INTERNATIONAL JOURNAL OF SOCIAL SCIENCES BULLETIN
ISSN: (E) 3007-1917 (P) 3007-1909
Volume 3, Issue 7, 2025

INVESTIGATING THE IMPACT OF FLIPPED LEARNING PEDAGOGY ON STUDENT ENGAGEMENT AND SELF-DIRECTED LEARNING COMPETENCIES AMONG 10TH GRADE STUDENTS

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DOI: https://doi.org/10.5281/zenodo.17004085

Received	Revised	Accepted	Published
29 April, 2025	10 June, 2025	10 July, 2025	29 July, 2025

ABSTRACT

This study examined how 10th-grade students' self-directed learning competencies and level of engagement were affected by the flipped learning pedagogy. Sixty students were split equally into experimental (flipped) and control (traditional) groups using a pre-test–post-test control group design. While the control group received lecture-based instruction, students in the flipped condition accessed instructional materials prior to class and participated in interactive, group activities during lessons. Validated self-report measures were used to gather information on self-management and self-monitoring, as well as behavioral, emotional, and cognitive engagement. Significant differences in favor of the flipped learning group were found across all variables. Compared to their peers in the traditional classroom, students who were taught using flipped pedagogy reported greater engagement, improved self-monitoring, and stronger self-management. These results are consistent with earlier studies that found flipped classrooms promote learner autonomy, metacognitive regulation, and active learning. According to the study's findings, flipped pedagogy provides a more successful framework for encouraging student participation and independent study in secondary school.

INTRODUCTION

Pedagogical innovation is still essential in the quickly changing educational landscape to engage students and get them ready for the demands of a world that is becoming more complex. The flipped learning pedagogy, which moves direct content instruction outside of the classroom and devotes in-class time to interactive, learner-centered activities, has become increasingly popular among instructional reforms (Tang, Wang, Blackwell, & Fong, 2020). For students in the tenth grade, who are making the shift from foundational to more independent and critical learning, this teaching approach has special potential (Fredricks, Blumenfeld, & Paris, 2004). However, because of the increasingly abstract nature of the material and the conflicting demands of both academics and personal lives, secondary school pupils frequently show signs of waning engagement (Skinner & Pitzer, 2012).

By encouraging active in-class participation through discussions, group projects, and problem-solving, flipped learning presents a viable solution that could increase students' commitment to learning (Bergmann & Sams, 2014). Critical lifelong skills are self-directed learning competencies, which include goal-setting, progress tracking, and independent strategy adaptation (Zimmerman, 2002). It is anticipated that adolescents in the tenth grade will move toward increased independence; flipped classrooms could offer them organized chances to practice planning, responsibility, and reflective learning. Emerging research in secondary contexts highlights flipped learning's potential to foster these competencies (Lo & Hew, 2019; Hung, 2015).

First, there aren't many studies that focus on cohorts in the tenth grade, which is a crucial developmental stage for encouraging independence and participation. Second, the flipped model needs to

look at how engagement and self-direction relate to one another, as they are frequently studied independently. Third, specific research is needed to understand the distinct cultural and pedagogical context of high school learning, which includes standardized curricula, larger class sizes, and adolescent developmental factors. By investigating the effects of flipped pedagogy on 10th grade students' self-directed learning competencies and student engagement in secondary school settings, this study aims to close these gaps. The study attempts to provide nuanced evidence on the potential of flipped learning to rekindle motivation and independence during a critical stage of schooling by combining quantitative measurement with qualitative insights from student reflections.

Literature Review

Overview and Relevance to Secondary Education

By using video or digital resources to deliver rerouting class time to active, collaborative tasks, flipped learning reconfigures traditional instruction (Bergmann & Sams, 2014). Constructivist theories, which support learner-centered, inquiry-driven activities, are in line with this design (Bishop & Verleger, 2013). Flipped learning can support differentiated pacing and meaningful interaction in secondary contexts, where issues with student diversity and engagement are common (Lo & Hew, 2019).

Participation in academic tasks is referred to as behavioral engagement; interest and enjoyment are considered emotional engagement (Fredricks et al., 2004). According to research, passive lecture techniques and a lack of relevance frequently cause secondary students to lose interest (Skinner & Pitzer, 2012). An alternative is provided by flipped classrooms, which devote class time to interactive exercises. When compared to traditional delivery, ninth and tenth graders in a flipped mathematics course showed better behavioral engagement (such as time-on-task) and emotional interest, according to Tang et al. (2020). Peer discussion and group problem-solving were praised by students, indicating that active class sessions were linked to engagement. In addition, Gan et al. (2022) investigated the use of flipped instruction in a high school science course and found increased cognitive engagement, as indicated by more in-depth inquiry and thoughtful journal writing. This suggests that active learning in the classroom fosters critical thinking and mental investment.

Self-Directed Learning

Teenagers make progress toward managing their own learning. Goal-setting, strategy application, self-evaluation, and flexibility are all components of self-directed learning (SDL) (Zimmerman, 2002). Lifelong learning and long-term academic resilience are linked to instructional strategies that foster these abilities (Deci & Ryan, 2000). Hung (2015) demonstrated that compared to their counterparts in traditional classes, Hong Kong secondary students in flipped English classrooms demonstrated greater levels of self-regulation, planning, and resource management. Strong evidence for SDL enhancement is also found in Lo and Hew's (2019) systematic review, which notes that flipped learning strengthens autonomy by encouraging students to take charge of their own pace, look for extra resources, and assess their own understanding prior to class.

Relationships Between Engagement and Self-Directed Learning

According to Reeve and Tseng (2011), self-directed learners are more likely to maintain their emotional and cognitive engagement, while engaged students are more likely to exercise greater autonomy. The active nature of flipped learning may stimulate both at the same time; while in-class activities maintain behavioral and emotional engagement, the preparation phase promotes planning and monitoring. This synergy is supported by research by Panadero, Alonso-Tapia, and Huertas (2014), which found that students who displayed higher SDL strategies also reported higher engagement in a blended secondary environment (similar to flipped design). Nevertheless, there is still a significant gap in the empirical research linking the two constructs in the flipped model at the secondary level.

Challenges of Flipped Learning

Flipped learning has promise, but there are challenges in putting it into practice in secondary schools. According to Jensen, Kummer, and Godoy (2015), some students are reluctant to take charge of their pre-class preparation, which causes them to lag behind in class activities. Time management issues and limited access to technology were identified as obstacles in Lo and Hew's (2019) review, particularly for underprivileged students. Additionally, teachers require assistance in managing in-class active learning, developing or curating interesting pre-class

materials, and revamping lesson plans—tasks that require time and resources that are frequently scarce in secondary schools (Turan & Akdag-Cimen, 2020).

While some environments may require scaffolding for learner autonomy, collectivist cultures may embrace group-oriented flipped tasks (Hao, 2016). Effectiveness is also influenced by subject matter; for example, STEM subjects frequently gain more from in-depth problem-solving in the classroom (Karabulut-Ilgu, Jaramillo, & Jahren, 2018), while the humanities may need modified collaborative formats. Results are significantly impacted by student preparedness, which includes digital literacy and time management abilities (Mok, 2023). To reduce resistance and progressively increase SDL, pre-intervention orientation sessions and instructions on how to handle pre-class assignments are frequently advised (Lai & Hwang, 2016).

There are several theoretical underpinnings for the flipped model:

❖ Flipped classrooms are an example of constructivism, which holds that students actively create knowledge by rearranging class time to facilitate group meaning-making (Vygotsky, 1978).

❖ According to Self-Determination Theory (SDT), relatedness, competence, and autonomy all contribute to intrinsic motivation (Deci & Ryan, 2000). Flipped learning fosters relatedness (through cooperative groups), competence (through in-class mastery tasks), and autonomy (self-paced pre-class learning).

❖ Self-efficacy and self-regulation are key components of the Social Cognitive Theory (Bandura, 1986). By managing pre-class assignments and reflecting on their learning, students gain self-regulation skills, and flipped formats support observational learning through video content and in-class modeling.

Objectives of the Study

1. To investigate the impact of flipped learning pedagogy on students' behavioral engagement among 10th-grade students.
2. To examine the effect of flipped learning pedagogy on students' emotional engagement.
3. To analyze the influence of flipped learning pedagogy on students' cognitive engagement.
4. To evaluate the effect of flipped learning pedagogy on students' self-management, as a dimension of self-directed learning.
5. To assess the impact of flipped learning pedagogy on students' self-monitoring, as a dimension of self-directed learning.
6. To determine the overall impact of flipped learning pedagogy on students' engagement and self-directed learning competencies compared to traditional teaching methods.

Null Hypotheses

- H01: There is no significant difference in behavioral engagement between students taught through flipped learning pedagogy and those taught through traditional learning methods.
- H02: There is no significant difference in emotional engagement between students taught through flipped learning pedagogy and those taught through traditional learning methods.
- H03: There is no significant difference in cognitive engagement between students taught through flipped learning pedagogy and those taught through traditional learning methods.
- H04: There is no significant difference in self-management between students taught through flipped learning pedagogy and those taught through traditional learning methods.
- H05: There is no significant difference in self-monitoring between students taught through flipped learning pedagogy and those taught through traditional learning methods.
- H06: There is no significant difference in overall engagement and self-directed learning between students taught through flipped learning pedagogy and those taught through traditional learning methods.

Methodology

This study used a pre-test–post-test control group approach and a quasi-experimental research design to investigate how flipped learning pedagogy affects 10th-grade students' self-directed learning competencies and student engagement. Purposive sampling was used to choose a sample of 60 students, who were then split into two groups: 30 were placed in the experimental group, which used flipped learning pedagogy, and 30 were placed in the control group, which used traditional teaching methods. Students in the experimental group received reading materials, videos, and digital resources as instructional content before class. After that, class time was devoted to application-based exercises, group problem-solving, and interactive discussions. Lessons were taught in the control

group using the traditional lecture-based approach, with no prior knowledge of the material. Validated self-developed questionnaire were used to gather information on self-directed learning (self-management and self-monitoring) and student engagement (behavioral, emotional, and cognitive) following the intervention.

Data analysis and results

Table 1

Investigating the Impact of Flipped Learning Pedagogy on Student' Behavioral Engagement (Aspect of Students' Engagement) Among 10th Grade Students

Comparison	Students	Mean	Std. Dev.	t- Value	Sig. Level
Flipped Learning Pedagogy	30	4.47	.34	6.07	.000
Traditional Learning Method	30	3.33	.97		

Compared to students in the traditional classroom (M = 3.33, SD = 0.97), students in the flipped classroom (M = 4.47, SD = 0.34) showed higher behavioral engagement. The flipped learning strategy increased behavioral engagement, as demonstrated by the independent samples t-test, which showed a significant effect of instructional method on engagement (t(58) = 6.07, p <.001). Additionally, compared to the traditional method, where students' engagement varied more widely, the flipped group's lower standard deviation indicates greater consistency in engagement levels. These results lend credence to the claim that flipped learning pedagogy increases classroom engagement and active student participation, which is consistent with the larger goal of encouraging student engagement and developing self-directed learning skills.

Table 2

Investigating the Impact of Flipped Learning Pedagogy on Student' Emotional Engagement (Aspect of Students' Engagement) Among 10th Grade Students

Comparison	Students	Mean	Std. Dev.	t- Value	Sig. Level
Flipped Learning Pedagogy	30	4.47	.38	4.80	.000
Traditional Learning Method	30	3.45	1.09		

Students' emotional engagement with the flipped learning pedagogy group differed significantly from that of the traditional learning method group, according to the results shown in Table 2. When compared to students who were taught using the traditional method (M = 3.45, SD = 1.09), those who were taught using flipped learning reported higher emotional engagement (M = 4.47, SD = 0.38). This difference was statistically (t(58) = 4.80, p <.001). While the traditional group showed more variability in emotional responses, the flipped group's comparatively low standard deviation indicates that students' emotional engagement was continuously high. These findings imply that students' emotional attachment, interest, and positive attitudes toward learning are strengthened by flipped learning pedagogy. The wider advantages of flipped pedagogy for developing student engagement and self-directed learning competencies may be reinforced by this increased emotional engagement, which may also lead to increased motivation and a willingness to actively participate in class activities.

Table 3

Investigating the Impact of Flipped Learning Pedagogy on Student' Cognitive Engagement (Aspect of Students' Engagement) Among 10th Grade Students

Comparison	Students	Mean	Std. Dev.	t- Value	Sig. Level
Flipped Learning Pedagogy	30	4.43	.40	12.53	.000
Traditional Learning Method	30	2.49	.74		

Students who were taught using flipped learning pedagogy showed a highly significant difference in their cognitive engagement, according to the results in Table 3. Compared to students in the traditional classroom (M = 2.49, SD = 0.74), those in the flipped classroom reported significantly higher levels of cognitive engagement (M = 4.43, SD = 0.40). This difference was statistically significant (t(58) = 12.53, p <.001). While the higher variation in the traditional group suggests that students' levels of engagement are uneven, the lower standard deviation in the flipped group suggests consistent levels of cognitive engagement. When compared to traditional instruction, these results imply that flipped learning pedagogy greatly increases students' commitment to critical thinking, problem-solving, and deep learning. Because sustained intellectual effort, higher-order thinking, and active knowledge construction are essential for both student engagement and the development of self-directed learning competencies, the flipped approach thus seems to be especially successful in promoting these skills.

Table 4

Investigating the Impact of Flipped Learning Pedagogy on Student' Self-Management (Aspect of Self-Directed Learning) Among 10th Grade Students

Comparison	Students	Mean	Std. Dev.	t- Value	Sig. Level
Flipped Learning Pedagogy	30	4.34	.37	17.46	.000
Traditional Learning Method	30	2.31	.52		

Compared to students in the traditional group (M = 2.31, SD = 0.52), those in the flipped learning group reported significantly better self-management (M = 4.34, SD = 0.37). This difference was highly significant (t(58) = 17.46, p <.001). While the traditional group exhibited more inconsistency and a lower overall capacity to regulate their learning, the flipped learning group's low standard deviation indicates that students continuously displayed high levels of self-management. These results demonstrate how flipped learning pedagogy promotes improved time management, organizational abilities, and self-regulation of learning tasks—all of which are essential components of self-directed learning. In this sense, flipped learning not only increases student participation in class but also gives them the skills they need to be in charge of their own education.

Table 5

Investigating the Impact of Flipped Learning Pedagogy on Student' Self-Monitoring (Aspect of Self-Directed Learning) Among 10th Grade Students

Comparison	Students	Mean	Std. Dev.	t- Value	Sig. Level
Flipped Learning Pedagogy	30	4.49	.35	15.98	.000
Traditional Learning Method	30	2.32	.66		

When compared to students who were taught using the traditional method (M = 2.32, SD = 0.66), students who were taught using flipped learning reported higher levels of self-monitoring (M = 4.49, SD = 0.35). This difference was highly significant (t(58) = 15.98, p <.001). In contrast to the traditional group, which showed more variability and generally poorer monitoring of their own learning, the flipped group's lower standard deviation suggests that students continuously developed strong self-monitoring skills. These results imply that flipped learning pedagogy improves students' capacity to monitor their development, evaluate their comprehension, and successfully modify their learning tactics. In order to develop long-lasting self-directed learning competencies, flipped classrooms seem to encourage increased learner autonomy and metacognitive awareness.

Table 6

Investigating the Impact of Flipped Learning Pedagogy on Overall Student' Engagement and Self-Directed Learning Among 10th Grade Students

Comparison	Students	Mean	Std. Dev.	t- Value	Sig. Level
Flipped Learning Pedagogy	30	4.44	.31	15.31	.000
Traditional Learning Method	30	2.78	.50		

In comparison to the traditional learning group (M = 2.78, SD = 0.50), the flipped learning group showed significantly higher overall scores (M = 4.44, SD = 0.31). This difference was highly significant (t(58) = 15.31, p <.001). Additionally, the flipped learning group's lower standard deviation indicates more consistency in the students' self-directed learning competencies and engagement, while the traditional method group's results were more varied and lower. These results highlight how flipped learning pedagogy improves self-directed learning (self-management and self-monitoring) and behavioral, emotional, and cognitive engagement separately, while also making a significant overall improvement. All of this points to flipped learning as a more successful and integrated teaching approach for encouraging students in the tenth grade to participate actively, regulate their own learning, and use metacognition.

Discussion

When using flipped pedagogy in the classroom, students reported being more focused, engaged, and behaviorally active. The results of Zainuddin and Halili (2016), who discovered that flipped classrooms foster more interactive settings that encourage active engagement, are consistent with this finding. According to Lo and Hew (2017), flipped learning also improves emotional engagement by giving students adaptable, learner-centered opportunities that spark motivation and interest.

This study's notable increase in cognitive engagement is consistent with research by Thai, De Wever, and Valcke (2017), who found that flipped learning encourages deeper cognitive investment, such as critical reflection, higher-order thinking, and problem-solving. All of these findings point to the effectiveness of flipped pedagogy in converting passive learning into an engaging, active process.

The evidence that flipped pedagogy greatly improves students' self-directed learning competencies is another important contribution of this study. These findings corroborate the findings of Bishop and Verleger (2013), who contended that flipped classrooms empower students to assume greater accountability for their education by facilitating pre-class preparation and in-class cooperation. Similarly, by requiring students to plan, coordinate, and evaluate their learning process, flipped approaches foster greater learner autonomy, according to Chen, Wang, Kinshuk, and Chen (2014).

The increased self-monitoring levels seen in this study also support research by Sung, Chang, and Liu (2016), who found that flipped learning environments foster metacognitive skills by motivating students to assess their own learning and modify their approach accordingly. Together, these results imply that flipped learning fosters student engagement during instruction while also fostering the development of long-term skills necessary for lifelong learning.

Conclusion

This study adds to the increasing amount of data showing that flipped learning is an effective teaching strategy. Flipped classrooms offer a potent substitute for conventional teaching strategies by dramatically increasing student engagement and self-directed learning competencies. These findings' consistency with earlier studies highlights flipped learning's strength as an instructional approach that can equip students for the challenges of education in the twenty-first century.

Recommendations

✓ Flipped learning strategies should be formally incorporated into secondary education by curriculum designers and schools, especially in grades where students are moving toward more independent learning. Adopting flipped pedagogy can support the development of adolescents' autonomy, motivation, and critical thinking since this study shows notable improvements in student engagement and self-directed learning competencies.

✓ Teachers must receive training in active learning techniques, classroom facilitation, and digital content creation in order to implement flipped pedagogy effectively. Creating interesting pre-class materials (videos, readings, digital modules) and organizing in-class activities to foster cooperation and problem-solving should be the main goals of professional development workshops.

✓ Even though flipped learning encourages independence, students may need scaffolding at first in order to efficiently manage their time, keep an eye on their own progress, and consistently finish pre-class assignments. As a result, schools ought to implement digital literacy assistance, orientation sessions, and organized pre-class preparation guidelines.

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