Educational Technology in Context with Specially Flipped Learning

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ABSTRACT

Flipped learning, a specific type of blended instruction, involves moving direct instruction (like lectures) to out-of-class time, while in-class time is dedicated to active learning activities like problem-solving and discussions. This approach leverages technology to deliver content and allows for more personalized and collaborative learning during class. Flipped learning has garnered substantial attention as a potential means to enhance student engagement, improve learning outcomes, and adapt to the evolving educational landscape. However, despite the growing interest and potential benefits of flipped learning, several challenges and areas of concern persist. This systematic literature review critically examines the implementation of the flipped classroom in higher education by focusing on the role of technologies and tools, pedagogical activities and courses, and existing challenges.

Keywords: Approach, Content, Flipped Classroom, Higher Education, Innovation, Learning

INTRODUCTION

The flipped learning approach has recently gained popularity as an educational innovation in educational technology, especially as it applies to higher education (Divjak et al., 2022). The most effective way to motivate students is by using technology-enhanced teaching methods that go beyond traditional lectures (Yıldız et al., 2022). Technology plays a crucial role in enhancing student engagement and satisfaction (Wang et al., 2019), with the flipped classroom model relying heavily on technology (Tomas et al., 2019). Flipping a classroom involves turning the usual classroom on its side (Güler et al., 2023). Outside of class, students are encouraged to actively learn new material by reading or watching recorded lectures. It demands that students retain and analyze the knowledge supplied for the class (Bachiller & Badía, 2020). The student is then asked to use what they have learned in class to complete group problem-solving exercises using peer instruction (Huang et al., 2023). As a result, students gain a deeper learning experience by gaining a comprehensive understanding of the subject matter. Compared to the conventional lecture approach, this form of learning is more dynamic and student-centered (Karjanto & Acelajado, 2022). A flipped classroom can reduce the amount of time spent lecturing, provide hands-on experience, and help students become more prepared and motivated for their studies (Jiang et al., 2022). As a result, it can also enhance students' academic performance, engagement with the material, and comprehension, as well as their self-assurance and critical thinking abilities (Mortaza Mardiha et al., 2023). Flipping the classroom offers time-pressed students the benefit of following course material at their own pace (Torío, 2019).

FEATURES OF FLIPPED LEARNING

1. Content Delivery:
Students access pre-recorded lectures, videos, or other materials outside of class through online platforms like Canvas.

2. Active Learning:
In-class time is used for more interactive activities such as group work, collaborative problem-solving, debates, or discussions where students apply and deepen their understanding of the material.

3. Technology Integration:
Flipped learning relies heavily on technology for content delivery and assessment, often utilizing learning management systems (LMS) and online platforms.

4. Student Responsibility:
Students are expected to take ownership of their learning and prepare for class by engaging with the pre-class materials, rather than passively receiving information in class.

5. Enhanced Learning:
By shifting the focus to active learning, flipped classrooms aim to foster deeper understanding, critical thinking, and higher-order skills.

BENEFITS OF FLIPPED LEARNING

1. **Personalized Learning:**
   Students can learn at their own pace and revisit material as needed.

2. **Increased Engagement**:
   In-class activities, like collaborative problem-solving, can be more engaging for students.

3. **Deeper Understanding:**
   By applying knowledge in class, students can build a stronger understanding of the material.

4. **Improved Time Management:**
   Students can learn the basics outside of class and then spend in-class time focusing on more challenging tasks.

5. **More Opportunities for Collaboration**:
   Flipped classrooms often include more opportunities for students to work together and learn from each other.

CHALLENGES OF FLIPPED LEARNING

1. **Preparation:**
   Teachers need to create and manage a variety of digital learning materials.

2. **Student Adaptation:**
   Some students may initially find it challenging to adjust to the new learning format.

3. **Technology Access:**
   Students need reliable access to technology and the internet.

4. **Digital Divide:**
   Some students may not have access to the technology or digital literacy skills needed for success in a flipped classroom.

EXAMPLES OF FLIPPED LEARNING IN ACTION

1. **Pre-recorded lectures**:
   Students watch video lectures before class and then discuss the concepts in class.

2. **Online assignments**:
   Students complete online quizzes or exercises before class to check their understanding of the material.

3. **Interactive activities:**
   In-class time is used for group work, simulations, or problem-solving exercises. Using a systematic approach, a total of 30 research articles published between 2014 and 2023 were chosen for the review. This study identified video creation tools, learning management systems (LMS), content repositories, collaborative platforms, podcasts, and online assessment tools as technologies that play a central role in the flipped classroom. Moreover, this study identifies specific pedagogical activities within different courses that contribute to the effectiveness of flipped learning in higher education. The implementation challenges that teachers and students may face in the flipped classroom were presented, and potential strategies to alleviate these challenges were provided. This study will contribute to a more comprehensive understanding of flipped learning's benefits, technologies and tools, challenges, and potential to improve higher education.

Teachers provide pre-recorded videos for students to access, allowing them to adjust their learning pace and time based on their proficiency level. Teachers and students may both become more tech-literate (Huang et al., 2023). Additionally, a flipped classroom encourages student collaboration and offers additional chances for teacher-student engagement throughout the teaching and learning process (Güler et al., 2023).

Flipped learning in higher education offers a cost-effective, student-centered approach to accommodate growing enrollments and can mitigate funding and structural issues that prioritize faculty research over student learning (Zou et al., 2020). Meanwhile, it equips students with 21st-century skills needed for global challenges (Zhao et al., 2021) and

knowledge needed to meet current market demand (Ng & Lo, 2022). The flipped classroom approach enhances critical thinking, teamwork, and problem-solving skills in real-world settings, enhancing learning, academic performance, and practical knowledge (Castedo et al., 2018; Rodríguez-Chueca et al., 2019; Sevillano-Monje et al., 2022). Students with strong academic backgrounds as well as a set of practical knowledge, skills, and abilities are always preferred by employers.

Employers favor hiring people with the abilities and dispositions necessary to turn ideas into reality (Pattanaphanchai, 2019). Due to the obsolete teacher-centered teaching methodology, the traditional education system has failed to build crucial employability skills, behaviors, traits, and competences (Khan & Abdou, 2021). In the traditional teacher-centered teaching approach, the development of necessary abilities and inspiring students by personalizing learning around their interests are disregarded. Students are unable to put their theories into practice in a real-world working environment (Lopes et al., 2019). The above-mentioned problems with traditional teaching methods could be resolved by flipped learning. It involves students practicing theories and necessary skills in a variety of student-centered activities such as presentations, group activities, and hands-on activities while being guided by the instructors (Galway et al., 2014; McLean & Attardi, 2018).

Numerous systematic review studies on flipped classrooms have been published, covering a wide range of significant topics. These review studies have limited publishing coverage, focus on one learner category, or focus on a single academic field. Huang et al. (2023) suggested video tutorials for a systems programming course in a flipped classroom to enhance students' learning interest. Senali et al. (2022) provided the state-of-the-art in flipped classroom business and entrepreneurship education. Another review conducted by Divjak et al. (2022) highlighted the flipped classroom methods used during the pandemic. Jiang et al. (2022) summarized the studies in flipped language teaching by using articles from the social sciences citation index. Flipped learning in higher education is gaining popularity, but systematic literature review (SLR) is lacking on investigating technologies, pedagogical activities, and courses. This can be helpful for teachers to apply technology according to the nature of the course. Moreover, the identified pedagogical activities can be helpful for other teachers to enhance students learning. Furthermore, this study identifies the challenges of implementing flipped classrooms and provides recommendations on how to overcome them. The recommendations can be helpful for teachers and students to cope with issues related to the flipped classroom.

Inclusion and Exclusion

Inclusion and exclusion criteria were established in order to make sure that only studies that are extremely relevant to this analysis are included (Table 1). Finding domain-relevant articles requires conducting a thorough keyword search. The titles, abstracts, and keywords were therefore searched for relevant terms. For this review, empirical research is taken into account. Continuous examination and revision of the work are benefits of an empirical method (Rodríguez-Chueca et al., 2019). It raises the standard and reliability of the research being done. In addition, English is the language that is read and written the most. Additionally, the flipped classroom trend became more widespread in 2014 (Galway et al., 2014; Li & Li, 2022). The analysis encompassed all relevant research that had been published in English between January 2014 and July 2023. This study's objective is to describe flipped classroom technologies, courses, and activities. Therefore, only studies that provide a detailed description of flipped classroom practices and methodologies are considered in this review.

Flipped classroom is an instructional approach in which students view explanations and materials prepared by the teacher at out-of-class time to expand collaboration with students in an informal way. In this study, it used as a technology-enhanced educational approach to convey teachings with computer-mediated interaction, such as video recorder, computer-generated lectures, and online conversations. This study investigates EFL students' views regarding the effectiveness of flipped learning on the improvement of their writing skills. A mixed method was utilized, which included assembling quantitative statistics, followed by the quantitative results. The first quantitative phase used a pre- and post-test true experimental design with a control group. Experimental group (a) consists of 35 female students has been teaching with the flipped learning method. Control group (b) is composed of 32 female students and followed traditional face-to-face teaching technique. Two ways Ancova was used to measure the writing improvement in both groups. It was discovered that the EFL students in experimental group outperformed the learners in the control group after treatment procedure. The findings show that the majority of students expressed generally positive attitude toward flipped learning on the improvement of their writing skills.

Flipped Classroom Model

The flipped classroom instruction has gained momentum in the recent decade. While a flipped classroom (FC) model is often discussed through the technological lens, it is more appropriate to define it as an instructional approach in which the explanations and materials prepared by the teacher are viewed by students at out-of-class time (Mehring, 2017). Following this definition, a flipped EFL instruction provides the teacher with an opportunity to expand collaboration with students in an informal way, diversify learning, and free time on different activities in class. Instead of giving explanation during a lesson, the teacher shares instructional videos among students to ease and facilitate the acquisition of EFL writing skills (Leis et al., 2015).

With a flipped classroom model, the teacher promotes personalised learning and gives impetus to the use of individual learning styles (Leis et al., 2015). In this paper, flipped classroom is utilized as a technology-enhanced instructional approach to deliver lectures with computer-mediated interaction such as videos, virtual lessons, online conversations, and dialogue to support learning and assist social interactions, and eventually language enhancement. Thus, it can be realized that, the definition of FC strengthens the idea of social constructivism theory, which include collaborations amongst students throughout chat, online conversation to simplify approachability, and self-reliant to construct knowledge. The main distinction between traditional classrooms and flipped classrooms is that the former uses lectures and homework to shape EFL students' knowledge and the latter introduces knowledge outside classrooms.

In traditional classrooms, the teacher disseminates new materials among EFL university student and gives them writing tasks to practice the acquired knowledge (Talbert, 2017). A flipped instruction encourages EFL university students to take responsibility for their writing, expand their learning experiences, and acquire writing competence through mastery of fundamental writing principles. Given that Saudi EFL students experience the greatest difficulty with writing in EFL traditional classrooms (Rafada & Madini, 2017), the shift towards a flipped instruction is fully justified. In a flipped classroom, the roles of teachers and students are different from the roles, which these stakeholders fulfil in a traditional classroom (Reidsema et al., 2017). While EFL teachers are knowledge builders and EFL students act as passive recipients of language knowledge in a traditional classroom, EFL students become active agents of the learning process in a flipped classroom. This active participation is explained by the increased corroboration of students with teachers during writing activities, teachers' scaffolding, and the challenges which students face when they learn new materials in out-of-class settings (Leis et al., 2015). In more specific terms, a flipped instruction stimulates EFL students to use reflective thinking while processing new information and overcoming learning difficulties. However, EFL students are supported by teachers when they fulfil the activities which are beyond their levels of English proficiency (Leis et al., 2015).

The flipped classroom considered as on of the blended learning method. Boelens et al. (2018) highlighted the main characteristic of blended learning as "an instructional approach that combines online and face-to-face instructional activities, to create more flexible modes of education, and personalized learning trajectories" (p. 199). Consequently, the idea of time and place flexibility blended learning delivers students with ample occurrences to accomplish personalized education. The notion of blended learning reposes on the belief that the technology should not replace the conventional learning, however would add further breadth to the learning experience.

FC is "a pedagogical model in which direct instruction moves from a group learning space to an individual learning space, and the resulting group space is transformed into a dynamic, interactive, learning environment" (Hamdan, 2014). The growing research in utilizing FC instructional approach has therefore its grounds on the capability to enrich teaching and learning; to promote better students' learning outcomes (Giannakos et al., 2014) and; to expand learners' experiences and competences (Bergmann and Sams, 2012).

Students benefit from this pre-class exposure to materials and outside classroom events because they can adjust their learning pace to meet their individual studying style and levels of understanding. During in-class classroom sessions, students have the opportunity to engage with the IBL activities, through group work, instead of passively listening to the teacher (i.e. lecturing). In turn, teachers can spend the in-class time for facilitation, observation of student performance and providing adaptive feedback to individual student or to groups of students (Fulton, 2012; Hughes, 2012; Herreid and Schiller, 2013).

CONCLUSION

Flipped classroom (FC) models have indeed attempted to address contemporary issues of how student engagement can be maximized by allocating more class time for active and student-guided learning and by using advanced technologies to support a blended learning approach. A typical FC methodology offers students access to online video lectures/tutorials (flips) prior to in-class sessions and the need to complete an entrance ticket, so that they are prepared to take part in more interactive, collaborative and higher-order activities such as research, debates, problem solving and discussions, i.e. Inquiry-based leaning (IBL) methodology (Lage, Platt, and Treglia, 2000; Zappe et al., 2009; Bergmann, Overmyer, and Wilie, 2012; Fulton, 2012; Hughes, 2012; Talbert, 2012; Davies, Dean, and Ball, 2013).

'The regular and systematic use of interactive technology' (Strayer, 2012, p. 172) accepts unique FC approaches. However, there are counteracting studies (e.g. Rutherfoord and Rutherfoord, 2000; Tenneson and McGlasson, 2006) which claim that FC models are not new since educators have always used readings, and computer-assisted guidelines to get their learners prepared for the in-class activities. This study, which is an expansion of a FC research which aimed to collect experiences and perception of teachers and students (Loizou and Lee, 2020), challenges existing studies, as it comes to offer a new insight into the digital tools which can be further used, especially for students in primary education.

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