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Comprehensive structured review of implementing flipped classroom approaches in education

Rohaida Mazlan, Zamri Mahamod, Khairul Azhar Jamaludin
Center for Learning and Teaching Innovation Studies, Faculty of Education, Universiti Kebangsaan Malaysia, Selangor, Malaysia

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ABSTRACT

In recent years, the flipped classroom model has garnered significant attention in education, marking a shift from conventional teaching methods to a more student-centered approach. This systematic review delves into the implementation of flipped classrooms and their influence on educational environments. The focus is on effective teaching strategies that enhance student engagement and learning outcomes. A detailed analysis of current research identifies common methodologies, such as using pre-recorded lectures and active learning techniques in class. Evidence suggests that flipped classrooms contribute to improved academic performance, increased student participation, and higher satisfaction levels. This review involved an extensive search of scholarly articles from databases like Scopus, Web of Science (WoS), and ERIC, covering studies published between 2021 and 2024. Using the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework, 35 primary studies were analyzed, revealing three main themes: i) the effectiveness of blended learning, ii) flipped classroom methodologies and their impacts, and iii) technological innovations and gamification in education. In conclusion, the flipped classroom model shows promise for enhancing language education through more effective and engaging instructional methods. However, successful adoption requires careful planning and support to overcome potential challenges. This review offers valuable insights for educators and policymakers interested in innovative teaching approaches in language education.

Corresponding Author:

Zamri Mahamod
Center for Learning and Teaching Innovation Studies, Faculty of Education
Universiti Kebangsaan Malaysia
43600 UKM Bangi, Selangor, Malaysia
Email: d-zam@ukm.edu.my

1. INTRODUCTION

The conventional paradigm of education, characterized by in-person teaching in the classroom and supplementary assignments to enhance comprehension (a long-standing practice for centuries), is facing increasing opposition. The transformation arises from the evolving requirements of learners in the contemporary global context, necessitating learner-centric and customized learning systems. The flipped classroom is an innovative educational approach that has gained global recognition. This model adopts a reversed teaching paradigm, supplying instructional information, typically in the form of online lectures, outside of class hours. Thus, interactive and active learning activities take up class time. The flipped classroom aims to enhance student engagement and promote effective learning during class. In Malaysia, the educational landscape has undergone a significant transformation, driven by technological advancements and

the Malaysian Education Blueprint 2013-2025 [1]. This blueprint stresses student-centered learning and the integration of ICT in education. Remarkably, flipped classrooms serve these objectives perfectly, acting as a practical remedy to improve the status quo in education. Despite the potential of flipped classrooms, with a recent introduction to Malaysia, they are in an early stage, and only a few studies have been conducted on this matter locally within the Malaysian context. Given this gap, our goal was to compile the existing literature on the implementation of flipped classrooms in developing countries such as Malaysia. We specifically concentrated on the implementation process, the challenges encountered during its execution, and the results of the application, which could guide future research. Accordingly, this approach allows us to explore broad avenues for future studies.

Bergmann and Sams [2] popularized the concept of flipped classrooms in the early 2000s. It involves delivering pre-recorded lectures or instructional videos for students to watch at their own pace before class. Discussions, problem-solving, and collaborative activities then occupy class time, reinforcing and applying the knowledge from the videos. This pedagogical approach shifts the focus from teacher-centered to student-centered learning, promoting active participation, and critical thinking. Notably, numerous studies have highlighted the benefits of flipped classrooms. According to [3]–[6], flipped classrooms enhance student engagement and motivation by allowing students to control their learning. It also facilitates differentiated instruction, as students can learn at their own pace and revisit the material as needed [7]–[9]. Moreover, flipped classrooms provide more opportunities for formative assessment and immediate feedback, which are crucial for improving student performance and understanding [10]–[12]. At the same time, [13]–[15] discovered that flipped classrooms can lead to higher academic achievement and improved student attitudes towards learning in the context of higher education. Similarly, a study by [16], [17] in Malaysia revealed that students perceived the flipped classroom model as beneficial for their learning, citing increased engagement, a better understanding of the material, and enhanced problem-solving skills.

Despite its advantages, implementing flipped classrooms presents several challenges. A major obstacle is the digital divide, which separates those with access to modern information and communication technology from those without [18], [19]. In Malaysia, this divide can hinder the effective implementation of flipped classrooms, particularly in rural areas where internet access and digital literacy may be limited [20], [21]. Additionally, flipped classrooms require high self-motivation and discipline from students, as they need to engage with pre-class materials independently. Thus, some students may struggle with this responsibility, leading to varying levels of preparedness and participation. Another challenge is the resistance to change among educators [22], [23]. Transitioning from traditional teaching methods to a flipped classroom model requires significant effort, training, and a shift in mindset [24], [25]. Moreover, educators may also face difficulties creating or sourcing high-quality instructional videos and designing interactive classroom activities that effectively complement the online content [26], [27]. Therefore, several strategies can be employed to successfully implement flipped classrooms in Malaysia. First, providing professional development and training for educators is essential [28]–[30]. This training should focus on developing skills in creating digital content, integrating technology into teaching, and designing effective in-class activities. Second, addressing the digital divide by ensuring equitable access to technology and internet connectivity is crucial [31]. This can be achieved through government initiatives, partnerships with the private sector, and community-based solutions. Third, fostering a supportive learning environment that encourages student collaboration and active participation is key [32]–[34]. This involves creating a classroom culture that values critical thinking, problem-solving, and peer learning.

The flipped classroom model holds outstanding promise for enhancing the quality of education in Malaysia. Targeted strategies and collaborative efforts can mitigate the challenges to its implementation. By embracing this innovative approach, Malaysia can move closer to achieving the goals outlined in its education blueprint and preparing students for the demands of the 21st century. This literature review provides a foundation for further research on the impact of flipped classrooms in Malaysia, highlighting the need for empirical studies and best practices to guide educators in this transition.

2. METHOD

This section underscores the need for a systematic assessment of flipped classrooms' implementation and methodology in education. The following section describes the research methodology used in this study. The review comprises three segments: i) an evaluation of blended learning effectiveness, ii) an analysis of the impact of flipped classroom strategies, and iii) a study of technological advancements and gamification in education. This section meticulously examines and synthesizes scientific literature to identify, select, and evaluate significant flipped classroom approaches. The final part considers potential scholars who can recommend appropriate actions based on the identified concerns. The analysis employs the preferred reporting items for systematic reviews and meta-analyses (PRISMA) [35] approach, a widely recognized

standard for conducting systematic literature reviews. Note that adhering to publication guidelines is crucial for authors to ensure the review's completeness and accuracy, incorporating relevant and critical information. In addition, PRISMA emphasizes the importance of randomized study assessment surveys in systematic analysis reports across various research types.

2.1. Identification

This study employed a systematic review approach to choose a significant amount of relevant material carefully. Keywords were selected, and relevant terminology was determined through the use of dictionaries, thesauri, encyclopedias, and prior studies. Search queries were subsequently constructed for the Scopus and Web of Science (WoS) databases to retrieve all pertinent terms (refer to Table 1). In the initial part of the review, a total of 775 papers relevant to the research question were acquired from these databases.

Table 1. The search strings

Scopus	WoS
TITLE-ABS-KEY ((implementing OR approach) AND "Flipped Classroom" AND "Blended Learning" AND (education OR teaching)) AND (LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "COMP") OR LIMIT-TO (SUBJAREA, "ARTS") OR LIMIT-TO (SUBJAREA, "MULT")) AND (LIMIT-TO (PUBYEAR, 2021) OR LIMIT-TO (PUBYEAR, 2022) OR LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2024)) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (LANGUAGE, "English")) Date of access: June 2024	(Implementing OR approach) AND "Flipped Classroom" AND "Blended Learning" AND (education OR teaching) (Topic) and 2024 or 2023 or 2022 or 2021 (Publication Years) and Article (Document Types) and English (Languages) and Education Educational Research or Education Scientific Disciplines or Social Sciences Interdisciplinary or Multidisciplinary Sciences (Web of Science Categories) Date of access: June 2024

2.2. Screening

The screening process assesses the gathered research items to determine if they align with the established research topics. One crucial factor to consider at this stage is selecting research relevant to implementing flipped classrooms in education. Redundant documents are eliminated from the search results. During the initial screening phase, 618 publications were excluded. This was followed by a second screening of 157 papers, which were evaluated based on specified criteria for inclusion and exclusion (refer to Table 2). The main emphasis was on research articles as the primary source of practical ideas. Excluded from consideration were reviews, meta-syntheses, meta-analyses, books, book series, chapters, and conference proceedings. The examination was restricted to English-language articles published between 2021 and 2024. A grand total of 38 items were rejected on account of duplication.

Table 2. The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Timeline	2021–2024	<2021
Literature type	Journal (article)	Conference, book, and review
Publication stage	Final	In press
Subject	Social science, computer science, art humanities, and multidisciplinary	Besides social science, computer science, art humanities, and multidisciplinary

2.3. Eligibility

During the eligibility review, a total of 119 articles were compiled. During this phase, a comprehensive examination of the titles and content of each article was conducted to ensure that they met the inclusion criteria and were relevant to the research objectives of the ongoing study. A total of 84 publications were rejected from the study due to their failure to meet the standards. Due to the abstract's lack of relevance to the study's objective, the title's irrelevance, the study being outside the field of interest, and the unavailability of full-text access, it is deemed unsuitable. Accordingly, there are 35 remaining items for the next review.

2.4. Data abstraction and analysis

This study utilized a range of research tools, with a special emphasis on quantitative methods, to conduct an integrated analysis. The goal was to ascertain pertinent matters and subordinate subjects. The

conceptual inquiry began with the acquisition of data. Figure 1 depicts a comprehensive analysis of 35 articles to extract relevant statements and materials for this investigation. We thoroughly examined notable research studies on blended learning and flipped classrooms, focusing on their conclusions and techniques. The authors collaboratively generated themes based on the evidence. During the entire procedure, a log was maintained to record analyses, interpretations, inquiries, and other pertinent thoughts. The writers evaluated the ultimate outcomes to detect any inconsistencies in the progression of themes. Any divergences in viewpoints regarding the themes were deliberated and resolved through the process of comparing facts and maintaining continuous communication. Ultimately, modifications were implemented to guarantee coherence in the formulated topics. Two professionals with expertise in language teaching and educational technology conducted reviews to verify the authenticity and dependability of the sub-themes. The validity, clarity, and relevance of each sub-theme were improved through revision based on expert feedback. The questions are as follows: i) How does blended learning influence student performance and engagement in various educational contexts? ii) How does the flipped classroom model affect student learning outcomes and satisfaction in different educational settings? and iii) What are the impacts of technological innovations on teaching and learning processes in various academic disciplines?

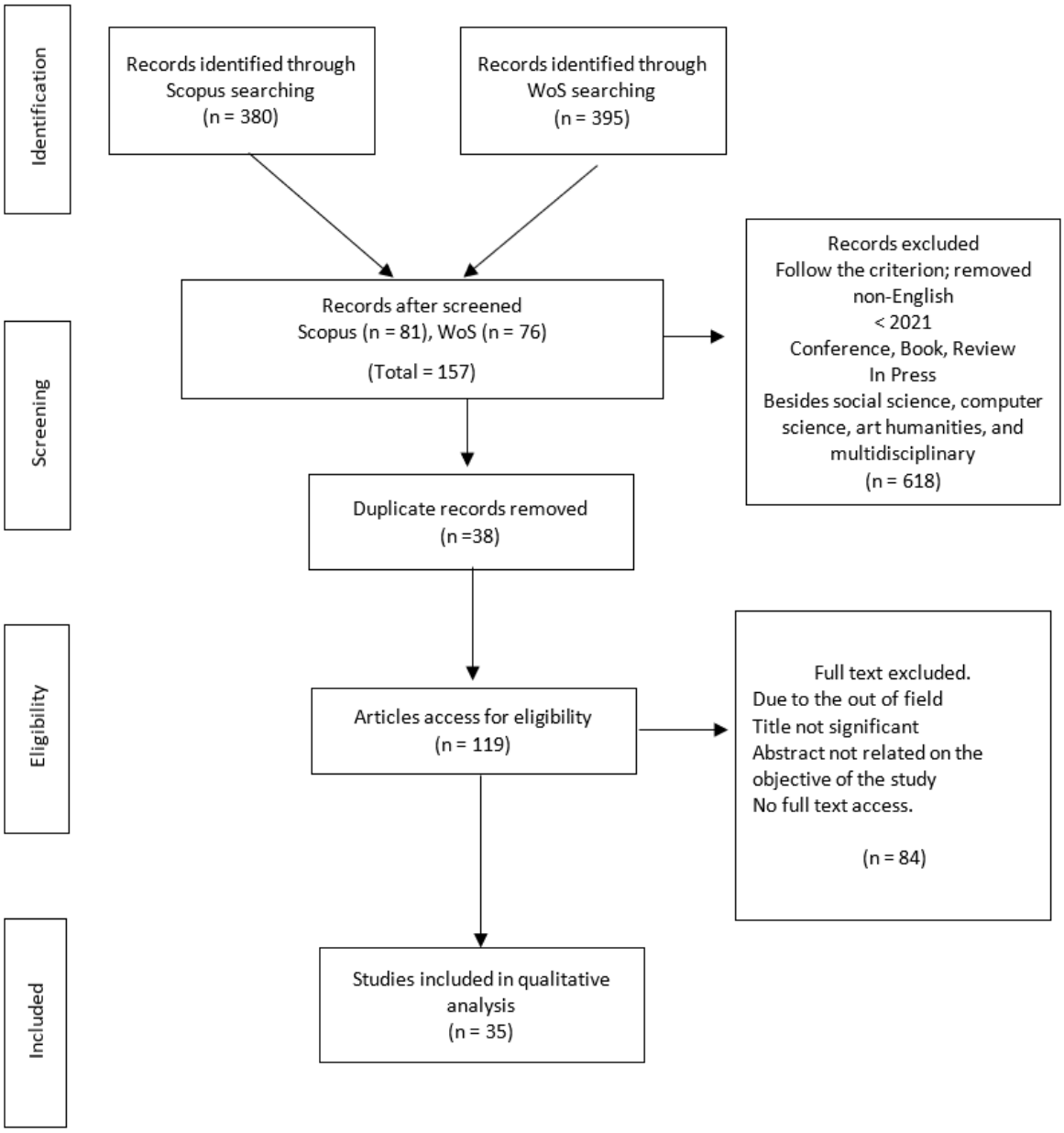

Figure 1. Flow diagram of the proposed searching study [35]

3. RESULTS AND DISCUSSION

The flipped classroom is a very efficient pedagogical method. An excellent teaching methodology can ensure optimal student learning outcomes. The search methodology resulted in the retrieval and examination of 35 publications. The articles were classified into three primary themes: the efficacy of blended learning (8 articles), the effects of flipped classroom techniques (21 articles), and technological advancements and gamification in education (6 articles).

3.1. Theme 1: effectiveness and impact of blended learning

The effectiveness and impact of blended learning have been increasingly studied across various educational contexts, demonstrating significant improvements in student performance and learning outcomes. The combination of traditional face-to-face instruction with online components, as observed in the study by Xu *et al*. [36], highlights the potential of blended learning to provide individualized teaching in large classes. By leveraging data from student's online behavior, this approach enables educators to predict and enhance student performance. The integration of flipped classrooms and small private online course (SPOC) methodologies allows for more personalized and engaging learning experiences, contributing to better academic results. Kang and Kim [37] explored the effects of a flipped classroom combined with team-based learning (TBL) in a public healthcare education course. Their findings indicated that this blended learning approach significantly enhanced knowledge acquisition, problem-solving abilities, and overall learning satisfaction among undergraduate nursing students compared to traditional lecture-based methods. This study underscored the potential of blended learning to foster active learning and improve educational outcomes in healthcare education, suggesting that similar approaches could be beneficial across other disciplines as well. The integration of these skills into blended learning curricula can enhance students' ability to apply knowledge critically and creatively. He *et al*. [38] and Pimdee *et al.* [39] investigated the development of a blended problem-based learning model in online flipped classrooms to enhance problem-solving skills and academic achievement among Thai student-teachers. Their study demonstrated that this approach not only improved students' problem-solving abilities but also increased their academic performance and satisfaction. As a result, the incorporation of problem-based learning into blended environments provides students with opportunities to engage deeply with content, apply theoretical knowledge to real-world scenarios, and develop critical thinking skills.

Shi [40] examined the implementation of a flipped classroom model in an intercultural communication course, highlighting the importance of focusing on student engagement and the practical application of skills. By combining online and face-to-face teaching methods, educators can create a more effective and immersive learning environment that prepares students for real-life intercultural interactions. This approach allowed students to analyze and solve actual communication problems, fostering a deeper understanding of intercultural dynamics and enhancing their communication competencies. Haningsih *et al*. [41] explored the application of blended learning in an Islam Ulil Albab course, demonstrating its potential to enhance students' piety and engagement. The study utilized a flipped classroom model that integrated both online and offline teaching methods, emphasizing active student participation and contextual learning. The results indicated that blended learning can effectively meet the needs of students in developing both academic and personal growth, suggesting its applicability in diverse educational and cultural contexts. Yan and Li [42] focused on the perceptions and learning difficulties of engineering students in a blended learning environment. Their study revealed that while students encountered challenges in visualizing complex concepts, they exhibited positive attitudes toward the flipped classroom approach. This research highlighted the significance of addressing specific learning difficulties and tailoring blended learning strategies to meet the unique needs of different student populations, particularly in technical and engineering disciplines. Korson [43] proposed a place-based approach to blended learning, emphasizing the need for flexibility and engagement with local contexts in educational provision. By integrating experiential learning with digital media and online components, this approach seeks to maintain a connection to physical places and communities, even in a predominantly online learning environment. This framework aims to address the changing needs of students and instructors, fostering a sense of belonging and enhancing the overall learning experience.

The comprehensive analysis of these studies demonstrates that blended learning, particularly through the flipped classroom model, has a significant positive impact on student performance, engagement, and satisfaction. Notably, the integration of online and face-to-face teaching methods allows for more personalized and interactive learning experiences, fostering the development of critical thinking, problem-solving, and intercultural communication skills. As educational institutions continue to adopt and refine blended learning strategies, further research and innovation will be essential to fully realize its potential benefits across diverse academic disciplines and cultural contexts.

3.2. Theme 2: flipped classroom methodologies and their impacts

The exploration of flipped classroom methodologies and their impacts reveals significant insights across various educational settings. Chen [44] analyzed the effectiveness of flipped classrooms from an experiential learning perspective, comparing high-flipped, low-flipped, and traditional blended learning strategies in an enterprise resource planning (ERP) system course. The study concluded that high-flipped classrooms yielded the highest learning outcomes and student satisfaction, followed by low-flipped and traditional blended learning. This finding underscored the potential of partially flipped classrooms as a feasible approach to implementing experiential learning strategies while addressing practical challenges associated with fully flipped classrooms.

Meanwhile, Youhasan *et al*. [45] developed and evaluated the flipped classroom navigator (FCN) to enhance flipped classroom pedagogy in undergraduate health professions education. Their research highlighted the significance of training for both teachers and students to engage in flipped classrooms effectively. The FCN achieved a good level of agreement for its ease of use and relevance, suggesting that such web-based tools can significantly promote flipped classroom methodologies. Similarly, Youhasan *et al*. [46] examined the educational impact of the FCN in Sri Lankan nursing education, discovering that it improved participants' understanding of flipped classroom pedagogy and motivated them to incorporate it into their teaching practices. At the same time, Salleh [47] investigated university student perceptions of online-based technology in flipped classrooms, revealing positive reception and improved confidence among students. This study noted that while initial apprehension existed regarding peer motivation, students embraced the flipped learning strategy. These findings align with those of Gonda *et al*. [48], who designed a flipped classroom model to reduce student academic procrastination. Their experimental design demonstrated a statistically significant reduction in procrastination behaviors and increased self-regulatory skills among students, emphasizing the effectiveness of well-structured flipped classroom designs in fostering continuous student engagement. In addition, Ebron and Mabuan [49] examined the application of flipped classroom approaches in teaching writing within a university English as a second language (ESL) context. Despite technological limitations, students provided positive feedback, citing the method's ability to support active learning and practical application. Similarly, Muluk *et al*. [50] investigated the impacts of a flipped international English language testing system (IELTS) writing course in Indonesia, finding significant improvements in writing performance and positive student attitudes towards the flipped instructional method. These studies suggested that flipped classrooms can enhance writing skills and foster favorable learning experiences in language education.

The impact of flipped classroom methodologies on democratic education was explored by Ferrer and Martínez [51] in a Spanish higher education context. Their study highlighted those students with previous experience in flipped classrooms had higher scores in learning democratic principles and collaborative learning. This indicated that flipped classrooms can effectively support the development of critical thinking and democratic values. Alyoussef [52] further examined the acceptance of flipped classrooms in higher education using the technology acceptance model (TAM) and unified theory of acceptance and use of technology (UTAUT) models, concluding that perceived usefulness and ease of use significantly influence attitudes towards adopting flipped classrooms, thereby promoting technology integration in education. Meanwhile, Samofalova *et al*. [53] focused on adaptive higher education through flipped classrooms, highlighting the significance of personalized learning and continuous monitoring. Their study demonstrated that adaptive learning via flipped classrooms improved academic achievement and educational maturity in linguistic students. This aligns with findings from Ölmefors and Scheffel [54], who discussed the need for special care in implementing flipped classrooms to ensure equal learning opportunities for neurodiverse students in Swedish high schools. These studies collectively emphasized the adaptability and inclusiveness of flipped classroom methodologies.

In the context of sociology education, Baker *et al*. [55] analyzed a blended and flipped interactive workshop model. Their study identified key elements such as course format, mini-lectures, face-to-face activities, and assessment models that contributed to the effective implementation of flipped classrooms. This comprehensive approach reflected the broader trends of flexibility and technological advancement in higher education. Accordingly, the flipped classroom methodology has demonstrated significant potential in various educational contexts, enhancing both academic achievement and student engagement. For instance, Al-Jarrah *et al*. [56] examined the impact of flipped learning on eighth-grade students in Jordan, revealing that students in the experimental group, who were taught using the flipped classroom strategy, exhibited significantly higher academic achievement and a more positive attitude towards learning compared to the control group. This study underscored the effectiveness of flipped learning in improving not only academic outcomes but also student attitudes towards education, particularly in the subject of English.

In the context of higher education, Díaz *et al*. [57] investigated the flipped classroom model among university students, revealing that it significantly enhanced learning satisfaction and interaction. Their longitudinal qualitative study highlighted that student appreciated the increased engagement and competence development facilitated by the flipped classroom approach. Similarly, Koribská *et al*. [58] emphasized the benefits of the flipped classroom in promoting student-centered learning and the development of students' learning competencies. However, they also noted that its effective implementation requires careful consideration of contextual factors, which can present challenges in different educational environments. The flipped classroom methodology has also been proven to impact specific skills and subjects positively. Alwehebi [59] explored its effect on pre-service teachers' lesson plan writing and teaching skills in Saudi Arabia. The study revealed a positive correlation between flipped classroom instruction and improvements in these skills, indicating that this approach can be particularly beneficial in teacher training programs. Additionally, Florence and Kolski [60] conducted action research in a high school writing course. They discovered that the flipped classroom model not only improved student engagement and perceptions of learning but also led to significant gains in writing achievement. In specialized courses, such as antenatal education, the flipped classroom has also proven effective. Lin *et al*. [61] evaluated its application in an antenatal education center in China, demonstrating that the blended learning approach improved knowledge, self-directed learning abilities, learning satisfaction, and various pregnancy outcomes compared to traditional methods. This study highlighted the versatility of the flipped classroom model in diverse educational settings, including health education. Further supporting these findings, Taşpolat *et al*. [62] examined the use of the flipped classroom in programming language training at the higher education level. Their study reported significant improvements in students' academic achievement and attitudes toward programming when using this methodology. The flipped classroom was proven to increase teacher-student interaction, student motivation, and independent learning. However, challenges such as technological requirements and the need for students to engage with pre-class materials were noted.

Despite the widespread benefits of the flipped classroom model, some studies have highlighted limitations and areas for improvement. For example, Price and Walker [63] revealed that while the flipped classroom made a statistics module more accessible and interesting for business and management students, it did not significantly affect exam performance, attendance, or online engagement. Additionally, Yoon *et al*. [64] addressed the need for support to promote self-regulated learning in the flipped classroom. Their empirical study validated the effectiveness of a learner dashboard combined with a reflection interface, which improved students' self-regulated learning skills and engagement.

3.3. Theme 3: technological innovations and gamification in education

Technological innovations and gamification in education have garnered substantial interest and application in recent years, particularly within the flipped classroom model. The flipped classroom, an innovative pedagogical approach, involves reversing the traditional learning environment by delivering instructional content, often online, outside of the classroom. Furthermore, the use of technological tools and gamification has enhanced this model, resulting in improved student engagement and learning outcomes. Various studies highlight the diverse impacts of these methodologies across different educational contexts. Priyaadharshini and Maiti [65] demonstrated the efficacy of flipped classrooms combined with learning analytics in higher education. Their research utilized a novel model, the confusion assessment method–score (CAM-S), to measure cognitive, affective, and motivational traits among students. In addition, the flipped classroom, supported by gaming environments, significantly enhanced learner performance compared to traditional methods. This approach aligns with the findings of Lopes *et al*. [66], who explored the integration of gamification and TBL in flipped classrooms. Their study indicated that these active learning methodologies are particularly well-received by students in engineering and technology fields, fostering a positive perception of blended learning techniques.

Ramírez-Donoso *et al*. [67] investigated the impact of a mobile collaboration tool based on gamification within a blended learning course. Their study revealed that the mobile application MyMOOC space (MMS) positively influenced students' motivation and utilization of digital resources. Moreover, the gamified approach increased interaction with assessment exercises and consumption of video content, highlighting the potential of gamification to enhance traditional and flipped learning models. Similarly, Pérez-Sanagustín *et al*. [68] discovered that integrating self-regulatory learning scaffolds in a MOOC-based flipped classroom significantly improved student engagement and time management. These scaffolds provided feedback on student activity, facilitating better strategic planning, and participation. Notably, the role of gamification in education extends beyond engagement to improving specific learning outcomes. Goldbarsht and Johnston [69] discussed the concept of flipping not only the classroom but also the textbooks used in legal education. Furthermore, by adopting a student-centric approach to textbook design, they aimed to enhance the learning experience further, suggesting that traditional texts could be restructured to

complement flipped learning methodologies. This notion supports the broader educational shift towards more interactive and engaging learning materials. Additionally, Walinski *et al*. [70] emphasized the necessity of adapting teaching methods to meet the learning preferences of generation Z students in dental education. They proposed a combination of blended learning, TBL, and flipped classroom formats to increase learning effectiveness and student satisfaction. This approach reflects the need for educational institutions to evolve and incorporate new technologies and methodologies that resonate with modern learners.

In conclusion, the integration of technological innovations and gamification within the flipped classroom model has revealed considerable promise in enhancing educational outcomes. The studies reviewed indicate that these methodologies foster greater student engagement, improved performance, and a positive learning experience. Accordingly, the ongoing evolution of educational practices to include these innovative approaches suggests a significant shift towards more dynamic and interactive learning environments.

4. CONCLUSION

Blended learning, combining traditional face-to-face instruction with online components, significantly improves student performance and learning outcomes in various educational contexts. Leveraging data from online behavior enhances individualized teaching in large classes while integrating flipped classrooms and SPOC leads to personalized and engaging learning experiences. This approach enhances knowledge acquisition, problem-solving abilities, and overall satisfaction, particularly in healthcare education. Furthermore, emphasizing higher-order thinking skills through innovative strategies aligns with the goals of creating interactive, student-centered learning environments. Moreover, blended learning models are effective in intercultural communication courses, improving student engagement and practical skill application and in engineering education despite the challenges of visualizing complex concepts. Additionally, place-based approaches integrating experiential learning with digital media maintain connections to physical communities. Overall, blended learning fosters critical thinking, problem-solving, and intercultural communication skills, highlighting the need for continued adoption, refinement, and research to maximize its benefits across diverse academic and cultural contexts.

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BIOGRAPHIES OF AUTHORS

Rohaida Mazlan is a Ph.D. Candidate at the Faculty of Education, Universiti Kebangsaan Malaysia (UKM), Bandar Baru Bangi, Selangor, Malaysia. She is the former assistant director in the Malay Language Unit of Curriculum Development Division, Ministry of Education Malaysia. Her research focuses on teaching and learning strategy, Malay education and flipped classrooms in education. She can be contacted at email: p113602@siswa.ukm.edu.my.

Zamri Mahamod is a professor in the field of Malay language education at the Faculty of Education. As an academic, he has produced numerous journals and scholarly books in addition to conference proceedings articles. His expertise is consulted by Malaysian Examinations Council (MPM), Dewan Bahasa dan Pustaka (DBP), and Teacher Education Institute (IPG) regarding Malay language education. He can be contacted at email: d-zam@ukm.edu.my.

Khairul Azhar Jamaludin is a senior lecturer in the Centre of Education Leadership and Policy, Faculty of Education, Universiti Kebangsaan Malaysia. His areas of specialization and research are in curriculum development, technical and vocational education and training (TVET) pedagogy and curriculum, and teaching English as a second language. He can be contacted at email: khairuljamaludin@ukm.edu.my.