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A COMPREHENSIVE SYSTEMATIC REVIEW ON EFFECTIVE STRATEGIES FOR STUDENT ENGAGEMENT IN BLENDED LEARNING ENVIRONMENTS

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ABSTRACT

Objective: This study aims to systematically review the empirical literature on blended learning, student engagement, and learning outcomes, particularly in the context of higher education in Indonesia, while also comparing global findings. By examining the effectiveness of blended learning designs in enhancing student engagement and learning outcomes, this research seeks to provide insights into how blended learning can be effectively applied to improve these aspects.

Research Design & Methods: This study utilized Petticrew and Roberts' (2008) systematic review method to explore the impact of blended learning on student engagement and learning outcomes in higher education, focusing on relevant literature that met strict inclusion criteria and descriptive analysis based on four dimensions of learning outcomes.

Findings: Blended learning increases student engagement across academic, behavioral, cognitive, and affective dimensions, In Indonesia, challenges such as unequal access to technology and the digital literacy gap still exist, but the benefits are equally distributed across STEM and non-STEM students.

Implications & Recommendations: Blended learning design should consider equitable access to technology, digital skills training, and flexible approaches to overcome technical barriers and increase student engagement.

Contribution & Value Added: This review synthesizes empirical findings to provide actionable insights into blended learning designs that balance technological innovation and accessibility. It highlights the universal applicability of blended learning across disciplines and its potential to transform higher education in Indonesia by addressing digital divides and fostering inclusive learning environments.

Keywords: Blended Learning, Student Engagement, Hybrid Learning.

JEL codes: I23, M53
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INTRODUCTION

Student engagement reflects the energy they put into the learning process, whether physically, emotionally or intellectually. The higher the student engagement, the more energy they invest in learning, which ultimately improves learning outcomes, such as deeper concept understanding, critical thinking ability and practical skills. This positive relationship, in turn, can reinforce a continuous and effective cycle of student engagement (Bond et al., 2020). Student

engagement is also associated with higher intrinsic motivation and ownership of the learning process, which plays an important role in higher education (Bliuc et al., 2007).

Blended learning, as a combination of the advantages of face-to-face teaching (such as direct interaction in the classroom) with online teaching (such as technology-mediated interaction between students, lecturers, and learning resources), has become an increasingly popular strategy in higher education (De Bruijn-Smolders & Prinsen, 2024). This method utilizes the potential of technology-based teaching, such as interactive modules and online learning platforms, as well as hands-on learning experiences that involve communication and collaboration in the classroom (Westerlaken et al., 2019). Studies have shown that blended learning can improve academic learning outcomes, student motivation, and learning time efficiency (Z. Sun et al., 2017). For example, the optimal combination of online and face-to-face learning can create a more flexible and adaptive learning experience (Aravind, 2024).

However, while the potential of blended learning in improving learning outcomes has been widely discussed, there is a knowledge gap regarding the extent to which and how this approach can effectively promote student engagement in various dimensions: academic (such as academic performance and grade point average), personal (such as emotional well-being), social (such as cooperation skills), and civic (such as involvement in community activities) (Panigrahi et al., 2021). An understanding of the factors that determine the effectiveness of blended learning design is essential to combine the "best of both worlds" to support optimal student engagement (Wafik et al., 2024).

In addition, the educational environment in Indonesia presents its own challenges and opportunities. The adoption of blended learning in Indonesia still faces barriers such as unequal access to technology, limited digital literacy, and resistance to pedagogical change (Ashraf et al., 2022). However, great opportunities also arise with the widespread access to digital technology and the increasing need to create inclusive and flexible learning systems (Damanik, 2020). Knowledge of how to design and implement effective blended learning is not only relevant for academics, but also important for education practitioners and policy makers. For example, Indonesia's Ministry of Education and Culture has encouraged the adoption of digital learning through programs such as Merdeka Belajar Kampus Merdeka (MBKM), which provides opportunities for students to learn flexibly and collaboratively (Basri, 2024).

This study aims to systematically review the empirical literature related to blended learning, student engagement, and learning outcomes, particularly in the context of higher education in Indonesia. By comparing global findings, this research not only aims to provide insights into how blended learning can be effectively applied to improve student engagement, but also to identify enabling and constraining factors that are unique to Indonesia. With this approach, this research contributes to the global literature on blended learning, while providing practical guidelines for educators and policy makers in Indonesia to design and monitor more relevant, inclusive and sustainable learning programs.

LITERATURE REVIEW

Blended Learning in Higher Education

Blended learning is a learning approach that integrates face-to-face teaching with online learning to optimally utilize the strengths of both methods. It has been widely discussed in the literature as an effective method to improve academic learning outcomes. A meta-analysis of 40 studies published between 1997 and 2008 showed that students who learned through blended learning had better academic performance than those who only learned through face-to-face instruction (Means et al., 2013). In addition, pedagogical approaches such as collaborative and expository have a significant impact on learning outcomes in blended learning, while independent learning does not have a similar impact.

In the context of health professions, another meta-analysis in 2015 confirmed that blended learning consistently has a positive impact on knowledge acquisition, with equivalent or

better results than non-blended instruction (Liu et al., 2016). Another study in 2017 also showed that blended learning provides greater benefits than face-to-face learning in terms of final course grades, especially for students with high grade point averages and those in science, technology, engineering and math (STEM) fields (Vo et al., 2017). However, the impact of blended learning is uneven across disciplines. Non-STEM students, who require online dialogic interaction and more indirect support from instructors, tend to benefit less than STEM students whose learning process is more linear and directed. Therefore, a deeper understanding of effective blended learning design is needed to increase student engagement across disciplines.

Student Engagement in Learning

Student engagement pertains to the level of effort and enthusiasm that learners invest in their educational experiences. Initial studies on this topic commenced in the 1980s and have progressively developed into a comprehensive concept that includes various dimensions such as academic, behavioral, cognitive, and emotional engagement (Appleton et al., 2006; Fredricks et al., 2004).

Dimensions of student engagement according to Appleton et al. (2006) and Christenson et al. (2008) include:

1. Academic Engagement

Academic engagement refers to the time and effort students invest in learning tasks and activities, including the completion of homework, assignments, and other academic responsibilities. It also encompasses students' focus during lessons and their ability to stay attentive and actively participate in academic activities. High academic engagement is often associated with better learning outcomes, as students demonstrate a strong commitment to their studies and tend to exhibit higher levels of performance in exams and assignments (Buchan & Precey, 2023). In blended learning environments, academic engagement is often enhanced by the flexibility to work at one's own pace, making it easier for students to manage time and prioritize learning tasks effectively (Lin, 2021).

2. Behavioral Engagement

Behavioral engagement involves active participation in class, both physically (attendance) and virtually (engagement in online discussions, group work, and forums). It includes students' willingness to attend classes regularly, engage in class discussions, collaborate with peers, and interact with course materials. Behavioral engagement is a key indicator of how committed students are to the learning process and can predict both short-term and long-term academic success (Nesbitt et al., 2018). In blended learning settings, this type of engagement can be fostered through interactive activities such as online quizzes, group projects, and live discussions, which encourage students to participate actively and demonstrate their learning.

3. Cognitive Engagement

Cognitive engagement refers to a student's ability to self-regulate and manage their learning, focusing on the relevance of the material being studied and the value they attach to the lessons. This type of engagement involves deep learning processes, such as critical thinking, problem-solving, and the ability to connect new knowledge with existing knowledge. Students who are cognitively engaged are more likely to engage in self-reflection, set academic goals, and take responsibility for their learning (X. Sun & Guan, 2021). In blended learning environments, cognitive engagement can be enhanced through personalized learning experiences, self-paced learning modules, and interactive tools that help students make meaningful connections with the course content (Halverson, 2016).

4. Affective Engagement

Affective engagement refers to the emotional connection students have with their learning experience, which includes their sense of belonging, motivation, and emotional investment in the learning environment. Students who feel emotionally connected to their learning environment are more likely to persist through challenges, be motivated to achieve their academic goals, and feel a

sense of satisfaction with their educational journey (Vaughan, 2014). This type of engagement is crucial for promoting a positive learning experience, particularly in blended learning settings where students may face isolation or disconnection. To foster affective engagement, instructors can create supportive learning communities, provide opportunities for student collaboration, and incorporate elements of gamification or real-time feedback that help students feel more connected and motivated (Chiu, 2021).

Research by Bond et al. (2020), which included 243 studies on student engagement and educational technology, found that blended learning is often used to improve behavioral aspects of engagement, but less attention is paid to cognitive and affective engagement. Therefore, more research is needed to understand how blended learning can improve student engagement holistically.

Design Effective Blended Learning

The design of blended learning plays an important role in determining its effectiveness. Three widely used blended learning designs are online learning communities, flipped classrooms, and gamification-based learning:

1. Online Learning Community. A virtual environment that supports collaboration among students. Online learning communities have been shown to improve course performance and learning satisfaction through instructor-student and student-to-student interactions (Diramio & Wolverton, 2006). Important elements in these communities are social presence and teaching (Biocca et al., 2003; Yuan & Kim, 2014).
2. Flipped Classrooms. This approach requires students to study the material independently before class and then apply it in face-to-face activities. A study by Van Alten et al. (2020) shows that flipped classrooms produce better learning outcomes than face-to-face instruction, provided there is sufficient face-to-face time and the use of quizzes as evaluation.
3. Gamification-based Learning. The integration of game-based design elements in learning has been found to increase student motivation, engagement and performance (Subhash & Cudney, 2018). Gamification also has a significant impact on students' attitude towards learning.

Indonesian Context in Blended Learning

In the Indonesian context, the implementation of blended learning faces unique challenges, including limited technological infrastructure, gaps in internet access, and variations in digital capabilities among students and lecturers. Nonetheless, research shows that blended learning has great potential to increase student engagement, especially when supported by locally appropriate designs. For example, technology-based learning initiatives in Indonesia, such as the Ministry of Education and Culture's Rumah Belajar platform, have shown that combining technology with inclusive pedagogical approaches can improve access and quality of learning. However, further studies are needed to evaluate how locally implemented blended learning models can improve multidimensional student engagement and learning outcomes.

This study aims to examine how blended learning can improve student engagement across multiple dimensions (academic, behavioral, cognitive, and affective) and its impact on learning outcomes in higher education in Indonesia. By comparing global findings and local contexts, this research is expected to provide new insights for educators and policy makers to design effective blended learning models that are relevant to Indonesian needs.

METHODS

This study used the systematic review method designed by Roberts H Petticrew M (2008) to analyze the impact of blended learning on student engagement and learning outcomes in higher education. The review process involved three main stages. The first stage was to establish inclusion criteria to ensure that the included studies were relevant and of high quality. The second

stage involved determining appropriate search terms and databases to ensure the literature search was broad and included reliable sources. In the third stage, a thorough literature search was conducted to select studies that met the inclusion criteria. The results of this review were then described and summarized based on the blended learning design applied in each study, which was further linked to the reported learning outcomes. Although the analyzed studies showed significant variation in student engagement, a meta-analysis could not be conducted. Instead, we explore and outline the findings from the studies based on the authors' conclusions and student self-reports, and analyze the broader impact of blended learning.

To ensure the quality of this systematic review, strict inclusion and exclusion criteria were established. The research focused on learning interventions in a higher education context, with the aim of evaluating their impact on student engagement and learning outcomes within the current curriculum, based on field studies rather than laboratory experiments. In the case of blended learning, studies that highlighted only one aspect, such as student engagement or learning outcomes, were excluded. The learning outcomes analyzed include four main dimensions as expressed by Conway et al. (2009), namely academic (e.g. knowledge and grade point average), personal (e.g. well-being and moral development), social (e.g. teamwork skills and understanding of diversity), and civic (e.g. participation in community activities).

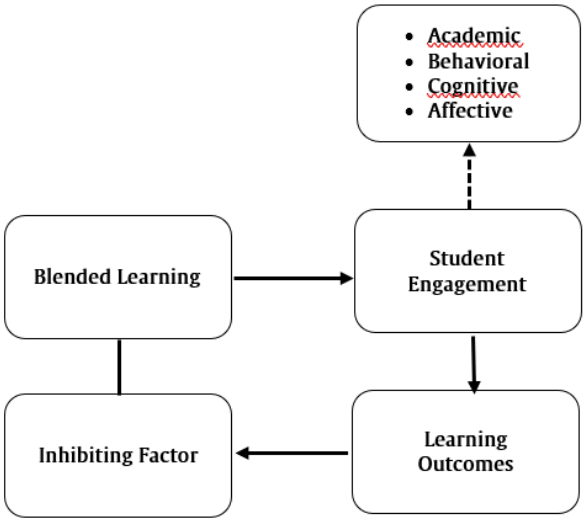

Figure 1. Conceptual model blended learning review

RESULT

From a technical perspective, the blended learning environments implemented in various studies show significant differences, especially in terms of the media and platforms used to create online learning communities. Some studies utilize platforms such as Edmodo, Google Drive, and YouTube to support the interaction between students and teachers in the online learning context. Although there are variations in the technologies used, didactically, the blended learning designs in these studies can be categorized based on the main learning objectives to be improved. In general, five main categories of blended learning designs can be identified, each with a different focus on facilitating the learning process.

Jou et al. (2016) discovered that incorporating Google Drive for online discussion activities significantly enhanced motivation (cognitive engagement) among 60 undergraduate students taking a mechanical design course, compared to traditional offline discussions. Additionally, the study revealed a moderate improvement in the students' academic performance (academic outcomes). To develop the blended learning environment, the researchers utilized the knowledge transformation model, which is structured into four primary stages.

1. Socialization through an interactive online course community, which allows students to

actively interact with peers and teachers.

2. Externalization of tacit knowledge into explicit knowledge through the use of media, which allows implicit information to be clearly understood and shared among participants.
3. Combination of students and teachers to present and share knowledge using weblogging, serving as a platform for discussion, feedback and collaboration.
4. Internalization of the rules required for effective peer collaboration, supported by the use of Google Sites as a tool to support learning and interaction among students.

Through this approach, this research emphasizes the importance of using digital media in improving students' motivation, social interaction, and academic achievement in blended learning.

Firstly, there are learning designs that focus on the formation of online learning communities between students and teachers, aiming to encourage peer learning and direct interaction with teachers. In this design, various online platforms, such as those found in studies by Chen & Chiou (2014), Demirer & Sahin (2013), Feghali et al. (2011), were used to facilitate the sharing of learning materials, assignments, as well as opportunities for discussion and feedback between students and instructors. The main objective is to create an environment that allows students to learn collaboratively with their peers and receive direct guidance from the instructor. The use of social media and online tools has proven effective in increasing student engagement as well as facilitating more open interaction between all parties involved.

Secondly, the flipped classroom design has been the main approach in several studies. In this approach, students autonomously gather their course materials through online resources, including videos and podcasts. Subsequently, they engage in application tasks that are conducted both online and offline within the classroom, typically working in small groups. This approach, found in several studies (Kurt, 2017; Peterson, 2016; Safar & AlKhezzi, 2013), aims to promote more self-regulated learning by students themselves and improve their ability to manage their learning process independently. The flipped classroom allows students to gain a basic understanding first through online materials, before collaborating with peers in class to complete more applied tasks.

Third, online peer assessment has become an important part of the learning process in some studies (Svenningsen & Pear, 2011). In this design, students are given the opportunity to provide feedback on their peers' work, which not only increases their engagement in the learning process but also develops critical and reflective skills. This peer assessment allows students to see different perspectives, deepen their understanding of the material, and improve communication and collaboration skills in an online context.

Fourth, there are designs that incorporate gamification elements and fun factors in online learning, which are intended to incentivize students to be more motivated to learn and work harder. Examples of this approach involve the use of online badges or medals to recognize student achievements, as well as the application of Augmented Reality (AR) technology to create a more interactive and fun learning experience. Research adopting this approach, such as that found in Wang (2017), study, shows that elements of fun and incentives can significantly increase students' motivation to engage in learning.

Lastly, an individualized intervention approach was used in some of the studies of Wong et al. (2023), where students were provided with monthly reports detailing their study behavior both online and offline. These reports are accompanied by customized interventions to support each student's individual learning needs. This approach aims to provide more personalized and in-depth feedback and help students identify areas for improvement in their learning process.

Overall, although each study employs a distinct approach in the design of blended learning, they all share the common objective of enhancing student engagement and learning outcomes. The diversity in the application of technology and learning design illustrates the adaptability of blended learning to meet various student learning needs and to fully leverage the potential of both online and face-to-face instruction.

Table 1. Overview of the included studies.

Article	Blended-learning Interventions	Research Design	Result	Quality of Study	Engagement Dimension	Learning Outcomes
(Chen & Chiou, 2014)	Online learning system with peer-to-peer discussion using Google Services and Moodle.	Experiments with control and experimental groups.	Online communities improve cognitive and affective engagement and academic outcomes.	Medium	[Cognitive]: Discussion improves understanding. [Affective]: Sense of community increased.	[Academic]: Better test scores. [Social:] More collaborative interaction.
(Demirer & Sahin, 2013)	Educational technology platform for assignment sharing, online discussion, and online feedback.	A quasi-experimental study.	Online platform improves assignment quality and test scores.	High	[Cognitive]: Mastery of material improved through collaborative tasks.	[Academic]: Assignment and exam grades improved.
(Feghali et al., 2011)	A jigsaw blog for peer collaboration and peer feedback-based learning.	A quasi-experimental study.	The jigsaw blog improves collaboration, confidence, and social engagement.	High	[Social]: Peer-to-peer interaction increased. [Cognitive]: Deeper reflection.	[Academic]: Better exam results. [Personal:] Self-confidence increased.
(Jou et al., 2016)	Google Drive is used for interactive discussions and online assignment collaboration.	Quantitative study with surveys and interviews.	Immersive discussions on topics through online media increase engagement and understanding.	Medium	[Cognitive]: Critical reflection increased.	[Academic]: Better understanding of concepts. [Social:] Peer-to-peer collaboration.
(Min et al., 2019)	An organized online learning community with forum-based collaborative activities.	Small group-based experiments.	Online communities increase student motivation, collaboration and achievement.	Medium	[Cognitive]: Increased motivation to learn.	[Academic]: Academic performance improved. [Social]: Teamwork is more effective.
(Monteiro & Morrison, 2014)	Online discussion forum for self-reflection and problem-based discussions.	Mixed methods: survey, interview, and observation.	Online discussion forums enhance self-reflection and relevance of the course to personal life.	Medium	[Behavior:] Active participation. [Cognitive:] Deep reflection on the material.	[Social]: Teamwork skills improved. [Academic]: Course relevance increased.
(Svenningsen & Pear, 2011)	CAPSI for online technology-	Control group-based	CAPSI increases cognitive engagement	Medium	[Cognitive]: Improves critical	[Academic]: Little impact on final

Article	Blended-learning Interventions	Research Design	Result	Quality of Study	Engagement Dimension	Learning Outcomes
	based peer-to-peer assessment.	experiment.	but its impact on academic outcomes is limited.		thinking.	exam scores.
(Tsai, 2015)	Co-regulated learning based on online discussion and collaborative assignments.	Experiment with a control group.	Co-regulated learning improves cooperation, problem-solving skills and efficacy.	High	[Cognitive]: Problem-solving. [Social:] Better teamwork support.	[Academic]: Better understanding of the material. [Social]: Improved cooperation.
(Wang, 2017)	Augmented Reality (AR) for interactive learning.	Control group-based experiment.	AR increases behavioral engagement but has technical challenges that limit results.	Medium	[Behavior:] Active participation. [Cognitive:] Moderate comprehension of material.	[Academic]: Limited academic learning outcomes.
(Wong et al., 2023)	Personalized interventions based on monthly reports and direct feedback from teachers.	Control group-based experiment.	Personalized interventions improve self-efficacy and academic achievement.	High	[Cognitive]: Understanding improved. [Affective]: Motivation increased.	[Academic]: Grades and self-efficacy improved. [Personal]: Self-development.
(Hew et al., 2016)	A leaderboard and badge-based gamification in online learning.	Control group-based experiment.	Badges as incentives increase motivation, but their impact on academic outcomes is not significant.	Medium	[Behavior:] Competition in gamification drives engagement. [Affective]: Motivation increases.	[Academic]: No significant improvement. [Personal]: Self-efficacy increased.
(Hew et al., 2016)	Augmented Reality (AR) is used for interactive and exploratory learning activities.	Control group-based experiment.	AR increases behavioral engagement, but there are technical constraints that limit its impact on academic outcomes.	Medium	[Behavior:] Participation increased with interactive features. [Affective]: Interest in the material increased.	[Academic]: Concept understanding improved slightly.

The Effect of Blended Learning on Student Engagement and Academic Outcomes

Online learning communities are formed between students and teachers to support an online learning structure that allows students to cooperate with fellow students and interact with teachers. This online learning community is facilitated through platforms such as Google Services, Moodle, and Facebook, which allow the sharing of learning resources such as videos, animations,

and assignments. Online announcement pages are used to organize learning activities, such as preparing chapter materials, participating in peer discussions, completing exercises, and interacting with teachers. In two studies, students were divided into groups of 5 - 6 people to interact and learn together, although the other study did not mention such subgrouping. These online learning communities proved instrumental in improving student engagement and learning outcomes. Chen & Chiou (2014) research shows that blended learning has a small positive impact on learning satisfaction (cognitive engagement) and sense of community in class (affective engagement), but has a significant influence on academic outcomes such as final exam scores. The study also highlighted that comfort in using a blended learning environment was able to increase students' learning motivation and reflective thinking, supported by peer feedback. Furthermore, Demirer & Sahin (2013) study reported a moderate to high positive impact of blended learning on assignment quality and test scores, based on data from 22 students enrolled in an educational technology course. These results suggest that hybrid learning not only improves academic engagement but also students' academic achievement. Furthermore, research by Feghali et al. (2011) involving 115 students compared the blog-assisted jigsaw learning method with the traditional learning method. The jigsaw approach, which utilized feedback and collaboration between students, showed a moderate positive impact on their attitudes and academic performance. The group using the blog showed higher peer pressure when presenting their work, reflecting the social and personal effects of this method. The use of blogs in jigsaw learning also contributed to improved cognitive engagement and academic outcomes, including confidence in presentation and ability to provide peer feedback.

The Impact of Online Learning Communities on Engagement and Learning Outcomes

Research conducted by Min et al. (2019) revealed that an online learning community motivated a cohort of undergraduate students to exert greater effort and surmount educational challenges, in contrast to their peers engaged in conventional learning methods. The findings indicated that this online community had a moderate to significant positive influence on students' attitudes, specifically in terms of cognitive engagement, as well as their academic performance. This study underscores the potential of online learning to enhance motivation and educational outcomes through increased interaction and collaboration among students. It supports the notion that online learning environments can foster a supportive atmosphere that promotes active student engagement, ultimately leading to improved academic success.

A study conducted by Monteiro & Morrison (2014) revealed that interactive learning had small to moderate positive effects, particularly in areas such as participation in discussion forums and student engagement behaviors. Participants noted an enhancement in their personal connection to the Applied Information Technology course, indicating increased cognitive engagement. They expressed that the online learning community, termed "collaborative blended learning," facilitated broader thinking, allowed them to view situations from various angles, and enhanced their skills in time management, teamwork, self-reflection, and logical reasoning. Nevertheless, despite the significant positive influence of blended learning on academic engagement and behavior, the study unexpectedly found no impact on university English placement assessments. The researchers speculate that the brief duration of the study (9 weeks) may not have been sufficient to yield measurable effects on the test outcomes.

In a study conducted by Tsai, (2015), the blended learning framework implemented included an online learning community utilizing a "web-based co-regulated learning" (CRL) model. The findings indicated that CRL had a minimal effect on students' perceptions of learning, specifically in terms of cognitive engagement, while demonstrating a moderate positive influence on the outcomes of the Microsoft Excel certification exam. Additionally, students noted that CRL positively affected their problem-solving abilities and collaborative skills, which were fostered through peer discussions and the opportunity to reach out to teammates for assistance. Participants also expressed that CRL motivated them to exert greater effort, complete assignments ahead of deadlines, and cultivate "learning by doing" competencies. Moreover, they reported an increase in their independence, feeling less reliant on their instructors, which signifies a growth in their learning autonomy.

The overall findings from these studies underscore the importance of online learning in creating an environment that supports student engagement, increases motivation, and produces positive impacts on learning outcomes. Although impacts vary by duration and learning design, the use of well-structured online learning communities can provide significant gains in students' interactive learning, collaboration skills and academic independence.

Technology Innovation in Blended Learning: Gamification, AR, and Personalized Intervention Approaches

In a study conducted by Svenningsen & Pear (2011), a computer-assisted learning system (CAPSI) was applied to grade unit exams in two ways: by a teaching assistant or by two peer online raters. In this study, students were required to complete 20 unit exams and peer-assess the other 10 unit exams. The experimental group that followed face-to-face learning still conducted the exams and peer assessments online. The results showed that although the CAPSI system did not have a significant impact on students' final exam scores, there was a slight positive impact on their cognitive engagement, particularly in terms of critical thinking. In the experimental group, the critical thinking score was indeed higher than the control group (9.33 versus 8.62). However, the researchers concluded that the 13-week duration of the experiment was too short to show a significant impact on larger academic outcomes. This study illustrates that while the use of technology in learning, such as CAPSI, can motivate students to participate more actively in peer assessment, it takes longer to profoundly affect academic outcomes.

A similar study conducted by Hew et al. (2016), which used gamification mechanisms in blended learning, provided different insights. In this study, the experimental group given the game mechanism reported a significant increase in motivation. However, the positive effects on academic fact recall were not always consistent. In one study, gamification was shown to increase student engagement, but in another study, the impact on academic fact recall was negative. However, both studies emphasized that game mechanics serve as incentives that encourage students to work harder. Engagement in the game also creates an element of competition among students, which motivates them to work harder to keep up with the class or even surpass their classmates. This suggests that gamification, while not necessarily having a direct impact on improving academic knowledge, can play a major role in increasing student engagement and motivation to learn.

Research by Wang (2017), which involved the use of augmented reality (AR)-based blended learning, also showed mixed results. In this study, the experimental group that used AR technology to study a specific topic showed a moderate negative impact on cognitive engagement, such as learning feedback, and a small negative impact on their weekly grades. However, while AR did not significantly improve academic outcomes, it was shown to increase student engagement in learning. After the AR feature was removed, students who originally engaged with AR reported increased engagement in their assignments, worked harder to complete their work, and showed better results. This suggests that while AR can introduce an element of fun entertainment, technical challenges such as limited experience with AR, slow internet connections, and limitations of students' mobile devices, may hinder the potential of this technology in creating effective learning experiences. Active engagement and appropriate technology support are key factors in the success of AR-based learning approaches.

The study by Wong et al. (2023) implemented a personalized intervention strategy that utilized monthly learning reports, enabling students to assess their learning behaviors in both online and classroom settings in comparison to their peers. Second-year students participating in a blended learning technical course received these reports via email, which reflected their learning activities in both environments. The findings indicated that students benefited from tailored feedback and interventions provided by their instructors. Those in the experimental group were given comprehensive details in their monthly reports, whereas the control group only had access to the average scores of their cohort. The outcomes demonstrated that the personalized intervention strategy significantly enhanced motivation (cognitive engagement) and had a moderate effect on academic performance (academic outcomes). Furthermore, the authors noted

that a focus on student-centered learning, prompt feedback, and tailored interventions according to individual student needs played a crucial role in cognitive engagement.

DISCUSSION

This systematic review aims to address two critical issues: firstly, to assess the effectiveness of blended learning models in enhancing student engagement and learning outcomes within higher education, along with identifying the factors that may hinder this process; secondly, to examine the correlation between student engagement and learning outcomes in the realm of blended learning. Overall, the findings indicate that blended learning positively influences various aspects of student engagement, such as academic, behavioral, cognitive, and affective engagement, in addition to improving learning outcomes. Nonetheless, some research has indicated that blended learning may adversely affect students' academic performance under specific circumstances, particularly when the duration of the study is deemed insufficient to yield significant results.

In this review, five blended learning designs shown to be effective in improving both student engagement and learning outcomes are: 1) the establishment of online learning communities that involve interactions between students and instructors to support peer learning and enhance collaboration; 2) the flipped classroom model, which allows students to prepare course materials online and participate in class activities through online and offline applications that support self-regulated learning; 3) online peer assessment that becomes an integral part of the learning process, reinforcing students' active involvement in evaluating peers' performance; 4) the use of entertainment elements in online learning as an incentive to increase students' motivation and effort in learning; and 5) a personalized intervention approach by providing monthly reports that assess students' learning behavior, accompanied by tailored interventions to support their academic development. These designs show that blended learning can benefit student engagement and learning outcomes, although results may vary depending on the conditions and design features implemented.

However, there are no studies that explicitly measure the relationship between student engagement and learning outcomes, although the results obtained in this review suggest that student engagement is likely to be positively related to learning outcomes if these are further analyzed. Positive student engagement in various dimensions, such as behavioral, cognitive, and affective, is likely to have an impact on improving their learning outcomes. Therefore, it is important to note that while this study provides an overview of the effects of blended learning, the more in-depth relationship between student engagement and academic outcomes requires further exploration.

The review also noted that the studies included mostly focused on Asian contexts, which may have influenced the results found. Contextual variations related to student populations from different cultural and social backgrounds need to be considered, as this may affect the way blended learning is accepted and implemented. Therefore, more research needs to be conducted in other continents to explore the impact of blended learning in different contexts, which can help enrich the understanding of the effectiveness and applicability of this method in various educational settings. While there is a view that students in STEM fields benefit more from blended learning compared to non-STEM students, the results of this review do not support this notion. On the contrary, blended learning was shown to provide balanced benefits for students across disciplines, both STEM and non-STEM, particularly in terms of engagement and learning outcomes. This suggests that blended learning approaches are not limited to specific disciplines but are effective across a wide range of educational fields. This finding highlights the need for further research to understand more deeply how blended learning can be optimized in an inclusive manner, covering different groups of students and disciplines. As such, the development of more adaptive and equitable blended learning strategies can be a key focus for improving the quality of education across different academic contexts.

In Indonesia, the implementation of blended learning in higher education has become an increasingly important topic to improve student engagement and learning outcomes. Various empirical literatures show that blended learning has great potential in encouraging student engagement in various dimensions, including academic, behavioral, cognitive, and affective. However, its implementation in Indonesia is not free from contextual challenges, such as differences in access to technology, the digital divide between urban and rural areas, and variations in students' digital skill levels. In addition, although technology and online learning are becoming more common, many students in Indonesia still face barriers related to uneven technological infrastructure, such as limited internet speed, inadequate devices, and lack of skills in using digital learning tools effectively.

In empirical studies, many studies reveal that blended learning can encourage students to be more active in academic and social activities, and improve their ability to collaborate and think critically. However, to achieve such outcomes, it is important for the design of blended learning in Indonesia to consider locally relevant factors. For example, the use of more appropriate technology that is accessible to all students, as well as providing training to improve their digital skills, is essential for blended learning to be effective. In addition, flexibility in teaching methods, such as using a combination of online and face-to-face assignments, can help overcome various limitations, such as unstable internet connection issues or dependence on certain equipment.

The literature also highlights that students' engagement in blended learning has an effect not only on academic outcomes, but also on their social skills and personal development. For example, students who engage in online learning communities, such as online group discussions or peer assessment, tend to develop better communication, time management and self-reflection skills. In Indonesia, integrating this social learning in blended learning design could be an important step to encourage students' holistic development, not only in academic achievement but also in broader aspects of life skills. Therefore, it is important to conduct further research that can delve deeper into blended learning designs that suit the Indonesian context. Research in this area should concentrate on various aspects of student engagement and their effects on quantifiable learning outcomes. By gaining a deeper insight into the elements that affect the efficacy of blended learning in Indonesia, particularly regarding its design and execution, we can develop more inclusive and effective educational models. These models aim not only to enhance academic performance but also to bolster students' capacity to navigate the challenges presented by an increasingly digital environment.

CONCLUSION

The data obtained in this review suggest that blended learning is a promising tool to improve student engagement and their learning outcomes. Based on this study, several blended learning designs are recommended as the first step in transitioning from face-to-face to blended learning, namely: 1) online learning communities involving both students and instructors to encourage peer learning and interaction between students and instructors, 2) flipped classroom, where students are required to prepare learning materials online before class meetings (e.g. through videos or podcasts), followed by offline and online application tasks, mostly done in student groups, to encourage self-regulated learning, and 3) online peer assessment. In addition, for instructors already using blended learning formats, online fun factors (e.g. by awarding badges or medals online, or using Augmented Reality) and personalized intervention approaches (providing monthly reports on students' online and offline learning behavior, and providing tailored interventions based on these reports) can serve as incentives for students to learn more effectively. In this review, the included studies are described, highlighting elements of blended learning design that have been shown to increase student engagement (academically, behaviorally, cognitively, and affectively) and contribute to their learning outcomes (academically, personally, socially, and civically). With this understanding, educators and policy makers can introduce blended learning in higher education in an evidence-based manner, so that they can design and monitor blended learning that supports student engagement and learning outcomes. For future research, it is important to examine: 1) how student engagement can be enhanced not

only academically, behaviorally, and cognitively, but also affectively, and 2) how blended learning design can influence student engagement as well as their learning outcomes, not only academically, but also personally, socially, and civically.

Recommendations for future research include the need to focus on broader dimensions of student engagement, especially affective engagement which is still under-researched. In addition, it is important to examine more deeply how different blended learning designs affect student engagement and learning outcomes in the long term. Thus, future research can provide more comprehensive insights into how blended learning designs can be optimized to support students' academic success across different fields of study and across the globe.

REFERENCES

Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. *Journal of School Psychology*, 44(5), 427– 445. https://doi.org/10.1016/j.jsp.2006.04.002

Aravind, B. S. (2024). Exploring the Challenges and Opportunities of Blended Learning in a Technology– Enabled Education Environment. *Journal of Effective Teaching and Learning Practices*, 1(1), 10– 19. https://doi.org/10.70372/jetlp.v1i1.aravind

Ashraf, M. A., Mollah, S., Perveen, S., Shabnam, N., & Nahar, L. (2022). Pedagogical Applications, Prospects, and Challenges of Blended Learning in Chinese Higher Education: A Systematic Review. *Frontiers in Psychology*, 12. https://doi.org/10.3389/fpsyg.2021.772322

Basri, H. (2024). The Effectiveness of Blended Learning, Digital Literacy Programs, and Teacher Training on Student Outcomes in 2024. *Global International Journal of Innovative Research*, 2(8), 1745– 1752. https://doi.org/10.59613/global.v2i8.249

Biocca, F., Harms, C., & Burgoon, J. K. (2003). Toward a More Robust Theory and Measure of Social Presence: Review and Suggested Criteria. *Presence: Teleoperators and Virtual Environments*, 12(5), 456– 480. https://doi.org/10.1162/105474603322761270

Bliuc, A.-M., Goodyear, P., & Ellis, R. A. (2007). Research focus and methodological choices in studies into students' experiences of blended learning in higher education. *The Internet and Higher Education*, 10(4), 231– 244. https://doi.org/10.1016/j.iheduc.2007.08.001

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: a systematic evidence map. *International Journal of Educational Technology in Higher Education*, 17(1), 2. https://doi.org/10.1186/s41239-019-0176-8

Buchan, A., & Precey, R. (2023). Propelling Student Engagement in Blended Learning Courses. *Journal of Perspectives in Applied Academic Practice*, 11(3). https://doi.org/10.56433/jpaap.v11i3.578

Chen, B. H., & Chiou, H.-H. (2014). Learning style, sense of community and learning effectiveness in hybrid learning environment. *Interactive Learning Environments*, 22(4), 485– 496. https://doi.org/10.1080/10494820.2012.680971

Chiu, T. K. F. (2021). Digital support for student engagement in blended learning based on self-determination theory. *Computers in Human Behavior*, 124, 106909. https://doi.org/10.1016/j.chb.2021.106909

Christenson, S. L., Reschly, A. L., Appleton, J. J., Berman, S., Spanjers, D., & Varro, P. (2008). Best practices in fostering student engagement. In Best practices in school psychology V. National Association of School Psychologists.

Conway, J. M., Amel, E. L., & Gerwien, D. P. (2009). Teaching and Learning in the Social Context: A Meta-Analysis of Service Learning' s Effects on Academic, Personal, Social, and Citizenship Outcomes. *Teaching of Psychology*, 36(4), 233– 245. https://doi.org/10.1080/00986280903172969

Damanik, E. L. (2020). Blended Learning: An Innovative Approach on Social Sciences at Indonesian

Higher Education. *Education Quarterly Reviews*, 3(1). https://doi.org/10.31014/aior.1993.03.01.117

De Bruijn-Smolders, M., & Prinsen, F. R. (2024). Effective Student Engagement with Blended Learning: A Systematic Review. *Heliyon*, 10(23), e39439. https://doi.org/10.1016/j.heliyon.2024.e39439

Demirer, V., & Sahin, I. (2013). Effect of Blended Learning Environment on Transfer of Learning: An Experimental Study. *Journal of Computer Assisted Learning*, 29(6), 518– 529. https://doi.org/10.1111/jcal.12009

Diramio, D., & Wolverton, M. (2006). Integrating Learning Communities and Distance Education: Possibility or Pipedream? Innovative Higher Education, 31(2), 99– 113. https://doi.org/10.1007/s10755-006-9011-y

Feghali, T., Zbib, I., & Hallal, S. (2011). A web-based decision support tool for academic advising. *Educational Technology and Society*, 14(1), 82– 94.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, 74(1), 59– 109. https://doi.org/10.3102/00346543074001059

Halverson, L. R. (2016). Conceptualizing Blended Learning Engagement. *Dissertations*, 137. https://scholarsarchive.byu.edu/etd/5981

Hew, K. F., Huang, B., Chu, K. W. S., & Chiu, D. K. W. (2016). Engaging Asian students through game mechanics: Findings from two experiment studies. *Computers & Education*, 92– 93, 221– 236. https://doi.org/10.1016/j.compedu.2015.10.010

Jou, M., Lin, Y.-T., & Wu, D.-W. (2016). Effect of a blended learning environment on student critical thinking and knowledge transformation. Interactive Learning Environments, 24(6), 1131– 1147. https://doi.org/10.1080/10494820.2014.961485

Kurt, G. (2017). Implementing the flipped classroom in teacher education: Evidence from Turkey. *Educational Technology and Society*, 20(1), 211– 221.

Lin, L. (2021). Student Learning and Engagement in a Blended Environment. In Research Anthology on Developing Effective Online Learning Courses (pp. 1371– 1385). *IGI Global*. https://doi.org/10.4018/978-1-7998-8047-9.ch068

Liu, Q., Peng, W., Zhang, F., Hu, R., Li, Y., & Yan, W. (2016). The Effectiveness of Blended Learning in Health Professions: Systematic Review and Meta-Analysis. *Journal of Medical Internet Research*, 18(1), e2. https://doi.org/10.2196/jmir.4807

Means, B., Toyama, Y., Murphy, R., & Baki, M. (2013). The Effectiveness of Online and Blended Learning: A Meta-Analysis of the Empirical Literature. Teachers College Record: The Voice of Scholarship in Education, 115(3), 1– 47. https://doi.org/10.1177/016146811311500307

Min, Q., Wang, Z., & Liu, N. (2019). Integrating a cloud learning environment into English-medium instruction to enhance non-native English-speaking students' learning. *Innovations in Education and Teaching International*, 56(4), 493– 504. https://doi.org/10.1080/14703297.2018.1483838

Monteiro, E., & Morrison, K. (2014). Challenges for collaborative blended learning in undergraduate students. *Educational Research and Evaluation*, 20(7– 8), 564– 591. https://doi.org/10.1080/13803611.2014.997126

Nesbitt, S. R., Marmet, M. D., Balduzzi, T. M., & Fenner, R. (2018). The Impact of Behavioral Engagement on Outcomes in Graduate Business Blended Learning Environments. *The BRC Academy Journal of Education*, 7(1), 79– 99. https://doi.org/10.15239/j.brcacadje.2018.07.01.ja04

Panigrahi, R., Srivastava, P. R., Panigrahi, P. K., & Dwivedi, Y. K. (2021). Role of Internet Self-Efficacy and Interactions on Blended Learning Effectiveness. *Journal of Computer Information Systems*, 62(6), 1239– 1252. https://doi.org/10.1080/08874417.2021.2004565

Peterson, D. J. (2016). The Flipped Classroom Improves Student Achievement and Course Satisfaction in a Statistics Course. *Teaching of Psychology*, 43(1), 10– 15. https://doi.org/10.1177/0098628315620063

Roberts H Petticrew M. (2008). Systematic Reviews In The Social Sciences: A Practical Guide. A Practical Guide By Mark Petticrew, 1– 10.

Safar, A., & AlKhezzi, F. (2013). Beyond Computer Literacy: Technology Integration and Curriculum Transformation. *A Journal Pertaining to College Students*, 47(4).

Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, 87, 192– 206. https://doi.org/10.1016/j.chb.2018.05.028

Sun, X., & Guan, H. (2021). Research on Blended Learning Practice Based on Student Engagement. *Proceedings of the 7th International Conference on Social Science and Higher Education (ICSSHE 2021)*. https://doi.org/10.2991/assehr.k.211122.052

Sun, Z., Liu, R., Luo, L., Wu, M., & Shi, C. (2017). Exploring collaborative learning effect in blended learning environments. *Journal of Computer Assisted Learning*, 33(6), 575– 587. https://doi.org/10.1111/jcal.12201

Svenningsen, L., & Pear, J. J. (2011). Effects of computer-aided personalized system of instruction in developing knowledge and critical thinking in blended learning courses. *The Behavior Analyst Today*, 12(1), 34– 40. https://doi.org/10.1037/h0100709

Tsai, C.-W. (2015). Applying web-based co-regulated learning to develop students' learning and involvement in a blended computing course. *Interactive Learning Environments*, 23(3), 344–355. https://doi.org/10.1080/10494820.2013.764323

Van Alten, D. C. D., Phielix, C., Janssen, J., & Kester, L. (2020). Effects of self-regulated learning prompts in a flipped history classroom. *Computers in Human Behavior*, 108, 106318. https://doi.org/10.1016/j.chb.2020.106318

Vaughan, N. (2014). Student Engagement and Blended Learning: Making the Assessment Connection. *Education Sciences*, 4(4), 247– 264. https://doi.org/10.3390/educsci4040247

Vo, H. M., Zhu, C., & Diep, N. A. (2017). The effect of blended learning on student performance at course-level in higher education: A meta-analysis. *Studies in Educational Evaluation*, 53, 17–28. https://doi.org/10.1016/j.stueduc.2017.01.002

Wafik, H. M. A., Mahbub, S., & Das, J. (2024). Optimizing Strategies for Enhanced Effectiveness in Blended Learning Models. *Cognizance Journal of Multidisciplinary Studies*, 4(7), 197– 219. https://doi.org/10.47760/cognizance.2024.v04i07.017

Wang, Y. -H. (2017). Using augmented reality to support a software editing course for college students. *Journal of Computer Assisted Learning*, 33(5), 532–546. https://doi.org/10.1111/jcal.12199

Westerlaken, M., Christiaans-Dingelhoff, I., Filius, R. M., de Vries, B., de Bruijne, M., & van Dam, M. (2019). Blended learning for postgraduates; an interactive experience. *BMC Medical Education*, 19(1), 289. https://doi.org/10.1186/s12909-019-1717-5

Wong, A. K. C., Hung, T. T. M., Bayuo, J., & Wong, F. K. Y. (2023). The development and implementation of a blended video watching and peer learning model for master' s nursing students: a quasi-experimental study. *BMC Nursing*, 22(1), 62. https://doi.org/10.1186/s12912-023-01204-0

Yuan, J., & Kim, C. (2014). Guidelines for facilitating the development of learning communities in online courses. *Journal of Computer Assisted Learning*, 30(3), 220– 232. https://doi.org/10.1111/jcal.12042