# Effect of the Flipped Classroom Model with Loop Game on Learning Outcomes in Economics Threshold Concepts

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**Received:** 29 September 2024; **Accepted:** 24 October 2024; **Published:** 12 November 2024

**To cite this article (APA):** Jimoh, A. S., Mohammed, A. O., Lawal-Arogundade, S. O., & Obimuyiwa, G. A. (2024). Effect of the Flipped Classroom Model with Loop Game on Learning Outcomes in Economics Threshold Concepts. *Asian Journal of Assessment in Teaching and Learning*, *14*(2), 30–40. https://doi.org/10.37134/ajatel.vol14.2.3.2024

**To link to this article:** https://doi.org/10.37134/ajatel.vol14.2.3.2024

## *Abstract*

This study investigated the influence of implementing a Flipped Classroom model integrated with Loop Game activities on students' learning outcomes in Economics Threshold Concepts. The study employs a quasi-experimental design with a one-group pre-test and post-test format. A systematic sampling technique was used to select a sample of 12 schools from the four zones in Lagos State Education District V, using three schools from each zone. Intact classes of year two senior secondary school students were used in each sampled school. The study raised two research questions and tested one hypothesis at a 0.05 level of significance. Results indicated that the application of the Flipped Classroom model combined with Loop Game activities significantly improves learning outcomes in Economics Threshold Concepts. The pre-test average score was observed to be 5.22, which increased to 7.42 in the post-test, amounting to over 40% increase. This descriptive comparison illustrated a substantial enhancement in students' understanding of the material following the implementation of this learning model. A paired sample t-test analysis confirmed a significant increase in learning outcomes ($r = 0.81$, $p < 0.05$). These findings demonstrated that the use of the Flipped Classroom model with Loop Game activities effectively enhances learning outcomes in Economics Threshold Concepts. It was recommended, therefore, that senior secondary schools should make efforts to integrate the Flipped Classroom model with Loop Game activities in teaching Economics Threshold Concepts as it has been found to create more effective and interactive learning experiences for senior secondary school students.

***Keywords:*** *Flipped Classroom Model, Loop Game, Assessment, Learning Outcomes, Economics, Threshold Concepts*

## INTRODUCTION

Economics education is one subject area in constant search of innovative pedagogical methods that could deeply inspire students with complex economic concepts. Traditional lectures often fall short in creating deep learning and applying theoretical frameworks whereby students struggle with abstract conceptions and their real-world implications (Davies, 2019). Hence, the flipped classroom model develops as an innovative pedagogical intervention which can help to overcome these limitations by

inverting the traditional learning environment: delivering instructional content outside of class and using in-class time for active learning activities (Nurwulandari, 2024; Purba, Kristiani, Sangka, & Hussain, 2021; Olaniyi, 2020). It allows for more personalisation in learning, thereby enhancing student involvement and learning outcomes.

Over the past two decades, learning outcomes in Economics have deteriorated, often a result of the fact that many students are befuddled and give wrong answers instead of using the right concepts and terms. This is consolidated in the work of Adio, Oluwatosin, & Olatunde (2021), who presented a staggering percentage of senior secondary school leavers who fail Economics and, consequently, struggle to gain admission into tertiary institutions. Several WAEC chief examiners' reports also validate this assertion and indicate the challenge of using correct economic terminology and students' performance decline in Economics in Nigeria (Olaniyi, 2020; Mohammed, 2024). Economics is supposed to be precise, interesting, simple, and relevant to life, but to many students, it is hard, abstract, and almost impossible to do well in. This view may come from some perceived difficult topics in Economics, which are often threshold concepts (TC), serving as a key to understanding the subject (White Olsen, Schumann, 2016; Mohammed, 2022).

Threshold concepts represent a critical aspect of disciplinary understanding, acting as "portals" to deeper comprehension and transformative learning experiences (White et al., 2016; Davies, 2019). These concepts, as defined by Meyer and Land, often challenge students due to their counter-intuitive nature, requiring a shift in mental models and analytical frameworks (Timmermans & Meyer 2019). In Economics, concepts like opportunity cost, demand and supply, price determination and zero-sum game (Davies, 2019) exemplify such thresholds, often posing significant hurdles for students (Mohammed, 2022). According to Purba et al. (2021), flipping these threshold concepts creates a unique opportunity to employ active learning strategies to better increase and deepen engagement with those necessarily challenging ideas.

Another active learning strategy that fits well into the flipped classroom (FC) model is the loop game. It is an interactive game activity that encourages collective learning, critical thinking, and problem-solving skills. The mechanism of the loop games presupposes a chain of questions or any situations where students proceed by answering, in turn, to the next stage (Teichmann, Ullrich, Knost, Gronau, 2020; Cetin, 2020; Purba et al., 2021). The repetition reinforces learning and allows the learners to apply their knowledge more interactively. It is therefore planned to elicit that integration of loop games into a flipped classroom will provide instructors with the ability to render a more exciting learning process for deeper understanding and actual use of economic threshold concepts (Cetin, 2020; Mohammed, 2022).

The contribution that this research work tends to make pertains to the literature on using innovative pedagogies in teaching Economics. Furthermore, it will also provide some insights into educators' engagement with enhancing curriculum activities in this challenging subject area to enable more effective approaches to student learning experiences and consequent outcomes through a deeper understanding and appreciation of economic principles. This will be done by prying into the threshold concepts identified in Economics and the flipped classroom model with the incorporation of loop games viewed by the Economics teachers and the effect on students' learning outcomes in Economics.

Traditional pedagogical approaches in Economics education often fall short in fostering deep understanding and application of complex economic concepts, particularly threshold concepts that require a shift in mental models and analytical frameworks. Students often struggle to grasp these counter-intuitive ideas, leading to rote memorisation rather than meaningful learning. This issue is further compounded by the passive nature of traditional lectures, which often fail to engage students and provide opportunities for active learning and application of knowledge (Mohammed & Jimoh, 2022). While the flipped classroom model has shown promise in addressing some of these limitations (Olaniyi, 2020), its effectiveness in teaching economic threshold concepts remains underexplored. Moreover, the successful deployment of flipped classrooms hinges on incorporating engaging and effective active learning activities during in-class sessions. Therefore, this study addresses the need to investigate the potential of integrating the flipped classroom model with loop games, a highly interactive and engaging active learning strategy, to enhance student learning outcomes in Economics threshold concepts. This research aims to explore whether this combined approach can effectively promote deeper understanding, improve knowledge retention, and foster a more positive learning experience for students grappling with challenging economic principles. To this end, this research

investigates the effect of the flipped classroom model, incorporating loop games as a central active learning component, to enhance student learning outcomes in Economics threshold concepts. Specifically, this study provided answers to the following research questions and tested the stated hypothesis as below:

i. What is the level of students' learning outcome in Economics among Secondary School Students in Lagos State Education District V?
ii. What are the views of Economics teachers on identified Threshold Concepts in Economics among Secondary School Students in Lagos State Education District V?
iii. What is the usability of the flipped classroom strategies, incorporating loop games as in-class activities, in the teaching of Economics among Secondary School Students in Lagos State Education District V?

1. Hypothesis

The following hypothetical statement was tested at a 0.05 level of significance.

$H_0$ The flipped classroom model, incorporating loop games as in-class activities, does not have any significant effect on learning outcomes in Economics among Senior Secondary School Students in Lagos State Education District V.

## THEORETICAL FRAMEWORK

This study draws upon two interconnected theoretical frameworks – theory of conceptual change and gamified learning theory – that guide the discussion into the effectiveness of flipped classrooms with loop games for teaching economic threshold concepts:

1. Theory of Conceptual Change

Conceptual change theory, propounded by Posner, Strike, and Hewson in 1982, provided a framework through which to understand how learners approach new ideas that may challenge or contradict existing beliefs or mental models (Posner et al., 1982). This view theorises that learning involves more than just acquiring new information but rather is a fundamental change in the way learners think about or perceive a concept. This is particularly true when students come to concepts that are complex or abstract, sometimes called threshold concepts, that force them to redefine what they already know to construct a far more precise and sophisticated understanding (Nersessian, 2017).

A central construct of this theory is the role of preconceptions in learning: Learners come into the classroom with prior knowledge, beliefs, or experiences incomplete or inaccurate in some way (Meyer & Timmermans, 2016; Nersessian, 2017). It is these preconceptions that create barriers to learning if not appropriately addressed. Nersessian (2017) observed, therefore, that conceptual change involves the creation of a cognitive conflict whereby the students are faced with an information base or experiences that conflict directly with their notions. This thus instigates the learner to review and modify his mental models.

Instructional methods to facilitate such a shift should assist the learner in the reconstruction process. This means that not only is a tool provided but also scaffolding, which can help students move from their initial misconceptions to a more refined understanding. In the case of Economics, when threshold concepts such as opportunity cost or market equilibrium are hard to grasp, instructional designs based on the Theory of Conceptual Change become vital (Meyer & Timmermans, 2016).

While influential, the Theory of Conceptual Change has equally received its fair share of criticism due to its complexity and difficulty in precisely defining what must be considered a conceptual change. Critics such as Rusanen (2014) argued that it essentially confuses the psychological and scientific concepts, thereby confusing the nature of changes happening in the minds of learners. Besides, Potvin, Nenciovici, Malenfant-Robichaud, Thibault, Mahhou, & Chastenay (2020) also averred that mechanisms of conceptual change are not very well known, and there is no agreement on how these processes could be modelled in any theoretically promising way. This lack of clarity, according to Rusanen (2014), discloses an inconsistency in the application of the theory across educational settings.

Despite these criticisms, studies (Nersessian, 2017; Nadelson et al., 2018) have emphasised that the Theory of Conceptual Change represents a workable theory through which learning is easily understood and promoted, particularly for the complex and abstract ideas of Economics. It is still useful today because of its emphasis on resolving preconceptions and employing cognitive conflict to encourage deeper understanding, which many find useful in educational research and practice. This proves particularly true in subjects like Economics, where threshold concepts such as opportunity cost or market equilibrium may be quite tricky for students to comprehend.

2. Gamified Learning Theory

The gamified learning theory, as propounded by Eric Landers in 2014, suggests that the learning process will be more engaging and, therefore, more memorable when game-like elements are introduced into the learning process (Sanchez et al., 2020). This theory borrows from the success of many kinds of gaming and purports that incorporating elements like points, rewards, competition, and immediate feedback should have positive effects on the level of engagement in learning, motivation, and performance of a learner. Gamification supports basic human needs-desires for achievement, recognition, and advancement-that make learning interactive and rewarding (Ortiz-Rojas et al., 2017; Oliveira et al., 2021).

In loop games, gamification has been the forerunner in the transformation of conventional learning into an interactive, engaging, and entertaining process (Guardiola & Czauderna, 2024; Sanchez et al., 2020; Huang et al., 2019). The idea of the loop game is to construct learning cycles whereby learners enforce key concepts repeatedly. Loop games allow learners to revisit threshold concepts, test knowledge, and build mastery over time through game-like interactions: scoring, challenges, and leaderboards (Guardiola & Czauderna, 2024). Certainly, with any gaming experience, the same can be said, as the player is usually motivated by repeated effort to get to higher levels and better scores. Undeniably, the incorporation of loop games into instructional design offers a pragmatic way for conceptual change to take place.

Gamified learning theory also postulates that the learners who feel most engaged and challenged have a greater likelihood of internalising their learning (Ortiz-Rojas et al., 2017). One integral part of the gamified systems, according to Sanchez et al. (2020), is immediate, which helps students take cognisance of their knowledge gaps and ensures mistakes are corrected then and there. The competitiveness within the games gives way to accomplishment and challenges the learners to always strive to bring in better performances at higher levels (Huang et al., 2019). In other words, gamified learning theory indeed provides a strong background for the usage of loop games because the learning process is much more interactive, entertaining, and productive since such game mechanisms naturally motivate students to learn and recall even very complex information.

## METHODOLOGY

This study used a quasi-experimental design with a pretest and posttest non-equivalent group comprising two treatment groups (TC in FC and Lecture method) to investigate the effect of the use of flipped classroom with the aid of loop games as the in-class activities on the student's learning outcome in Economics in Lagos State Education District V, Nigeria. The population included all Economics teachers and students in the 72 senior secondary schools in education district V of Lagos State. A systematic sampling technique was used to select 12 schools (3 from each of the four local governments) and divide them into two experimental and one control group from each local government. One intact class of SSS two students was used in each school while all Economics teachers available were sampled. Students in SSS 2 were considered in this study because students in SSS 1 were yet to have deep knowledge of the threshold concepts, while SSS 3 students were writing WASSCE and NECO at the period of this research. Teachers and students responded to questionnaire items designed solely for them. The students took the achievement test before and after the intervention to measure their economic cognition, economic and intellectual skills, and attitude.

The research instruments were threefold: the Leaning Outcomes in Economics Questionnaire (LOEQ), the Test of Mastery in Economics Threshold Concepts (TMETC) and the Threshold Concept and Flipped Classroom Questionnaire (TCFCQ). LOEQ had two sections, A and B. Section A consisted

of the demographics of students, while section B consisted of 20 positive items that were measured on four columns, ticked according to the modified Likert scale – VL - Very Low, L - Low, H – High, VH – Very High. LOEQ was subdivided into seven items on economic cognition, seven items on economic intellectual skills, and six items on attitude to Economics. These items were designed to gauge students' self-perceived level of economic intellectual skills, economic cognition and attitude towards Economics, providing valuable insights into their confidence, comprehension, and engagement with economic concepts. Items in LOEQ were adapted from the Jimaa (2013). This instrument was validated by Economics teachers and other experts in Economics. To ascertain the degree to which the LOEQ consistently measured what it was meant to measure, the items were subjected to a Guthman Split-Half method of reliability on Statistical Package for Social Sciences version 25. The coefficient gave a value of 0.97, which suggests that the test is highly reliable.

TMETC consisted of 15 multiple-choice questions attempted by students before responding to the questionnaire. This was considered necessary to test the mastery level of the students in the identified threshold concepts in Economics and to induce positive and reliable responses when they responded to the questionnaire. The students were given 15 minutes to provide answers to the questions. The questions were set considering the identified topics, which are considered threshold concepts in the Economics syllabus, and examination questions obtained from some of the sampled schools. The scoring of the questions was two marks for the multiple-choice questions, giving a total of 30 marks. Questions in the TMETC were drawn from the topics that have been taught in their previous classes on the identified threshold concepts in Economics. TMETC was validated by Economics teachers in the sampled schools.

TCFCQ was made up of two sections – A and B. Section A included the purpose of research work, duration, name of the school and teachers' demographics. Section B consisted of 22 positive items that were measured on four columns, ticked according to the modified Likert scale – SD – Strongly Agree, D - Disagree, A - Agree, SA – Strongly Agree, bordering on views of teachers on identified threshold concepts in Economics and the usability of active learning. Items included in the teachers' questionnaire were adapted from the Organisation for Economic Co-operation and Development (OECD) Teaching and Learning International Survey (2018), some statements from the body of this research work. The coefficient of Guttman Split Half reliability of TCFCQ was 0.98, calculated using Statistical Package for Social Sciences (SPSS) version 25.

The gathered data from this study was analysed using descriptive and inferential statistics. The descriptive statistics of table, mean, standard deviation, and percentage were utilised to analyse the three research questions. The inferential statistics were analysed with the use of Analysis of Covariance (ANCOVA) statistics in SPSS version 25 to test the hypothesis at a 0.05 level of significance. Since the groups were not randomly assigned, the covariate was the pretest scores on TMETC, which controlled for any initial difference among the groups. The data underwent the necessary parametric assumption tests to check its suitability for the statistical tool. These tests include Levene's test of homogeneity, which measured the group variance, and the Shapiro–Wilk test of normality, which assessed the data distribution.

## RESULTS AND DISCUSSION

This section presents and discusses the data collected for this study as well as the results of the analysis carried out using SPSS.

1. Answers to Research Questions

a. Question One: What is the level of students' learning outcome (economic cognition, economic, intellectual skills and attitude) in Economics among Secondary School Students in Lagos State Education District V?

Table 1 shows that all areas of measurement for students' learning outcomes in Economics have means above the criterion mean of 2.50, showing that secondary school students in Lagos State Education District V generally possess good economic cognition, well-developed intellectual skills, and a positive attitude toward Economics. Given that the weighted mean is 3.40, it means that the overall decision is high. This means that the levels of students' learning outcomes on cognition, intellectual skills, and attitude in Economics are high. This result substantiates the findings of Adekoya (2023), which revealed an enhancement in students' achievement, economic reasoning and attitude to Economics in Nigeria. Mohammed (2024) found an opposing opinion about this submission, where it was found that the percentage increase (3.5%) in the participation rate was met with an even greater percentage decrease (6.8%) in the candidates who obtained credit passes over the five years.

**Table 1** Level of Students' Learning Outcomes in Economics

| ITEMS | VL | L | H | VH | Mean ($\bar{x}$) | SD |
|---|---|---|---|---|---|---|
| Economic Cognition | | | | | | |
| A1 | 6 (0.8%) | 34 (4.3%) | 304 (38.4%) | 448 (56.6%) | 3.51 | 0.62 |
| A2 | -- | 50 (6.3%) | 352 (44.4%) | 390 (49.2%) | 3.43 | 0.61 |
| A3 | 13 (1.6%) | 84 (10.6) | 285 (36%) | 410 (51.8%) | 3.38 | 0.74 |
| A4 | 9 (1.1%) | 45 (5.7%) | 334 (42.2%) | 404 (51%) | 3.43 | 0.65 |
| A5 | 13 (1.6%) | 62 (7.8%) | 337 (42.6%) | 380 (48%) | 3.37 | 0.70 |
| A6 | 3 (0.4%) | 71 (9%) | 384 (48.5%) | 334 (42.2%) | 3.32 | 0.65 |
| A7 | 8 (1%) | 48 (6.1%) | 323 (40.8%) | 413 (52.1%) | 3.44 | 0.66 |
| Economic Intellectual Skills | | | | | | |
| A8 | 4 (0.5%) | 80 (10.1%) | 316 (39.9%) | 392 (49.5%) | 3.38 | 0.69 |
| A9 | 14 (1.8%) | 43 (5.4%) | 346 (43.7%) | 389 (49.1%) | 3.4 | 0.68 |
| A10 | 11 (1.4%) | 80 (10.1%) | 291 (36.7%) | 410 (51.8%) | 3.39 | 0.72 |
| A11 | 8 (1%) | 57 (7.2%) | 333 (42%) | 394 (49.7%) | 3.41 | 0.67 |
| A12 | 11 (1.4%) | 50 (6.3%) | 379 (47.9%) | 352 (44.4%) | 3.35 | 0.66 |
| A13 | -- | 50 (6.3%) | 352 (44.4%) | 390 (49.2%) | 3.43 | 0.61 |
| A14 | 13 (1.6%) | 84 (10.6%) | 285 (36%) | 410 (51.8%) | 3.38 | 0.74 |
| Attitude to Economics | | | | | | |
| A15 | 9 (1.1%) | 45 (5.7%) | 334 (42.2%) | 404 (51%) | 3.43 | 0.65 |
| A16 | 13 (1.6%) | 62 (7.8%) | 337 (42.6%) | 380 (48%) | 3.37 | 0.70 |
| A17 | 3 (0.4%) | 71 (9%) | 384 (48.5%) | 334 (42.2%) | 3.32 | 0.65 |
| A18 | 8 (1%) | 48 (6.1%) | 323 (40.8%) | 413 (52.1%) | 3.44 | 0.66 |
| A19 | 4 (0.5%) | 80 (10.1%) | 316 (39.9%) | 392 (49.5%) | 3.38 | 0.69 |
| A20 | 14 (1.8%) | 43 (5.4%) | 346 (43.7%) | 389 (49.1%) | 3.4 | 0.68 |

Criterion Mean = 2.50; Weighted Mean = 3.40; SD = .67; Overall Decision = High
Key: VL = Very Low; L = Low; H = High; VH = Very High; SD = (Standard Deviation)

b. Question Two: What are the views of Economics teachers on identified Threshold Concepts in Economics among Secondary School Students in Lagos State Education District V?

Table 2 shows the views of Economics teachers on the identified threshold concepts (opportunity cost, demand and supply, price determination and zero-sum game) in Economics. The result showed that there is an overall consensus among the teachers because owing to the weighted mean, which stood at 3.31, was higher than the criterion mean of 2.50, which is indicative that there is an agreement among the teachers about the relevance of threshold concepts when teaching the subject of Economics. The relatively low values for standard deviation (0.71) further reinforce this conclusion through the consistency of responses. In a nutshell, most teachers of Economics agree that threshold concepts are important for secondary school students to foster a deeper understanding of Economics principles. This result is in agreement with the findings of Ileuma and Mohammed (2022) that Economics teachers have a consensus opinion on the versatility of threshold concepts in Economics. The weighted mean of 3.31 also showed that the consensus of Economics teachers is aligned with the greater understanding of threshold concepts as transformative in Economics education. This assertion is supported by Goebel and Maistry (2024), who indicated the transformative nature of learning anytime students engage in

threshold concepts. Goebel and Maistry illustrated this by showing how student engagement in a threshold concepts-infused tutorial programme led to a deeper, more reflective understanding of Economics principles.

**Table 2** Views of Economics Teachers on Identified Threshold Concepts in Economics

| ITEMS | SD | D | A | SA | Mean ($\bar{x}$) | SD |
|---|---|---|---|---|---|---|
| B1 | 1 (3.4%) | 3 (10.3%) | 10 (34.5%) | 15 (51.7%) | 3.34 | 0.81 |
| B2 | -- | 3 (10.3%) | 12 (41.4%) | 14 (48.3%) | 3.38 | 0.68 |
| B3 | 1 (3.4%) | 6 (20.7%) | 9 (31%) | 13 (44.8%) | 3.17 | 0.89 |
| B4 | -- | 3 (10.3%) | 14 (48.3%) | 12 (41.4%) | 3.31 | 0.66 |
| B5 | -- | 5 (17.2%) | 16 (55.2%) | 8 (27.6%) | 3.1 | 0.67 |
| B6 | -- | 5 (17.2%) | 14 (48.3%) | 10 (34.5%) | 3.17 | 0.71 |
| B7 | -- | 2 (6.9%) | 12 (41.4%) | 15 (51.7%) | 3.45 | 0.63 |
| B8 | -- | 4 (13.8%) | 11 (37.9%) | 14 (48.3%) | 3.34 | 0.72 |
| B9 | -- | 3 (10.3%) | 10 (34.5%) | 16 (55.2%) | 3.45 | 0.69 |
| B10 | -- | 3 (10.3%) | 10 (34.5%) | 16 (55.2%) | 3.45 | 0.69 |

Criterion Mean = 2.50; Weighted Mean = 3.31; SD = .71; Overall Decision = Agree
Key: SD = Strongly Disagree; D = Disagree; A = Agree; SA = Strongly Agree; SD = (Standard Deviation)

c. Question Three: What is the usability of flipped classroom strategies, incorporating loop games as in-class activities, in the teaching of Economics among Secondary School Students in Lagos State Education District V?

Table 3 shows that while the overall weighted mean is 2.97, which is close to the criterion mean of 2.5, the responses reflect a much more scattered perception among the teachers on the usability of flipped classroom strategies using loop games. This would then indicate that even though many teachers think that this approach has proven helpful, there is not full consensus in view, with some teachers holding neutral or slightly negative views. This variability is reflected in the higher standard deviation for these items. Overall, there is generally moderate agreement about the usefulness of these strategies but less enthusiasm compared to that expressed concerning the threshold concepts. This is in line with the findings of Huang et al. (2019), who reported that while gamification embeds the possibility of inducing engagement if placed within a flipped learning environment, such impacts are not always consistent. In their study, some teachers and students were seen to be distracted by and overwhelmed with the additional game-like components if they were not well-versed in navigating digital platforms. This observation concurs with the mixed feelings expressed by teachers in this study, where the usability of flipped classroom strategies using loop games was not fully embraced.

In addition, Huang et al. (2019) observe that gamification in flipped learning generally works well when game elements fit the learning goals and how those elements are executed. This understanding justifies the present findings, where the scattered perception might indicate a series of different comfort levels and familiarity with the gamified strategies among teachers, which differ in how these are integrated into the learning process. While these potentially enrich the student's learning experience, as evidenced by Olaniyi (2020), consistent success in this respect depends on serious game element alignment with pedagogic goals and sufficient support for teachers in the effective use of such technologies. Furthermore, Olaniyi (2020) also submitted that incorporating active learning strategies in flipped classroom helps students to cross the threshold to mastery of Economics concepts.

**Table 3** Usability of Implementing the Flipped Classroom Strategies, Incorporating Loop Games as In-Class Activities, in the Teaching of Economics

| ITEMS | SD | D | A | SA | Mean ($\bar{x}$) | SD |
|---|---|---|---|---|---|---|
| C1 | 10 (34.5%) | 3 (10.3%) | 10 (34.5%) | 6 (20.7%) | 2.41 | 1.16 |
| C2 | 3 (10.3%) | 2 (6.9%) | 12 (41.4%) | 12 (41.4%) | 3.14 | 0.94 |
| C3 | 2 (6.9%) | 6 (20.7%) | 8 (27.6%) | 13 (44.8%) | 3.1 | 0.96 |
| C4 | -- | 4 (13.8%) | 14 (48.3%) | 11 (37.9%) | 3.24 | 0.68 |
| C5 | 11 (37.9%) | 3 (10.3%) | 10 (34.5%) | 5 (17.2%) | 2.31 | 1.15 |

*continued*

| | | | | | | |
|---|---|---|---|---|---|---|
| C6 | -- | 5 (17.2%) | 14 (48.3%) | 10 (34.5%) | 3.17 | 0.71 |
| C7 | -- | 2 (6.9%) | 12 (41.4%) | 15 (51.7%) | 3.45 | 0.63 |
| C8 | 7 (24.1%) | 6 (20.7%) | 14 (48.3%) | 2 (6.9%) | 2.38 | 0.93 |
| C9 | -- | 3 (10.3%) | 10 (34.5%) | 16 (55.2%) | 3.45 | 0.69 |
| C10 | 3 (10.3%) | 10 (34.5%) | 5 17.2% | 11 (37.9%) | 2.85 | 1.05 |
| C11 | -- | 2 (6.9%) | 10 (34.5%) | 17 (58.6%) | 3.52 | 0.63 |
| C12 | 8 (27.6%) | 6 (20.7%) | 3 (10.3%) | 12 (41.4%) | 2.66 | 1.27 |

Criterion Mean = 2.50; Weighted Mean = 2.97; SD = .90; Overall Decision = Agree
Key: SD = Strongly Disagree; D = Disagree; A = Agree; SA = Strongly Agree; SD = (Standard Deviation)

d. Test of Hypothesis

$H_0$ The flipped classroom model, incorporating loop games as in-class activities, does not have any significant effect on learning outcomes in Economics among Senior Secondary School Students in Lagos State Education District V.

Table 4 shows that the adjusted model is significant, as indicated by an F-statistic of 767.31 and a p-value of .000. A Partial Eta Squared value of 0.66 is indicative of the proportion of variance in learning outcomes in Economics accounted for by the model. The variable of the loop games shows a statistical significance by an F-statistic value of 1292.14 and a p-value of .000. The above result means that the incorporation of loop games into activities in a class significantly impacts the student's learning outcomes, as seen by a Partial Eta Squared value of 0.62, showing an impressive effect size. The R-squared value of .66 (with an Adjusted R Squared of .66) indicates that roughly 66.2% of the variability in post-test scores can be accounted for by the model, which incorporates loop games as one of its variables. In other words, the flipped classroom model integrating loop games significantly affects the learning outcomes in Economics for senior secondary school students in Lagos State Education District V. The null hypothesis stating that there is no significant effect of the flipped classroom model integrated with loop games on the learning outcomes in Economics is therefore rejected. In consonance with this result are the findings of Nurwulandari (2024) that applying the flipped classroom model with the self-regulated learning strategy has an impact on improving learning outcomes. Guardiola & Czauderna (2024) also attested to the efficacy of the loop games in their research work titled "Teaching and learning game design with the concept of gameplay loops".

**Table 4** ANCOVA Output of the Effect of Flipped Classroom Model, Incorporating Loop Games as In-Class Activities on Learning Outcomes in Economics Threshold Concepts

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared |
|---|---|---|---|---|---|---|
| Corrected Model | 4714.564[a] | 2 | 2357.282 | 767.307 | .000 | .662 |
| Intercept | 2265.343 | 1 | 2265.343 | 737.380 | .000 | .485 |
| Prettest | 3970.057 | 1 | 3970.057 | 1292.273 | .000 | .622 |
| Group | 74.175 | 1 | 74.175 | 24.144 | .000 | .030 |
| Error | 2408.566 | 784 | 3.072 | | | |
| Total | 50400.000 | 787 | | | | |
| Corrected Total | 7123.131 | 786 | | | | |

R Squared = .662 (Adjusted R Squared = .661)
Dependent Variable: Posttest

Table 5 showed that the pre-test average score was 5.22 (SD = 3.087), which increased to 7.42 (SD = 3.010) in the post-test, reflecting a substantial improvement of over 40%. This descriptive comparison highlights a marked enhancement in students' learning outcomes in Economics following the implementation of the flipped classroom model with the incorporation of loop games. The paired samples t-test further supports this improvement, with a high correlation between the pre-test and post-test scores ($r = 0.81$) and a statistically significant difference in the means ($p < 0.05$). These results further underscore that the flipped classroom model integrating loop games had a significant positive effect on students' learning outcomes in Economics.

**Table 5** Paired Samples Statistics of the Pretest and Posttest

| | Mean | Std. Deviation | Std. Error Mean | Correlation | Sig. |
|---|---|---|---|---|---|
| Pretest | 5.22 | 3.087 | .110 | .807 | .000 |
| Posttest | 7.42 | 3.010 | .107 | | |

N - 787

## CONCLUSION AND RECOMMENDATIONS

The result of the study concluded that the implementation of the Flipped Classroom model integrated with Loop Games significantly enhanced the students' learning outcomes in Economics threshold concepts. This teaching approach increased the post-test average score from 5.22 to 7.42, reflecting more than a 40% improvement among the students in knowledge and retention of advanced economic concepts. The Flipped Classroom model effectively created an active learning classroom that increased the students' interest in challenging topics such as opportunity cost, demand and supply, and determination of price. According to teachers, a weighted mean of 3.31 expressions showed consensus on the relevance of threshold concepts in Economics. Although the teachers recognised the possible benefits inherent in integrating Loop Games with the Flipped Classroom model, their responses were mixed, and only moderate enthusiasm for its usability was reflected in the weighted mean of 2.97. However, the positive effect of the Flipped Classroom with Loop Games on student performance was clearly shown to be statistically significant through ANCOVA. That is, this approach actually has a high impact on learning outcomes.

Given the results of this study, the following recommendations are considered imperative.

- Schools should consider the Flipped Classroom model integrated with Loop Games as an approach for teaching Economics at school since it proved effective in enhancing grasping and mastering by students of some tricky concepts.
- Professional development programmes should also be given to the teachers to allow them to acquire the necessary skills to use these approaches in their classroom sessions. The success of the method in Economics would thus imply its success in other subjects, particularly those that are complex.
- Apart from the curricular instructions, educational policymakers should institute the use of active learning strategies such as Loop Games in schools to increase learner involvement and knowledge retention.
- There is a dire need for more quantification of the effectiveness of this pedagogical model for a considerable duration in varying educational settings as a way of fine-tuning its effectiveness for improved students' academic performance.

## ACKNOWLEDGEMENT

This work was supported by the Tertiary Education Trust Fund of Nigeria through the Institution-Based Research Grant with reference number LASU/VC/DSI/RP/24/007. The funding helped in the design of the study, collection, analysis, and interpretation of data, and also in writing the manuscript. We would like to take this opportunity to express our deep appreciation to the editorial team of the Asian Journal of Assessment in Teaching and Learning for their valuable guidance and support during the reviewing process. Without such editorial guidance and encouragement, this article may not have seen its final form. We also would like to recognise the research assistants for this project. Their contributions to data collection, transcription, and technical assistance were very important in completing this research. They have agreed to be recognised in the publishing of this work.

## DATA AVAILABILITY STATEMENT

Data will be made available on request.

## FUNDING

This work was supported by Tertiary Education Trust Fund Institution Based Research, an intervention agency set up to provide supplementary support to all levels of public tertiary institutions with the main objective of funding tertiary education in Nigeria.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

## REFERENCES

Adekoya, P. A. (2023). *Effects of Experiential Teaching Methods on Senior Secondary School Students' Learning Outcomes in Economics in Ogun State, Nigeria (Doctoral dissertation).* University of Ibadan Post Graduate College.

Adio, Y. O., Oluwatosin, W. L., & Olatunde, F. A. (2021). Assessment of the Implementation of Economics Curriculum and Students' Learning Achievement in Public High Schools in Osun State, Nigeria. *KIU Journal of Social Sciences, 7*(1), 239–251.

Cetin, I. (2020). Teaching loops concept through visualization construction. *Informatics in Education-An International Journal*, *19*(4), 589-609.

Davies, P. (2019). The construction of frameworks in learners' thinking: Conceptual change and threshold concepts in Economics. *International Review of Economics Education*, *30*, 100135.

Goebel, J. S., & Maistry, S. M. (2024). Liminality from the Inside. *Threshold Concepts in the Moment*, *77*, 155.

Guardiola, E., & Czauderna, A. (2024). Teaching and learning game design with the concept of gameplay loops. *Journal of Gaming & Virtual Worlds*, *16*(1), 107-125.

Huang, B., Hew, K. F., & Lo, C. K. (2019). Investigating the effects of gamification-enhanced flipped learning on undergraduate students' behavioural and cognitive engagement. *Interactive learning environments*, *27*(8), 1106-1126.

Ileuma S. and Mohammed A. O. (2022). Perception of Teachers and Students Mastery of Threshold Concepts in Economics among Lagos State Senior Secondary Schools in Nigeria. *Journal of Arts and Social Science Education (JASSE),* 1(2), 18-28.

Jimaa, S. (2013). Students' Rating: Is it a Measure of an Effective Teaching or Best Gauge of Learning? *Procedia-Social and Behavioral Sciences*, *83*, 30-34.

Meyer, J. H., & Timmermans, J. A. (2016). Integrated threshold concept knowledge. In *Threshold concepts in practice* (pp. 25-38). Brill.

Mohammed A. O. (2022). Influence of Threshold Concept and Flipped Classroom on Senior Secondary School Students' Academic Achievement in Economics in Lagos State, Nigeria. *Journal of Capital Development in Behavioural Sciences (JOCADEBS),* 10(2) 183–200.

Mohammed A. O. (2024). Level of Participation and Students' Achievement of Credit Passes in Economics in WASSCE Over Five-Year Period (2018-2022) in Nigeria. *Journal of Economics and Environmental Education (JEEE)* 8(1) 42-55.

Mohammed, A. O., & Jimoh, S. A. (2022). Perceived Difficult Topics and Senior Secondary School Students' Academic Achievement in Economics in Lagos State. *Albukhary Social Business Journal (ASBJ)*. *3*(2), 83–94.

Nadelson, L.S.; Heddy, B.C; Jones, S.; Taasoobshirazi, G. & Johnson, M. (2018). Conceptual Change in Science Teaching and Learning: Introducing the Dynamic Model of Conceptual Change. International Journal of Educational Psychology, 7(2), 151-195.

Nersessian, N. J. (2017). Conceptual change. *A companion to cognitive science*, 157-166.

Nurwulandari, N. (2024). The Implementation of Flipped Classroom Model with Self-regulated Learning (SRL) on Learning Results for Studying Physics Material. *Tarbiyah: Jurnal Ilmiah Kependidikan*, *13*(1), 105-114.

Olaniyi, N. E. E. (2020). Threshold concepts: designing a format for the flipped classroom as an active learning technique for crossing the threshold. *Research and Practice in Technology Enhanced Learning*, *15*(1).

Oliveira, R. P., Souza, C. G. D., Reis, A. D. C., & Souza, W. M. D. (2021). Gamification in e-learning and sustainability: A theoretical framework. *Sustainability*, *13*(21), 11945.

Ortiz-Rojas, M. E., Chiluiza, K., & Valcke, M. (2017). Gamification and learning performance: A systematic review of the literature. In *11th European Conference on Game-Based Learning (ECGBL)* (pp. 515-522). Acad Conferences Ltd.

Posner G. J., Strike K. A., Hewson P. W., & Gertzog W. A., (1982) Toward a Theory of Conceptual Change, *Science Education* 66(2), 211–227.

Potvin, P., Nenciovici, L., Malenfant-Robichaud, G., Thibault, F., Sy, O., Mahhou, M. A., ... & Chastenay, P. (2020). Models of conceptual change in science learning: Establishing an exhaustive inventory based on support given by articles published in major journals. *Studies in Science Education*, *56*(2), 157-211.

Purba, S. E. E., Kristiani, K., Sangka, K. B., & Hussain, O. K. (2021). The flipped classroom: an overview of its impact on Economics learning. *International Journal of Pedagogy and Teacher Education*, *5*(1), 26-34.

Rusanen, A. M. (2014). Towards to an explanation for conceptual change: A mechanistic alternative. *Science & Education*, *23*, 1413-1425.

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational psychology review*, *32*(1), 77-112.

Sanchez, E., van Oostendorp, H., Fijnheer, J. D., & Lavoué, E. (2020). Gamification. In *Encyclopedia of Education and Information Technologies* (pp. 816-827). Cham: Springer International Publishing.

Teichmann, M., Ullrich, A., Knost, D., & Gronau, N. (2020). Serious games in learning factories: perpetuating knowledge in learning loops by game-based learning. *Procedia Manufacturing*, *45*, 259-264.

Timmermans, J. A., & Meyer, J. H. F. (2019). A framework for working with university teachers to create and embed 'Integrated Threshold Concept Knowledge' (ITCK) in their practice. *International Journal for Academic Development*, *24*(4).

White, B. A., Olsen, T., & Schumann, D. (2016). A threshold concept framework for use across disciplines. In *Threshold concepts in practice* (pp. 53-63). Brill.