

A Study on the Impact of Blended Learning on Teaching and Learning Outcomes

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Abstract:

Blended learning has emerged as an effective pedagogical approach that integrates traditional classroom instruction with digital learning environments to enhance teaching effectiveness and student engagement. This paper examines the impact of blended learning on teaching and learning outcomes by focusing on learner-centred instructional models such as the Bridge–Objective–Pre-assessment–Participatory Learning–Post-assessment–Summary (BOPPPS) model and the Presentation–Assimilation–Discussion (PAD) Class. Unlike conventional teacher-centred methods that often rely on one-way knowledge transmission and limit students' active participation, blended learning encourages meaningful interaction, collaborative learning, and continuous feedback. The BOPPPS model promotes goal-oriented learning through clearly defined objectives and systematic assessment, while the PAD Class strengthens learners' critical thinking by balancing classroom instruction with individual reflection and discussion. By combining face-to-face teaching with technology-supported learning strategies, blended learning improves student motivation, knowledge retention, and academic performance. The study argues that adopting these innovative instructional models can transform higher education by fostering active learning, improving communication between teachers and students, and creating more effective and engaging learning experiences.

Keywords: Blended Learning, Pedagogical Approach, BOPPPS, PAD, Technology-Supported

1. Introduction:

Digital technology has revolutionized teaching and learning around the globe. Online learning platforms such as Massive Open Online Courses (MOOCs) and Small Private Online Courses (SPOCs) have opened up new ways to access knowledge and created new methods for teaching and learning. These advancements have promoted blended learning, a combination of in-person and online learning in the classroom that is more flexible and dynamic than traditional classroom settings.

Blended learning combines the strengths of traditional classroom interaction with the accessibility and convenience of digital technologies. This approach enables students to learn beyond the physical classroom while maintaining meaningful interaction with teachers and students. By offering multiple modes of instruction, blended learning supports independent learning, encourages active participation, and accommodates diverse learning styles. It also allows educators to use digital resources, collaborative activities, and classroom discussions in a complementary manner, thereby enriching the overall learning process.

Blended learning was especially highlighted in the COVID-19 pandemic, when schools around the world had to move in many cases from the classroom to the Internet. The unexpected switch was proof of the potential and challenges of a completely virtual learning environment. Additionally, it highlighted the importance of blended learning as a model that is sustainable and that makes use of the flexibilities of digital learning and the pedagogical advantages of being present in the classroom. In this sense the role of the teacher is not only one of disseminator and communicator of knowledge but is also supposed to enable inquiry, critical thinking, collaborative learning, and self-directed learning.

2. Review of related Literature:

D. Randy Garrison and Heather Kanuka (2004) argue in their research paper "Blended Learning: Uncovering Its Transformative Potential in Higher Education" that blended learning combines face-to-face and online teaching to create a more interactive learning environment. They state that this approach improves critical thinking, learner engagement, and meaningful educational experiences.

Charles R. Graham's (2006) "Blended Learning: Uncovering Its Transformative Potential in Higher Education" explains blended learning as the integration of classroom instruction with digital learning technologies. He highlights its flexibility, accessibility, and effectiveness in improving teaching practices and student learning outcomes.

Barbara Means and her colleagues (2010) found in the article "Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies" that students in blended learning environments often perform better than those in fully face-to-face classrooms. Their study attributes this improvement to greater flexibility, interaction, and access to learning resources.

Kaleta and colleagues' (2012) "Promoting Effective Teaching Through Blended Learning." explain that blended learning improves teaching by combining face-to-face instruction with online activities. They highlight increased flexibility, student participation, and collaborative learning.

Xuexin Zhang (2014) in his research paper "PAD Class: A New Attempt in University Teaching Reform" introduces the PAD Class model, which combines presentation, assimilation, and discussion in university teaching. The study demonstrates that this blended approach promotes independent learning, active participation, and deeper understanding among students.

Stefan Hrastinski's (2019) "What Do We Mean by Blended Learning?" discusses blended learning as a learner-centred approach that combines the strengths of online and classroom instruction. He concludes that effective course design and active student participation are essential for successful learning outcomes.

John Sweller's (2020) "Cognitive Load Theory and Educational Technology" explains that instructional design should reduce unnecessary cognitive load to improve learning. He suggests that educational technology, when properly designed, can enhance understanding and make blended learning more effective.

Yang Liu et al. (2023) "Impact of the Blended Teaching Model Based on BOPPPS and PAD Class on Student Learning Outcomes" investigated a blended teaching model based on the BOPPPS and PAD Class approaches. Their findings indicate significant improvement in student participation, academic performance, and classroom interaction through structured blended learning.

3. Research Gap:

The literature review supports that the blended learning approach will improve students' participation, learning achievement, and interaction in the classroom. The majority of the studies, however, are oriented

towards certain teaching models, technological tools or broad educational results and they do not consider the influence of blended learning on the students' learning results in different higher education contexts, while considering the influence of blended learning on teaching practices. Furthermore, additional empirical studies that focus on the feasibility, effectiveness, and adaptability of blended learning in specific fields and institutions are needed. The present study thus aims to close this gap by investigating the impact of blended learning on the teaching and learning outcomes in higher education in a comprehensive analysis.

4. Research Objectives:

1. To examine the effectiveness of blended learning in improving teaching and learning outcomes in higher education.
2. To examine the impact of blended learning on students' academic performance, engagement, and participation.
3. To evaluate the contribution of the BOPPPS and PAD class models in promoting active learning and students' engagement.
4. To identify the opportunities and challenges associated with the blended learning based on existing literature.
5. To suggest strategies and best practices for enhancing the effectiveness of blended learning in teaching and learning.

5. Theoretical Framework: Synthesizing BOPPPS and the PAD Class Model

In order to effectively investigate the impact of blended learning, this study is based on the synthesized framework of structured lesson plan based on BOPPPS model and student-centred learning based on Presentation-Assimilation-Discussion (PAD) model. This synthesis offers a solid, practical framework for the design and assessment of blended-learning environments, beyond blending-in-blending, to a thoughtful management of cognitive engagement.

The BOPPPS model was developed in Canadian teacher training and involves six stages: Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment and Summary. The "Bridge-in" is the hook that gets students' attention and connects to the previous knowledge to the new concepts. The next "Objectives" set out for students help them know what they are expected to learn, giving them a map for learning. In a blended environment, "pre-assessment" is vital to determine the wide range of starting points of students, which is often caused by some students not participating equally with the pre-class online materials. The main focus is the "Participatory Learning" which is a process of active engagement, rather than passive listening. The "post-assessment" shows the outcome of the objectives and the last "Summary" brings them to the fore.

But, although structurally sound, BOPPPS can be somewhat linear in terms of its sequencing. This is where the PAD (Presentation-Assimilation-Discussion) class model introduced by Zhang Xuexin plays an important role. PAD does not alter the traditional lecture format, but rather breaks the class session into distinctive segments, emphasizing the internalization of knowledge by students. The "Presentation" is brief, presenting essential points without providing too much information. The key element to a successful innovation is the 'Assimilation' section of the lesson, typically time that is set aside between lessons or even during the lesson in a blended model, allowing students plenty of time to process the learning, to work with difficult concepts, and to develop their own understanding. This independent processing is

crucial to beyond rote learning. In the last phase, the “Discussion” phase is the time when students are gathered again for debate, clarification, and synthesis of their assimilated knowledge in the process of interacting with each other and their teacher.

This combination of these two models yields a rich theoretical toolkit to grasp blended learning. The BOPPPS structure helps the PAD phases be meaningful and connected to learning goals. The Bridge-in, Objectives, and Presentation, for instance, can be online, pre-class components of PAD. The Assimilation phase is actually the connection between online and face-to-face sessions, in which students will study a text in great detail independently. The class face-to-face time then is focused on Participatory Learning (BOPPPS) and intensive Discussion (PAD) with Post-assessment and Summary. This synthetic approach argues that intentional design of the cognitive process, from initial introduction to independent learning to culminating in collaborative synthesis, are most effective when both the online and offline environments are applied in their best ways.

6. Research Methodology

The present study focuses on qualitative research based on secondary data. Appropriate review of literature, including research articles, books, policy documents, reports, and earlier studies, was analytically reread. The collected data were analysed using thematic analysis to explore key themes related to teaching effectiveness, student engagement, academic performance, and the impact of blended learning on teaching and learning outcomes.

6. Analyzing the Impact of Blended Learning:

The implementation of a blended learning model, particularly one structured around the synthesized BOPPPS-PAD framework, fundamentally alters the dynamic of both teaching and learning. The impact is multifaceted, requiring an analytical examination of how this shift affects student engagement, knowledge retention, and the evolving role of the teacher.

I. The Transformation of Student Engagement

The typical lecture-based learning style can leave students as passive consumers of knowledge. If blended learning is well planned, it requires active participation. The first “Presentation” of ideas is made available online (usually in video lectures or interactive modules), and students can control the rate at which they see the ideas first. They can rewind, pause and replay complex concepts, a great help when there is a variety of learning speeds. This independence helps to motivate students to take ownership of learning. But engagement is more than viewing a video. It's during the “Assimilation” phase that the biggest changes take place. In the traditional model this assimilation is frequently done in a random manner while homework is being done and is often done without the proper prior knowledge. In the blended approach, the assimilation is a conscious and planned process performed between the online presentation and the in-class discussion. Students are asked to do a specific set of activities, including quizzes, short reflections or problem sets, which require them to engage with the material. This individual assignment identifies problematic zones, and is then the subject of the in-person meetings.

As a result, the experience of the student in class is changed. It's no longer about information delivery; it's about information application and synthesis. The students' prior assimilation work energizes the “Discussion” phase, transforming it into a context for high-level cognitive engagement. Students are ready to discuss, discuss, and solve intricate problems. This is a characteristic of deep learning: active interaction with classmates. In purely traditional settings, engagement often decreases over the course of the lecture

while in a well-structured blended school, engagement levels are also high, but during the face-to-face interactive sessions students are making use of the knowledge they have accessed and assimilated.

II. Cognitive Load and Knowledge Retention

The critical analytical angle is the way in which blended learning deals with the cognitive load. The typical long lecture format can easily exceed a student's working memory, resulting in poor understanding. This is a focus of the BOPPPS-PAD framework. The smaller chunks of information in the online modules enable better management of the intrinsic cognitive load.

In addition, the frequent, low-stakes assessments introduced as part of the "Pre-assessment" and "Post-assessment" components of BOPPPS are an integral part of knowledge retention. The testing effect is a well-established psychological phenomenon that found that retrieval of information leads to better memory for that information. A blended model would include a brief quiz given at the end of a module that would be followed by a short quiz at the end of the in-class discussion. The repetition of exposure, assimilation, retrieval, and application reinforces the encoding of information in the brain and not just by a large test at the end of the semester.

Another effect that the synthesized framework benefits from is the "spacing effect." The blended approach does not try to fit into one setting, but spreads the learning process out over time. Students have to read the online presentation, to read the material independently, and engage in further discussion in the classroom to revisit the material more than once, with breaks. This spaced repetition has been shown by an analysis to be more effective in long-term retention than massed practice. Thus, the role of blended learning in results goes beyond teaching content, it relates to the timing and structure of the teaching that matches the human cognitive structure.

III. The Paradigm Shift in Teaching

Perhaps the biggest change is that of effect on teaching outcomes. The blended learning model requires that teachers move away from being "sage on the stage" and become "guide on the side. This is not a merely "mindset" issue, it takes effort and time to shift.

The intensive work around instructional design, in the blended model, takes place prior to the start of the course. Designing effective online modules, structuring meaningful assimilation activities, and structuring the in-class discussion demands careful planning; here, the structured approach of BOPPPS is critical. Therefore, the focus of the teacher changes from content to experience.

The face-to-face sessions are analytical and responsive, focused on the teacher. The basic concepts have been covered via the internet and the time in class is devoted to the specific parts of the concepts where students had difficulty during the assimilation phase. This needs a lot of pedagogical flexibility. The teacher should take into account the results of the pre-assessment or data from an online activity log to guide the discussion based on the knowledge gaps identified. The teaching isn't about the delivery of a scripted note, it's about leading the conversation in a dynamic, interactive way. This change may result in more rewarding teaching experiences, as teachers can spend their time working on complex, higher-order issues with students, instead of covering basic facts and information. But it requires significant institutional support and professional development, because many teachers are trained mostly through traditional lecture approach.

7. Conclusion

The shift from traditional learning (lecture) to blended learning model is a fundamental restructuring of the learning process. It can be concluded from this shift with the synthesized lens of the BOPPPS and PAD

frameworks that the effectiveness of blended learning is not just due to the addition of technology, but due to pedagogical redesign that it demands.

The real impact on learning outcomes is the application of the delivery method to cognitive principles. The blended format not only reduces the cognitive load by moving most content delivery online, but it also maximizes the testing and spacing effects and turns students from passive recipients into active participants by using the application face-to-face. It is the assimilation phase which is the really critical one, and makes sure that classroom talk is not merely superficial knowledge but personal interaction with the material. At the same time, teachers need to have a paradigm shift in the impact on teaching outcomes. This requires a lot of initial design work and more in-class agility, but it will result in a more in-depth and analytical interaction with students. Finally, the study finds that if properly designed and well-informed, blended learning can be a tool for improving both the quality of teaching and learning and the level of students' understanding, and can prepare students not only to remember but also to synthesize and apply the knowledge in complex situations.

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