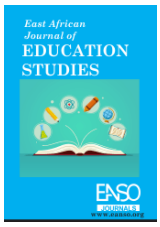

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Original Article

The Impact of Flipped Classrooms on Students' Perceived Academic Performance: A Case of Selected Secondary Schools in Dar es Salaam, Tanzania

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Flipped Classroom, Perceived Academic Performance, Constructivist Learning, Secondary Education, Active Learning.

ABSTRACT

This study examined the impact of the flipped classroom approaches on students' perceived academic performance in secondary schools in Dar es Salaam, Tanzania. The study was guided by constructivist learning theory, which emphasises active knowledge construction, learner autonomy, and collaborative engagement. A quasi-experimental design was employed, involving eight classes from two secondary schools, covering English, Geography, and Mathematics subjects. The study adopted a mixed-methods approach, where data were collected through closed- and open-ended questionnaires, and classroom observations; at different times, i.e. pre- and post-tests measures. Quantitative data were analysed using descriptive statistics, paired samples t-tests, and Mixed ANOVA, while qualitative data were subjected to content analysis. The results revealed a statistically significant improvement in students' perceived academic performance after the flipped classroom intervention. Paired samples t-test results showed a strongly significant difference between pre-test and post-test scores across all subjects ($p = .000$). Additionally, Mixed ANOVA results indicated a significant main effect of TimePoint ($p < .001$, $\eta^2 = .016$), suggesting that while the intervention led to meaningful improvements, the effect size was modest; possibly due to time frame that was reserved for the intervention. Among subjects, English and Geography showed higher post-test mean scores compared to Mathematics, which scored 0.5 points lower, possibly due to the intervention's heavy reliance on pre-class lesson notes rather than diverse digital resources. The study recommends that future implementations of the flipped classroom should allow longer intervention periods and the incorporation of diverse learning materials in order to maximise its effectiveness in improving students' perceived academic performance.

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INTRODUCTION

In an era where academic success is progressively defined by students' self-perception and ownership of learning, understanding how students gauge their own performance has become fundamental in educational research and reform. Students' perceived academic performance refers to students' own perceptions, beliefs or attitudes towards their academic abilities to succeed (Izaguirre et al, 2023; Khan et al, 2013). It encompasses students' self-judgment on how well they are progressing in their studies, often reflected in their sense of competence, confidence, and academic progress. Although it is not the actual academic success, perceived academic performance determines the extent to which students become successful in their academic achievement (Ajmal & Rafique, 2018; Ferla et al, 2010; Yuniar, 2021).

Studies indicate that students' perceived academic performance is moulded by multiple factors, including their prior academic experiences, feedback from teachers and peers, and their self-efficacy beliefs (Izaguirre et al, 2023; Chaves-Barboza et al, 2015; Zimmerman, 2000). Research has identified a number of aspects in which perceived academic performance plays on students' welfare. For instance, it has been stressed that perceived academic performance plays a critical role in driving students' motivation, engagement, resilience and academic performance (Cruz et al, 2024; Mathew, 2017; Palazon-Herrera & Soria-Vílchez, 2021). Students with positive academic self-perceptions tend to set higher goals, demonstrate greater persistence, and experience a stronger sense of achievement, contributing positively to their academic outcomes. In contrast, negative self-perceptions tend to lead to reduced motivation and heightened anxiety, as students may fear failure and question their abilities, which in turn affects their academic engagement and overall learning experience (*ibid*).

Several factors hinder students from achieving their perceived academic performance across different contexts. These challenges often include unfavourable learning environments, such as overcrowded classrooms, high student-teacher ratios, and limited access to educational resources like textbooks. Additionally, inadequate government funding and resource constraints further exacerbate these issues, impeding students' ability to engage in supportive and conducive learning settings (Izaguirre et al, 2023; Kibuthu & Muasa, 2023; Pugnerová & Pospíšilová, 2020). These issues collectively influence how students

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perceive their own academic abilities, potentially undermining their confidence and motivation to excel.

Tanzania's secondary education system is not exempt from these challenges, as it faces numerous obstacles that influence students' academic performance and their perceptions of their abilities. Key issues include limited teaching and learning resources, including textbooks (Nyandara & Jonas, On Press); overcrowded classrooms, and inadequate infrastructure, which hinder effective teacher-student interactions (Assey & Babyegeya, 2022; Philip, 2022). These factors negatively impact students' engagement and their self-assessment of academic success.

In addressing these issues worldwide, various initiatives and efforts have been established to enhance students' engagement and motivation, ultimately fostering their perceived abilities and confidence in academic achievement (Filho et al, 2023; UNESCO, 2023; World Bank, 2023). These initiatives aim to promote and establish more dynamic and responsive learning environments. Among the most distinguished innovations in teaching and learning is the adoption of flipped classrooms, a strategy that has shown significant potential in improving students' self-perception of their academic performance (Once & Kara, 2019; Ruiz-Jiménez, Licerán-Gutiérrez & Martínez-Jiménez, 2022).

The flipped classroom approach (FCA), also referred to as the inverted classroom, redefines the traditional teaching-learning paradigm by reversing the time and place for delivering instructional content and completing homework. According to Farag and Haroun (2020), this approach fosters a more positive perception of learning outcomes among students by shifting the focus from passive reception of knowledge to active engagement with learning materials. In a flipped classroom, students are introduced to new content outside of class, typically through videos, readings, or other pre-recorded materials; while class time is reserved for interactive activities, problem-solving, and collaborative discussions (Bhat & Bhat, 2018; Bergfjord & Heggernes, 2016). This method inherently increases one-on-one interaction between students and teachers or instructors, enabling personalised feedback and support. By engaging with concepts and peers during class sessions, students gain opportunities to clarify doubts, deepen their understanding, and reinforce learning in meaningful ways (Aidoo et al., 2022; Farag & Haroun, 2020). Enfield (2013) highlights that the flipped classroom also provides a structured environment for students to work in small groups or independently, with instructors available to address questions and challenges as they arise. This direct interaction not only supports students in resolving academic difficulties but also builds their confidence in mastering course content.

Additionally, the flipped approach promotes active learning and critical thinking, which are crucial for cultivating a positive academic self-concept. Etemi (2020) highlights that students in flipped classrooms are encouraged to take ownership of their learning, fostering a sense of responsibility and self-efficacy. The collaborative exercises and group interactions further enhance interpersonal skills, contributing to a well-rounded learning experience (Aidoo et al., 2022; Blair, Maharaj & Primus, 2016). These factors collectively work to help students develop a favourable perception of their academic achievement, as they see tangible progress in their abilities and gain confidence in their performance. Through this model, students are not only equipped with academic knowledge but are also empowered to believe in their capacity to succeed, bridging the gap between perceived and actual academic achievement (Ruiz-Jiménez, Martínez-Jiménez & Licerán-Gutiérrez, 2023; Sirakaya & Özdemir, 2018). This dynamic transformation makes the flipped classroom an effective strategy for enhancing students' perceptions of their academic performance.

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Problem Statement

The motivation for this study arises from a critical role that the students' perceived academic performance plays in shaping their overall academic success. However, challenges affecting perceived academic performance, such as low student engagement, diminished motivation, and deficient learning outcomes, persist globally and are similarly prevalent within the Tanzanian education system (Assey & Babyegeya, 2022; Philip, 2022). In light of the identified challenges, there arose a pressing need to explore innovative pedagogical approaches that can enhance students' perception of their academic capabilities. One among the approaches is the flipped classroom approach, which has gained attention for its potential to improve most of the students' hindrances to learning, such as students' engagement, motivation, and active learning. This approach has demonstrated success in various educational contexts (Aidoo et al., 2022; Etemi, 2020; Ruiz Jiménez et al, 2023; Sirakaya & Özdemir, 2018). However, its effectiveness in enhancing students' perceived academic performance within the Tanzanian secondary school context remains largely unexplored. This gap is critical, as students' perceptions of their academic abilities tend to significantly influence their actual academic success (Ajmal & Rafique, 2018; Ferla et al, 2010; Yuniar, 2021).

Building on the findings of a feasibility study conducted by Nyandara and Jonas (In Press), which explored teachers' and students' awareness of this innovative pedagogy in Tanzanian secondary schools, the need for a follow-up experimental study became evident. The study revealed that both teachers and students had limited familiarity with the flipped classroom approach and its potential to address persistent educational challenges, enhancement of students' perceived academic performance in particular. This lack of awareness emphasised on the necessity of a further investigation to determine whether implementing this pedagogy could positively influence students' academic self-perception and, ultimately, their learning outcomes. This study sought to address the major question: *"To what extent does the flipped classroom approach influence students' perceived academic performance in Tanzanian secondary schools?"*

THEORETICAL FRAMEWORK

This study was guided by *Constructivist Learning Theory*, rooted in the works of Jean Piaget and Lev Vygotsky. The theory postulates that learners actively construct knowledge through interaction with their environment, including content, peers, and instructors. Unlike traditional teaching approaches, where learners are passive recipients of information, constructivist learning emphasises meaningful engagement in activities that foster deeper understanding and long-term retention.

This theory is particularly relevant to the present study, which examines the impact of the flipped classroom approach on students' perceived academic performance. In a flipped classroom, the learning process is restructured to shift the responsibility of initial knowledge acquisition to the learners, allowing them to engage with instructional materials, such as pre-recorded videos, audio lessons, and digital notes, before class. This independent, pre-class engagement enables students to process foundational knowledge at their own pace, while in-class sessions focus on interactive discussions, problem-solving, and collaborative learning, reinforcing comprehension through active engagement.

The principles of Constructivist Learning Theory are reflected in this study in several ways. First, the theory emphasises *Active Knowledge Construction*, where students are not merely passive listeners but actively engage with learning materials before class. This approach enables them to develop initial understandings, which they refine through teacher guidance and peer interactions during in-class activities. Second, the flipped classroom model, like constructivist learning, enhances classroom

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interaction by fostering collaborative learning through peer discussions and teacher scaffolding. This structure provides an environment where students apply knowledge in real time, receive immediate feedback, and build confidence in their academic abilities, which are the key aspects of constructivist learning. By aligning with *Constructivist Learning Theory*, the flipped classroom approach in this study not only transforms the traditional learning experience but also promotes the enhancement of students' perceived academic performance.

MATERIALS AND METHODS

This study employed a quasi-experimental design and was conducted in two secondary schools located in Dar es Salaam, Tanzania, School "A" from Ilala Municipality and School "B" from Ubungo Municipality. Dar es Salaam was selected as a case for this study due to its status as the largest and most urbanised region in the country, often positioning it at the forefront of educational innovations and policy implementation. Furthermore, according to the Tanzania Basic Education Statistics (BEST), schools in Dar es Salaam are characterised by high student enrolment and persistent overcrowding, which underscores the need for more effective and student-centred pedagogical approaches such as the flipped classroom model. Moreover, the selection of Ilala and Ubungo municipalities was intentional to reflect the diversity within urban educational settings. Ilala is one of the oldest and most established municipalities in the region, whereas Ubungo is a relatively new administrative entity, having been established in recent years. This contrast offers a range of educational experiences and infrastructure maturity, enriching the comparative potential of the study. Moreover, both municipalities comprise diverse socioeconomic contexts, encompassing middle- and low-income communities. This diversity allows for a more comprehensive exploration of how the flipped classroom approach impacts students across varying backgrounds and learning environments.

A total of eight classes participated, divided into four experimental classes and four control classes. Three subjects were involved in this study, which were English (representing Language subjects), Geography (representing Arts subjects), and Mathematics (representing Science and Mathematics Stream). At School "A", the study involved Form One English and Form Three Geography classes; while at School "B", Form One English and Form Three Mathematics classes participated. Mathematics was purposely included in this study because in the initial study (Nyandara & Jonas, In Press), students showed some doubts on whether this approach can work even in complex subjects like this.

The selection of Form I and Form III students for this study was based on the fact that Form I students are at the initial stage of their secondary education journey, making this a formative period for developing effective learning habits and attitudes. Hence, introducing student-centred pedagogies such as the flipped classroom approach at this early stage may positively influence their learning behaviours, academic self-concept, and overall adaptation to the demands of secondary education. Conversely, Form III students were included because they are in a critical academic year within the Ordinary Level of Secondary Education in Tanzania. This year is often viewed as a high-stakes period, during which students are expected to consolidate foundational knowledge in preparation for their final Form IV national examinations. Hence, implementing innovative teaching strategies such as the flipped classroom model at this stage may significantly affect students' perceived academic performance and motivation, particularly as they engage in more independent and outcome-driven learning.

The learning activities for the experimental groups involved activities such as pre-class lesson notes, interactive discussions, and active learning

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exercises during class time, while the control groups followed the traditional teacher-centred approach, with direct instruction in the classroom. The study was carried out over a period of two months.

To assess the impact of the flipped classroom approach on students' perceived academic performance, both experimental and control groups participated in pre- and post-tests using a combination of open- and closed-ended questionnaires. Additionally, observation sessions were conducted twice, once at the beginning and again towards the end of the intervention period for both groups. The purpose of pre-testing for both groups was to establish a baseline of their initial performance and to provide a basis for comparison after the intervention. The post-testing aimed to determine whether there was any improvement in students' perceived academic performance following the intervention. The questionnaire employed a 5-point Likert scale with eight statements: I am now performing better in class than before; My level of learning has improved; I can academically compete with my classmates; I understand when the teacher teaches in class; I often get grades that align with my goals in my assignments; I allocate enough time to complete my academic tasks; I think I perform better than my peers; I know my weaknesses in learning and work on improving them.

In addition to that, the researcher used an observation checklist with a number of attributes which were observed, and the researcher was supposed to tick YES/NO, followed by the description of the observed behaviours. The attributes included: The students initiate a task without need for teacher's verbal encouragement; Students request help in order to start a task; Students demand help in order to start on a task; Students hesitate to do a task despite teacher's encouragement; Students need teacher's verbal encouragement to keep working; and Students accept help from peers when needed.

To analyse the collected data, a number of statistical methods were used. For quantitative data, descriptive analysis was performed, involving computing means and standard deviations for the four phases of the study, i.e. pre- and post-tests for control and experimental groups, to understand participants' initial perceptions and allow for comparison of the findings after the intervention. A t-test method was employed in order to compare the means of the two groups to determine the statistical significance of the findings. Given the study's intricacy, it involved several aspects such as gender, group, school, class, and time. Multiple ANOVAs were used in order to simultaneously analyse multiple dependent variables, to understand the interrelationships between the variables, and increase statistical power. On the other hand, qualitative data were analysed using the Content Analysis method, so as to methodically organise and categorise data, identifying patterns, themes, and trends.

FINDINGS

This section presents the findings of the study, which employed a quasi-experimental design involving both pre-test and post-test procedures. The pre-test results revealed comparable performance levels between the control and experimental groups, suggesting that the groups were relatively similar before the intervention. For example, the control group's mean scores ranged from 2.25 for item 1 to 2.75 for item 8; whereas the experimental group's mean scores ranged from 2.19 for item 8 to 2.83 for items 2 and 7. Additionally, the standard deviations for the two groups at the pre-testing stage also showed similarities. The control group's standard deviations ranged from 0.634 for item 4 to 0.732 for item 6, while the experimental group's standard deviations ranged from 0.637 for item 1 to 0.724 for item 4.

These scores provide valuable insights into the performance and variability of responses within the control and experimental groups. The mean scores suggest that, before the intervention, both groups

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had moderate perceptions of their academic performance. Additionally, the standard deviations for both groups were relatively close, indicating no excessive variability in responses, but enough to suggest some differences in perceptions among participants. These similarities in mean scores and standard deviations suggest that the two groups were reasonably comparable at the pre-testing stage, providing a solid foundation for assessing the impacts of the intervention.

After the intervention, significant changes have been observed. For example, the post-test mean scores for the control group remained nearly identical to the pre-test scores, ranging from 2.28 for item 5 to 2.73 for item 2. In contrast, the post-test mean scores for the experimental group showed substantial increases, ranging from 3.84 for item 7 to 4.21 for item 4. The standard deviations for the control group ranged from 0.616 to 0.705, while for the experimental group, they ranged from 0.634 to 0.716. This significant increase in mean scores for the experimental group after the intervention suggests that the flipped classroom approach effectively enhances students' perceived academic performance compared to traditional teaching methods. Not only that the relatively close standard deviations for both groups indicate consistent responses among participants, highlighting the approach's impact on improving students' outcomes.

Apart from the results from the descriptive analysis, which have already been articulated, data were also subjected to a t-test analysis. The t-test method was deemed necessary for this study to determine if there is a significant difference between the means of two groups. Upon performance, the findings from the t-test analysis provided further evidence of the impact of the flipped classroom approach on students' perceived academic performance. While the descriptive statistics offered initial insights into the performance of the control and experimental groups, the t-test analysis allowed for a more rigorous comparison of the mean scores between these groups. By examining the significance of the differences in mean scores, the t-test analysis confirmed the effectiveness of the intervention and validated the observed improvements in students' perceived academic performance. The results from the t-test analysis are summarised in Table 1.

Table 1: Independent Samples t-test Results

Variable	Applicable Row	Sig.2-tailed	t-test for Equality Means	95% Confidence Interval of the Difference	
			Mean Difference	*Lower*	*Upper*
I am now performing better in class than before	Equal Variance Not Assumed	.000	.863	.719	1.006
My level of learning has improved	Equal Variance Not Assumed	.000	1.109	.977	1.240
I can academically compete with my classmates	Equal Variance Assumed	.000	1.099	.963	1.235
I understand when the teacher teaches in class	Equal Variance Not Assumed	.000	1.096	.955	1.237
I often get grades that align with my goals in my assignments	Equal Variance Not Assumed	.000	.859	.725	.993
I allocate enough time to complete my academic tasks	Equal Variance Not Assumed	.000	1.189	1.050	1.327

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Variable	Applicable Row	Sig.2-tailed	t-test for Equality Means	95% Confidence Interval of the Difference	
			Mean Difference	*Lower*	*Upper*
I think I perform better than my fellows	Equal Variance Not Assumed	.000	.919	.785	1.052
I know my weaknesses in learning and work on improving them	Equal Variance Not Assumed	.000	.836	.688	.985

The t-test analysis as per Table 1 revealed significant differences between the control and experimental groups in all measured variables. This implies that the intervention that was subjected to the experimental group demonstrated substantial improvements in the students' perceived academic performance across all the involved variables. Looking at this table's scores one-by-one, the result from this analysis indicates that there is a strong relationship between the flipped classroom approach and students' perceived academic performance. For instance, p-values for all eight variables are less than .001, which implies that there is a very strong relationship between the predictor variable, which in our case is the flipped classroom approach and the outcome variable, which is students' perceived academic performance.

Moreover, the t-test for equality of means revealed statistically significant differences between the experimental and control groups across all measurements. On average, the experimental group consistently scored higher than the control group by this magnitude; as their mean differences ranged from 0.836 to 1.189, suggesting that the differences are not only statistically significant but also potentially meaningful in a classroom context. Not only that the 95% confidence intervals for all the variables did not include zero, indicating that the differences between the two groups are unlikely to have occurred by chance, suggesting a consistent and meaningful disparity between the two groups.

Furthermore, Multivariate Analysis of Variance (MANOVA) was deemed necessary for this study as it involved analysing multiple dependent variables, namely, gender, group, time, class, and school simultaneously. This approach allowed the researcher to examine whether the independent variable had an overall effect on the combination of these dependent variables, rather than assessing each one separately. The analysis revealed a significant main effect of TimePoint, indicating notable differences between pre-test and post-test scores. The multivariate tests, including Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root, all yielded consistent results: $F(1, 746) = 12.303$, $p = .000$, with a Partial Eta Squared = .016. The partial eta squared value of .016 suggests a small effect size, indicating that while the effect of TimePoint is statistically significant, its practical impact is relatively modest.

Another aspect of the analysis involved using MANOVA was to examine the effect of the intervention on gender. The results, as indicated by Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root, showed no significant differences in the changes from pre-test to post-test scores between males and females, as shown by the scores: $F(1, 746) = 2.409$, $p = .121$. This suggests that gender did not significantly influence the observed changes over time.

Again, the statistical analysis between pre-test and post-test scores across classes that were involved in the intervention, indicated significant differences between experimental and control groups and indicated by: Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root: showing

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F(1, 746) = 199.278, p = .000, Partial Eta Squared = .211. According to these scores, there is a significant interaction between TimePoint, which indicates pre- and post-test, and class, suggesting that the changes from pre-test to post-test scores differ significantly across different class levels. The partial eta squared value of .211 indicates a large effect size.

Additionally, a Multivariate Analysis of Variance (MANOVA) was conducted to examine the relationship between TimePoint and subject area, aiming to assess the impact of the flipped classroom approach across the three subjects involved in the study: English, Geography, and Mathematics. The objective was to determine whether there were statistically significant differences in students' perceived academic performance among these subjects. The findings indicate that the impact of the flipped classroom approach varied across subjects and groups, i.e. some subjects in the experimental group appeared to benefit more from the intervention than others.

A closer examination of the subject-wise impact showed that English and Geography experienced the greatest improvement. Their initial mean scores were both 1.5, which increased to 3.5 post-intervention, reflecting an improvement of 2.0 points. Mathematics, on the other hand, showed a slightly lower improvement, with an initial mean of 1.5 and a post-intervention mean of 3.0, indicating an increase of 1.5 points. While the improvement in Mathematics was slightly lower by 0.5 compared to English and Geography, the data still suggest that the flipped classroom approach had a positive effect across all subjects. This infers that with careful planning and implementation, the approach can be effectively utilised to address challenges related to students' perceived academic performance in Tanzanian secondary schools.

Nonetheless, as previously identified, this study employed a mixed-methods approach. Data collection was conducted using a questionnaire that combined both closed- and open-ended questions. The statistical data from the closed-ended responses have already been analysed and compiled. Together with this, the open-ended questions were designed to capture students' perspectives on the benefits they gained from the flipped learning intervention, as well as their opinions on the potential of this approach. Specifically, students responded to two key questions: **"***What benefits have you gained from being given lesson notes before the class? Please specify them"*; and "*What are your opinions on learning by being given lesson notes in advance before the class session*?" The responses to these questions indicated that students appreciated the new teaching approach introduced by their teachers.

Below are some of the responses to the first question: as per a Form I student from School "A", *"…The benefit I gained is that I study on my own before the lesson, which enhances my understanding of the subject and helps me plan my study time effectively…".* Another student, a Form III Geography student from the same school, added, *"…Since our teacher started giving us notes before class, my understanding has improved, my performance has increased, and it is a great way to study at home…".* Similar responses were gathered from School "B". A Form III Mathematics student shared, *"…It has helped me prepare mentally, especially when the teacher enters the class and asks questions, I can confidently answer them…".* Another student, a Form I English learner, expressed, *"…I have benefited from studying independently, and this approach has strengthened my ability to think critically…".*

Regarding the second question, which sought to capture students' opinions on this pedagogical practice, students demonstrated positive thoughts toward this learning approach. For instance, a Form III Mathematics student from School "B" expressed his support for this method, stating, *"…I believe we should continue with this approach. Personally, I have embraced it fully, and I am confident that if we keep learning this way, my academic performance will improve, and I will pass my exams...".* Another

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Form I English student from the same school echoed this sentiment, saying, *"…We should continue receive study notes before lessons because it has helped me a lot. I study on my own at home, and when I don't understand something, the teacher clarifies it in class…".* Similarly, a Form I English student from School "A" highlighted the interactive benefits of this approach, stating, *"…Being given notes before the lesson improves communication between me and the teacher in class…".* Another student, a Form III Geography student from same school, recommended that all teachers implement this practice, emphasizing, *"…Teachers should work harder to provide us with notes before lessons because it allows us to study in advance. That way, when the teacher comes to class, he simply builds on what we have already learned…".* Overall, students expressed strong support for the flipped learning approach, emphasising its role in enhancing their self-perceptions of their academic performance.

As previously mentioned, observation was employed as one of the data collection methods in this study. The researcher used an observation checklist to complement data obtained through other methods. The checklist included attributes designed to assess behaviours related to students' perceived academic performance. At the beginning of the study, students' behaviours in both the experimental and control groups were largely similar. In approximately 70% of the observed lessons, students hesitated before starting tasks, struggled to initiate work without the teacher's verbal encouragement, and rarely accepted help from peers. However, following the intervention, a significant behavioural shift was observed in the experimental group. Unlike the control group, more than 90% of the students in the experimental group actively interacted with peers, demonstrated greater independence in completing tasks, and no longer relied heavily on the teacher's direct guidance. This indicates that the flipped classroom approach positively influenced the students, enhancing their ability to perceive and assess their academic performance compared to those taught using traditional methods.

DISCUSSION OF THE FINDINGS

This study examined the impact of the flipped classroom approach on students' perceived academic performance. The study employed a mixed-methods approach; while data were collected using a questionnaire that combined both closed- and open-ended questions, along with observations. Quantitative data were analysed using descriptive statistics, t-tests, and Multivariate Analysis of Variance (MANOVA), while qualitative data were scrutinised through content analysis. The descriptive analysis of all eight study items revealed that pre-test mean scores and standard deviations for both groups were relatively similar, signifying comparable perceptions of academic performance before the intervention. However, following the intervention, the experimental group demonstrated a substantial increase in mean scores and standard deviations, whereas the control group's scores remained almost unchanged. Furthermore, the t-test results reinforced these findings, with highly significant two-tailed p-values (.000) for all items, suggesting a strong effect of the intervention. The t-test for equality of means further supported the meaningfulness of these differences in a classroom context. Additionally, the 95% confidence interval of the difference did not include zero for any variable, indicating that these differences were unlikely to have occurred by chance.

While there was a scarcity of direct literature on the impact of the flipped classroom approach on students' perceived academic performance, these findings align with broader research on related aspects such as students' academic performance, student engagement, motivation, and preparedness for class and examinations. For instance, Studies by Lee and Wallace (2017), Palazon-Herrera and Soria-Vílchez (2021), and Zainuddin et al. (2019) present that students taught using the flipped classroom model achieved higher academic

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performance than their peers in traditional learning environments.

The analysis revealed a significant main effect of TimePoint, indicating notable differences between pre-test and post-test scores. However, the Partial Eta Squared value was 0.016, suggesting a small effect size. This indicates that while the flipped classroom intervention had a statistically significant impact, its practical effect was relatively modest. One possible explanation for this outcome is the duration of the intervention, which lasted approximately two months. Research suggests that the effectiveness of educational interventions, particularly those involving pedagogical shifts like the flipped classroom, is often influenced by the amount of time students have to adapt to new learning approaches and instructional strategies.

Several studies highlight the importance of sufficient intervention time for maximising learning outcomes. Van Alten et al. (2019) emphasise that the flipped classroom model requires an adjustment period for both students and teachers, and short-term interventions may not fully capture its long-term benefits. Similarly, Freeman et al. (2014) argue that active learning approaches, including flipped classrooms, yield stronger effects when implemented over extended periods, allowing students to fully assimilate into new learning habits. Given these insights, future studies could explore longer intervention periods to determine whether extended exposure to the flipped classroom approaches would result in a more substantial practical impact on students' perceived academic performance.

Moreover, research by Enfield (2013) and Farag and Haroun (2020) highlights the role of the flipped classroom approach in transforming teaching and learning from passive knowledge reception to active engagement with learning materials. Additionally, Etemi (2020) emphasised that flipped classrooms encourage students to take ownership of their learning, nurturing a sense of responsibility and self-efficacy. These findings further support the effectiveness of the flipped classroom model in enhancing various aspects of students' learning experiences.

In the same way, the findings of this study revealed that the flipped classroom approach had a significant impact on students' perceived academic performance across all subjects involved, English, Geography, and Mathematics, regardless of their fields of specialisation. These results align with previous studies by Yakob et al. (2023), Njadat (2024), and Falode & Mohammed (2023), which confirmed that the integration of the flipped classroom approach effectively supports teaching and learning across various subjects and contexts, particularly in English and Geography. Regarding Mathematics, the findings are consistent with the work of Wei et al. (2020), who compared the effects of flipped and traditional learning approaches on students' performance in Mathematics. Their study found that students exposed to the flipped classroom approach outperformed those in traditional learning settings. Additionally, studies by Uy (2022) and Ruiz-Palmero et al. (2023) further support the effectiveness of the flipped classroom approach in Mathematics, particularly in teaching mathematical concepts in both conventional and online learning environments.

On the other hand, a closer examination of the effects of the approach in the current study revealed that, while English and Geography achieved higher and similar scores, Mathematics scored slightly lower by 0.5 points. This trend could be explained within the Tanzanian context, as a feasibility study by Nyandara and Jonas (On Press) indicated that students voiced doubts about the effectiveness of the flipped classroom approach in facilitating Mathematics learning. Another possible reason for this variation could be the nature of the study materials that were used in the intervention, which relied heavily on pre-class lesson notes. This hints at the need for further studies incorporating a wider variety of instructional materials, such as digital resources, videos, CDs, and audio content, to

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determine whether similar findings would be observed under different conditions.

The findings of this study align closely with the premises of the *Constructivist Learning Theory*, which emphasises that learners actively construct their own knowledge through meaningful engagement with content, peers, and instructors (Piaget, 1952; Vygotsky, 1978). The flipped classroom approach used in this study represents key constructivist principles by shifting the focus from passive reception of knowledge to active learning, where students interact with instructional materials before class and engage in deeper, collaborative learning during in-class sessions. One of the central tenets of constructivist learning is active knowledge construction, which was evident in this study's findings. The post-test results showed a significant improvement in students' perceived academic performance across subjects, indicating that engaging with pre-class materials and participating in interactive, student-centred classroom activities contributed to their learning. This supports the constructivist idea that knowledge is constructed through experience and interaction rather than mere transmission from teacher to student (Bruner, 1966).

Additionally, the findings reinforce the constructivist principle of social interaction as a key driver of learning (Vygotsky, 1978). The flipped classroom model in this study encouraged students to engage in peer discussions, problem-solving activities, and teacher-guided facilitation, nurturing deeper understanding and critical thinking. This collaborative engagement is particularly crucial in constructivist learning, as it allows students to refine their ideas, confront misconceptions, and internalise new knowledge through dialogue and shared experiences.

Moreover, learner autonomy and self-regulation, which are fundamental aspects of constructivist learning, were reflected in the findings. Since students were responsible for engaging with pre-class materials independently, they developed a sense of ownership over their learning, aligning with Vygotsky's notion of the Zone of Proximal Development (ZPD), where learners progress through guided support until they achieve independent mastery. The improvement in perceived academic performance suggests that students benefited from this structured independence, confirming the research by Lo & Hew (2017), who found that flipped classrooms enhance students' self-efficacy and confidence in learning.

Nevertheless, the study also revealed that the effect size of the intervention was relatively small, which may be attributed to the length of the intervention or students' initial unfamiliarity with the flipped classroom model. Constructivist learning emphasises the gradual internalisation of knowledge through continuous engagement, suggesting that longer exposure to the flipped classroom approach might yield even more pronounced improvements in perceived academic performance (Freeman et al., 2014).

CONCLUSIONS AND RECOMMENDATIONS

This study examined the impact of the flipped classroom approach on students' perceived academic performance in English, Geography, and Mathematics in secondary schools in Dar es Salaam, Tanzania. The findings exposed a statistically significant improvement in students' perceptions of their academic performance after the intervention ($p = .000$), supporting the principles of Constructivist Learning Theory, which emphasises active engagement, learner autonomy, and collaborative learning. However, Mathematics showed slightly lower post-test gains compared to English and Geography, possibly due to the heavy reliance on pre-class lesson notes rather than interactive digital materials. The study recommends that future implementations of the flipped classroom should allow longer intervention periods to maximise its effectiveness in improving students' perceived academic performance. The study further recommends the incorporation of diverse learning

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materials, including digital resources such as videos, interactive simulations, and multimedia resources, in order to improve engagement and understanding, particularly in subjects like Mathematics.

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