
| RESEARCH ARTICLE

The Effectiveness of the Flipped Classroom Teaching Method on the Components of Academic Optimism in Mathematics

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| ABSTRACT

The important mission of education is to contribute to the all-round growth of students intellectually, behaviorally, and attitudinally. Academic optimism is considered one of the most important components of attitudinal growth and complements the intellectual and behavioral growth of students, which has attracted the attention of experts and researchers in the field of education. This research was conducted with the aim of identifying the impact of the flipped classroom teaching method on the components of academic optimism in mathematics class. The present research method was a semi-experimental design with a pretest-posttest design with one control group. The statistical population of the study included all sixth-grade students in Middle School classes in Herat City. First, through purposive sampling, 42 students were selected, and then, due to the homogeneity of the samples, they were randomly assigned to two experimental groups (21 students) and control groups (21 students). To collect the data, the Academic Optimism Questionnaire (AOQ) by Moran et al. (2013) with a reliability of 0.93 for the entire test, was used. The research hypotheses were analyzed using multivariate analysis of variance (MANOVA) in the SPSS26 software. The findings showed that the flipped classroom teaching method led to a significant increase in the academic optimism of students in the components of students' trust in the teacher ($p < 0.000$), academic emphasis ($p = 0.013$), and school unity ($p = 0.015$). Therefore, the flipped classroom teaching method is considered one of the most effective methods for the development of academic optimism, and its use is recommended for middle school teachers.

| KEYWORDS

Teaching method, flipped classroom, academic optimism, math lesson, Middle school students

| ARTICLE INFORMATION

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1. Introduction

Education is a crucial aspect of fostering the holistic development of students, encompassing their intellectual, behavioral, and attitudinal growth. Academic optimism is considered one of the key components of the attitudinal and complementary intellectual and behavioral growth of students, attracting the attention of education specialists and researchers in the field (Douri, Larranger, & Hirst, 2021). Academic optimism is a positive belief in students, indicating their ability to create an environment of enthusiasm and academic progress by emphasizing their own learning and having confidence in their teachers. This academic construct consists of three components: students' trust in their teachers, students' academic emphasis, and school unity (Hoy, 2012).

According to Furgodocylgman (2012), optimistic students perceive negative events, do not see them as inevitable, and approach them in constructive ways. Furthermore, they have confidence in themselves when facing challenges. Findings have shown that optimism is learnable, and through effective intervention in the student's growth and development environment, they can be transformed into optimistic individuals. Academic optimism leads to the enhancement of motivation and academic enthusiasm (Bankole, Michel, & Moore, 2013).

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One of the important beliefs in student learning is academic optimism (Moran, 2013). Optimism is a type of expectancy of a positive outcome, regardless of individual performance (Feldman & Cabot, 2015). Academic optimism of students is a new field that has emerged over time based on humanistic psychology, positive psychology, and the theoretical foundations of social cognition, Bandura's self-efficacy, and Seligman's concept of optimism (Hoy, 2012).

One of the major challenges for teachers in classrooms is focusing students' attention on academic subjects and helping them in their learning. The important question is: What factors influence students' academic activities and learning? Teachers often report difficulties in managing classroom time and the number of face-to-face interactions in achieving an effective balance between lecturing and active learning strategies (Straayer, 2012).

Therefore, one of the questions that is usually important for educators to answer is how to address all the learning needs of students. The flipped classroom is one of the popular technologies that has emerged in recent years and strengthens learning patterns (Jansen & Gooday, 2015). This model strives to respond to this challenge by allocating more time to the classroom for active learning methods and providing greater access to advanced technologies to support a blended learning approach (Kim, Kim, Khira, & Gitman, 2014). Thus, flipped classrooms seek to address this challenge by allocating more time to the classroom for active learning methods and providing greater access to advanced technologies to support a blended learning approach (Kim et al., 2014). The flipped classroom method was first introduced in 2000 by Baker (Straayer, 2012). In this method, the teacher provides all the content that is to be taught to the learners in advance. They are expected to learn the desired instructional content individually at home or in a space other than the classroom through watching videos or experiments, reading text and audio files, or whatever the teacher provides to facilitate a better understanding of the classroom session topic and then come prepared to the classroom (Herrid, 2013, cited in Golzari & Attararan, 1395).

The flipped classroom model represents fundamental changes from the lecture-centered teaching model to a learner-centered learning model, where the learner prepares their attention to the instructional materials before the classroom and completes the assigned tasks, while the instructor uses classroom time to improve learners' understanding and engage in learning activities for a deeper comprehension of the subject concepts and address any difficulties, thus addressing the time management challenge in the classroom (Gilboy et al., 2015). According to the theoretical framework of the research, flipped teaching-learning activities are a new pedagogical approach that focuses on learner-centered learning (Gilboy et al., 2015).

The flipped classroom is a pedagogical strategy that has been primarily used in higher education and has seen significant growth in secondary schools (typically from fifth grade to twelfth grade) (Tucker, 2012). Research on the importance of academic optimism as an attitudinal component and its relationship to academic achievement has yielded various results. For instance, Khodaverdi and Zarinabadi (201x) found a significant relationship between academic optimism and the use of self-regulated learning strategies. Adams et al. (2011) demonstrated a meaningful relationship between academic optimism among students and self-regulated learning. Biel and Smith (2012) concluded that there is a positive and significant relationship between academic optimism and reading achievement among students. On the other hand, Pamaalji (2012) found no significant relationship between academic optimism in schools and student achievement, even with control for socio-economic status. Additionally, academic optimism in schools does not have the ability to predict student achievement (cited in Eschenmann et al., 2013). Research by Karabay and Dipaolu (2011) on academic optimism and collective commitment in urban schools yielded different results, showing that in schools where the teaching staff is optimistic, students can achieve success despite their low socio-economic status. Garol and Kermagil (2010) found that regardless of students' socio-economic status, the three-factor structure of academic optimism has a positive and significant impact on student achievement. Despite conflicting findings from some studies, the flipped classroom teaching approach is considered one of the most effective methods for increasing academic satisfaction. Research shows that flipped classroom methods can have a positive impact on student self-esteem and increase optimism in academic subjects (Gonzalez et al., 2019; Malavarma, Sosyalovati, Sifa, & Rifani, 2020; Malverman, Nogrohoho, Sosyalovati, Afriyulda, & Kunojiaya, 2019).

Therefore, a review of literature and research has shown that the effectiveness of the flipped classroom teaching method on students' optimism varies under different conditions, and overall, previous research has not yielded clear results in this area. Therefore, middle school students in Herat City, with their specific educational conditions, may perceive the flipped classroom approach differently in terms of academic optimism. As a result, it is necessary to study the effectiveness of the flipped classroom teaching method on the components of academic optimism in middle school students in Herat City, as previous research has provided ambiguous answers.

2. Methodology

The present study falls under the category of applied research in terms of its objective and semi-experimental research in terms of data collection method. The research method employed was a pre-test and post-test design with one control group. The statistical population of the study consisted of middle school students in Herat City during the academic year 1402. A sample of

42 individuals was initially selected using the purposive sampling method, and then, due to the homogeneity of the samples (in terms of academic level, age, gender, and socio-cultural-economic status), they were randomly assigned to two groups: the experimental group (21 individuals) and the control group (21 individuals). Both groups were taught by one teacher (mathematics), with the control group receiving conventional teaching and the experimental group receiving a flipped classroom teaching method. The inclusion and exclusion criteria for the participants in this study included grade level, access to computers, mobile phones, multimedia devices, and internet. It is worth mentioning that the researcher taught both groups the mathematics subject. In the flipped learning approach for the experimental group, the teacher first defined their objective for teaching and the content they intended to cover and then prepared resources, including videos, audio files of concepts, worksheets, and guiding activities and questions.

Initially, the instructional materials were provided to students through the educational network. Inside the classroom, learners individually and in groups dedicated their time to working on exercises from the textbook, solving problems created by themselves and the teacher, addressing individual difficulties (misunderstandings and lack of comprehension), and completing more complex and higher-level cognitive tasks under the supervision of the teacher. Additionally, before starting each activity within the classroom, the teacher conducted necessary assessments to determine whether students had studied and achieved the minimum levels of knowledge and understanding of the lesson concepts, providing appropriate feedback if needed. In subsequent activities outside the classroom, learners had two responsibilities: first, to prepare themselves for the next session by studying the provided contents, and second, to complete the assignments and supplementary exercises from the previous session that the teacher predicted or to watch and solve any additional videos, notes, clips, or worksheets provided after the end of the class.

The teaching method in the classroom where students did not have access to the internet or mobile phones, with the teacher delivering the lesson through lectures and conventional teaching methods relying on the textbook. Students were mainly listeners in the classroom and took notes. As a result, a significant amount of class time was spent on describing and note-taking basic concepts of the subject matter, leaving insufficient time for more samples and additional examples. Consequently, these tasks were delegated to students to be completed at home.

The Academic Optimism Questionnaire (AOQ) developed by S. Moran and colleagues (2013) was used to collect the data. This questionnaire consists of 28 items and three subscales, including students' trust in teachers (items 1-10), students' academic emphasis (items 11-18), and school unity (items 19-28). Arefi (2014) has confirmed the construct validity of the questionnaire, and the overall reliability of the questionnaire has been reported as 0.92 using Cronbach's alpha. In the present study, the reliability of the mentioned questionnaire for each of the subscales, student academic emphasis, students' trust in teachers, and school unity, was found to be 0.90, 0.95, and 0.93, respectively, and for the entire instrument, it was 0.93, using Cronbach's alpha. The hypotheses were tested using multivariate analysis of variance (MANOVA), and the SPSS version 26 software was employed.

3. Results and Discussion

The results of the descriptive statistics for the research variables, broken down by pre-test-post-test and experimental-control groups, are presented in Table 1. The research hypotheses have been investigated here using analysis of covariance or multivariate analysis of variance.

Variable	Test Steps	Group	Mean	Std. Deviation
Students' trust in teachers	Pre-test	Experimental	36.82	4.53
		Control	38.78	3.88
	Post-test	Experimental	43.53	5.2
		Control	40.5	2.82
Academic Emphasis	Pre-test	Experimental	30.94	3.43
		Control	30.58	3.77
	Post-test	Experimental	37.12	2.05
		Control	34.16	2.96
School Unity	Pre-test	Experimental	39.52	3.62
		Control	37.6	4.91
	Post-test	Experimental	45.18	3
		Control	39.95	3.78

Table 1: Descriptive statistic of Research Variable

To test the first hypothesis of the study (the effect of flipped learning on students' academic optimism), a Wilks' Lambda Test has been used. As observed, the value of Wilks' Lambda for group changes is equal to 0.560, and the F value is equal to 8.395, in which the significant level is 0.000 ($p < 0.01$). Therefore, with 99% confidence, the findings supported the first hypothesis of the research. The result is reflected in table 2.

Effect	Index	Value	F	Hyp. Df	Error df	Sig
Group	Wilks' Lambda	0.56	8.395	3	32	0.000

Table 2: Wilks' Lambda Test

The second hypothesis of the research states that "flipped learning is effective on students' academic performance in terms of student trust in the teacher, academic emphasis, and school unity." To test this hypothesis, a multivariate analysis of variance (MANOVA) is used. Table 3 states that there is a significant difference between control and experimental groups according to students' trust in the teacher ($F=15.17$, $P < 0.05$), Academic Emphasis ($F=6.93$, $P < 0.05$) and School Unity ($F=6.39$, $P < 0.05$). The statistics with 95% confidence have approved the second hypothesis of the research.

Variable	Source	Sum of Squares	df	Mean square	F	Sig
Students' trust in teachers	Group	226.25	1	226.25	25.71	0.000
	Error	489.63	34	14.40		
Academic Emphasis	Group	60.54	1	60.54	6.93	0.013
	Error	297.10	34	8.73		
School Unity	Group	45.96	1	45.96	6.36	0.015
	Error	664.30	34	10.53		

Table 3: MANOVA (The effect of flipped learning on components of Academic Optimism in Math classes)

4. Conclusion

In this study, the effectiveness of flipped learning on the components of students' academic optimism in math classes was examined. The results showed that the use of the flipped learning method had a significant impact on all components of academic optimism in mathematics classes. These findings are consistent with the research by Moran, Michel, and Moran (2013), which demonstrated a direct and significant relationship between students' academic optimism and their academic progress. They are also aligned with the results of Jafari, Ghahramani, Keshavarzi, and Kaveh (2015), who showed that teaching optimism to students through social competence can be effective and enhance their interpersonal and social relationships. Furthermore, the findings of Hajazi, Saleh Najafi, and Ghalamali Lavasani (2015) indicated that optimism leads students to develop beliefs that promote personal efficacy and positive evaluation of their social context, resulting in positive expectations. The results of the test of the effects among the participants on the components of academic optimism demonstrated their significance at the 0.05 level. Therefore, the impact of flipped learning on all components of academic optimism is confirmed. This finding is consistent with the research by Piri, Sahabi, and Saadollahi (2018), which showed that flipped classes, with the help of the interaction variable (pre-test), had a significant effect on the self-directed learning variable (except for the self-management component) in promoting learning.

Furthermore, the findings of Kavian et al. (2018) demonstrated that flipped learning contributes to improving students' understanding and learning activities for deeper comprehension of course concepts. Moran (2018) also concluded that flipped learning is one of the most effective ways to enhance active learning and understanding. The results of the second hypothesis align with the research conducted by Esmaili et al. (2016) and Sahabi et al. (2017), which confirmed the effectiveness of flipped learning on factors influencing learning. In explaining these findings, it can be stated that the presence of flexible rules and a democratic structure in schools can enhance academic optimism overall. Paying attention to the results of this study and the findings of other research suggests that creating and developing an environment to improve students' academic optimism should be part of schools' vision. The present study showed that, on average, students performed well in the flipped classroom and had a more favorable perception of this method. Additionally, this approach promotes increased learning and access to the instructor and contributes to the flipped learning literature. While many studies support the effectiveness of flipped teaching on students' academic optimism (Gonzalez et al., 2019; Malavarma et al., 2020; Mouwad et al., 2019; Esmailifar et al., 2016), some studies do not support the current findings. Contradictory research argues that the impact of flipped teaching on academic optimism may vary under different conditions (Dorry et al., 2021). On the other hand, theoretical and empirical literature suggests that academic optimism is related to academic progress, motivation, and many other factors and does not change significantly in the short term

or under the influence of only a few variables (Hoy, 2012). Therefore, it appears that in this study, the flipped classroom as an independent variable had sufficient richness (a combination of multiple factors) to increase students' academic optimism. Every research study has limitations that, when addressed, can contribute to improving the quality of future similar research. These limitations prevent the generalization of a study over a long period and in all aspects. Like any other study, this research also had controllable and uncontrollable limitations that can open new avenues for future research. These limitations include the inability to carry out the follow-up phase and the inability to conduct this research in larger populations. Therefore, it is recommended that this study be conducted with a follow-up phase and be implemented in different communities, including girls, different academic levels, disciplines, and courses.

Based on the current study findings, it is recommended that the flipped learning method be introduced and implemented for teachers and educational managers in in-service training programs. This will not only familiarize them with this approach but also reduce their resistance towards flipped learning and provide them with the necessary guidance and instructions for implementing this method. On the other hand, parents should also be educated and encouraged to change their perspective on learning and provide the necessary conditions and resources for their children to engage in flipped learning. Furthermore, considering the role of note-taking and summarizing in the flipped learning process, which are influential factors in academic optimism, it is suggested that teachers enhance these skills in students.

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