

# Efficacy of ADDIE-Integrated Flipped Learning Model: An Intervention Study

Vijayakumar S., B.S. Abdur Rahman Crescent Institute of Science and Technology, India  
Tamil Arasan P., SRM Institute of Science and Technology, Kattangulathur, India  
Venkateswara U., St. Joseph's College of Engineering, India

## ABSTRACT

The absence of a universal and useful framework for directing the integration of flipped classrooms is one of the main obstacles inhibiting teachers from implementing flipped learning in their teaching practices. This unclear framework results in the reality that the efficacy of the flipped learning strategy is still unknown. This study presented the “ADDIE Paradigm,” a step-by-step generic model based on learning and teaching research findings. The study involved two cohorts of 60 first-year college students. The experimental group used ADDIE for five weeks, while the control group received instruction using the flipped model. The findings confirmed the viability of the ADDIE integrated flipped learning paradigm, which not only enhanced student engagement and teaching quality but also helped them perform better on exams. Future research topics, as well as instructional ramifications for online learning, are highlighted. Thus, the findings of this study can reinforce the theoretical foundations for flipped learning and aid in their acceptance in actual teaching.

## KEYWORDS

ADDIE Model, Flipped Learning, Higher Education, Intervention Research, Pedagogy, Quantitative Analysis, T-Test

## INTRODUCTION

“Learning theorists believe that flipped classrooms help students learn and retain more than standard lectures. Without the pressure of producing content, educators may teach students how to solve problems and apply knowledge to real-world issues. Flipped classroom proponents believe students will spend less time being diverted and more time using material through critical content-processing activities. Flipped classes are being promoted for various reasons as educators abandon the lecture paradigm. Academic rigour, motivation and student learning are the leading causes for incorporating flipped models”. (Talavera et al., 2022 p.289) Instructors have often complained about pupils arriving to class unprepared. Flipped classrooms encourage student preparation and attendance through active learning. In flipped classrooms and technology-enhanced classrooms, in-class activities based on pre-tasks motivate students to accomplish tasks and join the class to learn more. Flipped classrooms can improve student learning and preclass activities. To be regarded as successful, each educational system must demonstrate that academic achievement is improved. Fructuoso et al. (2022) note numerous examples of learning achievements in other sectors. However, research on flipped classroom approaches in language education is still very much in inception, and most learning studies have been conducted on a limited scale.

DOI: 10.4018/IJEA.316536

\*Corresponding Author

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Compared to the number of hours spent studying science, language education is thought to make up a minor fraction of higher education. Students are having a more challenging time learning English due to this condition. Some colleges adopt online instructional approaches as a solution to this problem. A further issue is that classroom strength is high in the Indian context. Effective online and flipped models are required in this situation. Significant adjustments were made due to the current effort to include flipped learning in higher education, which impacted the learning approach in many ways. Contradictory results have been observed in previous research studies spanning over ten decades of studies on flipped learning. A review of the literature on flipped classrooms in a university environment was undertaken to thoroughly understand the implementation of teaching methods in a higher education context. The prior research's extensions of the traditional flipped classroom paradigm served as the basis for this study. This study's results indicate that using flipped classrooms is recommended primarily to improve students' performance, understanding, success and other learning outcomes.

The challenges of designing the multimedia materials and the amount of time needed for instructors to develop the instructional methods and for learners to comprehend them are the main challenges of this approach. Other critical insights for the additional research were highlighted, along with recommendations for policymakers. "Flipped classrooms, often reversed classrooms, have gained popularity in higher education during the past few years. In a regular classroom, a teacher often uses direct instruction to present instructional material to the class. Students are given homework to complete outside of class time after the lesson" (Loizou, & Lee, K. 2020, p.44).

In comparison, in a flipped learning environment, educational material is recorded on video and given to students as homework to watch before class. The remainder of the face-to-face time is devoted to active learning activities like a conversation, peer cooperation, problem-solving, and discovery. As a result, a course's standard lecture and homework components are switched around, according to Yousufi (2020). The basic idea behind the flipped classroom is to provide leverage before instruction and optimise the valuable in-class time available for cooperative learning (p.91).

Sezer & Abay (2019) claim that "there is no one flipped classroom model in use; for instance, educators can use a partial flipped approach rather than a fully flipped technique". (p.854) Readings, discussions, role-plays, educational events, and quizzes are just a few extracurricular and classroom activities that may be found in flipped classrooms. Given the range of flipped classroom models implemented, assessing the efficacy of instructional strategies in enhancing scholarship is challenging. Researchers have addressed the benefits and drawbacks of the flipped paradigm and reported a range of results. Polat & Karabatak (2022) observes that examining which tactics and strategies employed in flipped classrooms support learning is indispensable in determining if the teaching approach is practical. The viability of the instructional design is not assured by simply substituting recorded lectures for in-person lectures and assigning homework during class. (p.142) Guo (2019) echoes a similar view. According to him, "A significant barrier prevents instructors from implementing this instructional approach in their teaching practices because the research on flipped classrooms tends to be context-specific, so there is a lack of a general and practical framework for formulating and executing flipped classrooms" (p.365)

Therefore, the present investigation aims to solve this lacuna by analysing how a flipped paradigm employing the Addie integrated strategy affects students' learning results. To properly plan and implement a flipped classroom, this research intends to provide teachers with a general, practical, and customisable technique. The idea includes step-by-step directions for executing flipped instruction and is based on a robust theoretical framework. The model used in this study not only enhances the body of expertise but also helps academics understand flipped classrooms. To determine whether this methodology is more effective at promoting student learning than a traditional flipped approach, we tested it in an undergraduate course.

Nahar (2019) claims that "The flipped classroom concept calls for students to be in ownership of individual learning before, during, and after class. Students are expected to participate in the training resources provided by the instructor during the pre-class phase. Then, as a follow-up activity to solidify the knowledge they had acquired during the earlier phases, participants are exposed to various assignments

or exams during the post-class phase. The outcomes from these learning stages inspired several earlier research to support the viability of the flipped classroom across multiple learning environments.

Parker et al. (2016) examined ADDIE's effectiveness using student assessment data. The initiative aimed to enhance STEM instruction. The ADDIE model was used in the study as a model for the flipped learning process. Data from the pre-and post-assessment were used to analyse the incorporation of ADDIE components. After the ADDIE model was incorporated into the curriculum, the outcomes were much better. The research's findings will assist in developing technology-based curricular initiatives between higher education institutions and public school districts.

But Van Rooij's (2010) ADDIE study on ADDIE produced conflicting findings. To deliver the courses effectively, instructional designers in the digital age must be well-versed in instructional design and exhibit strong communication abilities. Rooij employed the ADDIE paradigm to satisfy these demands. The author contends there is a disconnect between project management models for instructional design and how effective instructional models interpret educational models for successful learning. The author suggests a sound instructional strategy. He contends that the ADDIE paradigm alone is inadequate for instructional design, instruction, or practice.

The use and breadth of machine learning (DL) technology in the instructional analysis were examined by Rahman and Duran in 2022. The ADDIE Pedagogical model was applied. The most recent advancement in remote learning systems creates a fantastic potential for integrating Deep Learning technologies, which can impact how these systems are designed, developed, and used for learning and teaching. The ADDIE paradigm offers analytical outputs and data-driven decisions that can be combined with teaching tools.

Effective learning is primarily due to the widespread perception that flipped learning provides students with significant learning opportunities by allowing them to connect new and prior information to conquer conceptual obstacles in a context-specific domain. 'But prior studies on the use and effectiveness of flipped classrooms in higher education are few and far between. (Putri, et al.,2022; Rajabi, et al.,2021 & Namaziandost, & Çakmak, F. 2020). There is little solid data to support the effectiveness of flipped learning in generating certain learning outcomes, particularly possibilities for peer collaboration and higher-order cognitive activities. Furthermore, implementing the flipped classroom paradigm might lead to customising instructional materials without imposing methodology or quality standards, according to Foster & Stagl (2018). "There is a noteworthy absence of evidence-based best practices for implementing the flipped classroom model in higher education, although more educators are developing and using it to improve student's learning results" (p.41).

As a result, this study examined earlier research on applying the flipped classroom technique in a university setting. Specifically, a demonstration of how flipped classrooms affect students' learning across various university fields was given. This study also highlighted the current adaptations to the flipped class and the significant prospects and obstacles. In this study, the term "flipped classroom" refers to the complete application of the instrument that consists, as indicated in Fig. 1, in which learners are provided access to the video/digital media lessons before class to get a head start on the course topics. Additionally, the flipped classroom participants can finish their homework or take their exams before or at the beginning of class. Finally, teachers must direct and respond to inquiries from students during class sessions while allowing them to work together to practice and apply the educational materials they had acquired in advance. The research gap was identified based on the previous studies, and a hypothesis was formulated.

## **HYPOTHESIS**

The intervention group exposed to ADDIE integrated flipped model performed better than the non-intervention group exposed to flipped learning

## Challenges and limitations of a Flipped Classroom

Ainulluluaah et al. (2022) remark that the “benefit of a flipped environment is its flexibility. Self-paced instructional videos allow students to learn anytime and at their own pace. Students’ cognitive load is reduced due to self-paced learning, which makes learning easier.” (p.4679). The flipped classroom strategy is thought to better tailor lessons for students with different levels of experience because it allows for self-paced individual learning. The flipped classroom model hypothesises that students with varying degrees of previous knowledge can receive tailored and appropriate training and supervision from outside of class and in-class sessions.

Additionally, this makes it possible for the cognitive load to be managed more effectively, which is suitable for learning. Foster & Stagl (2018) remark, “The flipped classroom concept faces several difficulties in addition to its many benefits for enhancing learning.” Debbag & Yıldız (2021) study contradicted the flipped classroom’s productivity compared to the standard classroom or even demonstrated that individuals in the flipped classroom setting fared worse than in their traditional classroom. Since the findings are contradictory, this study is required.

“. Cobena & Surjono (2022) claim that “Preparing an ADDIE integrated flipped course takes more time than a standard course. The teacher must restructure the teaching plan, delivery, and assessment to successfully apply the proposed flipped classroom method” (p.81). Teachers must prepare both in-class activities and pre-class video lectures. The teacher must devote more time designing, supervising, guiding, and providing feedback for the in-class exercises. Additionally, students need to put up extra commitment to flipped learning. Students must do a significant amount of pre-class preparation before entering the class.

## Addie Integrated Flipped Classroom Model

The ADDIE Model’s Implementation stage is where decisions about the environment, variables, and timeline of an educational programme are made. These considerations include learner orientation/grouping, access to course content, and the instructor’s participation as a cohesive instructional unit that sounds plausible to the learner. The application is activated or launched once it has been configured. To some extent, the implementation may be referred to as simply the teaching component. However, the structural features of education are critical to the success of a specific programme. As you saw in the Development phase, implementation considerations, such as how instructional media is accessed, begin before the proper implementation begins. The instruction took place in several formats, including specialised classroom sessions, weekly increments, and unscheduled self-directed learning. The ADDIE model should create optimal settings for the nature of the experiences in the classroom.

Many instructional design models have been created specifically to enhance learning. Some prominent studies are (Al-Samarraie et al., 2020; Julia et al. (2020) and Campillo et al., 2022 &). Even though scholars have attempted to integrate learning theoretical concepts into the teaching method and have offered conceptual frameworks, they are relatively context-specific. They cannot give teachers clear, step-by-step instructions. Some models are needed to improve online social presence, interaction, and a varied and smooth digital learning environment. In-class lectures were advised for complex topics, but their model did not clearly define how to distinguish between the tough and the easy concepts. A pre-class video lecture option was also proposed, but no method of ensuring that students watched the lectures were provided. In light of this, we recommend a more concise and practical approach that focuses on research in learning and instruction and offers detailed instructions for adapting the Addie embedded flipped classroom model by instructors.

## Phases of the Model

The different processes of the ADDIE paradigm are shown in Figure 1. The analysis phase, which makes up the first stage of the ADDIE model, is where instructional designers evaluate the current situation, examine the training environment, comprehend the goal of this learning algorithm, and

Figure 1. Components of the ADDIE Model



determine what has and hasn't worked to close knowledge gaps from the past. The researcher set attainable objectives that may be measured well within the required timeframe. The goal of the analysis stage utilised by practitioners is to develop the ideal framework to satisfy the audience's learning objectives. Remember that the analysis phase should resemble the heart of the formal curriculum once it is complete. The educator is aware of his mandatory training and may use all the pertinent data to advance to the second step.

The Design phase, the second iteration of the ADDIE paradigm, is where the data from the Testing process is examined to help in decision-making. In this stage, the learning program's design or outline is created. "It's crucial to remember that the conceptual design takes a lot of time, and the facilitator should go through it thoroughly. The instructional designers frequently start with an assessment during the design process and work backwards for objective congruence. Instructional designers choose specific learning objectives and goals throughout the design phase. It's crucial to remember that the application developers should have their concept, storyboard, and general design accomplished by the time the design process is over" (Ayçiçek & Yanpar, 2018, p.71)

The development stage, also known as the building stage of the learning course, is the fourth level of the ADDIE paradigm instructional design. The content idea is prepared during the design phase, and professional educators must bring those ideas to life during this development phase. To increase learner engagement, the designer can lay out the content graphically, produce graphics, and incorporate multimedia. Repeated testing is necessary during development to prevent navigation in the online course and spelling, syntax, and grammar errors in the offline method.

The implementation stage involves exporting your course file and posting it to an efficient LMS system. Both instructor-led and self-directed learning are incorporated during the implementation phase. After the course has been made available and students have begun using it, it is crucial to keep a close eye on things to determine whether or not any pertinent issues are emerging. The evaluation phase is the final step. In the assessment phase, the effective teacher will gather crucial data and information throughout this phase and monitor the outcomes and development.

## METHOD

The current study sought to determine whether the ADDIE-integrated flipped classroom paradigm helped enhance undergraduate students' learning. At a premier research-oriented institution in India, the study was carried out over a 5-week course called "Foundation to Public Speaking." The study involved two cohorts of 60 first-year college students. The Flipped Model was used to teach one class ( $n = 30$ ), whereas the Addie augmented Flipped Model was used to prepare the other group ( $n = 30$ ). The researchers were the instructors for both courses. The classes were conducted on Monday and Wednesday. The control group was slated from 12 to 12.50 p.m., while the treatment group had a time slot from 9.00 to 9:50 a.m.

The course syllabus was presented to the students during the first week of class. The instructor was explicit about the course's objectives, substance, instruction, assessment, timeline, and requirements.

Figure 2. Classroom activities during the ADDIE enhanced Flipped Model



The instructor explained the flipped classroom methodology and why it would be used to structure and deliver the course. To assess the students' learning, they were required to complete a survey and an exam in the final week. The teacher designed experimental tasks for the flipped classroom to build and activate the students' prior knowledge and prepare them for future instructional video lectures. The experimental activities were shared on the LMS before the class. Third, instructional videos were given to pupils to aid in memorisation and comprehension of the information after the exploratory tasks were finished. When necessary, the videos came from the Internet or were made by the instructor.

Each class had roughly 3–4 clips, with each video lasting around 10 minutes. The instructor offered text-based readings in conjunction with the videos for several courses. Videos, lessons, and pre-class activities were submitted to the internet platform and organised by week. One day before starting the offline, face-to-face class, the students were instructed to review these materials.

In the Addie, Integrated flipped classroom, the faculty integrated text, graphics, audio, and video and changed the contents to suit their needs. Students captured their voices, listened to the recordings, communicated with the teacher and other students, and achieved outcomes. Through the teacher console, instructors intervened and managed the students' computers. Flipped and ADDIE integrated flipped groups differ primarily in the distribution of class time.

Except for the ADDIE manipulation, the control and experimental groups in this controlled experiment were identical. The control group, which is not exposed to the explanatory variables under examination like the experimental group is, offers a starting point against which any differences in the experimental class may be compared. Because there is only one difference between the manipulation of the treatment and control groups, any differences between the two are most likely caused by experimental intervention rather than chance. Typically, experimental studies include control groups and intervention groups. The participants were usually randomly assigned to either experimental or control groups. Randomising subjects into either group where the independent variable has been altered allows us to infer that the groups are nearly equal. Each aspect of the testing environment is guaranteed to be identical to ensure that the different treatments result in differences between groups. It is pertinent to note that both the experimental and control groups consist of 30 students. The control group was given standard flipped instruction, and the experimental group was exposed to ADDIE-integrated flipped learning.

A paired t-test was used in the study. Each individual had two parameters, such as a before and after grade. The average difference between these pairings is tested to see if it differs significantly from zero via a paired t-test. Since it uses samples to make inferences, this test is an example of an inferential statistical process. In this instance, the researchers selected an arbitrary selection of participants, administered an ADDIE-integrated flipped session to them, and then administered a post-test. The paired pretest and post-test scores for each subject are shown in further detail in the following section.

## RESULTS

The ESP students' presentations were examined depending on their speaking activities. A paired t-test is used in this study because the researcher was interested in the difference between two variables for the same subject. Non-intervention is the flipped procedure, and intervention is Addie integrated flipped model.

Ross, A., & Willson (2017) claim that "Paired Samples Statistics gives univariate descriptive statistics for each variable" (p.51). Notice that the sample size in this study is 30. The SD and the mean were reliable. The paired sample correlation is given in Table 2.

Crawford, Howell, & Garthwaite (1998) observe, "For each set of entered variables, Paired Samples Correlations displays the Pearson correlation coefficient along with a two-tailed significance test. The results of the paired samples test are provided. (p.899) According to the results of the paired samples correlation, the ADDIE-integrated flipped group outperformed the Flipped group. The outcomes of the matched samples test are shown in Table 3.

The average mean between Addie's integrated flipped and flipped group is 15.187. The deviation between both groups is presented in the nested column. The t-test statistic is significant ( $T=5.652$ ). A two-tailed value less than 0.5 allows us to reject the null hypothesis. The alpha value of this test is less than 0.5, so we conclude that it is significant. Mojtahedi's (2020) study on Flipped learning aligns with the results of this study.

**Table 1. Paired Samples Statistics**

	Mean	N	Std.Deviation	Std. Error Mean
Pair1 Flipped Model	19.354	30	4.36845	.39870
Addie Integrated Flipped Model	34.541	30	5.98759	.21423

**Table 2. Paired Samples Correlation**

	N	Correlation	Sig
Pair -1	398	.268	.000

**Table 3. Paired Sample Test**

	Paired Differences						
	Mean	Std. Deviation	Std Error Mean		t	df	Sig(2-tailed)
Flipped & Addie Integrated	15.187	3.65201	.2956	95% Confidence Interval of the Difference	45.652	30	.000
				Lower			
				15.2303			
				Upper			
				19.8562			

## DISCUSSION

This study is essential since it illustrates a successful concept-oriented flipped classroom paradigm that gives teachers step-by-step instructions. This study's central research question focused on determining how well the ADDIE-integrated flipped classroom paradigm facilitates student learning. The ADDIE-integrated flipped instruction considerably impacted students' course achievement, as predicted. First, compared to the control group, participants in the flipped cohort performed well. Second, individuals in the ADDIE group reported higher levels of engagement in their studies, particularly in their relationships with peers. Third, pupils in the ADDIE group demonstrated improved development of generic skills. On the final exam, participants in the ADDIE group performed significantly better than their counterparts in the conventional group.

ADDIE is more flexible than other pedagogical methods, such as the ASSURE and SAMR models, because numerous parts of the project can be performed and prepared at their discretion. This strategy can flexibly meet project requirements if developers use each phase's outputs while keeping the overall picture in mind. Each step can be altered regularly to meet the demands of the users better. Each phase may seem to be distinct and deeply interconnected. Developers can use one stage to inform another and to choose which activities to perform at each step. Although the ADDIE Model is a two-stage process, the initial examination can take a long time during both stages.

This study proposes an integrated flipped model that draws on various pedagogical ideas to encourage its implementation. Teachers can create and execute flipped learning using the explicit, step-by-step directions provided by the ADDIE integrated method. Teachers may use this concept as a scaffold to assist students in developing educational materials that are appropriate for their teaching methodologies. Ultimately, the results support the model's effectiveness in fostering academic achievement, which was thoroughly evaluated by several metrics, including students' involvement, an improved learning experience, and improved grades.

## CONCLUSION

The results of this study have apparent ramifications for teachers who implement flipped instruction. First, the Addie integrated approach fosters student learning and offers a matrix for application. Teachers could consider this concept as a foundation for their flipped classroom strategies. The flipped classroom may be useless or detrimental to students' learning if implemented with the wrong attitudes and behaviour. The ADDIE integrated flipped model offers teachers a generic, practical, and workable framework to apply in their teaching practice by building on published research from learning and instruction. Following this model's steps would help teachers understand how to provide flipped instruction.

The use of model-based instructional design has a lot of benefits. The ADDIE model was found to be useful for teaching languages in the context of higher education. This indicates that it is adaptable enough to improve the learning process. A novice or unskilled ELT practitioner may find it difficult initially. One of the most well-known and widely applied models, ADDIE, is reliable and applicable in various industries. Regardless of the model the instructional designer selects, that individual must ensure that the lesson's goals are achieved. Because the ability to do the tasks that have been assigned is what learning is all about. The researchers' most significant limitation is that it excludes the humanistic component. For instance, it is impossible to foresee every student's behaviour. Therefore, while addressing various learning styles in a class, the instructor may still fail to reach some pupils. Both students' and instructors' experiences will be improved as a result.

The current study illustrated a prospective flipped classroom format to help teachers plan and implement flipped instruction. However, a few restrictions should be recognised since they suggest areas for future investigation. First, only an undergraduate course was the subject of the study. It is crucial to replicate the current study with several different subject matters and a more comprehensive range of ages before confirming and recommending the system's validity in boosting learning. More follow-up investigations are necessary. However, the investigation is an essential first step in researching the flipped model.



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*S. Vijayakumar has a doctorate in Educational Technology. He has two patents and five book publications. He has collaborated with the University of IOWA and Curtin University which has culminated in book publications. He has published a number of research papers in international peer-reviewed journals.*

*P. Tamilarasan is an Assistant Professor in the English and foreign languages department at SRM University. He holds a doctorate in African American Literature. His research interest includes English for specific purposes and Computer-Aided Instruction. He has presented various papers at international conferences and published them in international peer-reviewed journals.*

*U. Venkateswara serves at St. Joseph's College of Engineering, OMR, Chennai as an Associate Professor in the department of English. He is a member of several national and international bodies which includes both academic and voluntary institutions. He has presented in several national and international conferences in Malaysia, Indonesia, and Singapore. With the academic publications and presentations at different national and international conferences, he has earned inspiration to continue with his research interest which includes Assessment, Learner Autonomy, ELT, Sociolinguistics, and Mobile Learning.*