EPH - International Journal Of Educational Research

ADVANTAGES AND DISADVANTAGES OF FLIPPED CLASSROOM IN ADULT EDUCATION USING DISTANCE LEARNING FOR LEARNING PROGRAMMING

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Abstract

The flipped classroom model has emerged as an innovative approach to education, particularly gaining traction in adult education and distance learning contexts. This pedagogical framework reverses the traditional classroom structure, encouraging students to engage in self-directed learning at home while reserving class time for interactive activities and collaborative projects. This paper provides a comprehensive review of the advantages and disadvantages of the flipped classroom model, particularly focusing on its application in adult education, programming learning, and distance education. Five key themes emerge from the discussion: flexibility, personalized learning, active engagement, technology reliance, and assessment challenges. While the flipped classroom offers benefits such as flexibility in scheduling, personalized learning experiences, and increased interaction, it also poses challenges related to technology dependence, potential learning style mismatches, and difficulties in measuring engagement and providing timely feedback. Through a theoretical lens grounded in constructivist learning theory and active learning principles, the paper explores how the flipped classroom model aligns with contemporary educational theories and practices. Furthermore, practical recommendations are provided for educators looking to implement the flipped classroom model in adult education settings, emphasizing the importance of creating high-quality pre-class materials, promoting active learning and practice, and fostering a supportive learning community. By leveraging the theoretical underpinnings of constructivism and active learning, educators can optimize the flipped classroom model to cater to the unique needs of adult learners, promote engagement, and enhance learning outcomes.

Keywords: *flipped classroom, adult education, programming learning, distance education, active learning.*

INTRODUCTION

The flipped classroom paradigm, which was first created for older kids, has drawn interest from early development educators looking for creative ways to maximize learning in preschool. By encouraging students to learn fundamental skills through self-directed learning at home, this pedagogical framework flips the traditional classroom structure and frees up teachers' time to concentrate on group projects and hands-on learning. Bishop and Verleger (2013). The flipped classroom model is a teaching approach that has gained popularity recently, in which the usual classroom format is reversed. Under this strategy, teachers concentrate on practical exercises and group projects during class time, while students gain core knowledge through self-directed learning at home. In K–12 education, the flipped classroom paradigm has gained widespread traction and demonstrated encouraging outcomes in terms of raising student involvement and learning outcomes. Strayer (2012). The flipped classroom paradigm has been used in adult education in recent years, especially when learning programming is being done remotely. In adult education, the flipped classroom paradigm offers the ability to foster cooperation and interaction between students and teachers while simultaneously giving students more flexibility and ownership over their education. Betihavas et al., (2016). But there are drawbacks to the flipped classroom model in adult education as well, such making sure everyone has equitable access to technology and meeting a range of learning requirements. To guarantee that the materials for self-directed learning are both effective and entertaining, educators must also put in a great deal of work and planning into the flipped classroom paradigm. Hew and Lo (2018). In spite of these obstacles, the flipped classroom approach in adult education has demonstrated potential for raising student engagement and enhancing learning results. Teachers may fully realize the promise of the flipped classroom model to improve adult education and encourage lifetime learning by utilizing technology and following best practices. Bergmann and Sams(2012). In a flipped classroom, the instructor guides the students rather than just imparting knowledge, and they take charge of their own education and set their own pace (Lai & Hwang, 2016). Instead of using lecture time to impart knowledge to students, teachers can interact with their classes through different learning activities including problem-solving, discussion, and collaboration, hands-on activities, and guidance. These days, schools and colleges all around the world have adopted the flipped classroom idea in a wide range of subject areas, including math, the social sciences, and the humanities (Hao, 2016).

According to O'Flaherty and Phillips (2015), there is a possibility that students will find the flipped technique more satisfactory and cost-effective than traditional training. Nevertheless, difficulties may arise from the longer time needed to restructure the course as a flipped classroom and the consequent inability of certain students to plan their time well in order to understand the material covered outside of class (Lai & Hwang, 2016).

Theoretical Background

The flipped classroom model, originating from constructivist learning theory, is grounded in the notion that individuals actively construct their own understanding and knowledge. According to constructivist theory, learners are not passive recipients of information but rather engage in an active process of making sense of new information by integrating it with their existing knowledge and experiences. (Bruner, 1960) This theory emphasizes the importance of students being actively engaged in their learning process, as they construct meaning through various learning activities. By engaging students in activities that require them to think critically, problem-solve, and apply their knowledge, the flipped classroom aligns with the principles of constructivist learning theory. (Vygotsky, 1978)

Moreover, the flipped classroom model also draws on the principles of active learning, which emphasize the importance of engaging students in activities that promote deeper understanding and retention of material. (Bonwell & Eison, 1991) In the flipped classroom, students are actively engaged in pre-class activities, such as watching instructional videos, reading, or completing online exercises, which prepares them for more interactive and collaborative activities during class time. This approach enables students to engage with the material multiple times and in various formats, reinforcing their understanding and retention. (Freeman et al., 2014).

Furthermore, the flipped classroom model leverages the affordances of technology and online learning to facilitate the delivery of instructional content and engage students in active learning. The availability of online platforms and tools enables educators to create and distribute instructional materials, such as videos, readings, and quizzes, and for students to access and engage with these materials at their own pace and on their own schedule. (EDUCAUSE, 2012) This flexibility allows students to take control of their learning process and engage with the material in a way that best suits their needs and preferences.

The flipped classroom model is grounded in constructivist learning theory, active learning principles, and the affordances of technology and online learning. By engaging students in active, self-directed learning activities outside of class and using class time for more interactive and collaborative learning experiences, the flipped classroom model aims to promote deeper understanding and retention of material.

Apply the idea of "flipped classrooms" to teach software engineering (programming), particularly in the field of adult education:

To effectively utilize the flipped classroom model in adult education for learning programming, educators should follow a structured approach. This begins with the creation of high-quality, engaging pre-class materials such as video lectures, interactive tutorials, or readings. These resources should be easily accessible and catered to the specific needs of adult learners, taking into account their diverse backgrounds and prior knowledge. (Laurillard, 2002). In the adult education sector, it is also essential to provide ample opportunities for active learning and practice. This could involve incorporating hands-on coding exercises, real-world projects, or collaborative problem-solving activities into the in-class sessions. Adult learners benefit from this approach as it allows them to apply theoretical knowledge to practical scenarios, which is

particularly important in the context of programming education. (Bransford et al., 2000). Furthermore, educators should promote interaction and discussion among students, both online and in person. Creating a supportive learning community where adult learners can share their experiences, ask questions, and collaborate fosters a positive and engaging learning environment. This collaborative approach aligns with the principles of the flipped classroom model, which emphasizes peer-to-peer learning and active participation. (Vygotsky, 1978). By leveraging the principles of the flipped classroom model, educators can enhance the learning experience for adult learners in programming education. Providing high-quality pre-class materials, promoting active learning and practice, and fostering a collaborative learning environment are key components of a successful flipped classroom approach in the adult education sector. As educators continue to explore innovative instructional methods, it is essential to consider the unique needs and preferences of adult learners and to tailor the approach accordingly. (Laurillard, 2002) (Bransford et al., 2000) (Vygotsky, 1978).

Apply the idea of flipped classrooms to distance learning:
Implementing a flipped classroom model in distance learning involves careful planning and the strategic use of technology to facilitate asynchronous learning activities. One key element is to create high-quality pre-recorded lectures or instructional videos, which students can access at their convenience (Bergmann & Sams, 2012). These resources should be engaging and interactive, incorporating quizzes, assessments, or simulations to encourage active learning and assess understanding (Bishop & Verleger, 2013). Additionally, instructors can use online discussion forums, collaborative platforms, or virtual office hours to facilitate peer-to-peer learning and provide individualized support (Bergmann & Sams, 2012). To address the challenge of technology proficiency among adult learners, it is essential to provide clear instructions and technical support, as well as alternative formats for accessing materials (e.g., transcripts for videos, downloadable PDFs) (Bishop & Verleger, 2013). Overall, successful implementation of a flipped classroom model in distance learning requires a thoughtful blend of instructional design, technology integration, and ongoing support for learners (Strayer, 2012).

Difference between Traditional classroom and Flipped classroom:
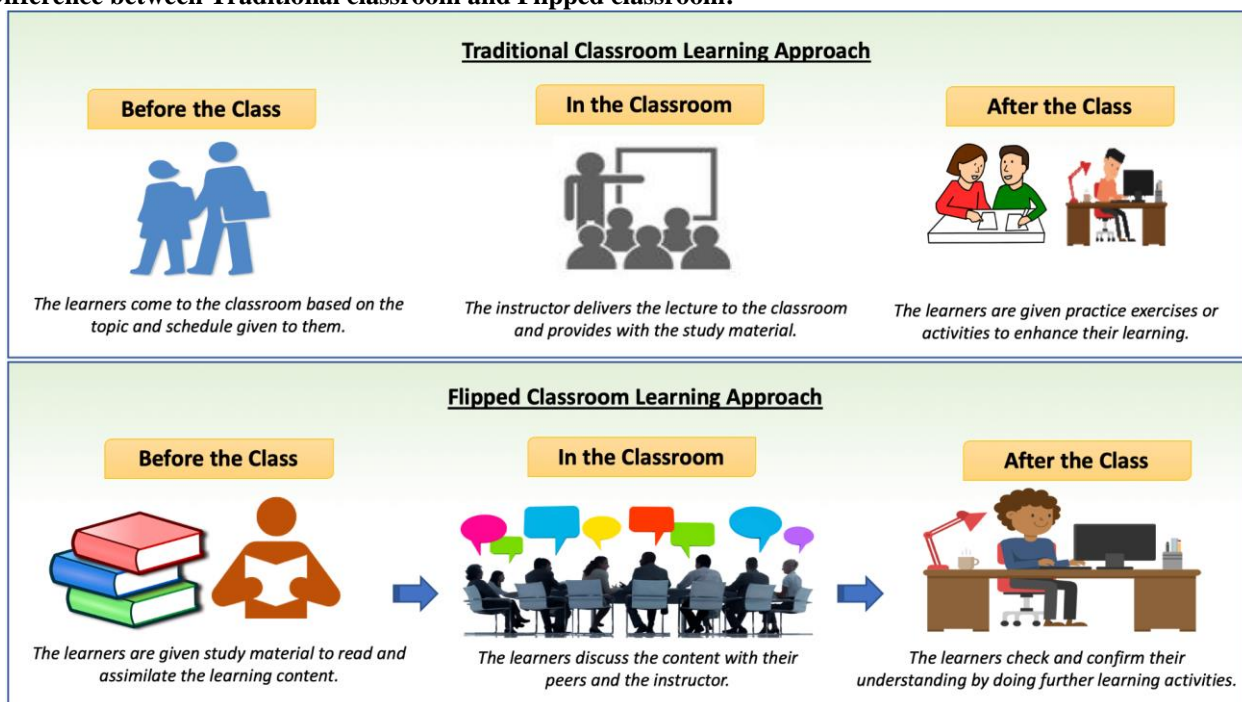
(Source: designinginstructionwithk.com)

The advantages and disadvantages of this concept in flipped classroom
Advantages of the Flipped Classroom Model
1. Flexibility: The flipped classroom model, as outlined by Brame (2013), offers adult learners the advantage of flexibility in their learning experience. With access to course materials and lectures at their convenience, students can navigate their educational journey based on their individual schedules and time zones. This approach fosters a more inclusive learning environment, catering to the diverse needs of adult learners who may be balancing work, family, and other responsibilities. By allowing learners to engage with materials on their own time, the flipped classroom encourages greater autonomy and self-direction in their learning process, ultimately enhancing the overall educational experience.

2. Personalized Learning: Personalized learning in the flipped classroom model allows for individualized pacing, catering to the varied needs and abilities of adult learners. Students can review material as necessary, reinforcing understanding and addressing specific challenges. Furthermore, those who have already mastered certain concepts can bypass these sections, optimizing their use of time and focusing on areas that require more attention. This flexibility enhances student engagement and encourages active participation, contributing to deeper learning and improved outcomes. The opportunity

for personalized learning aligns with constructivist learning theory, which emphasizes learners' active involvement in constructing their understanding of the material, fostering a more meaningful and lasting educational experience (Bruner, 1960; Vygotsky, 1978).

3. Active Learning: The concept of active learning has been a cornerstone of modern educational methodologies, aiming to shift the focus from passive consumption to active participation. This approach, advocated by researchers like Bonwell and Eison (1991), promotes a more engaging and interactive classroom experience. In the context of the flipped classroom model, active learning is particularly emphasized. Students are encouraged to engage with course content before attending class, typically through online lectures, readings, or interactive activities. This pre-class engagement not only primes students for more meaningful in-class discussions but also allows them to take charge of their learning experience and explore topics at their own pace.

4. Increased Interaction: The flipped classroom model optimizes classroom time for interaction and engagement. By having students familiarize themselves with the content before class through online lectures or readings, instructors can use classroom sessions for more in-depth discussions, problem-solving activities, and collaborative projects. This active engagement with the material and peers fosters a deeper understanding of concepts, as students have the opportunity to apply what they've learned and receive real-time feedback from instructors and peers. This not only enhances retention but also promotes critical thinking and analytical skills, essential in programming education. (Chen et al., 2014).

5. Immediate Feedback: In the flipped classroom, students engage with pre-class materials, often incorporating interactive elements, such as quizzes or activities, that provide immediate feedback. This instant feedback allows students to assess their understanding of the material and adjust their learning strategies accordingly. For instance, if a student answers a quiz question incorrectly, they can review the related content before class. Conversely, if they answer correctly, they may feel more confident in their understanding and be better prepared for in-class discussions. This real-time feedback mechanism helps students become more self-aware of their learning progress and promotes active engagement with the material. (Strayer, 2012).

6. Accessibility: The accessibility of materials in a flipped classroom is a key advantage, facilitating the integration of the most recent information and resources. This aspect of the model is particularly advantageous in rapidly-evolving fields such as programming, where staying current with technological advancements is critical. With the ease of updating materials, instructors can ensure that learners have access to the latest information, tools, and techniques. This ensures that learners are better prepared for the real-world application of programming skills and fosters a more engaging and relevant learning experience. The up-to-date nature of the materials also aligns with the demands of the modern workforce, where staying current is paramount to success. (Strayer, 2012).

7. Cost-Efficiency: The cost-efficiency of the flipped classroom model arises from the reduced need for physical materials such as textbooks, handouts, and other print resources. Instead, digital materials like online lectures, readings, and interactive quizzes can be easily created and distributed at a fraction of the cost. Moreover, the digital format allows for easy updates and revisions, eliminating the expense of reprinting materials. Additionally, the use of online platforms and tools can streamline administrative tasks, reducing administrative costs associated with traditional classrooms. Overall, the flipped classroom's reliance on digital resources results in significant cost savings compared to traditional classrooms (Brame, 2013).

8. Adaptable to Various Learning Styles: The flipped classroom model can be tailored to cater to diverse learning styles, fostering a more inclusive and effective learning environment. Visual learners can benefit from video lectures and multimedia resources, while auditory learners may prefer audio recordings or podcasts. Kinesthetic learners, on the other hand, can engage with hands-on activities or simulations. This adaptability ensures that all learners, regardless of their preferred learning style, can engage with the material in a way that resonates with them, promoting a deeper understanding and retention of concepts (Zhang et al., 2006). .

Disadvantages of the Flipped Classroom Model
1. Technology Reliance: The reliance on technology in the flipped classroom model can present a significant challenge, particularly for adult learners who may not be as comfortable or proficient with online tools. This reliance can create a barrier to entry for some learners, potentially hindering their ability to access and engage with course materials. Additionally, the use of technology may require additional training and support, which can further complicate the learning process for adult learners. As educators implement the flipped classroom model, it is essential to consider the digital literacy skills of adult learners and provide appropriate resources and support to ensure their success in the program. (Brame, 2013).

2. Increased Workload: The flipped classroom's increased workload stems from pre-class engagement with materials, which can be particularly demanding for adult learners managing multiple responsibilities. Unlike traditional classrooms, where lectures happen during class time, in a flipped classroom, learners are required to complete pre-class assignments, such as watching lectures or reading materials, independently. This requires proactive time management and commitment, which can be challenging for adults balancing work, family, and other commitments. Consequently, the flipped classroom

model's increased workload can potentially strain time and energy resources, potentially leading to disengagement or reduced performance for some adult learners. (Strayer, 2007).

3. *Learning Style Mismatch:* The flipped classroom model, while effective for many, may not align with the learning preferences of all students. This potential mismatch with different learning styles could lead to disparities in learning outcomes. For instance, learners who thrive in structured, teacher-centered environments may struggle with the self-directed, independent learning style emphasized in the flipped classroom. Additionally, those who prefer auditory or kinesthetic learning might find the primarily visual and text-based nature of pre-class materials less engaging. Such disparities could result in varied levels of engagement, comprehension, and ultimately, learning outcomes. It is vital for educators to consider individual learning styles and provide diverse approaches to accommodate a broader range of learners within the flipped classroom model. (Zhang et al., 2006).

4. *Potential for Disengagement:* Some students may become disengaged from the flipped classroom model if they perceive a lack of support or motivation to complete pre-class assignments. This could result from various factors, such as unclear instructions, a lack of perceived relevance of the material, or insufficient feedback on their progress. To mitigate this risk, educators should provide clear expectations, offer support and resources, and actively engage with students to ensure they feel valued and motivated to participate in the flipped learning activities. Building a sense of community and fostering a positive learning environment can also help to prevent disengagement and promote student success in the flipped classroom. (Tucker, 2012).

5. *Unequal Access to Resources:* Incorporating technology into the flipped classroom model can unintentionally widen the digital divide, as not all students have equal access to technology and digital literacy skills. This disparity in access to resources can create an uneven playing field where some students are at a disadvantage due to their limited access to technology and online materials. As a result, educators need to be mindful of these inequalities and work to provide alternative means of accessing materials for students who may not have reliable internet access or digital devices. This ensures that all students can fully engage with the flipped classroom model and benefit from its advantages. (Brame, 2013).

6. *Risk of Overloading Content:* In the flipped classroom model, there is a potential risk of overloading students with an excessive amount of pre-class content. This can lead to cognitive overload, where students may feel overwhelmed by the sheer volume of material they are expected to engage with. As a result, they may struggle to retain and comprehend the information effectively. To mitigate this risk, educators must carefully curate and sequence the pre-class content, ensuring that it is manageable and aligns with the learning objectives. Additionally, incorporating interactive elements and providing ample opportunities for reflection and application can help to reinforce learning and prevent cognitive overload. (Tucker, 2012).

7. *Dependence on Student Self-Motivation:* The success of the flipped classroom model heavily depends on the self-motivation of students to engage with pre-class materials. Unlike traditional classrooms where instruction is primarily delivered during class time, the flipped model requires students to take the initiative to review and understand concepts beforehand. This necessitates a proactive attitude and a strong intrinsic motivation to learn. Students who lack self-motivation may struggle to keep up with the pace of the course, potentially leading to frustration and disengagement. Educators implementing the flipped classroom must provide support and encouragement to help students develop effective self-motivation strategies and enhance their learning experience. (Zhang et al., 2006).

8. *Difficulty in Measuring Engagement:* Assessing student engagement with pre-class materials in a flipped classroom can be challenging due to the lack of face-to-face interaction and immediate feedback. Unlike traditional classrooms where instructors can gauge engagement through observation and questioning, the flipped classroom relies heavily on students' self-reporting or responses to online quizzes, which may not accurately reflect their understanding. Moreover, some students may simply go through the motions without truly engaging with the content. This difficulty in measuring engagement can hinder instructors' ability to provide timely and targeted feedback and adapt instruction to students' needs, potentially compromising the effectiveness of the flipped classroom model. (Chen et al., 2014).

Conclusion
The flipped classroom model, while holding promise for optimizing learning experiences, comes with a set of advantages and challenges. On one hand, it offers flexibility, personalized learning, and active engagement, fostering a deeper understanding of concepts and promoting collaboration among students. These aspects align with constructivist and active learning theories, which emphasize the importance of students' active involvement in their learning process. On the other hand, the model requires careful consideration of technology reliance, potential learning style mismatches, and the risk of overloading students with content. Moreover, assessing engagement and providing timely feedback can be challenging in the absence of traditional face-to-face interactions. In the context of adult education, especially for programming learning via distance education, the flipped classroom model has the potential to provide learners with greater autonomy and engagement. However, it demands a strategic approach that accommodates diverse learning needs and ensures equal access to technology and resources. Educators must be mindful of the implications of the flipped classroom model on adult learners, balancing the benefits of flexibility and engagement with the challenges of technology dependence and

workload management. Overall, the flipped classroom model offers a valuable pedagogical approach that can enhance learning outcomes when thoughtfully implemented. It requires collaboration among educators, administrators, and learners to create an environment that supports active engagement, fosters a sense of community, and promotes lifelong learning. By leveraging the theoretical underpinnings of constructivism and active learning, educators can optimize the flipped classroom model to cater to the unique needs of adult learners and provide a transformative educational experience.

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