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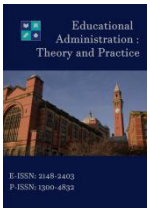

Blended Learning: Learning Outcomes, Class Dynamics, and Perceptions of Students and Teachers - A Systematic Literature Review

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Abstract

Blended learning combines learning media, a pedagogical approach, or traditional face-to-face learning and a web-based online approach. This article reports the results of a literature review on the effects of using blended learning and, more specifically, how blended learning affects learning outcomes, class dynamics, and student and teacher perceptions. The articles published from 2010 to April 2021 were searched using Harzing's Publish and Perish through the Scopus and Google Scholar databases. The systematic review followed the PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) guidelines. The literature review included (31) studies on the implementation of blended learning in South Africa, the United States, Australia, China mainland, Indonesia, Iran, Japan, Canada, Korea, Malaysia, New Zealand, Norway, Palestine, Philippines, Spain, Taiwan of China, Tanzania, Uganda, and Jordan. The main conclusion is derived from blended learning that can positively affect learning outcomes, class dynamics, and student and teacher perceptions. It is seen from technological advancement and the teacher's innovative method to developing students' interest and motivation in the teaching and learning process. On the other hand, there are findings that state the negative impact of blended learning on class dynamics, students who do not interact with the teachers and other students. In addition, the teacher also has limitations in monitoring students in blended learning. The obstacle to blended learning comes from the teacher's understanding and skill in using ICT and the ineffectiveness of infrastructure to apply blended learning.

Keywords: Blended Learning; Learning Outcomes; Class Dynamics; Students' Perception; Teachers' Perceptions

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Introduction

Blended learning is formed from the results of technological developments in education. Various learning variations can increase students' enthusiasm for learning (Alammary et al., 2014). By applying ICT, students and educators can communicate more effectively (Gleason, 2020). In addition, several publications that have substantially developed blended learning at higher levels of education, as stated by Oliver & Trigwell (2005), describe the most prevalent interpretation as an 'integrated' combination of conventional learning through web-based online methodologies. There have been several attempts to apply blended learning in academia and business since it was established (Miyazoe & Anderson, 2010; Neumeier, 2005; Wang et al., 2021).

Several studies examine attitudes, interaction patterns, and student satisfaction and investigate how teaching quality contributes to satisfaction in blended learning (Taghizadeh & Hajhosseini, 2021; Wang et al., 2021). According to Ayasrah (2022), it is found there is an unfavorable link and a limited degree of correlation between teachers' proclivity towards blended learning and teaching experience. Furthermore, blended learning can involve replacing part or all of face-to-face lectures with online learning opportunities, reducing the number of face-to-face learning. On the other hand, students also need to leverage technology-based learning materials for class preparation and assignments (Shu & Gu, 2018). Hence, this article discusses the results of a literature review on the effects of using blended learning. The researcher examines how blended learning influences students' learning outcomes, classroom dynamics, student and teachers' perceptions.

Literature Review

At first, blended learning is known as a hybrid learning concept that combines face-to-face and online learning. In fact, now is known as blended learning. Blended refers to mixed or combination and learning is one means to obtain knowledge and skill. According to Graham, blended learning is a combination or mixed learning combining face-to-face learning and traditional learning concept that is frequently used by the educational practitioner through direct methods for students online and offline and utilizing the use of technology. He also added that blended learning (BL) is a learning environment in combining teaching methods, delivery methods, and media formats and mixing them into one method of learning. (Graham, C. R., & Dziuban, C, 2008).

In terms of combination, mixed learning comes from the trend that promotes active pedagogy like constructivism. Mixed learning is frequently applied by global researchers in recent years, especially for the implementation of TIK and LKT (learning and knowledge technologies) in different educational contexts. Nevertheless, as stated by Shu and Gu (2018), the implementation of face-to-face learning in the classroom promotes interaction and acquires a possible approach to certain contents wider than online classes in mixed learning.

In addition, there are certain characteristics of blended learning. Firstly, blended learning promotes an activity that combines certain learning models, learning styles, and technology and commination-based learning media. Furthermore, blended learning is a combination between online autonomous learning and face-to-face learning applied by teachers to students and combines autonomous learning itself. Additionally, blended learning is promoted by effective learning either from the delivery method, learning method, or learning styles. Blended learning likewise involves parents as motivators and teachers as facilitators in the learning process for students. (Shivam, R., & Singh, S., 2015).

Methodology

The objective of the literature review in this article is to examine certain research based on the effects of blended use on learning, especially in learning outcomes, classroom dynamics, and student and teacher perceptions. The research method used was indicated from the Goal, Question, Metrics (GQM) approach. It was selected because a framework for transitioning from research

objectives and metrics and the result of the research was needed to see. For matrix, it was used to provide the answers based on the literature review.

There are phases described in designing research questions in this article. At first, a research objective (conceptual level) is defined, then a research question (operational level) is set, and finally, a set of metrics for answering the research question (quantitative level) is described. The GQM approach is selected because it provided a framework for transitioning from research objectives to research questions and metrics and presented research results. In this case, the matrix was used to provide answers as data from the literature review.

The following research questions are described as follows:

Q1: How does blended learning affect class dynamics?

Q2: How are students' perceptions of blended learning?

Q3: How does blended learning affect learning outcomes?

Q4: What does the teacher think about blended learning?

This literature review can be analyzed based on a comprehensive investigation. In a similar line to Dybå & Dingsøyr (2008) research, this literature review was divided into five stages. They are 1) reviewing the protocol, 2) identifying the inclusion and exclusion criteria, 3) finding out relevant studies, 4) making strategic assessments, 5) collecting the data, and 6) making a synthesis. As Grant et al (200) state, the assessment does not contain a quality assessment and the narrative synthesis and the thematic analysis are also contained in this literature review. It can be seen in the PRISMA flow diagram based on Fig. 1 that provides an overview of the ongoing process based on the following literature review of (213) articles, screening, critical appraisal, and the articles contained in the qualitative and quantitative analysis.

Protocol Review

The review protocol is implemented to maximize literature coverage, to identify and include related work that could be analyzed as a study (experimental, survey, case study, or similar), and to collect and synthesize relevant data linked to the specified research topics (see Section 1). This review establishes research topics, strategies, inclusion and exclusion criteria, quality standards, criteria, data extraction, and synthesis.

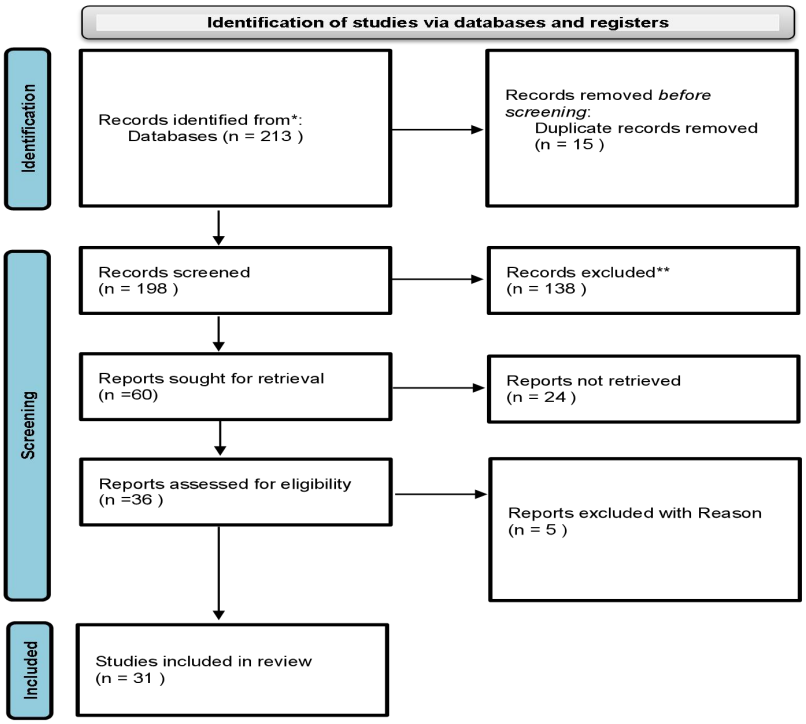

Figure 1. PRISMA Flowchart for this research

Inclusion and Exclusion Criteria

The inclusion and exclusion criteria are identified to see relevant articles possibly. Several researchers utilize templates for inclusion and exclusion criteria. However, one criterion refers specifically to blended learning. More complicated inclusions and exclusions should be made at the strategic assessment step.

The inclusion criteria for relevant studies can be seen as follows:

- Articles should be articles, not reports, book chapters, letters, or abstracts.
- The article should be published in an international peer-reviewed journal or conference.
- The article should be written in English and or Indonesian language.
- The article should be about blended learning described in the title or abstract.

On the other hand, the exclusion criteria should be articles that cannot be accessed through university or membership services.

Relevant Study Search

The analysis for relevant studies is conducted in two steps, they are 1) digital research databases and 2) the references that are checked for additional review. A keyword is "blended learning, and the databases are examined sequentially through Google Scholar and Scopus. This analysis is specified for articles written in English and Indonesian language and published in proceedings or journals. Scopus was selected in this literature review because of its ranking as an academic research database, its relevance, and its quality. And Google Scholar was selected because of its high-quality standard for research articles.

The title and abstract of the article are also checked to see their relevance. If the article is suitable for the inclusion and exclusion criteria, the pdf and site data of research articles are downloaded, and the citation and keyword data are paraphrased and put on. Based on the analysis, 31 qualified articles are accepted. Most rejected articles are not accessible through university or membership services. It is because they are project descriptions or abstracts, or articles in other languages with English titles and abstracts.

Critical Assessment

The critical assessment focuses on the relevant articles that only are classified as experimental, survey case studies, or blended learning topics. Proper research methods are described like research context, the number of subjects, scope, design, methods, execution, and credibility (conclusion from good analysis and reasoning). It can be seen in Table 1.

Table 1. Results of Critical Assessment

Group	**Number of Articles**	**Description**
Accepted Articles	31 (86,11%)	Relevant studies, thoroughness, and credibility
Blended learning and others	4(11,11%)	Blended learning studies combined with other learning
Review	1 (2,78%)	Only review
Total	36 (100%)	

Data Collection

Data were collected from (31) articles by analyzing all articles in detail. The data put into the spreadsheet were the type of article, number of research subjects (N), brief study descriptions, results, article topics, and research contexts.

Synthesis

The research articles were reviewed based on the type and four variables in this article (Table 2).

Table 2. Variables used in data synthesis

Variable	Description
Learning achievement	Studies measuring the learning effects of using blended learning are usually compared from pre-tests and post-tests or final exams.
Class dynamics	The study examines how blended learning influences classroom dynamics.
Student Perceptions	The study examines students' perceptions using blended learning.
Teacher's Perception	The study examines teacher perceptions using blended learning.

The four variables represent the four questions on the research objectives. Between articles and variables in this research are checked and matched to the articles, and the related part of the articles are added to the results and study descriptions in the spreadsheet in this article. Hereafter, the researcher can sort and collect the information from the articles. At last, the accepted articles are summarized according to the four research topics and reported.

Results

This section presents the overall outcomes from the literature review organized based on the four research topics. Based on (213) articles searched by Google Scholar and Scopus, it was obtained (31) articles were reviewed comprehensively. (182) articles could not be reviewed and analyzed because a few examined blended learning and other learning. The articles could not be accessed through the website of the university for authors.

The implementation of blended learning increases every year. The statistics of the articles using blended learning published every year can be seen on Figure 2. Figure 2 also shows that there is a noticeable increase in blended learning for the studies published from 2010 to 2021. It is seen that in 2021 the implementation of blended learning achieves a high percentage, which is implemented based on various backgrounds starting from after the Covid-19 pandemic to other cases. And technology plays an important role in learning innovation.

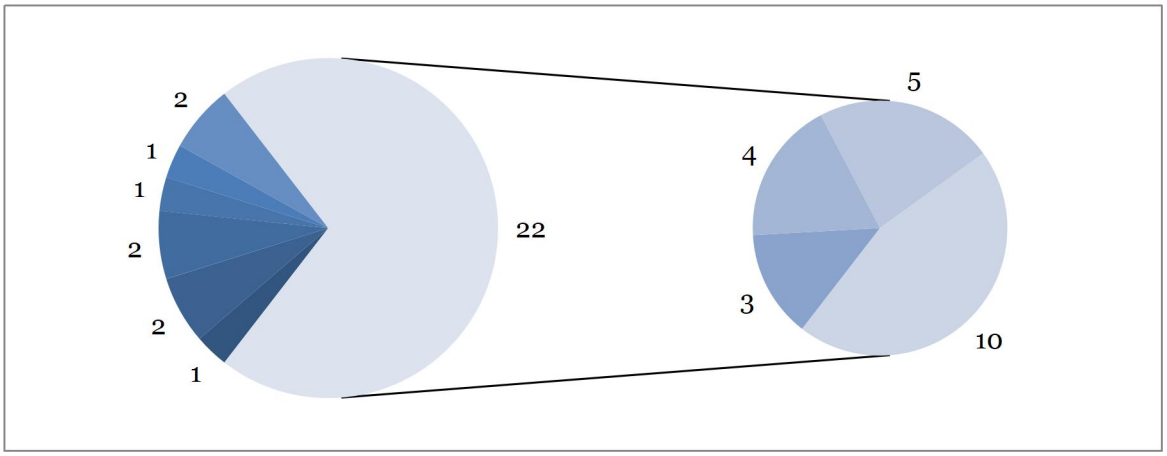

Figure 2. the Number of Article Publications from 2010 to 2021.

Based on Figure 2 above, it is found ten articles in 2021 mostly. One article is obtained in

2010, 2015, and 2016 at least. Others are found in several years with the number of articles. This percentage is indicated by the author and years, the title of the article, the research design, the four attributes or objects, and the country and result. And Figure 3 above shows the percentage of articles that can be described according to the same four attributes. The Figure reveals that the majority of studies (39%) have a focus on how students perceive the use of blended learning and learning outcomes (35%). The topics covered by the least number of articles are class dynamics and teacher perceptions.

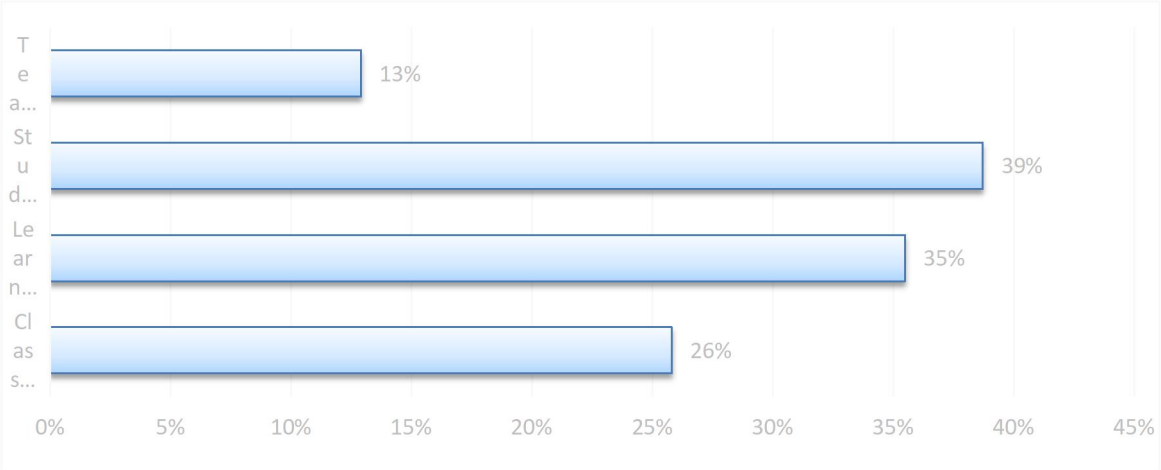

Figure 3. Statistics on article attributes.

Figure 4 shows the percentage of articles based on the research design. The research with case study design has the highest percentage (50%), followed by experimental design research with a percentage of (32%) and the smallest is mix-method design with a percentage of (16%). Blended learning research objectives with case studies mostly discuss students' learning outcomes and perceptions. Whilst mix-method tends to describe teacher perception. Hence, there is a relation between Figure 3 and Figure 4.

The high percentage of students learning outcomes and perceptions is similar line with the high percentage of case study research design, which mostly uses the students' perceptions and learning outcomes as a research objective. The mix-method research design that has the lowest percentage (see Figure 4) is similar line with the low teacher perception.

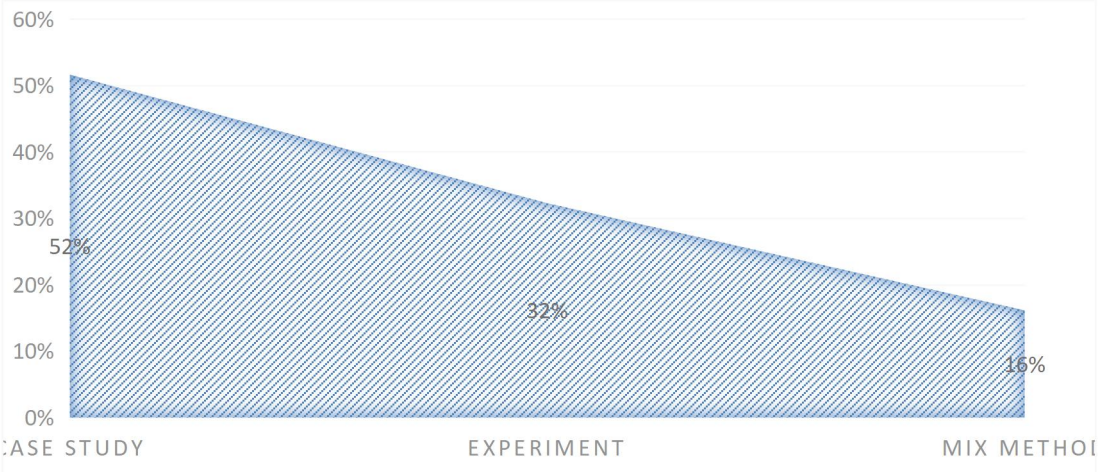

Figure 4. Research Design

Class dynamics in blended learning

During the COVID-19 pandemic, teachers and students adapt themselves to the change of online learning and teaching. In dealing with this difficulty, mixed learning strategies are

implemented in teaching. According to the study of Jr, Lapitan Ds et al., (2021), there are five components of mixed learning strategy, they are Discover, Learn, Practice, Collaborate and Assess (DLPCA). Asynchronous teaching and learning are implemented through pre-recorded lecture videos uploaded to YouTube to allow students to learn based on their skills and knowledge. While synchronous teaching and learning are applied through a video platform like Zoom or Google Meet. The challenges identified are the internet connection's stability and the instructor's familiarity. Instructors must also find ways to increase student interactions and maintain students' interest and engagement during the online learning process. As regards the survey, most students are satisfied with the DLCPA strategy. Therefore, this strategy is manageable and effective in online instruction for other undergraduate students of Chemistry coursework programs. In addition, related to the findings and insights in this literature review, a valuable resource for further hybrid instruction in the post-COVID-19 time in higher education is obtained (Figure 5).

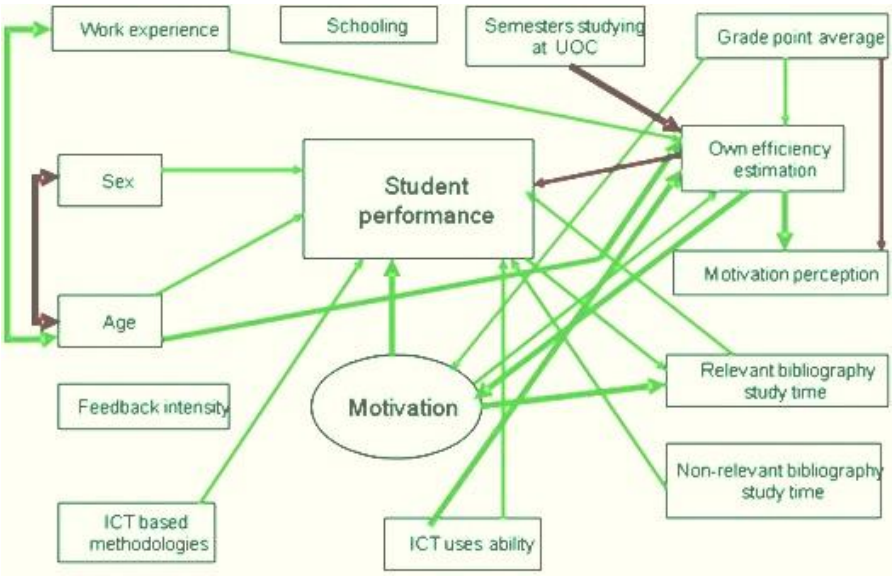

Figure 5. Analysis of the determinants of students' performance in e-learning

According to Taghizadeh and Hajhosseini (2021) research, the findings reveal that the interaction between students and instructors is frequently seen in blended learning classes. It comes from the teacher who can answer all students' questions, provides effective feedback on all students' comments, and interacts via email, social networks, and face-to-face learning. Students can also interact well by using online content which attracts students to learn comprehensively. However, the interaction between students and other students is rare because the students are less focused on and not active to participate in class discussions.

Structural model analysis

The resulting structural model was validated using the suggested research model and the statistical analysis discussed in the preceding section (Figure 6). Significant coefficients existed for each of the stated routes between the model components. 61% of the variation in PU was explained by the components TA, ET, and F2F. Exogenous variables in the model included TA and F2F, with F2F having a direct impact on PU and TA having an indirect impact. With ET on PU, the highest effect was seen (0.65), whereas F2F had the least impact on PU (0.21).

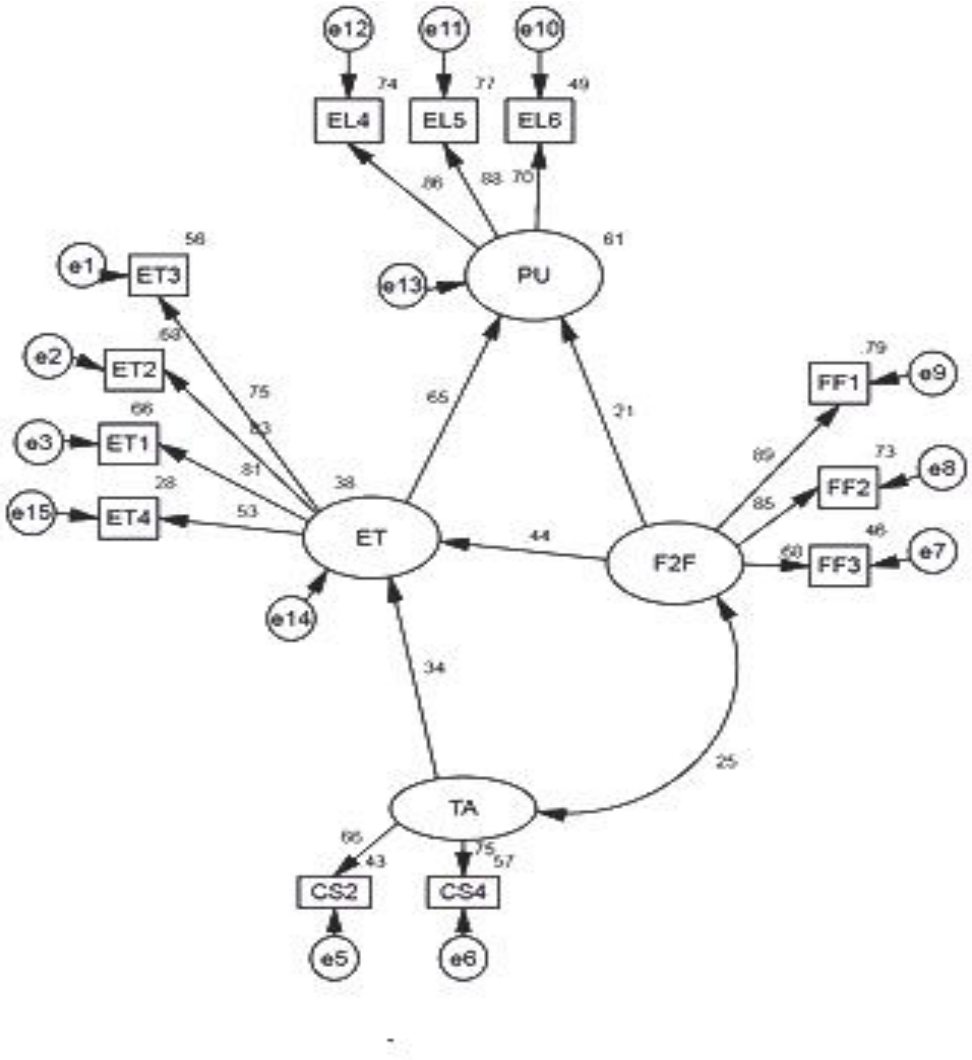

Figure 6. The structural equation model

An expanding literature suggests that interaction should be increased as a critical success factor in blended learning. According to Moore (1989), learner interactions are divided into student-to-student (S-S), student-to-teacher (S-T), and student-to-content (S-C). Students considered online and in-class learning as positive on its design and overall satisfaction. While the students who enrolled in-class learning, supplemented by online discussions, felt positive about the interactions. The least preferred model was in-class learning that alternates weekly between in-class and online sessions (Owston & York, 2019b; Zappala, G. and Burrell, 2002).

Several studies represented that the learning activities are more important for students than how they are delivered (Banerjee, 2011; Manwaring et al., 2017). An expanding literature indicates that students prefer learning activities that offer choice and promote social interaction. The value of online lectures, problem-solving exercises, various tools, and online discussions can appear for students (Bueno-Alastuey & López Pérez, 2014; Hung & Chou, 2015). On the other hand, according to Wai and Seng (2015), students are less interested when they have difficulty downloading the learning, use complex tools that limit their online participation, or if instructor attendance is not established or insufficient.

Critical Analysis

The literature has several definitions of critical thinking (Bueno-Alastuey & López Pérez, 2014; Hung & Chou, 201). The heart of critical thinking is taking control of one's thinking to better it, despite the focus on other elements. The concept and paradigm of critical thinking provided by Paul and Elder were used in the research. Critical thinking is "the ability of individuals to take

control of their own thinking and develop appropriate criteria and standards for analysing their own thinking. They suggested that critical thinking had three components: mental processes, intellectual norms, and intellectual characteristics. When someone uses intellectual standards (clarity, precision, accuracy, importance, relevance, sufficiency, logic, fairness, breadth, depth) to evaluate thinking-related components (goals, assumptions, questions, points of view, information, implications, concepts, inferences), they are demonstrating critical thinking.

Students' Perception of Blended Learning

Several research findings that students have positive responses toward blended learning technology (Al-Fodeh et al., 2021; Attard, 2020; Miyazoe & Anderson, 2010; Sari & Wahyudin, 2019; Varthis & Anderson, 2018). The first research topic aimed to learn more about students' thoughts or perceptions about the learning supported by the blended learning approach. Through blended learning, students find study support, such as online homework, beneficial because it provides flexibility and is easily accessible so they can study comfortably. Blended learning allows them to practice and improve the learning activities that have been done in class and consider blended learning to improve their understanding of class material, i.e., guides them on what to learn, develop, and assess their understanding of the concepts learned in class (Tekane et al., 2020).

Students' perceptions of blended learning towards teachers as instructors have significant opportunities to interact with students and provide them with direct feedback during face-to-face learning. Hence, students who learned through face-to-face learning may be more likely to comprehend the learning material than students in online learning (Hung & Chou, 2015).

Students' perception of obtaining information can be seen through interaction in group discussions and presentations, with the central encouragement to be questioned by the instructor (teaching attendance). Students integrate and apply their knowledge by discussing it among themselves, teaching others, and practicing what they have learned—nevertheless, the lack of students' encouragement about feedback and time constraints (Almasi & Zhu, 2020).

The survey results reveal that there is no statistically significant variation in the reported social presence scores based on students' characteristics. However, affective expression and open communication were rated higher than social presence and group cohesiveness. Group assignments, teacher online activities, and student group discussions promote Social Presence (SP). Through social presence and interaction, students learn various concepts and exams through online and in face-to-face discussions. Briefly, students' characteristics are not measured. Because group discussion and social presence influence their learning (Almasi & Zhu, 2018; Zappala, G. and Burrell, 2002).

Anxiety is one of the barriers that appeared in blended learning. However, it weakens the use of the blended learning system, indicating that students are less anxious about using blended learning. The strong positive effect of Self Efficacy (SE) and blended learning on the system implies that students with high levels of self-efficacy are more likely to find technology accessible (Sabah, 2019).

Learning outcomes in blended learning

Mixed learning makes students more independent in the learning process. Students who learn independently get good results (Tsai et al., 2011). In addition, students' self-regulation and motivation are also related to their learning outcomes. By applying the mixed learning model, the influence of students' self-control on their learning outcomes is linked to autonomous learning (Khatib, 2010; Peng & Fu, 2021; Rahayu & Iswari, 2021; Zhu et al., 2016).

The blended learning model is not autonomous of students' learning outcomes. Learning outcomes provide statements about what students should know and understand at the end of the learning activity. The mixed learning model must also consider it. Several previous studies cover the critical role of learning outcomes in designing effective mixed-learning environments (Bralić & Divjak, 2018; Kintu et al., 2017). Achieving students' learning outcomes is not only enough because the procedure must exist to measure their achievement. To ensure the achievement of the intended learning outcomes, it is required to be harmonized with teaching and learning methods, assessments, and students' workloads.

Bernard et al. (2014) and Means et al (2013) speculate that when more than half of blended learning is implemented online, the results will be achieved higher than when proportionately less time is spent online. Almasi & Zhu (2020) conclude that students' experiencing high cognitive attendance had high academic outcomes. Based on those findings, cognitive presence will likely influence students' outcomes, regardless of varying degrees of manifestation. Furthermore, according to Abroto et al. (2021); Grønlien et al. (2021); Halasa et al. (2020); Kang & Kim, (2021), based on their research, students who applied blended learning have high motivation and learning outcomes than students who applied conventional learning. Thus, based on various references, blended learning provides positive significance to students' learning outcomes. It is seen from the technology and innovation applied while learning activities can increase students' learning interest, positive attitude, and students' motivation. Whilst no study represents the negative significance of blended learning on students' learning outcomes. The negative significance tends to the learning dynamics, and the low motivation to interact with the teacher and other students.

Teacher's Perception

Teachers' perception consists of several aspects. Teachers feel confident and students will have better cognitive abilities than in traditional learning in blended learning. It comes from some obstacles for teachers to implement blended learning. Teachers with several years of experience encounter difficult situations such as pandemics or natural disasters, but elder teachers with more teaching experience tend to have less computer savvy. In addition, teachers respond that blended learning is challenging to implement with limited internet access because there are still many schools that are not yet equipped with facilities for online learning (Alea et al., 2020; Anoba & Cahapay, 2020). Teaching quality shows the most significant contribution to blended learning satisfaction. This is related to the teacher's use of appropriate materials, timeliness and attention, successful students' learning interaction, the quality of technology tools, and reasonable learning competence. Hence, the importance of online teacher training is to improve the knowledge, skills, and strategies needed for online teaching (Taghizadeh & Hajhosseini, 2021). Schools are required to promote training and workshops for teachers to equip them with skills and knowledge in online learning. Online learning can provide access for students at a higher level of education. However, online learning has challenges to implement for students based on the context, but it can be improved by utilizing technology (Mahlangu, 2018). In addition, schools should have programs to promote plans, implementation, and evaluation for learning activities to ensure online learning is effective and successful to be applied. It is also stated by Bozkurt (2019) that an institution can provide training and workshops. Similarly, schools should provide more facilities and equipment for online learning. Online learning should be constantly evolving and provide an ideal learning environment at school.

Blended learning is implemented based on the teachers' perspectives on the effectiveness of implemented education rules and the government's response to the pandemic. Although it was flexible to use, teachers have various challenges in implementing this method during the pandemic, such as preparedness, technological literacy, technology access, financial difficulties, and health risks. It means that the government and other education stakeholders can provide additional financial support to schools, increase teacher professional development activities, and develop learning platforms that allow open access to quality educational resources (Batac et al., 2021).

Conclusion

Interaction has been increased as a critical success factor in blended learning. Students considered online and in-class learning as positive on design and overall satisfaction. While students who enrolled in-class learning, supplemented by online discussions, felt emphatic about the interactions. Learner interactions are divided into student-to-student (S-S), student-to-teacher (S-T), and student-to-content (S-C).

Students have positive responses towards blended learning technology. Students who have been taught by blended learning have higher motivation and learning outcomes than those who have been taught by conventional learning. By applying blended learning, students found learning support because it provided flexibility to study comfortably. At the same time, blended learning

has challenges mentioned by students, including technical problems like internet connection during online face-to-face learning and unable to interact directly with teachers if there are obstacles in learning.

The teacher's perception of blended learning consisted of several aspects. Teachers felt confident and students had better cognitive abilities than in traditional learning in blended learning. Teachers with several years of experience encounter difficult situations such as pandemics or natural disasters, but elder teachers with more teaching experience tend to have less computer savvy. The main challenges mentioned by teachers included the difficulties in monitoring the development of students' knowledge, the problems that were related to network connectivity, the assessment process that was neglected, and some teachers' difficulty to use technology in blended learning.

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