Flipped Classroom and Blended Learning: How Do They Affect Design Students'
Learning Motivation in the Post-pandemic Era?

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Abstract
In the post-pandemic era, education has significantly transformed, moving from traditional face-to-face teaching to blended learning, which combines online and offline methods. Online education has emerged as a flexible and accessible alternative, especially during extraordinary circumstances such as pandemics. This shift has increased the demand for student-centered blended learning methodologies to address the limitations of conventional educational systems. The flipped classroom approach, a form of blended learning, is widely recognized in higher education as an effective pedagogical strategy. However, there is a lack of comprehensive tools to assess the motivation of design students in flipped classrooms. This study aims to investigate the factors influencing the motivation of design students in flipped classrooms and to develop a motivation scale for this purpose. The research aims to explore the factors affecting design students' motivation in a blended learning environment, with a particular focus on flipped classrooms. Our objective is to develop a reliable and validated motivation scale to assess the motivation of design students in such settings. This scale will aid in evaluating and enhancing the effectiveness of flipped classroom pedagogy within design education.

Keywords: Flipped Classroom, Blended Learning, Design Education, Motivation

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Introduction

As for design students, learning motivation is crucial in flipped classrooms. In the post-pandemic era, education is embracing a new opportunity for intelligent transformation, with teaching modes gradually evolving from traditional offline classroom instruction to blended learning combining offline and online methods (Zhang, 2023). In extreme situations like pandemics, students quickly adapt to online learning, which may permanently alter Learning Delivery Models (LDM)(Lockee, 2021). Previously, design in higher education hardly used blended learning modes but studio-based learning because design education focuses on 'hands-on' and 'learning by doing' modes. Therefore, in the past, design education adopts face-to-face teaching methods, allowing students to acquire knowledge and experience from design assignments. As a result, design students may find it challenging to get used to the learning mode of blended learning, which may increase the extra learning load of design students. However, during the pandemic, the traditional face-to-face Learning Delivery Model (LDM) was not feasible, while online learning was compulsory. However, the pandemic made traditional face-to-face LDM impractical, necessitating a shift to online learning. This transition was supported by the flexibility and accessibility of online education (Zhu et al., 2020; Lockee, 2021). As online learning technologies advanced post-pandemic, design students became more accustomed to online learning, leading to higher education institutions in design being more open to blended learning. Although design education is returning to face-to-face learning post-pandemic, online learning elements are retained, which sets the stage for the implementation of blended learning and flipped classroom models in design education.

Previous studies have identified challenges faced by design students in blended learning environments, such as diminished motivation for online learning and difficulties adapting to the flipped classroom model (Gedera et al., 2015; Shapiro et al., 2017). Despite these challenges, the flipped classroom has the potential to boost motivation if tailored to the unique educational needs of design students. This study aims to explore factors influencing design students' motivation in the post-pandemic era by integrating flipped classroom and blended learning models, thereby addressing gaps in existing research.

Learning Model in Design Education

Design students, who traditionally engage in studio-based, hands-on learning, may face unique challenges when transitioning to a flipped classroom model. Understanding the learning model and factors influencing design students' motivation in this novel learning environment is essential for optimizing the effectiveness of flipped classrooms in design education.

Traditional Learning Model of Design Education

Although "learning by doing" has long been recognized as a fundamental approach in design education, there remains little consensus on its application in contemporary design courses. This is due to the shift from traditional offline courses to blended learning models, including innovative approaches like the flipped classroom. The learning process for design students is distinct from that of general students; for instance, design instructors often guide beginners through personal experiences and insights (Curry, 2014; Uluoglu, 2000, pp. 34–36). In this context, novice design students must develop their own understanding of implicit design knowledge. Dooren et al. (2014) propose that instructors assist students in clarifying the

design process, such as learning through doing and comprehending the process of learning through doing. However, specific design teaching methods need to be systematized to align with modern educational models, which will also influence students' motivation to engage in practical learning.

In this study, we have clarified the traditional design education model and the integration of the flipped classroom with a blended learning model. Currently, design education courses can be categorized into four types (Demirbas & Demirkan, 2007, p. 346):
    (1) Foundation courses, which primarily involve theoretical knowledge;
    (2) Technical courses, which include both theoretical and practical knowledge;
    (3) Art courses, which emphasize the presentation and expression of design concepts;
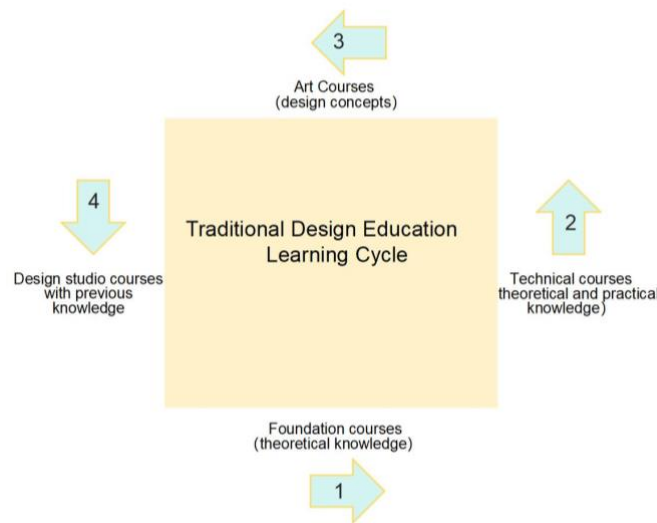   (4) Design studio courses, which integrate knowledge from the previous three categories.

Figure 1: Traditional Learning Mode in Design Education

Flipped Classroom Learning Model of Design Education

Design education is distinct from other disciplines as it emphasizes "learning by doing," with studio-based courses playing a central role. In design projects, students engage in continuous dialogue with peers and instructors, receiving feedback through critiques and iterative design processes (Demirbas & Demirkan, 2007). Flipped classrooms enable students to use class time for more interactive and collaborative activities by shifting part of the knowledge transfer to online learning before class. Blended learning combines online and offline teaching to create a more flexible teaching environment. Thus, blended learning in flipped classrooms (BLF) aligns well with the "learning by doing" approach, making it highly suitable for design education. Compared to traditional design education, BLF follows a three-step cycle:
    (1) Before class, students watch video lectures on basic design knowledge.
    (2) In class, the teacher delivers short lectures or presentations on design software and tools.
    (3) In class, students have increased practice time for projects or assignments to enhance their design skills, with the teacher acting as a facilitator.

Students typically acquire different types of knowledge through these methods, with theoretical knowledge often obtained online, while practical technical and artistic expression

courses are completed offline. However, the impact of the flipped classroom format on the learning motivation of design students requires further research and analysis based on actual circumstances.
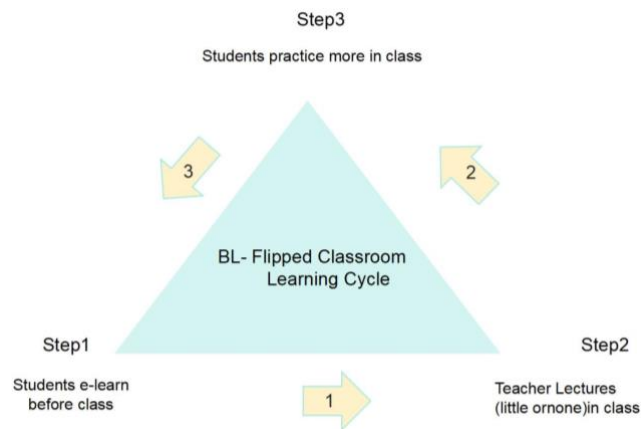

Figure 2: BL-Flipped Classroom Learning Mode in Design Education

Research Objectives

In design education, the integration of new educational environments and technology presents additional challenges to learning delivery modes, making students' learning motivation a crucial concern in the flipped classroom. To date, no research has examined the impact of flipped classroom teaching methods on the learning motivation of design students within a blended learning context. This study aims to explore the factors influencing the learning motivation of design students in flipped classrooms and to develop a reliable scale for measuring this motivation in the post-pandemic era.

Theoretical Framework

In this study, Self-Determination Theory (SDT), Expectancy Theory and Situational Motivation Theory (SMT) serve as the theoretical foundation for examining student motivation in various teaching and learning modes. According to SDT, student motivation is shaped by how well their environment meets their needs for competence, autonomy, and relatedness (Deci & Ryan, 2015). Conversely, Expectancy Theory posits that student motivation is determined by their expectations of success and the value they assign to achieving specific outcomes (Vroom, 1964).

Self-Determination Theory in Design Education

Self-Determination Theory (SDT), proposed by Deci and Ryan (1985), is a motivation theory that has significantly influenced over 200 empirical studies in educational research (Guay et al., 2008). It offers a valuable framework for understanding the flipped classroom approach. SDT emphasizes that students' motivation levels are shaped by their learning environments, which can either facilitate or hinder the fulfillment of their basic psychological needs (Deci & Ryan, 2008). Motivation plays a crucial role in the effectiveness of any educational method. According to SDT, motivation can be intrinsic—driven by interest in the learning activity— or extrinsic—driven by external rewards or pressures (Ryan & Deci, 2000). The theory posits that fulfilling three basic psychological needs—competence, autonomy, and relatedness—is essential for fostering intrinsic motivation.

In flipped classrooms, students' motivation is influenced by their ability to manage the online self-study component and engage in the interactive, face-to-face sessions. Research indicates that motivation is often higher in flipped classrooms compared to traditional methods, as students have more control over their learning (Chou et al., 2021; Lin et al., 2018). However, challenges such as lack of motivation for online self-study and insufficient in-class engagement remain significant obstacles (Gedera et al., 2015).

Consequently, students are expected to assume greater responsibility for their learning, especially in the online self-study component. This autonomy can enhance intrinsic motivation if students feel competent and supported. Conversely, if students struggle with self-study, their motivation may decline, leading to disengagement.

Expectancy Theory in Design Education

Expectancy Theory (Vroom, 1964) is frequently employed to elucidate individual motivation and is extensively applied in education to comprehend students' motivational processes in learning (Geiger & Cooper, 2024). The theory posits that individual behavior is contingent upon their expectations of the outcomes of a particular behavior and the attractiveness of these outcomes (valence). Through Expectancy Theory, we can examine how design students perceive the value of learning tasks and their anticipated success in educational settings, thereby informing instructional design and enhancing students' learning motivation (Min et al., 2020).

In education, Expectancy Theory is widely utilized to explicate students' learning behavior and motivation. Geiger and Cooper (2024) investigated accounting students' learning motivation through Vroom's Expectancy Theory, revealing a significant correlation between students' expectations for learning outcomes and their effort levels. For instance, design students frequently partake in project-based learning, where outcomes are unique and subjective. According to Expectancy Theory, students are more motivated if they believe their efforts will lead to success and that such success holds value. Research indicates that students' expectations for improved academic performance (e.g., higher GPA, better job performance, increased self-satisfaction) are primary motivational drivers. Similarly, Min et al. (2020) employed the Expectancy Theory model to analyze how students' expectations for learning outcomes influence their motivation. They found that students anticipating success are more likely to invest time and energy in their studies. This theory has been effectively applied to studying student motivation across various disciplines, providing a theoretical foundation for exploring flipped classrooms and blended learning models in design education.

Situational Motivation Theory in Design Education

Situational Motivation Theory (SMT), developed by Deci and Ryan, builds on Self-Determination Theory (SDT) by emphasizing that motivation is dynamic and influenced by specific situational factors. Unlike the traditional static concept of motivation, SMT examines how individuals mobilize and sustain learning motivation in particular contexts. In educational settings, SMT is especially useful for examining how to stimulate students' interest and participation by designing an engaging learning environment.

In design education, students' learning motivation is crucial because design courses typically require students to maintain high levels of initiative and commitment in solving complex

problems, engaging in creative thinking, and participating in interdisciplinary collaboration. Recently, with the rise of blended learning and flipped classroom models, researchers have focused on how these innovative teaching methods impact students' motivation through situational factors. Simultaneously, the post-pandemic design education environment has undergone significant changes. Zhan et al. (2022) found that motivation levels in a blended learning environment are closely linked to situational factors, especially in design courses. The combination of online and offline models enhances students' participation and autonomy.

Winarno (2020) noted that blended learning and flipped classroom models offer students greater flexibility, particularly in design courses, where students can present projects, receive feedback, and make revisions via online platforms. This flexibility greatly stimulates student motivation. However, Rotgans and Schmidt (2014) caution that situational motivation may diminish as task familiarity decreases. Therefore, in design education, instructors must continually update task content and challenge levels. For instance, they can enhance the learning experience by providing diverse resources and flexible learning schedules, thereby increasing student motivation.

Learning Motivation Scale for Design Students

Based on the theoretical framework (Fig.3), this paper presents a literature review on the motivation of students designed to learn in flipped classrooms and blended learning models, with a focus on the impact of these instructional modes on student learning motivation in the post-epidemic period.
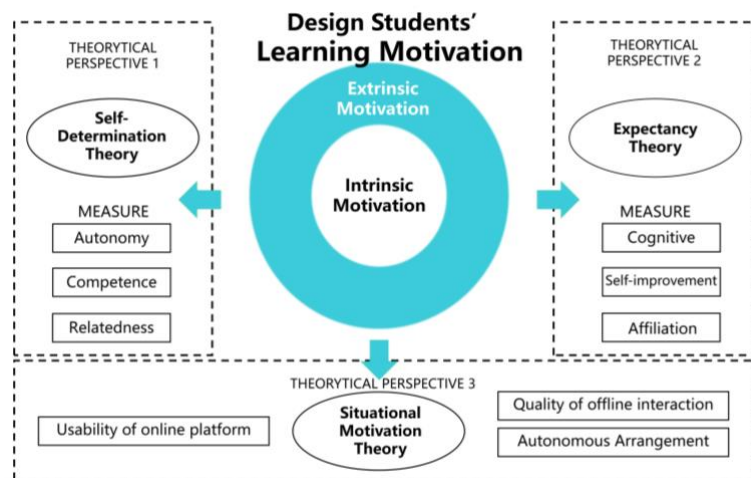

Figure 3: Theoretical Framework of Design Students' Learning Motivation

Existing research primarily focuses on general student populations, with limited in-depth studies on design students. Furthermore, the existing literature often exhibits methodological limitations, relying heavily on questionnaires without incorporating targeted student motivation scales. This study aims to develop a learning motivation scale tailored for design students in the post-epidemic era, incorporating insights from self-determination theory (SDT), expectancy theory, and situational motivation theory. The scale employs a five-point Likert rating method, with questions spanning four dimensions: basic information, self-determination motivation factors, expectancy theory motivation factors, and situational motivation factors.

The basic information dimension includes students' current year of study and primary design specialization, such as graphic design, interior design, industrial design, fashion design, and others.

Self-determination motivation factors are divided into three components: competence, autonomy, and relatedness.

Competence refers to students' confidence in their ability to complete design tasks in flipped classrooms and their belief in possessing the necessary skills to excel. This foundation enables students to effectively navigate challenges in both online and offline courses.

Autonomy allows students to learn at their own pace, aligning their actions with personal interests and values. This enhances intrinsic motivation, leading to greater engagement and persistence. In autonomy-supportive environments, such as offline courses, instructors encourage student choice, provide meaningful rationales for tasks, and acknowledge students' feelings and perspectives.

Relatedness involves a sense of belonging and connection with classmates, peers, and the school community. This connection fosters intrinsic motivation and engagement, making students feel valued and supported. In-person courses can enhance relatedness through a welcoming classroom environment, while online courses can promote collaboration and interaction by fostering a caring attitude towards students.

According to Expectancy Theory, a student's effort is influenced by their expectations regarding learning outcomes (expectancy value E) and their preference for these outcomes (goal valence V). This theory facilitates the measurement of students' expectations and goal valence, providing insights into their learning motivation.

Cognitive drive, exemplified by statements like "I am highly interested in the design content taught in the flipped classroom," indicates students' intrinsic interest and pursuit of learning, representing goal valence.

Self-improvement motivation, illustrated by statements such as "I believe that my efforts in the flipped classroom will lead to improved academic performance," reflects students' aspirations for future achievements. These aspirations, such as the desire to secure a good job, motivate students to exert effort in their studies. In design education, students may focus more on their design projects, as seen in sentiments like "The outcomes of design projects in the flipped classroom are important to me."

Affiliation drive, indicated by statements like "I am motivated to learn in the flipped classroom to achieve better grades and a sense of accomplishment," reflects students' desire for external rewards, such as recognition from parents and teachers, which can further motivate them to work diligently.

In a blended learning environment, the motivation of design students is influenced by various situational factors, including the presentation of online content, the interactivity of offline teaching activities, and the autonomous arrangement of tasks.

Usability of the online platform, such as technical support provided in the flipped classroom through instructional videos and online platforms, enhances learning. The stability and ease

of use of the online learning platform are crucial components of the blended learning model, directly impacting students' learning experience and motivation. Additionally, the richness and quality of online learning resources significantly influence students' motivation in online learning; rich and high-quality resources can stimulate students' interest and motivation.

Quality of offline interaction, including teacher-student and student-student interactions, positively affects motivation in the flipped classroom. Effective teacher guidance and student interaction in offline classes are essential for enhancing students' motivation and learning outcomes.

Autonomous arrangements, such as homework and assessment methods in the flipped classroom, are critical factors influencing students' motivation. Well-designed and scientific homework and assessment methods can stimulate students' motivation and enthusiasm for learning.

Table 1: Scale of Design Students' Learning Motivation

Theory	Aspects of the Theory	Sample Questions
Self-Determination Theory (SDT)	Competence	"I am confident in my ability to complete design tasks in the flipped classroom." "I believe I possess the necessary skills to excel in the flipped classroom."
	Autonomy	"The flipped classroom allows me to learn at my own pace." "In offline courses, teachers provide an autonomy-supportive environment that encourages my choices and perspectives."
	Relatedness	"I feel a sense of belonging and connection with my classmates in the flipped classroom." "The classroom environment makes me feel valued and supported."
Expectancy Theory	Cognitive	"I am highly interested in the design content taught in the flipped classroom." "I enjoy learning about design and find it intrinsically motivating."
	Self-Improvement	"I believe that my efforts in the flipped classroom will lead to improved academic performance." "I study hard in design because I want to achieve my future goals (e.g., finding a good job)."
	Affiliation	"I am motivated to learn in the flipped classroom to achieve better grades and a sense of accomplishment." "External rewards (e.g., class rewards, recognition from teachers) motivate me to work harder in design."
Situational Motivation Theory	Usability of Online Platform	"The technical support provided in the flipped classroom (instructional videos, online platforms) enhances my learning." "The online learning resources are rich and high-quality, which stimulates my interest in learning."
	Quality of Offline Interaction	"The quality of teacher-student and student-student interactions in the flipped classroom positively influences my motivation." "Good teacher guidance and student cooperation enhance my learning experience."
	Autonomous Arrangement	"I think the homework and assessment methods of the flipped classroom can stimulate my learning motivation." "Reasonable and scientific homework and assessment methods make me more engaged in learning."

Conclusion

This research contributes to the existing studies on flipped classrooms and blended learning by addressing the specific needs of design students. The study introduces a comprehensive scale to assess students' learning motivation and expectations in post-pandemic flipped classrooms with blended learning, presented in a Likert scale format. The scale includes basic information such as grade and major, alongside questions related to self-determination motivation factors, expectancy theory motivation factors, and situational motivation theory. It considers the learning scenarios of blended learning (both online and offline) and the flipped classroom learning mode.

By utilizing and analyzing this scale, educators can gain valuable insights to enhance instructional design and implementation strategies in flipped classrooms, ultimately improving students' learning outcomes and satisfaction. The study's findings offer practical implications for design educators aiming to effectively implement flipped classrooms.

Although this study provides valuable insights into the motivational factors affecting design students, its scope is limited to a specific student group. Future research should explore the generalizability of these factors across different disciplines, investigate the long-term impact of flipped classrooms on students' motivation and performance, and develop strategies for enhancing long-term learning motivation through optimized instructional design in design education, thereby improving the overall effectiveness of design education.

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