Flipped Learning Approach on Students' Motivation in Science

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ABSTRACT

This study investigated the effects of Flipped Learning on students' motivation towards Grade 11 science of Misamis Occidental National High School, Poblacion I, Oroquieta City, Misamis Occidental. Specifically, it aimed to: describe the students' motivation towards science when exposed to flipped learning and non-flipped learning in terms of: self-concept, intrinsic value, and utility value; and ascertain if there is a significant difference in students' motivation when exposed to flipped learning and non-flipped learning. Two Grade 11 sections of Misamis Occidental National High School or MONHS served as participants. Students' motivation were assessed through descriptive statistics. An independent t-test was used to ascertain the significant differences in students' motivation toward science learning. The findings of the study revealed that on students' motivation towards science learning, both groups were identified as "moderately motivated". Intrinsic value obtained the highest mean among the three-motivation indicators. As a result, there was no significant difference between students' motivation towards science learning under flipped learning.

Keywords: motivation, self-concept, intrinsic value, utility value, flipped learning.

INTRODUCTION

The implementation of the new K to 12 basic education curriculum by the Department of Education addressed the needs of Filipino learners in understanding science concepts, processes, and acquiring new scientific skills. With the effort of curriculum designers, the latest science curriculum envisions learners to be more active, well-equipped with technical and vocational skills, and become scientifically and technologically literate (Ibonia, 2019).

Even with these initiatives in place, science literacy remains a serious concern, as shown by international assessments. Results from TIMSS 2019 of the International Association for the Evaluation of Educational Achievement and PISA 2018 of the Organization for Economic Co-operation and Development revealed that the Philippines continued to rank among the lowest-performing countries in science literacy. Studies show that many Filipino students have a limited grasp of basic scientific ideas and facts (Mullis et al., 2020) and can usually apply everyday knowledge only to identify or explain simple scientific situations (Department of Education, 2019). Science is also often seen as difficult and boring, particularly when lessons cover complex topics, as noted by Mahanti and Sarkar (2018). In addition, students with low academic self-concept tend to be less confident during class discussions, which often leads to poorer academic performance (Schnitzler et al., 2021), even though self-concept plays an important role in helping students reach their potential during key stages of cognitive, social, and emotional growth (Ubago-Jimenez et al., 2024). Despite recent educational changes, international assessments continue to show that many Filipino students still struggle in science. They often have trouble understanding basic concepts and using what they learn to explain simple real-life situations, and this is made worse by the common view that science is difficult and by low self-confidence, which affects how actively they participate and how well they perform, especially during important stages of their development.

In response to these challenges, flipped learning has emerged as a pedagogical approach that allows educators to enhance traditional teaching methods while integrating technology into the classroom. This approach promotes active engagement and encourages learners to take responsibility for their own learning. According to Ayimbila (2024), flipped learning is a promising method for improving comprehension and retention with the

aid of technology. Flipped learning has become increasingly popular as a way to improve traditional teaching by making better use of technology and getting students more involved in the learning process. It encourages students to take greater responsibility for their learning and has been found to help them understand lessons better and remember them longer.

Stent motivation in science continues to be a major challenge for educators. Studies indicate that learners often lose motivation in online, self-directed learning settings, especially when they lack clear goals and outside support, which can negatively affect their science performance (Chan & Norlizah, 2017). Research by Wang and Liou (2017) showed that science achievement is influenced indirectly by academic self-concept through students' views of the interest and usefulness of science tasks. In the same way, Abarca and Osic (2024) explained that academic self-concept links motivation and achievement, as motivated students tend to build a more positive view of their abilities, leading to better performance. As such, self-concept stands out as an important motivational factor in academic success, beyond intelligence and previous grades.

Motivation in science learning is further shaped by intrinsic and utility values. Basas et al. (2020) reported that students experience satisfaction when their competence improves through science achievements. Alonso et al. (2023) emphasized that intrinsic motivation arises from engaging in activities for the inherent pleasure and satisfaction they provide. Shahid and Paul (2021) noted that exploratory activities foster intrinsic satisfaction, while Oclaret (2021) concluded that intrinsic motivation strongly influences academic performance and promotes high achievement driven by curiosity. Conversely, Yen (2020) suggested that prior experiences with flipped or online learning may not consistently affect motivation or learning performance. Motivation in science learning is strongly influenced by intrinsic value, as students tend to feel more satisfied and perform better when they enjoy learning activities and see improvements in their competence. While curiosity-driven and exploratory experiences generally support higher achievement, prior exposure to flipped or online learning does not always lead to consistent gains in motivation or performance.

Utility values also play a role in motivating students to pursue science and achieve better learning outcomes. Zhai and Putwain (2024) highlighted that recognizing the relevance of science concepts motivates students to consider science-related careers. Migalang (2018) and Mahinay and Nabua (2025) similarly found that students' motivation correlates with conceptual understanding and appreciation of science in future careers. Guo et al. (2024) further noted that while self-concept has a weak direct relationship with achievement, intrinsic motivation and self-determination indirectly influence outcomes. When students see how science connects to real-life applications and future careers, their motivation and understanding improve, and although self-concept may not strongly predict achievement on its own, intrinsic motivation and self-determination still play an important indirect role in supporting learning outcomes.

Motivation has a direct influence on students' science attitudes and academic performance. Bazar et al. (2024) highlighted that a lack of motivation can lead to poor outcomes, especially in teacher-centered classrooms where students play a passive role. Although flipped classrooms may improve understanding, research by Cagande and Jugar (2018), supported by Migalang (2018), shows that they do not always boost motivation. Rasheed et al. (2020) also pointed out that students who struggle with self-regulated learning often have difficulty managing their time, materials, and focus, which affects their performance. In general, students perform better and develop more positive attitudes toward science when motivated, while low motivation may often linked to passive teaching methods and weak self-management may hinder learning, even if understanding improves through flipped learning approaches.

With the Department of Education implementing the K-12 Basic Education curriculum, teachers are required to be more creative and innovative in delivering quality instruction, as stipulated in Article XIV of the 1987 Constitution, the Governance of Basic Education Act of 2001, and the Enhanced Basic Education Act of 2013 (Vegafria, 2017). In line with this, the present study was conducted to examine how online flipped learning affects students' learning outcomes and motivation in science. Guided by the K–12 curriculum's emphasis on creative and effective teaching, this study explores how online flipped learning influences students' motivation and performance in science.

Research Questions

This study aimed to examine the effectiveness of Flipped Learning (FL) on students' motivation in Grade 11 science of Misamis Occidental National High School.

Specifically, this study aimed to:

1. describe the students' motivation towards science when exposed to Flipped Learning and Non-Flipped Learning in terms of:

1.1 self-concept,

1.2 intrinsic value, and

1.3 utility value?

2. ascertain the significant difference in students' motivation when exposed to Flipped Learning and Non-Flipped Learning.

RESEARCH METHODOLOGY

Research Design

The study utilized a quasi-experimental sampling methods to assess the effectiveness of FL approach on students' motivation in science. Two (2) intact classes were selected in Grade 11 students from Misamis Occidental National High School. One section was exposed to FL using micro lectures, contextualized video lessons, PowerPoint presentations, and learning activity sheets based on a 7E lesson plan. The other section was exposed to non-FL using the conventional teaching method with a PowerPoint Presentation based on a 7E lesson plan. A pretest-posttest was used to determine a significant difference in the motivation of students when exposed in FL and those exposed in non-FL.

Participants

The two (2) intact sections of Grade 11 high school students of Misamis Occidental National High School were the participants of the study. These participants were enrolled for the academic year 2025-2026. One section composed of 49 students was exposed to FL, and the other section with 42 students was exposed to non-FL.

Instrument of the Study

For motivation in Science, a survey questionnaire by Wang and Liou (2017) about students' motivation toward science learning was employed. It has a Cronbach alpha for subscale ranging from 0.89 to 0.92 which indicates that it is appropriate to use in assessing students' motivation toward science. It consists of twenty (20) questions under three (3) identified motivation factors which include; Self-concept (9 items), intrinsic value (5 items), and utility value (6 items). The four (4) point Likert scale was utilized to analyze students' motivation towards science learning when exposed to online flipped learning and non-online flipped learning. The following were embedded in the scale during the interpretation of data.

Scale	Level of Motivation	Descriptive Rating	Qualitative Interpretation
4	3.51 - 4.00	Strongly Agree	Highly Motivated
3	2.51- 3.50	Agree	Moderately Motivated
2	1.51- 2.50	Disagree	Poorly Motivated
1	1.50- 1.50	Strongly Disagree	Not Motivated

Procedure

A letter of request was sent to the school principal of Misamis Occidental National High School (MONHS) asking permission to conduct the research study. A letter of consent was also submitted to inform the learners that they would be one of the subjects of the study. Attached the approval letter signed by the MONHS principal and student participant with parent's consent.

The students were oriented on how flipped learning and non-flipped learning will be implemented. The subject's contents, instruction, discussion, and assessments were delivered using flipped learning for the flipped group. The instructional materials such as micro-lectures, PowerPoint presentations, assignments, learning activity sheets and learning materials were subjected to content validation by an expert in earth science and given to the learners prior to starting the formal lesson. The non-flipped group was taught using the conventional mode of instructional delivery like the lecture method, and it was done synchronously with the same content for students exposed to flipped learning.

The treatment for the two groups covered Unit 1 in the second grading period. After the treatment, a post-test was administered to the two groups after completing all the science topics. They were informed that the survey's complete results would be kept confidential. The data collected were then tallied, tabulated, and analyzed.

Data Analysis

Descriptive statistics such as the weighted means, percentages, and standard deviation were employed in determining the students' motivation outcomes exposed to flipped learning and non-flipped learning.

The t-test was used to ascertain the significant differences between students' motivation exposed to FL and those exposed to non-FL.

RESULTS

These are the results obtained from the respondent data, presented, interpreted, discussed based on the order of the statement of the problem.

Self-concept

Table 1 presents the mean scores for students' motivation in science learning under self-concept. Both students exposed to FL and non-FL were identified as "Moderately Motivated" with a mean score of 2.56 and 2.57, respectively. This implies that both groups moderately valued their perceptions, belief, and abilities to complete their academic tasks.

Table 1Students' motivation towards science under self-concept.

Motivation indicators		FL		Non-FL	
		MEAN	QUALITATIVE INTERPRETATION	MEAN	QUALITATIVE INTERPRETATION
1	I usually do well in science	2.89	Moderately Motivated	2.81	Moderately Motivated
2	I learn things quickly in science	2.75	Moderately Motivated	2.86	Moderately Motivated
3	*Science is harder for me than other subjects	2.73	Moderately Motivated	2.69	Moderately Motivated

4	*Science is more difficult for me than for many of my classmates	2.51	Moderately Motivated	2.57	Moderately Motivated
5	My teacher tells me I am good at science	2.51	Moderately Motivated	2.45	Poorly Motivated
6	*Science makes me confused and nervous	2.51	Moderately Motivated	2.14	Poorly Motivated
7	My teacher thinks I can do well in science with difficult materials	2.39	Poorly Motivated	2.71	Moderately Motivated
8	*Science is not one of my strengths.	2.38	Poorly Motivated	2.55	Moderately Motivated
9	I am good at working out difficult science problems	2.37	Poorly Motivated	2.33	Poorly Motivated
	WEIGHTED MEAN	2.56	Moderately Motivated	2.57	Moderately Motivated
	*Item with Negative Statement				

Legend:

Level of Motivation	Qualitative Interpretation
3.51 – 4.0	Highly Motivated
2.51 – 3.50	Moderately Motivated
1.51 – 2.50	Poorly Motivated
1.00 – 1.50	Not Motivated

Based on the result, it was found out that students exposed to FL were "Moderately Motivated" on the following indicators:" I usually do well in science"; "I learn things quickly in science" and "*Science is harder for me than other subjects" which obtained the highest mean of 2.89, 2.75 and 2.73, respectively. This implies that students under FL have a varied perception towards the science, of which some students think that the subject is easy to learn and performs better than any other subject, and others consider it a complex subject to comprehend.

According to Mahanti and Sarkar (2018), students find science a challenging and tedious subject, especially understanding complex topics. However, students were found to be "Poorly Motivated" on the following indicators: "My teacher thinks I can do well in science with difficult materials "; "Science is not one of my strengths.", and "I am good at working out difficult science problems" which obtained the lowest mean of 2.39, 2.38 and 2.37, respectively. This shows that students were lack of encouragement and percieved science as a complex subject that could result in their poor performance in the subject. This might be similar to students' less

wanting to learn, ability to focus, and willingness to take risks and challenges in performing science-related tasks.

The study carried by Schnitzler et al. (2021) revealed that students with low academic self-concept exhibit less confidence in engaging in classroom discussions, and participation is reflected in their low academic performance. Ubago-Jimenez et al. (2024) concluded that self-concept is crucial for unleashing students' potential in a critical stage for their cognitive, social, and emotional development.

On the other hand, students exposed to non-FL were “Moderately Motivated” on the following indicators: "I learn things quickly in science", and "I usually do well in science," which obtained the highest mean of 2.86 and 2.81, respectively. This simply means that students consider science an easy task and contribute to their learning. However, students were found "Poorly Motivated on the following indicators: "*Science makes me confused and nervous", and "I am good at working out difficult science problems" with the lowest mean of 2.14 and 2.33, respectively. It implies that students under non-FL considered science a difficult subject that makes them confused and nervous during science interaction. This might be attributed to students' priorities in learning other subjects that compete for their time and attention. Students perceive science as a complex subject is attributed to its very abstract nature and the teaching strategies that show minimal effort is made in presenting the material in an exciting and relevant way.

As observed, the student during science class tried to be engaged by participating during the interaction. When the teacher asked higher-order thinking questions, they usually found ways to answer them. The study of Wang and Liou (2017) revealed that science academic self-concept had indirectly predictive effects on students' achievement through their perceptions of science tasks' intrinsic and utility values.

Further, Abarca and Osic (2024) added that academic self-concept plays a meditational role between academic motivation and achievement because motivated students are more proactive at school, thus developing a positive academic self-concept and improving their grades. The research further explained that Students' self-concept turned out to be the most critical motivational predictor of students' grades and beyond differences in their intelligence and prior grades.

Intrinsic Value

Table 2 displays the mean scores of students’ motivation in science learning under Intrinsic value. As gleaned from the table, students exposed to FL obtained a mean of 3.46, while those under non-FL obtained a much higher mean of 3.55. Both groups are classified under "Moderately Motivated", which implies that both groups were intrinsically motivated to participate and complete science-related tasks.

Table 2 Students' motivation towards science under intrinsic value

Motivation indicators		FL		NON-FL	
		MEAN	QUALITATIVE INTERPRETATION	MEAN	QUALITATIVE INTERPRETATION
1	I learn many interesting things in science	3.53	Highly Motivated	3.62	Highly Motivated
3	*Science is boring	3.49	Moderately Motivated	3.52	Highly Motivated
2	*I wish I did not have to study science	3.39	Moderately Motivated	4.02	Highly Motivated
4	I enjoy learning science	3.31	Moderately Motivated	3.38	Moderately Motivated

5	I like science	3.18	Moderately Motivated	3.21	Moderately Motivated
	WEIGHTED MEAN	3.46	Moderately Motivated	3.55	Highly Motivated

*Item with Negative Statement

Legend:

Level of Motivation	Qualitative Interpretation
3.51 – 4.0	Highly Motivated
2.51 – 3.50	Moderately Motivated
1.51 – 2.50	Poorly Motivated
1.0 – 1.50	Not Motivated

As gleaned from the table, students under FL were identified as "Highly Motivated" in the indicator "I learn many interesting things in science," which obtained the highest mean of 3.53. It only shows that science fascinates the students, bringing new information and concepts that could arouse their interest in learning about the science content. However, they were found "Moderately Motivated" on the following indicators: "*Science is boring";" *I wish I did not have to study science";" I enjoy learning science": and "I like science". This implies that the students show effort and interest moderately in their pursuits of completing science tasks. The negative impact of science on students might be attributed to their lack of engagement, creativity, and teacher's less effort in implementing varied strategies.

On the other hand, students under non-FL were "Highly Motivated" on the following indicators: "I learn many interesting things in science"; "*Science is boring"; and "*I wish I did not have to study science" with a mean of 3.62, 3.52 and 4.02, respectively. It only implies that science is an avenue for learners to take new knowledge and learnings that interest them. Moreover, it is also noted that groups were "Moderately Motivated" under the indicators: "I enjoy learning science"; and "I like science". As observed from the students, they are an enthusiast in giving efforts and time in dealing with the science concepts, especially in trying to answer the questions given during the class discussion. Basas et al. (2020) concluded that students have satisfaction every time they increase their competence in attaining achievements during science class.

According to Alonso et al. (2023), Intrinsic motivation is the most self-determined form of motivation that occurs when a person engages in an activity for its own sake, the pleasure and the satisfaction derived from it. Shahid and Paul (2021) stressed that whenever students are exposed to an exploratory-activities, it involves an inherent satisfaction toward their learning.

The study conducted by Oclaret (2021) revealed that internal motivation has a strong positive impact on their academic performance in which they perform well academically for their interest or curiosity of their learning. He also concluded that students are more interested in learning and achieving high goals if intrinsically motivated. The further study report that intrinsic motivation has a significant impact on students' academic performance and has high positive regard for their learning and see it as a venue where they can prove their competence and self-determination.

Utility Value

Table 3 presents the mean scores of students' motivation in science learning under Utility Value. The students exposed to FL and non-FL obtained the mean score of 3.30 and 3.18, respectively, indicating "Moderately Motivated". As can be gleaned from the table, students under FL were "highly Motivated" in the indicator "I think learning science will help me in my daily life," which obtained the highest mean of 3.52. This implies that students viewed science as a helpful subject relevant and meaningful to their daily lives. This means that students

learning about science concepts is relatable and helps them be engaged in the learning process that improves their academic outcomes.

Table 3 Students Motivation towards science under Utility Value

Motivation indicators		FL		Non-FL	
		MEAN	QUALITATIVE INTERPRETATION	MEAN	QUALITATIVE INTERPRETATION
1	I think learning science will help me in my daily life.	3.52	Highly Motivated	3.38	Moderately Motivated
2	It is important to do well in science	3.47	Moderately Motivated	3.43	Moderately Motivated
3	I need to do well in science to get into the of my choice	3.24	Moderately Motivated	3.21	Moderately Motivated
4	I need science to learn other school subjects	3.22	Moderately Motivated	3.07	Moderately Motivated
5	I need to do well in science to get the job I want.	3.06	Moderately Motivated	3.21	Moderately Motivated
6	I would like a job that involves using science	2.86	Moderately Motivated	2.76	Moderately Motivated
	WEIGHTED MEAN	3.30	Moderately Motivated	3.18	Moderately Motivated

*Item with Negative Statement

Legend:

Level of Motivation	Qualitative Interpretation
3.51 – 4.0	Highly Motivated
2.51 – 3.50	Moderately Motivated
1.51 – 2.50	Poorly Motivated
1.0 – 1.50	Not Motivated

The results of this study are congruent to what Garcia et al. (2018) affirmed that students applied and practiced their learned science concepts and related them to their lives. Moreover, they were found "Moderately Motivated" on the following indicators: "I need science to learn other school subjects"; "I need to do well in science to get into the of my choice"; "I need to do well in science to get the job I want."; "I would like a job that involves using science"; and" It is important to do well in science". These data revealed that students considered learning science as an avenue that could help them and influence them in choosing their future careers. This might be related to why science impacts and improves the quality of life and brings new opportunities and discoveries. When students are involved in science learning, they learn how to think critically, analyze and assess a problem or situation, essential skills in the scientific community and everyday life.

According to Zhai and Putwain (2024), utility values motivate students to pursue a science career and show great promise as effective means in promoting student motivation in specific educational tasks or classes. Migalang (2018) explained that in motivation towards learning, students recognize the relevance of science concepts in the present growth of scientific knowledge to their future endeavors. The result agrees with Mahinay and Nabua (2025) findings that motivation exhibits better conceptual understanding and positive learning outcomes and appreciates the importance of science in their future career.

A similar report by Anjass et al. (2025) showed that students positively impacted their goal orientation and became more independent and responsible learners as exposed to the flipped learning environment. They also further explained that students' orientation could be changed temporarily by the quality of the learning opportunity provided and, in particular, how it is assessed.

Summary table of students' motivation towards science

Table 4 presents the summary of students' motivation toward science learning under online flipped learning and non-online flipped learning. The data revealed that students exposed to online flipped learning obtained an overall mean score of 3.11, which indicates "Moderately Motivated" toward science learning. The following indicators considered the influence of motivation toward science learning as exposed to online flipped learning approach in their order, namely: Self-Concept, Intrinsic Value, and Utility Value. On the other hand, students exposed to non-online flipped learning gained an overall mean score of 3.09, indicating "Moderately Motivated" on the following indicators: Self-Concept, Intrinsic Value, and Utility Value.

Moreover, intrinsic value as a domain in motivating students obtained the highest mean score from both groups, 3.46 and 3.55, respectively. This means that both groups value their interest and capability in learning science and enjoying science.

Table 4 Summary table of students' motivation towards science

		FL			Non-FL		
MOTIVATION INDICATORS		MEAN		QUALITATIVE INTERPRETATION	MEAN		QUALITATIVE INTERPRETATION
1	Intrinsic Value	3.46		Moderately Motivated	3.55		Highly Motivated
2	Utility Value	3.30		Moderately Motivated	3.18		Moderately Motivated
3	Self-Concept	2.56		Moderately Motivated	2.57		Moderately Motivated
	Grand Weighted Mean	3.11		Moderately Motivated	3.09		Moderately Motivated

*Item with Negative Statement

Legend:

Range	Qualitative Interpretation
3.51 – 4.0	Highly Motivated
2.51 – 3.50	Moderately Motivated
1.51 – 2.50	Poorly Motivated
1.0 – 1.50	Not Motivated

The current result aligns with the findings of Daugelaite et al. (2012) cited in Migalang (2018) that online collaboration activity would provide the development of learners' intrinsic motivation, which leads to their improvements academically. Providing the learners with varied activities that capture their interest in learning science concepts and be a challenge to be engaged in the learning process may result in a positive learning outcome and meaningful learning. Stimulating students' way of thinking and directly involving them in the learning process help them find the relevance of their learning in their daily lives and relate it to real-life problems dramatically affects students' motivation.

However, Lai (2011), as cited in Migalang (2018), also noted that intrinsic motivation is highly desirable but not applicable to all students that perceived school as not intrinsically motivating. Bazar et al. (2024) also reported that some students with high science academic achievement have a low motivational belief in science learning.

On the other hand, the self-concept obtained the lowest mean from both groups, 2.56 and 2.57, respectively. This implies that students' motivation in achieving science tasks is affected by their perception and abilities in learning science. The study's findings conform to the results of Guo (2024), that self-concept has a weak significant relationship on students' academic achievement but further explained that intrinsic motivation and self-determination indirectly influence students' outcomes.

On the whole, students exposed to FL obtained a high mean compared than those exposed to non-FL. This shows that providing and preparing different learning materials in learning science allows them to be more responsible for their own learning pace and be more active and highly engaged during the discussion. Hence, giving the students the materials needed prior to the lesson's start helps the students be motivated.

Comparison of students' motivation

Table 5 illustrates the summary of motivational components between the student participants exposed to FL and non-FL. Students exposed to FL obtained a mean score on the following indicators on motivation, namely: Self-Concept (2.56), Intrinsic Value (3.46), and Utility Value (3.30). Students exposed to non-FL obtained a mean score on the following indicators on motivation, namely: Self-Concept (2.57), Intrinsic Value (3.55), and Utility Value (3.18). Both groups obtained an overall mean of 3.11 and 3.09, respectively. Results of the study implies that intrinsic value has founded to be the most influential on students learning outcomes among the three motivational factors on both groups. It is also revealed that students exposed to online flipped learning obtained a higher mean compared to students exposed to non-online flipped learning. The small difference of 0.02 on the overall mean might be attributed to students desire in participating classroom proceedings in an online environment.

Table 5 Comparison of students' motivation

	FL		Non-FL			
	MEAN	SD	MEAN	SD	t-value	p-value

Intrinsic Value	3.46	.406	3.55	.990	1.086	.280^{ns}
Utility Value	3.30	.480	3.18	.456	.460	.647^{ns}
Self-concept	2.56	.438	2.57	.409	.081	.936^{ns}
OVERALL	3.11	.365	3.09	.406	.394	.695^{ns}
*Significant at p<0.05						

As can be gleaned from the table, the comparison of students' motivation obtained a value of 0.394 with a probability value of 0.695, indicating not significant at 0.05 level. These results conclude that the study failed to reject the null hypothesis that "there is no significant difference between students' motivation when exposed to Flipped Learning, and Non-Flipped Learning". Findings of the study might be attributed on students' lack of commitment in completing science tasks, lacks of immediate support from the teacher and surrounding people, insufficient learning materials, inability to regulate their own learning, and students oftentimes procrastinate.

These results are consistent with Bazar et al. (2024) study that students' motivation towards science learning considerably impacted their science attitude and achievement. Lack of motivation has been identified as one of the causes of students' poor performance in science, and inability to comprehend what has been learned is mainly caused by the teacher-centered approach that makes learners passive listeners.

The study results were buttressed by Cagande and Jugar (2018) that the flipped classroom could improve students' level of understanding but was shown not to affect their academic motivation. Migalang (2018), in his study, corroborates with the findings that there was no significant difference in students' motivation when exposed to such a strategy. Accordingly, Rasheed et al. (2020) explained that learners who lack self-regulated learning might fail to manage the instructional materials given, cope with their time management, and affect their focus on their studies.

Lastly, the result of the study of Yen (2020) suggests that students' previous experiences of flipped learning and online learning may not always affect their motivation, learning performance, and perceptions of the format in a flipped classroom.

CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

The students' motivation toward science learning for both groups under the Flipped Learning, and non-Flipped Learning is moderately motivated. Of the three motivation indicators, the Intrinsic value obtained the highest mean and self-concept obtained the lowest mean.

Results of the study indicate no significant difference in students' motivation towards science learning exposed to Flipped Learning and non-Flipped Learning, hence, failed to reject the null hypothesis.

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REFERENCES

1. Abarca, G. M., & Osic, M. (2024). Academic self-concept and motivation as predictors of students' achievement in mathematics. Psychology and Education: A Multidisciplinary Journal, 21(4).
2. Alonso, R. K., Vélez, A., & Martínez-Monteagudo, M. C. (2023). Interventions for the development of intrinsic motivation in university online education: A systematic review. Sustainability, 15(13), 9862.
3. Anjass, E., Hamed, C., & Aguaded Ramírez, E. M. (2025). The effectiveness of using the flipped classroom in science education for ninth grade students. Journal of Technology and Science Education, 15(1), 78–90.
4. Ayimbila, E. A. (2024). Effect of flipped classroom instructional strategy on students' knowledge retention. Journal of Psychology and Student Performance.
5. Basas, B. R., Cornillez Jr., E. E., Balagasay, M. A., & Cinco, L. (2020). Science teachers' teaching competence and students' satisfaction. TARAN-AWAN Journal of Educational Research and Technology Management, 1(1), 1–9.
6. Bazar, J. S., Arabejo, A. J. D., Reyes, M. R., & Baluyos, G. R. (2024). Students' wellbeing and level of motivation towards science learning in relation to their academic achievement. EduLine: Journal of Education and Learning Innovation, 4(1), 182–195. https://doi.org/10.35877/454RI.eduline2009
7. Cagande, J. L., & Jugar, R. R. (2018). The flipped classroom and college physics students' motivation and understanding of kinematics graphs. Issues in Educational Research, 28(2).
8. Chan, Y. L., & Norlizah, C. H. (2017). Students' motivation towards science learning and students' science achievement. International Journal of Academic Research in Progressive Education and Development.https://doi.org/10.6007/IJARPED/v6-i4/3716
9. Department of Education. (2019). PISA 2018 national report of the Philippines. https://www.deped.gov.ph/wp-content/uploads/2019/12/PISA-2018-Philippine-National-Report.pdf
10. Garcia, C. R., Garcia, O. B., & Touron, J. (2018). The flipped learning model in online education for secondary teachers. Journal of Technology and Science Education. https://doi.org/10.3926/jotse.435
11. Guo, H., Zhou, Z., Ma, F., & Chen, X. (2024). Doctoral students' academic performance: The mediating role of academic motivation, buoyancy, and self-efficacy. Heliyon, 10, e32588.
12. Ibonia, C. M. (2019). Activity-based approach: Its effect on students' conceptual learning and motivation in Grade 10 science (Unpublished master's thesis). CMU Graduate School.
13. Liou, P.-Y. (2017). Profiles of adolescents' motivational beliefs in science learning and science achievement in 26 countries: Results from TIMSS 2011 data. International Journal of Educational Research, 81, 83–96.
14. Mahanti, J., & Sarkar, S. (2018). A study on motivation of high school students towards science learning. International Journal of Research and Analytical Reviews, 5(3), 138–142.
15. Mahinay, C. J. D., & Nabua, E. B. (2025). Conceptual understanding and motivation of Grade 12 learners on general physics 1: Basis for intervention. International Journal of Research and Innovation in Social Science, 3, 871–879.
16. Migalang, G. M. (2018). Blended learning strategy: Effects on students' academic performance and motivation toward science disaster readiness concept (Unpublished master's thesis). CMU Graduate School.
17. Mullis, I. V. S., Martin, M. O., Foy, P., Kelly, D. L., & Fishbein, B. (2020). TIMSS 2019 international results in mathematics and science. Boston College, TIMSS & PIRLS International Study Center. https://timssandpirls.bc.edu/timss2019/international-results/
18. Oclaret, V. (2021). Impact of academic intrinsic motivation facets on students' academic performance. https://doi.org/10.13140/RG.2.2.16764.46723
19. Rasheed, R. A., Kamsin, A., Abdullah, N. A., Kakudi, H. A., Ali, A. S., Musa, A. S., & Yahaya, A. S. (2020). Self-regulated learning in flipped classrooms: A systematic literature review. International Journal of Information and Education Technology, 10(11), 848–853. https://doi.org/10.18178/ijiet.2020.10.11.1469
20. Schnitzler, K., Holzberger, D., & Seidel, T. (2021). Student engagement patterns and their relations to academic self-concept and achievement. European Journal of Psychology of Education, 36(3), 627–652.

21. Shahid, M., & Paul, A. (2021). Intrinsic motivation represents the self-driven desire to engage in tasks and activities for their inherent satisfaction. Journal of Education and e-Learning Research, 11(2), 89–97.
22. Ubago-Jimenez, J. L., Zurita-Ortega, F., Ortega-Martín, J. L., & Melguizo-Ibañez, E. (2024). Impact of emotional intelligence and academic self-concept on academic performance of educational sciences undergraduates. Heliyon, 10, e29476.
23. Vegafria, L. (2017). Multimedia learning: An integrated teaching approach on students' achievement and attitudes(Unpublished master's thesis). CMU Graduate School.
24. Wang, C. L., & Liou, P. Y. (2017). Students' motivational beliefs in science learning, school motivational contexts, and science achievement in Taiwan. International Journal of Science Education.https://doi.org/10.1080/09500693.2017.1310410
25. Yen, T.-F. (2020). The performance of online teaching for flipped classroom based on COVID-19 aspect. Asian Journal of Education and Social Studies. https://doi.org/10.9734/AJESS/2020/v8i330229
26. Zhai, Y., & Putwain, D. W. (2024). Science motivation, academic achievement, and science career aspirations in early adolescents: The role of task values. Learning and Individual Differences, 116, 102577.