



## Blended learning in technology-enabled learning environments in the 21<sup>st</sup> century

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### Abstract

Blended learning is a concept that has risen in popularity over the last decade, and its advantages are acknowledged by e-learning instructors, professionals, and learners. The ability to blend traditional learning methods and technology offers abilities to integrate diverse ways of delivering content to learners with different learning preferences. The convenience of this learning method has increased in popularity due to the convenience it provides to learners and instructors. This literature review will focus on blended learning in technology-enabled learning environments today. Comparisons of blended learning in earlier centuries and current applications are discussed. Blended learning definitions will be analyzed, including the ambiguity and offer of proposed definition for learners and instructors. Blended learning theories and models are evaluated. This review will compare existing models for blended learning to identify or design a model suitable for higher education. There will be discussions of the pedagogical benefits and applications of blended learning. Lastly, there are suggestions of practices for blended learning and its benefits and applications.

**Keywords:** learning, teaching, blended learning, online learning, learning

### Introduction

Technology has played a significant role in transforming education to accommodate learners' needs and preferences. Adaptive tools that also include videoconferencing have changed where and how learning takes place. Blended learning has been in higher education since the late 1990s (Smith and Hill, 2019) [28]. Since the 1990s, increased the use of online environments has increased and most institutions use blended environments to create a feeling of community (Verkroost, *et al.*, 2008) [36]. Many universities and colleges have incorporated educational technologies into their curricula, and blended learning has become a form of teaching with technology. The term blended learning is used internationally, and there are efforts to expand higher education in developing countries such as the United Arab Emirates, Serbia, Nigeria, and Vietnam. The United Kingdom, Australia, and the United States of America dominate blended learning research (Smith and Hill, 2019) [28]. Blended learning is trending among K-12 and higher education institutions due to its positive impact on student performance and motivation (Ibrahim & Nat, 2019) [12]. The flexible mode of education has enabled efficient use of office hours, and instructors can provide differentiated support and guidance to meet each student's needs (Yick *et al.*, 2019) [40]. Blended learning was introduced in higher education to supplement traditional lectures with digital information (Yick *et al.*, 2019) [40]. Examples of blended learning given by Yick *et al.* (2019) [40] include a virtual presentation for complex procedures of assembling machinery and experiments. During times of uncertainty or crisis, such as the global pandemic, blended learning models have become necessary for educational institutions to allow students to continue learning safely. Educational institutions and administrators must understand blended learning principles and effectively implement them to achieve expected learning outcomes. Implementation of blended learning is achieved by understanding models and the

definition of blended learning.

### Definition of Blended Learning

Blended Learning is widely used today in higher education institutions, especially those which have embraced distance education and any other form of e-learning as one of their teaching efforts (Mortera-Gutierrez, 2006) [21]. Various authors have defined blended learning, and there continues to be ambiguity around the definition. Blended learning is defined as the integration of web-based learning approaches with traditional learning and the combination of tools used in an online learning environment (Oliver & Trigwell, 2005; Hiazi *et al.*, 2006; Lai *et al.*, 2016; Bryan & Volchenkova, 2016; Smith & Hill, 2019) [22, 17, 5, 28]. BL offers opportunities to cater to students' personal needs and provide personalized learning (Boelens *et al.*, 2018) [4]. The learners spend time out of the classroom reading new material online, supported by various online education platforms and technologies such as video, collaborative tasks, simulated instruction, and other materials (Yick *et al.*, 2019) [40]. Effective blended educational environments play on face-to-face and online strengths and combines the best of both approaches to facilitate the best learning outcomes for students (Waha & Davis, p. 173, 2014) [38]. The learners experience variation in their studying through various instruction media to achieve their learning goals and objectives. In terms of defining blended learning by educational goals, Oliver and Trigwell (2005) [22] and Driscoll (2002) [8] define blended learning as skill-driven learning, attitude-driven learning, and competency-driven learning. Students learn at their own pace; instructors are facilitators, mixed methods of content delivery develop different behaviors, and supportive tools enable knowledge management and mentoring during the learning process. Defining blended learning by learning goals would be useful for instructional designers who focus on reviewing the learning materials, chunk the material to minimize cognitive

overload, and determine the best medium for content delivery, and cater to the pedagogical implications of learning.

### **Pedagogical Definition of Blended Learning**

Pedagogically, blended learning is a combination of mixed web-based technologies to achieve learning and educational goals. Pedagogical approaches such as behaviorism, cognitivism, constructionism are used to create an optimal learning outcome, and actual learning tasks are combined with instructional technology (Oliver & Trigwell, 2005) <sup>[22]</sup>. Blended learning creates a harmonious balance between face-to-face interactions and online access to knowledge (Mortera-Gutierrez, 2006) <sup>[21]</sup>. However, Mortera-Gutierrez (2006) <sup>[21]</sup> further explains that there is a need to evaluate each course to identify instructional goals, instructor's background, student characteristics, and online resources in order to identify the ideal balance between online and face-to-face learning and the degree to which online activities replace face-to-face instruction (Van Laer & Elen, 2017) <sup>[32]</sup>. The instructor and the learner's pedagogical distance results in infrequent interaction in blended learning as the instructor is not constantly present compared to face-to-face lecture methods.

### **Arguments on Definitions of Blended Learning**

Some authors define blended learning as a mix of offline and online learning, suggesting that face-to-face instruction can replace technology. Further minimal preconditions to BL are identified, and the arrangement of blended learning environments is still unclear because old design methodologies such as face-to-face instruction do not aim at e-learning (Verkroot *et al.*, 2008) and need to redesign the whole learning process using technology. Additionally, Ibrahim and Nat (2019) <sup>[12]</sup> identify other contentious issues surrounding the definition of blended learning; specification of time for face-to-face and online instruction, hours to be allocated for different instruction methods, and determining which learning content should be blended. Various attempts have been made to resolve the arguments on the definition. Suggestions for clarification on the definition of blended learning include redefining the term blended learning to be blended pedagogies, learning with blended pedagogies, or blended teaching. Due to the varying definitions, the instructors and learners have different perspectives and expectations of blended learning.

### **Perspectives on Blended Learning**

#### **Instructors' Perspective**

Blended learning is designed to address student diversity. Instructors' perspectives of blended learning are derived from different beliefs. Boelen, Voet & DeWever, (2018) classified the instructors' beliefs into disregard, adapt, and transformation profile. Instructors with a transformation profile believed that blended learning course content should be designed in a completely different way and be tailored to specific learning groups, instructors with an adaptation profile, proposed additional support to adapt learning content to blended learning methods, and instructors with a disregard profile did not see the need for support in designing blended learning material despite identified challenges (Boelen, Voet & DeWever, 2018). However, overall, instructors have reported that course learning

objectives are more effectively accomplished within a blended course than within a traditional course because of learning flexibility and increased student engagement as students perform tasks to master concepts, write, and apply content. As teachers implement blended learning, there are also concerns about identifying ideal learning models that fit into their institution's culture of teaching and learning, and instructors must provide technical support in which they may have limited skills. The instructor's blended learning concerns and their adaptation and implementation of blended learning affect the students' attitude of learning.

#### **Students' Perspective**

Learners involved in blended learning described positive learning experiences. At the University of Wisconsin, Milwaukee campus, 80% of the students who took a blended learning course indicated they thought the experience was worthwhile and that they would recommend a course offered in a blended format to others (Vaughan, 2007) <sup>[34]</sup>. Students' principal reason for their high level of satisfaction was the time flexibility provided by a blended format. Time flexibility was defined as the ability to control the pace of one's learning, the convenience of scheduling coursework, and a decrease in time spent commuting (Vaughan, 2007) <sup>[34]</sup>. Learners also indicated that blended learning helped facilitate the development of a learning community. The students did not feel lost as there was round-the-clock online availability of instructor's support (Waha & Davis, 2014) <sup>[38]</sup>. As a result, there was a stronger student-instructor relationship and a reduction in the dropout rates. The increase in learning results from the instructor's adaptation of blended learning derived from external and internal factors.

#### **Factors That Influence Instructors use of Blended Learning**

Many factors influence the effective use of technology by instructors in online learning environments Boelens *et al.* (2018) <sup>[4]</sup> classified the factors as extrinsic and intrinsic motivators. The intrinsic motivators included instructors' teaching philosophy, beliefs about online learning and learning technologies, and instruction methods. The extrinsic factors included instructors' comfort level with technology, institutional rules and regulations of innovation, integration of technology in learning and teaching, preferred institutional policies and regulations on student-instructor interactions, allocation of technical support to provide compelling online learning experiences, and available technology infrastructure provided by the educational institution. Support from the education institution, such as the ready supply of technology software applications that are easy to use and in-time technical support, greatly motivate instructors to integrate technology in blended learning environments. Extrinsic factors may be out of the instructors' control; however, support from administration and instructor concerns motivate instructors to create effective blended learning environments. Intrinsic motivators to use blended learning could be influenced by the instructors' understanding of various theories that support blended learning.

#### **Theories that Support Blended Learning**

The theoretical components related to the reflection on the

epistemological and pedagogical bases of blended learning have given meaningful contributions to understanding the pedagogical process of blended learning environments. These theories are variation theory (Oliver & Trigwell, 2005) [22], media richness theory, social presence theory, and media synchronicity theory (Mortera-Gutierrez, 2006) [21].

**Variation Theory**

In looking at the relationship between learning theories and blended learning, we must start from the position that many students may not experience the learning environment as one that is blended in ways similar to the way intended by the instructional designer and instructors, and it possible for learners to experience variations that are a direct result of their blended learning experiences. Oliver and Trigwell (2005) [22] further explain these variations in the variation theory. The variation theory, a theory that focuses on implications for teaching (Hanfstingl *et al*, 2019) [9], asserts that learning can only occur when the learners experience different environments (Larsson, 2021; Voon *et al*, 2020; Royea & Nicol, 2019) [18, 37, 26] because they develop different understandings of objects of learning as they notice different features that characterize them (Hanfstingl *et al*, 2019) [9]. Larsoon (2021) states that "the pattern of contrast is seen as the origin and the driving force of learning in variation theory as it offers the learner the opportunity to initially see what has not been seen before, giving meaning to the particular dimension and the values used to open it up" (p. 27). The pattern of critical features of the object of learning help the instructor identify to what extent the learners already know about the object of learning structure

of features and where they have learning challenges (Hanfstingl *et al*, 2019) [9]. The instructor acts as a facilitator in a formal instructional environment and a subject expert to provide online guidance in informal learning environments (Voon *et al*, 2020) [37]. The learners' perceptions of variation within and between critical aspects such as discernment, simultaneity, and awareness allow them to construct knowledge of a given concept unique to them (Voon *et al*, 2020) [37]. The learner enters the learning environment intending to develop knowledge or have a new interpretation of the object of learning, and the student-teacher interaction creates the space of learning. A variation involves the discernment of different ways of experiencing the world around us and using similar or related knowledge to understand new knowledge. Instructional designers should design learning tasks that provide opportunities to discern critical aspects, explain single and interrelated aspects, and the activities should be done simultaneously to enhance the ability of discernment (Larsson, 2021; Voon *et al*, 2020) [18, 37]. Instructors need to know the critical features for the objects to be learned, including the enacted, intended, and enacted objects of learning (Table 1), to identify the opportunities for learning in the classroom. The variation theory indicates that "it is necessary to experience certain patterns of variation to develop certain ways of seeing" (Oliver & Trigwell, p. 22, 2005) [22]. These variations may occur using information technology to support learning and combine face-to-face and online learning components (Lai, Lam, and Kim, 2016) [17] to enhance social presence.

**Table 1:** Three aspects of an object of learning (Voon *et al*, 2020) [37]

<b>Intended object of learning</b>	<b>The teacher's intent for students to learn particular concepts which is manifested in the process of selection, organization, and evaluation of learning materials, bounded by the teacher's pedagogical, content knowledge, and experience.</b>
Enacted object of learning	This provides the basis from which students construct meaning; and their learning experience is informed by the critical aspects that they are able to distinguish and be aware of simultaneously.
Lived object of learning	Lived" refers to the way students understand, make sense of and understand the object of learning when the lesson ends and beyond.

**Social Presence Theory**

The social presence, originally defined in 1976 by social psychologists Short, Williams and Christie's (Dahlstrom-Hakki *et al*, 2020) [6], is the degree of prominence in a conversation by one person during an interpersonal relationship and is supported by communication through various technology media such as computer devices, telephone, fax, videoconferencing, and television (Mortera-Gutierrez, 2006) [21]. Social presence is defined as the degree to which a person is perceived as "real" in computer-mediated communication (Dahlstrom-Hakki *et al*, 2020; Schuetzler *et al*, 2020; Kear *et al.*, 2014; Swan & shih, 2005) [6, 27, 30] and hypothesized that people seek to maintain equilibrium in their interactions (Swan and Shih, 2005) [30]. The two key elements of social presence are immediacy and intimacy (Dahlstrom-Hakki *et al*, 2020) [6], and the theory asserts that the longer it took an individual to receive a response, the less social presence was perceived by the recipient, which led to less engagement. When discussing intimacy in social presence, Dahlstrom-Hakki *et al* (2020) [6] stated that the quality of the interpersonal relationship between individuals in the technology-mediated interaction influenced social presence and quality of social interaction.

Social presence is defined by communicating freely, collaborating, and showing emotion are all indicators of social presence behaviors. Social presence media delivers information resources such as the internet, web-based course, online instruction, self-paced courses, chatrooms, e-mails, and discussion boards, which create a sense of intimacy and immediacy among students and instructors (Mortera-Gutierrez, 2006) [21]. Face-to-face instructions are implied to have greater social presence levels in learning compared to asynchronous learning and communications. However, effective use of blended learning can maximize social presence. The learners can be encouraged to share examples, experiences, feelings, and ideas and make the active engagement a significant part of the course (Richardson & Swan, 2003) [24]. Asynchronous learning can be effectively used to increase social presence by creating discussion forums that encourage constant student-student and instructor-student interactions. The discussion forums could also be for problem and project-based activities and case studies (Richardson & Swan, 2003) [24]. Moreover, Richard and Swan (2003, stated that the efficient interaction between students and instructors using appropriate media influences group cohesiveness and forming communities of

knowledge, resulted in successful group performance.

### Media Richness Theory

Media Richness Theory was first developed in the 1980s by organizational scholars Lengel and Daft, and the scholars suggested that the effective use of a communication channel be matched by a rich medium of communication and quality task content (Ishii *et al.*, 2019) <sup>[13]</sup>. Face-to-face instruction or synchronous learning was the richest medium of instruction to explain complex tasks effectively, while simple tasks could be explained using asynchronous learning or written documents (Ishii *et al.*, 2019) <sup>[13]</sup>. Ishii *et al.* (2019) <sup>[13]</sup> further stated that the richness of a medium of communication should be based on the availability of multiple cues, language variety, individual experience, social influence, personal focus, and immediate feedback. Factors into consideration on individual experiences on perceived media richness included experience with a particular communicator, experience with a particular topic, and experience with a particular channel. Successful group performances increase engagement and motivation. The media richness theory (Mortera-Gutierrez, 2006) <sup>[21]</sup> indicates that appropriate media that supports language variety, prompt feedback, and focus on establishing an online identity facilitates group progress. The media used should provide affordances that are found in face-to-face group communication. These affordances include the ability to have real-time meetings and discussions, share resources and ideas, and create forums for discussions on particular topics by group members with similar interests. The rich media cues help increase sociability, gratification, social presence, manage group tasks, synchronize activities for successful group performance (Hsu *et al.*, 2020) <sup>[11]</sup>. However, instructors and designers should consider the valence of the message in selecting a communication channel (Ishii *et al.*, 2019) <sup>[13]</sup>.

### Media Synchronicity Theory

Synchronizing group activities result in timely completion of tasks and minimal duplication of work outcomes. The media synchronicity theory (Mortera-Gutierrez, 2006) <sup>[21]</sup> implies that group members have the ability to develop and complete various tasks at the same time. The theory posits media possess convergence and conveyance communication processes that work together at the same time with a coordinated pattern of behavior (Windeler & Harrison, 2018) <sup>[39]</sup>; Son *et al.* (2019), and communication increases when there is a fit between the capabilities offered by the media and the communication needs of the task. Windeler and Harrison (2018) <sup>[39]</sup> and Son *et al.* (2019) further state that all tasks require varying amounts of conveyance and convergence processes; some tasks emphasize conveying information while others require a greater focus on converging. The key propositions of media synchronicity theory are when conveyance is the goal in communication, media with low synchronicity such as voice mail and email (Son *et al.*, 2019), will lead to better communication performance while media with higher synchronicity, such

as video conferencing systems (Son *et al.*, 2019), is effective for convergence. Verhelahti *et al.* (2017) described five media capabilities that influence media synchronicity and communication processes “Transmission velocity means the speed at which a medium can deliver a message to the recipients. Parallelism refers to the extent to which signals from many senders can be delivered over the medium simultaneously. Symbol sets are the number of ways in which a medium allows information to be encoded for communication (visual, verbal, written communication), including cues. Rehearsability enables the sender to carefully modify a message before sending it to ensure that meaning is expressed as intended. Reprocessability of a medium enables both senders and recipients to reread and reconsider prior messages before engaging in communication” (p. 166). Completion of tasks is successfully done with the application of convergent and conveyance communication processes. Mortera-Gutierrez (2006) <sup>[21]</sup> further explains that asynchronous learning environments are more suited for exchanging information and learning resources, whereas synchronous learning environments are suited to reach a shared understanding on differing ideas and tasks.

### Blended Learning Models

Instructors have different models for learning and teaching to effectively achieve learning goals in online learning environments. Valiathan (2002) designed the attitude-driven model, competency-driven model, and skill-driven model for instructors to adopt as they create blended learning courses.

#### Skill-Driven Model

Blended learning environments that are skill-driven have instructor-student interactions through email, face-to-face meetings, and group discussions (Valiathan, 2002; Hizani *et al.*, 2006). The skill-driven learning aims to acquire specific skills and knowledge (Bryan, & Volchenkova, 2016) <sup>[5]</sup>. Announcements, overview sessions, and query resolutions could be communicated through email. Self-paced learning is encouraged through e-books, simulations, web-based tutorials, and the learning outcome resulting from effective student-instructor interactions. A combination of self-paced learning and instructor support keeps the student engaged in learning and thus influences course completion and student achievement (Hizani *et al.*, 2006). Attainment of learning goals influences behavior change (Hizani *et al.*, 2006; Valiathan, 2002), which can be influenced by practicing skills learned.

#### Behavior-Driven Model

Learners adopt new skills to practice in risk-free environments during the learning process (Hizani *et al.*, 2006). Instructional designers and instructors use the behavior-driven model (Valiathan, 2002) to create activities that necessitate collaboration skills and practical application of content learned. An example given by Valiathan (2002) is role-playing negotiation skills with a customer. Other activities that could use a behavior-driven model are group projects, group discussions, and webinars. Behavioral changes through learning result in a change of attitude toward concepts and preconceived ideas, leading to increased competency in various skills.



**Table 2:** Behavioral-Driven Model Blended Learning Plan (Valiathan, p. 2, 2002)

Activity	Technology-based techniques	Non-technology-based techniques
Announcement	LMS or email push	flyer, email, or phone
Overview session	Email webinar	traditional classroom
Self-paced learning	Web-based tutorial e-books simulations	Articles books workbooks with “if then” decision tables
Query resolution	Email FAQ instant messenger	Face-to-face meeting with expert
Assessment	simulations	print test
Collaborative session	Webinar chat	role-playing with peers
Practice	simulations	role-playing with peers
Feedback and closing session	Email Webinar	traditional classroom

**Competency-Driven Model**

The competency model is ideal for course content that facilitates tacit knowledge transfer (Valiathan, 2002). The model requires acquiring tacit knowledge from the subject expert in the learning environment of the job site (*et al*, 2006). In blended learning environments, tacit knowledge could be acquired by observing tasks (Bryan & Volchenkova, 2016) [5] and interacting with subject experts and real-time mentors while performing tasks. E-mails, group chat, group discussions, and discussion forums can be

used to practice and apply theoretical concepts (Table 3). Information acquired when using the competency model during the learning process could be captured in learning management systems. A lesson plan designed using the competency-driven model should include different technology-based and non-technology-based learning (Table 3), such as simulation for practical activities. Effective integration of blended learning models aids the learners and instructors in quantifying blended learning benefits.

**Table 3:** Competency-Driven Model Blended Learning Plan (Valiathan, 2002)

Activity	Technology-based techniques	Non-technology-based techniques
Create a community	▪ space on the internet or intranet	▪ study groups
Practice	▪ email ▪ discussion forums ▪ simulations	▪ face-to-face meetings ▪ workshops ▪ phone
Assign guides or mentors	▪ email	▪ phone
Hold group discussions	▪ discussion forums ▪ chat	▪ face-to-face meetings ▪ workshops ▪ phone
Capture learning	stories and data compiled in a knowledge repository (LMS/LCMS)	▪ white papers
Resolve queries	▪ Email ▪ Instant messenger	▪ face-to-face meeting

**Benefits of Blended Learning**

Studies have shown that BL can increase student learning outcomes, learning engagement, and student interaction. Blended learning facilitates easy interaction between instructors and learners due to various communication methods (Smith & Hill, 2019) [28]. Smith and Hill (2019) [28] stated other benefits are student and staff satisfaction, development of autonomy, and enables the rethinking and restructuring of pedagogic practice. High levels of satisfaction in learning can be attributed to the flexibility of blended learning. Learning can occur at any place and time, thus providing the flexibility of coursework schedules and controlling the learning pace (Taplin *et al.*, 2013). Education flexibility helps the learners have some level of control over the place, path, and time of learning (Boelens *et al.*, 2017; Rasheed *et al.*, 2020) [3], identify their educational challenges and communicate them to get more personalized instruction and clarification. Learners have reduced stress during the learning process as a result of a variety of learning choices, can access learning resources from home, allows the instructors to use different instructional methods, and the eLearning platforms that use animation pictures, games and videos create fun learning environments (Daskan and Yildiz, 2020). Other benefits of blended learning stated by Hizani *et al* (2006) are the student and instructor have full time access to each other on the full-time online course platforms. Additionally, students can ask questions and receive prompt feedback. The instructor can accurately

monitor students' progress; students can continue the train of thought after the face-to-face instruction, enhanced critical thinking since students have time to respond to questions, and increased inductive and deductive reasoning by giving students the necessary time to respond to questions (Hizani *et al* (2006). Despite the benefits of blended education, there are concerns.

**Challenges of Blended Learning**

Learners benefit from the flexibility of blended learning. However, it may be difficult for learners who have minimal time management skills, have unclear learning expectations (Vaughan, 2007) [34], and determine the desired amount of flexibility (Boelens *et al.*, 2017) [3]. The students will, therefore, accumulate assignments due and have incomplete assignments. Increased flexibility results in the high transactional distance, which decreases social interaction, create learner isolation (Boelens *et al.*, 2017) [3], and instructors might not notice when learners problems or learning progress. Lack of clear learner expectations may result in an inability to chunk learning tasks into manageable tasks and procrastination. Technology complexity challenges (Rasheed *et al.*, 2020; Kasur, 2013) may lead to poor implementation of blended learning models, causing the learner to spend additional time resolving technical issues and less time learning. This experience will create student dissatisfaction, inability to complete easy tasks and negatively affect the students'

learning experiences. High setup costs (Rowe & Dickernson, 2019; Rasheed *et al.*, 2020) may be required for the technologies used in blended learning, and thus blended learning may not be effectively adopted if an educational institution does not allocate funds to implement, test, and maintain the technology. Learners may also look at the cost-benefit relations in using blended learning where communication that is location or time-dependent requires less expenditure, while unidirectional transmission of information is associated with less cognitive effort than active participation (Kerres & de Witt, 2013). Lack of adequate research on models that support the adoption of blended learning (Smith & Hill, 2019) <sup>[28]</sup> makes it challenging to select appropriate blended learning models for learning tasks that are found in the course content. To overcome challenges in blended learning (Varhelahti *et al.*, 2017) recommended course management software systems, online or offline testing, and synchronous instant messaging. Identifying gaps in research on blended learning can help overcome the difficulties instructors and learners incur.

### Gaps in Research on Blended Learning

There is minimal experimental research to test the design principles for blended learning models (Ibrahim and Nat, 2019) <sup>[12]</sup>. Most of the research consists of literature reviews and systematic literature reviews. One of the most recent research studies was a theoretical and systematic literature review of 94 research articles on blended learning from 2004 to 2020 (Anthony, Kamaludin, *et al.*, 2020). There are only a few meta-analyses with qualitative or quantitative data on blended learning. Kaur (2013) states that blended learning research should be more holistic to understand the complexity of blended settings and processes. Specifically, Kaur (2013) state that there should be further research on strengths and weaknesses of new technologies integrated with blended learning and optimal blends for learning, successful models for instructors' support, and factors that improve the blending of physical and virtual elements of blended courses in higher education. Kintu *et al* (2017) emphasize future research on the interplay between the learner characteristics, design features, and learning outcomes which are indicators of blended learning effectiveness. Research on the effects of the COVID-19 pandemic on blended learning in education and the post-pandemic future should be carried out to guide education policymakers in making and selecting academic evaluation practices (Hazelkorn & Locke, 2021). Lack of adequate research can influence the identification of best practices in blended learning.

### Best Practices for Blended Learning

Instructors should identify models and approaches to fulfilling learning outcomes in blended learning. Margolis *et al.* (2017) gave examples such as including blended learning in the course syllabus and schedules, identifying ways to communicate with students consistently, considering time allocation for online activities, and briefly reviewing complicated topics during synchronous and face-to-face sessions. Strong student-instructor partnerships impact students learning and treating learners as Individuals impact social presence, and learning support in physical and virtual environments should encompass other aspects other than learning tasks and module content (Armellini *et al.*, 2020).

Learning resources and materials should be posted in a timely manner on learning platforms and discussion forums. The instructor should also encourage learning independence and conviviality (McGee & Reis, 2012) by assigning individual assignments, encouraging new ideas supporting exploratory studies, and allowing free expression of students' views. A framework of instructional activities should be designed to regulate learning and teaching (Boelens *et al.*, 2017) <sup>[3]</sup>. Boelens *et al* (2017) <sup>[3]</sup> stated that the framework should include four categories: monitoring, orienting and planning, evaluating, and adjusting. When an instructor selects content for a blended learning environment, communication, construction, and content components should be considered (Kerres & de Witt, 2003). The communication component (Kasur, 2013; Kerres & de Witt, 2003) should be used when knowledge consists of different competing concepts; students learn to express, discuss and formulate different points of view and participate in discussions. The construction component should be used when knowledge consists of procedures and declarative knowledge, and the content component should consist of knowledge that is communicated by technological means, facts, and rules for recall (Kerres & de Witt, 2003).

### Conclusion

Blended learning benefits learners and instructors when effective design models and teaching strategies are implemented. When instructors understand the various theoretical frameworks for blended learning, they can design learning content and activities that engage the learner and lead to learner satisfaction. More mixed methods and experimentation research need to be done to identify effective blended learning models. Educational institutions that adopt blended learning should be aware of the expenses required for creating high-quality blended learning environments.

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