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DEVELOPMENT OF ONLINE COURSE BASED ON BLENDED LEARNING TYPE OF FLIPPED CLASSROOM FOR PROSPECTIVE STUDENT TEACHERS

Cecep Kustandi, Robinson Situmorang, R A Hirmana Wargahadibarata
Universitas Negeri Jakarta, Jakarta
cecep_kustandi@unj.ac.id

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Abstrak
Penelitian ini bertujuan untuk melakukan pengembangan *online course* berbasis *blended learning* tipe *flipped classroom* untuk mahasiswa calon guru. Penelitian ini dirancang dengan menggunakan model *Integrative Learning Design Framework. Integrative Learning Design Framework* bukan merupakan model pengembangan baru dikalangan akademisi. Namun, *Integrative Learning Design Framework* menjadi model pengembangan yang masih relevan untuk dilakukan pada rancang bangun *online learning*. Model pengembangan ini digunakan untuk pembelajaran modern yang diintegrasikan terhadap pembelajaran berbasis jaringan. Penelitian ini bekerjasama dengan mahasiswa dan dosen program studi teknologi pendidikan di Universitas Negeri Jakarta. Hasil penelitian ini menunjukkan bahwa pengembangan *blended learning* dapat dilakukan dengan tipe *flipped classroom*. Hal ini dikarenakan pendekatan *blended learning* tipe *flipped classroom* memberikan kesempatan kepada mahasiswa di perguruan tinggi untuk meningkatkan *self-regulated learning*. Penelitian ini berimplikasi terhadap pemahaman mahasiswa terkait teknologi informasi. Selain itu, mereka menjadi lebih mampu merencanakan studi mereka, memantau kemajuan, dan mengevaluasi hasil belajar secara efektif.

Kata Kunci: Online course; blended learning; flipped classroom; mahasiswa calon guru

Abstract
This study aims to develop a flipped classroom-type blended learning online course for prospective teacher students. This study was designed using the Integrative Learning Design Framework model. The Integrative Learning Design Framework is not a new development model among academics. However, the Integrative Learning Design Framework is a development model that is still relevant for use in online learning design. This development model is used for modern learning that is integrated with network-based learning. This research was conducted in collaboration with students and lecturers of the educational technology study programme at Jakarta State University. The results of this study show that blended learning can be developed using the flipped classroom approach. This is because the flipped classroom approach to blended learning provides opportunities for university students to improve their self-regulated learning. This research has implications for students' understanding of information technology. In addition, they become better able to plan their studies, monitor progress, and evaluate learning outcomes effectively.

Keyword*: Online course; blended learning; flipped classroom; student teachers*

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INTRODUCTION

Technological transformation has driven innovation in the field of education. The presence of technology in education introduces new structures and values into the learning process (Chowdhury et al., 2024; Brehm, 2022). This situation poses a challenge for higher education institutions to face the Industrial Revolution 4.0 and move towards Society 5.0. Therefore, learning systems must become more innovative so that graduates are not only theoretically knowledgeable but also competitive and skilled in data literacy and technological literacy (Haugom et al., 2024; Laitinen-Väänänen et al., 2024). Accordingly, universities are encouraged to prepare human resources who are not only responsive but also adaptive and reliable in facing the Society 5.0 era. For this reason, the shift from conventional learning to blended learning has become a necessity (Al-Mekhlafi et al., 2025; Bahl et al., 2022).

Prospective teachers today belong to Generation Z, which is characterized by their closeness to technology (Suyatno et al., 2024). As a result, they are accustomed to using technology in their daily lives. Therefore, universities must adjust the learning process to align with the learning characteristics of Gen Z. Furthermore, students who choose to enter education programs and become future teachers must possess strong technological skills (Williams et al., 2023). This is because Gen Z prospective teachers will be teaching students who belong to Generation Alpha. Generation Alpha refers to individuals born after 2010, who grow up deeply intertwined with technology. For them, digital technology is a norm (Höfrová et al., 2024). In other words, Generation Alpha is expected to have creativity, problem-solving abilities, and critical thinking skills. This situation presents a challenge for prospective teachers to become accustomed to blended learning practices.

Previous studies have introduced blended learning as a combination of face-to-face learning and online learning (Wu & Luo, 2022; Minhas et al., 2021). Blended learning is used to facilitate student learning without the limitations of physical classrooms and time constraints. Various universities across Europe, Asia, and Africa have implemented blended learning in their educational processes (Wang & Zhang, 2022; Ngoasong, 2022; Yusoff et al., 2017). Blended learning is not merely a teaching method but also a strategy for universities to adapt to new social norms and values to remain relevant in the digital age (Muffels & Van Weyenberg, 2024). In the blended learning model, students are directed to seek information both online and offline based on academic relevance and clarity delivered by instructors. Blended learning fosters students' independence in learning, encouraging them to become proactive in managing their own learning activities and exercising self-control in addressing challenges that arise during the learning process.

Academics have conducted analyses on blended learning through systematic review processes. From these studies, blended learning has emerged as a prominent model and technology in educational research (Lutfi et al., 2024; Nada & Sumarni, 2023; Timikasari, 2022). In 2020, the use of blended learning increased significantly due to the COVID-19 pandemic, which necessitated online-based learning processes (Sinaga et al., 2024). Blended learning offers students the opportunity to monitor and motivate themselves throughout the learning process (Nanidya et al., 2019). Thus, its use can support students in evaluating and tracking their learning outcomes against expected achievements. Al Aslamiyah et al. (2019) stated that blended learning fosters student learning independence. Ramadhani et al. (2019) emphasized that the successful implementation of blended learning in universities requires adequate infrastructure and facilities. Therefore, this study aims to analyze the development of a blended learning-based online course for prospective teachers.

The flipped classroom has become a research topic among academics as a way to transform traditional classrooms into engaging learning environments (Love et al., 2015). However, Rucker et al. (2017) identified limitations in measuring the improvement of learning outcomes using the flipped classroom model. Furthermore, Ogden (2015) recommended evaluating the pedagogical approach of the flipped classroom model. The flipped classroom is a learning method that encourages students to prepare themselves before attending class, enabling them to be more ready to tackle more complex problems in class (Ölmefors & Scheffel, 2023). This readiness requires strategies and approaches that align with student learning characteristics. Considering that prospective teachers are being prepared to handle diverse learning environments when they officially become educators, and will be teaching Generation Alpha students, blended learning must be designed with careful consideration of the intended learning outcomes for teacher education students.

The flipped classroom is not a new innovation in educational technology. However, academics continue to develop it, though implementation challenges remain. These challenges are largely due to the methods used and the limited scope of research subjects, which mostly pertain to science and medical fields. Therefore, there is a need to evaluate the use of the flipped classroom model in education by ensuring supporting facilities and infrastructure. As such, this study aims to develop a blended learning-type online course based on the flipped classroom model for prospective teachers.

METHOD

This study was designed using the Integrative Learning Design Framework (ILDF) model (Bannan, 2013). ILDF is not a newly developed model among academics; however, it remains a relevant framework for the development of online learning. This development model is intended for modern learning that is integrated with network-based instruction. Therefore, the use of ILDF in this study aims to optimize the implementation of the flipped classroom type of blended learning. The ILDF model consists of three main phases known as the 3Es: Exploration, Enactment, and Evaluation. The exploration phase serves as the initial step in collecting and documenting information related to the learning context. Consequently, needs analysis, literature review, theory development, and student learning characteristics become essential components of the initial instructional design. The enactment phase involves mapping the findings from the exploration phase by designing the instructional framework, developing a prototype, and conducting expert testing. In the final phase, the online learning design must undergo formative evaluation. In this study, the evaluation process was conducted through one-to-one and small group trials.

In line with the objective of this research, which is to develop a blended learning-based online course of the flipped classroom type for prospective teachers, the study was conducted at Universitas Negeri Jakarta. Universitas Negeri Jakarta is a public university where the majority of study programs are designed to prepare students to become future educators. This research was carried out in collaboration with 20 students from the 2024 cohort of the Educational Technology study program and two lecturers from the Introduction to Information Technology course. Participants were selected using purposive sampling based on research needs and their willingness to engage in the series of research activities.

The ILDF stages were carried out using both qualitative and quantitative data collection methods (Sugiyono, 2015). The qualitative approach included participatory observation of participants during the learning process. This observation involved monitoring participants' active engagement in information searching and discussion throughout the course sessions. Subsequently,

in-depth interviews were conducted to analyze the needs for blended learning tailored to students' learning characteristics. Interviews were held in two stages: the first during the exploration phase, and the second during the one-to-one evaluation phase of the developed blended learning design. Each interview lasted approximately 125 minutes per participant. Additionally, documentation analysis was carried out to examine the semester learning plans prepared by the lecturers of the Introduction to Information Technology course. At the final stage, a Focus Group Discussion (FGD) was conducted with a small group as part of the formative evaluation.

The quantitative approach involved distributing questionnaires to media experts and subject matter experts to assess the feasibility of the initial product. The instruments used for expert evaluation were based on the Nielsen Attributes of Usability (NAU) (Nielsen, 2012), which were adapted into relevant indicators for this study.

Table 1. NAU Indicators

No	Indicators	Explanation
1	*Learnability*	Ease of user learning and running the system the first time
2	*Efficiency*	The users' task completion speed using the developed blended learning model
3	*Memorability*	The user's ability to recall how to use the system after a prolonged period of disuse.
4	*Satisfaction*	User satisfaction in using blended learning

The scoring instrument used follows the Likert scale category 1 (very poor) to 5 (very good). The analysis technique used in the qualitative approach is carried out through reduction, data presentation and drawing conclusions. While the quantitative approach uses simple statistics developed based on Arikunto (2006) which is processed into the following value criteria.

Table 2. Expert Test Value Criteria

No	Range	Category
1	4,21 – 5,00	Highly Appropriate
2	3,41 – 4,20	Appropriate
3	2,61 – 3,40	Less Appropriate
4	1,81 – 2,60	Inappropriate
5	0,00 – 1,80	Highly Inappropriate

RESULT

Blended learning is a learning model whose design process requires consideration. The findings of this study indicate three stages of ILDF that can be considered by the world of education in designing online learning as follows.

Table 3. Results of Educational Technology Student Interviews

No	Aspect	Interview Results
1	Learning Materials	"The learning materials we usually use vary, including e-books, printed books, and journals. The lecturer guides us to access learning resources through journals and e-books."(M2, 18 years old, June 2024)
2	Learning Methods	"In learning sessions, the lecturer usually presents a PowerPoint and then explains the material, followed by a discussion."(M4, 19 years old, June 2024) "There are more lectures, and we are asked to create PowerPoint presentations in groups and then have discussions."(M6, 18 years old, June 2024)
3	Learning Media	"The learning media that is intensively used is usually PowerPoint, and occasionally videos are shown."(M8, 19 years old, June 2024)

In the exploration stage, needs analysis is identified through in-depth interviews related to the introductory learning method of information technology.

The findings presented in Table 3 indicate that, in the Introduction to Information Technology course, the teaching method predominantly used remains lecture-based. Therefore, a learning model that can enhance student participation in class is needed. In general, students expect accessible learning resources and clear guidance related to information technology materials. Moreover, the learning methods employed are still largely conventional, while students require more flexible and interactive approaches.

"The reference sources provided are still unclear. As a result, we often feel confused when studying independently. Therefore, accessible and online-based learning resources are highly needed in the learning process."(M7, 18 years old, June 2024)

Figure 1. Competency Map

The interview result from M7 illustrates the conceptual condition of the learning process. Students need a relevant syllabus and learning resources that are easily accessible both online and offline. Thus, this represents the enactment stage resulting from the prior exploration phase. This development stage involved the construction of an online learning platform equipped with instructional videos, interactive modules, and online quizzes. The developed online course was created in collaboration with the institution's development team. Students are able to access the course online, anytime and anywhere. Figure 1 presents a concept map that outlines 14 learning topics covered in the Introduction to Information Technology course, such as ICT in education, knowledge and society, augmented/virtual reality, smart technology, and more. Through this competency map, students can gradually analyze the development of information technology and its impact on societal life, particularly in education.

Figure 1 represents the competency map for the online course in Introduction to Information Technology. This map was designed to help students identify and organize the topics they will study. The competency map includes fourteen topics: ICT in education, globalization and technological environment, knowledge and society, e-learning, personalized learning, digitalized and virtual classroom, multimedia and mobile learning, smart technology, augmented/virtual reality, artificial intelligence, gamification, ICT policies for education, the use of ICT for future education, and ICT trends in education.

Figure 2. Main Page of the Online Course Introduction to Information Technology

In the online course, the main page presents an explanation of the objectives of the Introduction to Information Technology course. Figure 2 illustrates the layout of this main page, highlighting the core learning objectives and the topics to be covered. Furthermore, lecture activities are conducted online using various instructional approaches. Following the development of the concept map, the design and structure of the main page for the blended learning-based online course were constructed.

Figure 3. Learning Material Page

Figure 3 displays the content page, which provides various learning media such as infographics, PowerPoint presentations, and videos. Additionally, it includes a structured arrangement of individual assignments delivered online. In the Smart Technology module, students are guided to apply technology to enhance students' learning experiences. This allows prospective teachers to foster their creativity in developing instructional materials into learning media. The instructional videos included in the online learning platform are short clips that explain the fundamental concepts of the course content. To increase student engagement, animations and real-world case examples are incorporated to facilitate understanding. In line with the analysis of students' learning needs regarding accessible resources, a web-based interactive module is also provided. This enables students to explore the material in a more interactive manner. The finalized blended learning design was then subjected to expert review through product trials involving media and content experts.

Table 4. Expert Test Results

No	Indicator	Range	Category
1	*Learnability*	3,51	Appropriate
2	*Efficiency*	3,30	Less Appropriate
3	*Memorability*	4,10	Appropriate
4	*Satisfaction*	3,51	Appropriate
	Average	**3,6**	**Appropriate**

The results of the expert review by media and content experts showed that the average score obtained was 3.6, which indicates the product is considered feasible. However, among the four indicators under the efficiency category, the average score was only 3.30. Media and content experts provided suggestions to enhance the online learning product by incorporating more engaging online quizzes and by adding animations and hypermedia-based videos to the developed modules. This would allow students to learn Introduction to Information Technology in a manner that is more aligned with educational needs. Following revisions based on expert feedback, the improved product was tested with students through one-to-one sessions and small group evaluations using Focus Group Discussions (FGD).

Table 5. Small Group Trial Results

No	Aspect	Interview Results
1	*Learnability*	"The developed blended learning is engaging and easy to use. The online learning platform can be accessed via smartphone or laptop."(M1, 18 years old, September 2024) "It's easy to operate and doesn't consume much data. The provided materials are diverse—there are videos, modules, and PowerPoint presentations. As a result, the learning resources are more interactive compared to what we usually use."(M4, 19 years old, September 2024)
2	*Efficiency*	"Using this blended learning is more efficient. I can access it from home and study the material in advance before the class starts."(M8, 19 years old, September 2024)
3	*Satisfaction*	"The materials provided are not only limited to conceptual introductions but also include practical activities and content related to the application of AI in education. We are also guided to analyze and develop AI in learning, making the learning activities more varied."(M6, 18 years old, September 2024)

The results of one-to-one and small group trials showed enthusiasm from prospective teacher students, which demonstrated the ease of the blended learning that was developed.

DISCUSSION

In today's technological era, higher education institutions continue to innovate in the learning process. Learning is not only limited to the transfer of knowledge but also provides opportunities for students to learn independently. Therefore, in its development, blended learning has become one of the technological innovations in lecture activities. However, learning innovations are carried out based on the needs of the learners. The results of this study illustrate that blended learning can be an alternative learning activity in the technological era. Lecturers do not only give lectures but also direct students to actively participate through online classes. Blended learning is not something new in the world of educational technology. Blended learning, also known as a teaching approach that integrates technology, is still the focus of various academic studies. In many studies, blended learning generally receives positive responses from its users. Moreover, in this study, blended learning with the flipped classroom type becomes the novelty because it is used for prospective teacher students. Therefore, prospective teacher students not only focus on the development of lesson plans but also the development of technology for education. The results of this study are supported by the recommendation of the study by Al-Mekhlafi et al. (2025), which states that in the development of blended learning, a clear strategic plan such as objectives, schedules, and resources must be developed. For this reason, this study uses the ILDF model as a planning process in the development of the blended learning online course. Moreover, the course used as the online course is an introductory course to educational technology to help prospective teacher students innovate in their future teaching. This study also supports the introduction of

various tools related to Artificial Intelligence (AI) as a form of ICT trend for education (Haugom et al., 2024). Thus, the introduction of AI in the blended learning process has a heterogeneous effect on the educational technology sector.

On the other hand, the use of blended learning minimizes learning activities that rely solely on lectures. In addition, the findings of this study encourage collaboration among various parties such as lecturers, students, and higher education institutions so that blended learning can be implemented properly (Laitinen-Väänänen et al., 2024). This is because the flipped classroom type of blended learning provides opportunities for university students to enhance self-regulated learning. Indirectly, students can transform their learning experiences both face-to-face and online (Sinaga et al., 2024). Students can be directed to analyze problems in education and learning and then seek solutions to these problems through the development of technology. Considering the study by Suyatno et al. (2024), which emphasizes that prospective teacher students have characteristics closely related to technology, they are given the opportunity to present the results of their analysis as a strategy to understand the material based on the learning resources provided. This study also shows that the flipped classroom encourages students to monitor their own thinking about the material being studied (Love et al., 2015). Considering that Generation Z is quick to adapt to using technology and is accustomed to accessing information independently, during the learning process they can evaluate their understanding related to information technology. Students can also determine their goals and strategic plans for the material they are learning. However, the transformation of the learning experience is also inseparable from the instructional design that supports independent learning.

The results of the study show that Universitas Negeri Jakarta, as a higher education institution focused on quality education, is making efforts to implement blended learning as a learning method in the Society 5.0 era. Thus, this study supports the research by Lutfi et al. (2024) which states that the effectiveness of blended learning can be reviewed based on the capabilities of higher education institutions. Through this study, Universitas Negeri Jakarta demonstrates its support in collaborating to develop blended learning through online courses. Therefore, students not only study but can also monitor and motivate themselves during the learning process. These findings reflect the application of constructivist learning theory where the active role of students is required in constructing knowledge. Knowledge construction is not limited to lecture models. However, the development of flipped classroom-type blended learning can provide students with the opportunity to review the material as often as needed to understand the concepts of information technology. This is done to improve their skills in using technology.

Blended learning used by students at home emphasizes self-regulated learning. Students can study anytime and anywhere. Different from Al Aslamiyah et al. (2019), the development of blended learning in this study uses the flipped classroom type. In its implementation, students find it easy to operate the online course. In addition, during classroom learning, they are encouraged to engage in group discussions that can develop critical thinking skills and communication abilities. Thus, this independent learning ability can train prospective teacher students to practice before conducting direct teaching activities in schools (Ölmefors & Scheffel, 2023). Therefore, the findings of this study are in line with Worthington and van Ores (2015), which state that social interaction in learning must continue to be developed. Furthermore, blended learning provides greater flexibility compared to traditional learning methods. The results of this study support students' independent learning who have difficulty understanding the material. The flipped classroom-type blended learning also accommodates various student learning styles so that they can become more engaged and motivated during the learning process. Therefore, lecturers can act as facilitators in delivering material, especially when giving feedback to students. This study is in

line with Rakha and Khalifa (2024), which state that the flipped classroom provides students with the opportunity to learn independently and encourages them to collaborate and apply their knowledge. In addition, students can access materials easily and understand the material through various learning resources available in the online learning platform. Thus, this study presents a new perspective on students' experiences before and after adapting to blended learning. The study by Ngoasong (2022) shows that student perceptions need to be considered. Therefore, this study provides various insights into their feedback on the developed flipped classroom-type blended learning. Through this study, students can develop the skills to analyze and improve their teaching practices when dealing with students. The results of this study can also serve as an alternative for higher education institutions to develop flipped classroom-type blended learning to enhance self-regulated learning and student learning outcomes as part of utilizing ICT for the future of education.

CONCLUSION

This study concludes that the design of an online learning system based on blended learning with a flipped classroom model can be developed using the ILDF model. Therefore, exploration becomes essential in constructing a learning model that aligns with the needs of prospective teacher students. The flipped classroom type of blended learning was deemed feasible for use by both media and content experts. Accordingly, during formative testing with a small group, students demonstrated enthusiasm throughout the learning process. They were able to manage and regulate their learning independently. In addition, the developed blended learning model fostered their creativity in utilizing information technology for instructional purposes when they become classroom teachers.This study has implications for enhancing students' self-regulated learning and promoting instructional innovation. Students become more capable of planning their studies, monitoring their progress, and evaluating their learning outcomes effectively.

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