available. They claim that some of the online media that are now available are not suitable for usage with the content that is discussed in practice for students who learn at a slower pace. The instructors need access to online media capable of catering to students with a poor learning capacity and covering all of the subject matter in the course curriculum in interactive media, such as gamification-based systems. When it comes to learning the “General English” subject, slow learners are deemed novice learners because they are pupils in their first school semester. They are all distinguished from one another by their unique sets of skills. This distinction influences the unique educational experiences provided to each student. In light of these scenarios, each portion of the addressed themes was built on various aspects: an overview of the materials and issues being discussed, video interaction, and a gamification-based interactive quiz.

4.2 Design

Initial design; at this point, the researchers had started to develop the learning media flipbook by creating the initial contents. The most recent version of Microsoft PowerPoint is used to create flipbooks. When the design is finished, it is first rendered as a PowerPoint document and then changed to PDF format. The editing process is then carried out on the media by entering the necessary video and sound instruments, after which the “professional flip book maker” was applied, along with the selection of templates tailored to the requirements. During this phase, a preliminary design of the educational medium known as a flip book was developed. In the product developed, seven topics cover the “General English” subject: Module 1. *Word Classes*

(Noun, Verb, Adjective Adverb); Module 2. *Simple Present Tense Vs. Past Tense*; Module 3. *Simple Future Tense (Will Vs be going to)*; Module 4. *Present Perfect Tense Vs. Past Perfect Tense*; Module 5. *Clauses in English*; Module 6. *Gerund Vs. Infinitive*; and Module 7. *Sentences in English*.

4.3 Develop

The testing stage and the validation of the practicability of the evaluation media developed are both included in the development stage. The validation of the practicability of the assessment instrument is accomplished by using an interactive digital gamification-flip book. The subsequent illustration offered a visual representation of the finished appearance of the product that had been developed using a digital gamification flip book. (see Figure 1)

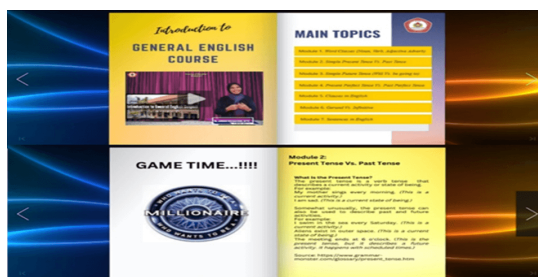


Figure 1 An interactive digital gamification-flip-book as product developed

As a component of this stage, expert validation was carried out to determine whether or not the assessment aspects of media and construction, in addition to language, that had been developed were suitable for measuring the variables that would be evaluated. This determination was made to ensure that the next stage of the process would be successful. Validation by experts was accomplished, and after obtaining permission from the relevant authorities, the researchers carried out restricted trials and primary research in the different sectors to which they belonged. Some validators have made modifications and suggestions based on their findings during the validation process to achieve the most relevant aspects for measuring what is being measured. This is done to obtain the most accurate results possible from the measurement. Consequently, the outcome of recapitulating the theoretical validity interpretation of the initial product’s material aspects following the validation criteria was determined and presented in Table 2.

Table 2 Aspects of validity in product developed

Rate Aspects	Validation of Accomplishment (%)	Criteria
Media	89.15	Very valid
Construction	87.70	Very valid
Language	88.25	Very valid
Average	88.37	Very valid

When referring to the validation achievement criteria provided and the results that are displayed in Table 2 indicate that the theoretical validity of the initial product construction aspect can be categorized as “Very Valid”. According to the validation results in Table 2, the proportion of material rate media aspect done by experts was 89.15%, the construction aspect was 87.70%, and the rate aspect of language utilized was 88.25%. The data showed that the validity level of media generated satisfied extremely valid standards and could be utilized without modification because the percentage obtained was greater than 85%. The development findings generated outstanding validation results from experts, suggesting that the digital media of interactive gamification-flip-book was viable with excellent criteria.

4.4 Disseminate

Then, in phase distribution, the interactive digital-gamification-flip-bbok is ready to be integrated into LMS called eLSIDA (e-learning STKIP PGRI Sidoarjo Asistif) that is available on <https://lms.elsida.ac.id>. In addition to this, the products that it has developed are put into action in order to examine their effectiveness.

The purpose of this development research was to develop an interactive media of digital gamification-flip-book that caters to the learning requirements of the students as well as their criteria for what constitutes an appropriate fit for slow learners. The validity of the evaluation instrument is ensured by its adherence to validity standards. It is possible to observe both the theoretical and empirical quality of the media generated in the digital-gamification-flip-book

(Putri et al., 2020; Rasiman, 2014). According to the findings of the research (al Alhareth & al Dighrir, 2014), an evaluation media is valid if it fits the criteria encompassing material, construction, and language features. The experts examined the practicability of utilizing the evaluation tool. In this research endeavour, “material validity” was defined as “aligning materials with learning markers”. The instrument material’s validity was linked to students’ appropriateness and competence representation to complete the media enhancement process (Hettiarachchi et al., 2014). A suitable question device requires an excellent question or revelation (Gutierrez et al., 2010; Nafi’ah et al., 2019; Raymond et al., 2013).

The results of the tests showed that there are certain benefits to the media generated through a digital flip book. Because the text that is utilized considers different learning scenarios and variants, the text selection can increase students’ expertise as media consumers. Different types of cognitive skills were evaluated using a variety of tests. The evaluation featured an informative introduction and an outline of the components, questions, and directions (Baartman et al., 2007). Despite this, the newly produced media has a few problematic aspects. The text selection for the presentation has yet to consider the level of complexity of the material being presented. The evaluation portion of the test for critical thinking skills did not contain any evaluation questions. However, the phrase on items that influence students’ challenges (as product users) to comprehend the purpose questions on items still needed proper spelling. This word is on items that have an impact on student difficulties. The fourth component is a readability evaluation tool connected to the language employed in the evaluation system. This research only focused on building an interactive medium for slow learners that was labelled a gamification-flip book. There needed to be more discussion of this topic. The implication demonstrates that the integration with LMS successfully offered activities to slow learners to aid them. Thus, further research is encouraged to examine the effectiveness of a digital gamification flipbook integrated into LMS for slow learners.

5 Conclusion

The response to the problem formulation, which is also the conclusion reached by this research, is the development process by researchers to make interactive learning media, flipbook. The processes included in this process are defined, designed, developed, and disseminated—the outcomes of the data analysis that has been carried out serve as the foundation for this material. Learning through multimedia flip books with the flipped classroom approach is more cutting-edge and interactive, making it possible for students to be active and engaged in the educational process (Yazıcı et al., 2022). Students show a greater interest in learning when studying the Multimedia Flipbook with the Flipped Classroom technique, which enhances the learning outcomes. It is possible that using the Flipped Multimedia book in conjunction with the Flipped Classroom approach might improve student learning outcomes.

On the other hand, the study that has been done up to this point does have a few constraints and limits. The first shortcoming of this line of inquiry is that it should have looked at the behavioural patterns that students exhibit while they are engaged in learning. This would have been useful for a more in-depth investigation into the effectiveness of various educational approaches. Second, based on the findings of this study, it is suggested that trials be carried out over extended periods and on a big scale. These experiments should also be supplemented by additional learning strategies, such as exploring which learning techniques can boost students’ meta-cognition tendencies in an environment gamified for learning. Those learning strategies can be found here.

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Conflicts of interest

The authors declare that they have no conflict of interest.

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