

Perception of Flipped Instructional Methodology: Differential Effects of Pre-Service Science Teachers' Gender and Age

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Abstract

The efficacy of flipped methodology is adequately reported, there is dearth of evidence on the pre-service science teachers' perception of the novel pedagogy. Therefore, the study investigated perception of flipped instructional methodology the differential effects of pre-service science teachers' gender and age in Emmanuel Alayande College of Education, Oyo. Two research questions and three hypotheses guided the study, adopting mixed method, both qualitative and quantitative approaches (concurrent triangulation) to the research. 476 pre-service science teachers were randomly selected for the study. Two instruments; Perception of Flipped Instructional Methodology Questionnaire (PFIMQ, $R=.73$) and Perception of Flipped Instructional Methodology Interview (PFIMI, $IRR=.81$) were used for data collection. Data were analyzed using frequency counts, percentages, mean and standard deviation. T-test and Analysis of Variance (ANOVA) were used to test the set hypotheses at 0.05 level of significance. Findings showed that majority of the pre-service science teachers preferred flipped methodology to conventional lecture method There is a significant pre-service science NCE teachers' perception of flipped methodology ($N = 476, \bar{x} = 34.60; SD = 7.39; df = 475, t = 35.71, p < .05$). The perception of flipped methodology was not differed by gender and respondents' age. It was therefore recommended that tertiary Institutions' lecturers should adopt flipped methodology to interact with their students and that tertiary institutions' management to organise seminars, symposia, lectures and workshops on the strategies to implement effectively the flipped methodology by the lecturers.

Keywords: Flipped instructional methodology, Pre-service science teachers' gender, Pre-service science teachers' age

Introduction

There have been advocacy for more effective instructional methodology at the tertiary level of education. Guided inquiry (Olagunju & Ige, 2013); technologically-aided instructions (Okebukola, 2013; Olagunju & Adesina, 2017), practical and pragmatic instruction, augmented-blended (Ige & Oke, 2019; Adebisi, 2019; Adesina, 2019; Kannan, Kuromiya; Gouripeddi; Majumdari; warriem & Ogata, 2020) had been recommended as active learning strategies and many more techniques for efficient and effective teaching learning in tertiary institutions.

None of these focused on students' attainment of the content knowledge outside the classroom setting. However, flipped methodology seems to focus on this paradigm shift. Flipped methodology according to Toh; Tengah; Shahrill; Tan and Leong (2017) is that kind of instructional methodology in which there is a shift to students attainment of the content knowledge outside of the class or before class in any

form of media then the in-class interaction time is spent to apply the content through problems solving, deeper coverage and interactions with peers. The convention of flipped pedagogy has the underlying fact of reversing or inverting the traditional teaching and learning approach from the dominance of the lecturers linear transmission of contents of instruction to the passive learners into an arrangement in which lecture materials can be accessed at home in advance of the class interaction and the in class time to focus on questioning and answers, advance conceptual knowledge as well as engaged peer-centred learning activities.

Jang and Kim (2020) identified flipped methodology as an innovative instructional model which is gaining popularity in higher education as it provides active and students centered learning which enhances students' learning outcomes both the attitudinal and academic achievement. Unlike the traditional lecture method, flipped pedagogy prompts the learners to study instructional contents before class interaction,

synchronously or asynchronously offline instructions, the application of such independent personal learning to be done in in-class activities. Jang and Kim (2020) posited that flipped methodology engages, enhances, enriches and empowers both the lecturers and the students for mutual interchange of ideas in a more an hypothetico-deductive model; they affirmed that such arrangement provides students with engaging

and interactive learning experiences that development the learners' complex reasoning, metacognitive thinking, speaking, written communication skills and critical thinking skills.

Hew; Jia; Gonda and Bai (2020) gave the five phases framework of flipped methodology; These are: Engage phase; Explore phase; Explain phase; Elaborate phase and the evaluate phase.



Fig. 1: *Conceptual Framework of Flipped Methodology*
(Source: Hew; Jia; Gonda & Bai, 2020)

Figure I, the first three phases started at pre-class, within the learners' control and management. At the engage phase, the learner engages with the contents of instruction through videos, lecture-notes, journal articles, magazines, etc. Questions are asked to prompt students to brainstorming or critical thinking which connect the new contents of instruction to their entry behaviour (previous knowledge). This leads to the second phase, explore, here the questions raised in the engage phase give the learners opportunities for exploration of the contents in order to construct their own understanding of the topic at hand. From the 2nd phase, having made succinct exploration, the students construct their knowledge which form the basis for their explanation of the topic(s) in consideration. The in-class phase, the lecturer whose task is instructional facilitator re-engage the learners with the content of instruction, using real world scenarios, poses problems or question to be answered them enhance their active and constructive interactive instruction. At the fifth phase, the lecturer provides more lucid information about the subject content of instruction using the lecture note or any other instructional materials, the learners are prompt to class discussion, application of the explored contents and the lecturer moderates or facilitates the interaction with prompting feedback. The last phase, evaluation phase, is solely meant for integrated formative assessments right from the beginning of the flipped methodology for continuous monitoring and revision of what ought to

have been learnt and summative at the end of the instruction, questions and tests, quizzes are posed to enhance mastery of the content knowledge.

The study is premised on the Constructivists' theories of human perception. Constructivist theories assume that the process of perception is a highly active process of extracting sensory stimuli, their evaluation, interpretation and backward organization of sensory stimulus. Perception is the end product of the interaction between stimulus and internal hypotheses, expectations and knowledge of the observer, while motivation and emotions play an important role in this process. Perception is thus influenced by a wide range of individual factors that can lead to an inadequate interpretation. (Eysenck & Keane, 2008). While behaviorist background is typical for the theory of direct perception, constructivists accepted Helmholtz's principle of sensory data processing by means of unconscious inference (inference of colour (constancy)). They also took into account the knowledge of Gestalt Psychology, which enabled them to look for unconscious patterns of perception as well as to study the influence of conscious experience on irreversibility or reversibility of perceived shape.

Among the constructivist theories of perception proponents are Gregory and Gibson who integrated the phylogenetic flow of time (the influence of evolution on cognitive apparatus) into the process of perception, Gregory used also the flow of ontogenetic time. They emphasized the importance of our previous experience and that data have the

past and the future which can change themselves and they influence each other. They have some hidden aspects that emerge only if influenced by various conditions. (Gregory, 1990). This is applicable to the present study as pre-service science NCE teachers' perception of flipped instructional methodology would have impacts on their acceptability or not of the novel pedagogy which invariable would influence their learning outcomes and efficiency via the methodology.

Blair, Maharaj and Primus (2015) analysed performance and perception in the flipped classroom of the undergraduate Material Technology course at The University of the West Indies, the qualitative data shows that the flipped format led to a slight improvement in how students perceived the course and the lecturer's reflection shows that they are keen to continue with the flipped format as it allowed more time for them to work with students at an individual level. It was therefore recommended that practitioners who intend to flip their classroom pay as much attention to student performance as they do to students' perception.

Aljaraideh (2019) investigated students' perception of flipped classroom for private universities in Jordan. The results showed that the students' perceptions of flipped classroom in the Jordanian private universities were high. This study recommended the necessity of using flipped learning technique at universities in Jordan due to its efficiency in developing students' understanding of the curriculum and in motivating them to become active rather than passive participants in the classroom. Onojah, Olumirin, Adegbija and Babalola (2019) evaluated the perception of undergraduate students on the utilization of flipped classroom for learning in South-West Nigeria established the invaluable in the perception of undergraduate students of flipped pedagogy as useful and easy to use for learning.

Rathner and Schier (2020) assessed the impact of flipped classroom andragogy on student assessment performance and perception of learning experience in two advanced physiology subjects found that students' perception of their learning experience remained at or above the university benchmarks with flipped classroom andragogy. Colomo-Magana, Solo-Varela, Ruiz-Palmero and Gomez-Garcia (2020) surveyed university students' perception of the usefulness of the flipped classroom methodology

using 123 students from the Faculty of Educational Sciences of the University of Malaga (Spain) found that the students perceived flipped pedagogy as effective in promoting learning that has a positive effects on the students' performance.

Joseph, Roach, Natarajan, Karkada and Cayaban (2021) discovered that flipped classroom improves Omani nursing students performance and satisfaction in anatomy and physiology. They found that the results of a survey showed that nursing students were satisfied with the flipped classroom method. Overall, 68 to 78% of students agreed or strongly agreed that the flipped classroom method improved their learning and increased their interest in the course. Nasera Putri and Purwaningsih (2021) examined students' view of flipped classroom in physics' class. The new instructional strategy was found to be more acceptable by the students in teaching and learning of Physics.

Birgili, Seggie and Oğuz (2021) investigated the trends and outcomes of flipped learning research between 2012 and 2018 using a descriptive content analysis. The results indicate that most of the studies are conducted with students as the most frequent study group and with a mixed-method research design in the subject areas of education and medicine. The flipped learning approach is mostly conducted in higher education. As a region, Asia has taken the lead in flipped learning studies. Finally, the outcomes of flipped learning indicate an increase in student performance and positive influence on cognitive, affective, and soft skills.

Al-Husban and Alshorman (2020) studied perceptions of Syrian student refugees towards blended learning, the implications for higher education institutions. Sampled 93 Syrian refugees and collected data using questionnaire, data were analysed using frequencies, percentages, means, standard deviations and t-test. Results revealed that the Syrian refugees have positive perceptions of the blended learning approach with which they are satisfied. Also, there was no significant difference in participants' perceptions of blended learning attributed to gender but age had a significant influence. As at 2020, Yeboah, Ampadu, Ahwireng and Okrah (2020) reported that the flipped methodology has not been conceptualized into the Ghanaian classroom and that majority of the teachers were not familiar with the model of flipped pedagogy. The case in Nigeria is not so different as

the researchers' personal enquiring on the flipped pedagogy from their professional colleagues revealed their low understanding of the methodology. Adesina (2021) experimented the flipped pedagogy with 300 level pre-service NCE teachers in GSE 323, Service and Technology in the society adopting pre-text, proof-text quasi-experimental design, found that there were significant improvement in the student innovativeness and metacognitive skills. Therefore, the present study investigates the views of the pre-service science NCE teachers on the adoption of flipped methodology.

Asad, Ali, Churi and Moreno-Guerrero (2022) studied the impact of flipped classroom approach on students' learning in post-pandemic: a survey research on public sector schools reported that the flipped classroom is a practical learning approach that enhanced student engagement, performance, and learning in the class. Torres-Martín, Acal, El-Homrani, and Mingorance-Estrada (2022). investigated implementation of the flipped classroom and its longitudinal impact on improving academic performance in a quasi-experimental type of non-equivalent groups, with a longitudinal trend design found that there is statistically significant differences in the improvement of academic performance with the flipped classroom methodology. Gopalan, Daughrity, and Hackmann (2022) in the past, the present, and the future of flipped teaching found a high trending of flipped pedagogy during the COVID-19 pandemic and the future higher rise in the adoption of the methodology in the prospective post-pandemic era. Martín-Gutiérrez, and Hervás-Gómez (2022) in the flipped classroom and the development of competences: a teaching innovation experience in higher education in a qualitative and quantitative approaches (mixed methods), through a pre-experimental design reported that there were significant differences in the acquisition of knowledge after the application of the flipped pedagogy and that there was a significant impact on the students' competence levels with a high levels of satisfaction in different concepts

Among the factors that moderate peoples view of an issue; component or methodology is gender. Pre-service science NCE teachers' position of being male and female did influence their performance in schools (Ndirika, 2013; Bamidele, 2018), the reverse is the effect of gender on students' perception of

experimental method (Raimi, Bolaji and Adesina, 2013; Wonu & Anakwe, 2014). Yu (2021) findings regarding gender differences in online learning outcomes tend to be inconsistent and even paradoxicals regards online learning perseverance and engagement. A similar finding was reported by Lu (2021) that students' perceptions of a blended learning environment to promote critical thinking has inconsistent gender effects. This engenders need for further clarification on gender impacts on flipped methodology preferences. Therefore, this study examines the gender difference in pre-service NCE teachers' view of flipped instructional methodology. Age is another variable that can easily differentiate individual(s) behaviour or perception of a methodology (Gonzalez, Famirez & Viadel, 2015; Afolabi, Afolabi & Adesina, 2018; Fleming; Mason & Paxton, 2018; Staddon, 2020). Ma, Chan and The (2020) found, from a generational perspective, the older adult behaviour model more effective than the young behaviour model in increasing self-efficacy to ICT methodology. Similar result was reported by Gomez-Garcia et al (2020) that age differentiated mathematics teachers on ICT training and use perceptions.

Statement of the Problem

Evidence in research reveals that the novel flipped instructional methodology improves students learning outcomes both the attitudinal and the academic achievement. The views of the students stand a strong factor for the efficacy of the pedagogy. This has not been ascertained in Colleges of Education in Oyo township. Whenever the students have a negative perception of an instructional strategy, it affects their disposition, acceptability as well as their productivity through the methodology. This study thus investigates the flipped instructional methodology, the view of pre-service teachers in Emmanuel Alayande College of Education, Oyo.

Objective of the Study

The main thrust of the research is to examine the perception of pre-service science NCE teachers on flipped instructional methodology.

The specific objectives of the study are:

- i. To investigate the perception of pre-service science NCE teachers on the flipped instructional methodology.

- ii. To assess whether there is gender difference in the pre-service science NCE teachers' perception of flipped instructional methodology.
- iii. To evaluate the effect of age difference in the pre-service science NCE teachers' perception of flipped instructional methodology.

Research Questions

The following questions were answered in the study:

- i. What is the perception of the pre-service science NCE teachers on the flipped instructional methodology?
- ii. Do the pre-service source NCE teachers prefer flipped instructional methodology to the regular conventional lecture method?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

Ho₁: There is no significant perception of flipped instructional methodology of pre-service science NCE teachers in Emmanuel Alayande College of Education, Oyo.

Ho₂: There is no significant gender difference of pre-service science NCE teachers' perception of flipped instructional methodology.

Ho₃: There is no significant age difference of pre-service science NCE teachers' perception of flipped instructional methodology.

Methodology

The research adopted the mixed method of qualitative and quantitative approach (concurrent triangulation). Qualitatively the sample of the study were interviewed, their responses were thematically analysed to answer the research questions. Quantitatively, questionnaire was administered on the sample in a likert-scale type of descriptive survey design and the collated data were subjected to inferential statistics for hypotheses testing. The 300 level pre-service science NCE teachers of

Emmanuel Alayande College of Education, Oyo were purposively sampled for the study (they were already exposed to flipped instruction in GSE 323, Science and Technology in Society). Altogether, there are 492 that responded to the questionnaire and the focused group interview.

Two instruments; Perception of Flipped Instructional Methodology Questionnaire (**PFIMQ**) and Perception of Flipped Instructional Methodology Interview (**PFIMI**). PFIMQ was a fifteen item instrument adopted from Onithin and Adetodun (2018) Perception of Flipped Pedagogy Scale. The 30-item instrument was a four-likert scale type with responses of Strongly Agree, Agree, Disagree, and Strongly Disagree, scored in 4,3,2,1 respectively for the items. The PFIMQ was trial-tested at another College of Education in Oyo township, the collated data were subjected to Cronbach's Alpha reliability which yielded the value of 0.73. PFIMI was a self-constructed tool with 10 items. The research instrument was given to experts in Test and Measurement as well as those in psychometrics, their critiques and comments enhance the face, content and construct validity of PFIMI. The scale was reduced to five items, the items were trial tested with individuals outside the scope of the study, their collated responses were subjected to inter-rater reliability of FleisKappa which yielded a value of 0.81. The researchers administered the validated instruments on the sample of the study, on the spot collection was made to ensure hundred percent retrieval. The collated interview was analysed thematically, the demographic variables of the respondents were represented in tables of frequency counts and percentages, mean and standard deviation were used to answer the research questions, t-test and analysis of variance (ANOVA) were used to test the set hypotheses at 0.05 level of significance.

Results

Table 1: Socio-demographic attributes of the Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	159	33.40

Female	317	66.60
Total	476	100.0
Age Group		
18 - 21yrs	124	26.05
21 – 24yrs	217	45.59
25yrs & above	135	28.36
Total	476	100.0

Table 1 revealed that there are 159 (33.40%) male, 317 (66.60%) female. 124 (26.05%) 18 – 21 years, 217 (45.59%) 21 – 24 years and 135 (28.36%) respondents in the distribution.

Answers to Research Questions

Research Question 1: What is the perception of the pre-service science NCE teachers on the flipped instructional methodology?

Table 2: Pre-service Science NCE Teachers' Perception of Flipped Instructional Methodology

S/N	Items		SA	A	D	SD	\bar{x}	SD
1.	I like flipped methodology of teaching science.	Freq. (%)	279 58.61	115 24.16	25 5.25	57 11.97	3.27	1.21
2.	Flipped methodology lecture note are easy to understand.	Freq. (%)	253 53.15	156 32.77	28 5.88	39 8.19	3.09	2.47
3.	Flipping methodology helps science contents mastery.	Freq. (%)	310 65.13	126 26.47	11 2.31	29 6.09	3.41	0.97
4.	Flipped methodology has videos that add meaning to lectures.	Freq. (%)	307 64.50	122 25.63	18 3.78	29 6.09	3.27	1.15
5.	Science contents are easy to learn with flipped methodology.	Freq. (%)	296 62.18	126 26.47	21 4.41	33 6.93	2.89	1.53
6.	Flipped methodology makes students more active in science classroom.	Freq. (%)	311 65.34	118 24.79	11 2.31	36 7.56	3.29	0.75
7.	Flipped methodology encourages interactions with peers and lecturers.	Freq. (%)	309 64.29	116 24.40	19 3.99	32 6.72	3.74	0.36
8.	Flipped methodology enhances my mind-on and hands-on in science instruction.	Freq. (%)	286 60.08	138 28.99	17 3.57	35 6.93	3.05	1.73
9.	Flipping science instruction enables quick objectives attainment.	Freq. (%)	325 68.27	101 21.22	19 3.99	31 6.51	3.32	0.83
10.	Flipped methodology helps science effective lesson evaluation.	Freq. (%)	299 62.82	126 26.47	13 2.73	38 7.98	3.19	0.57
	Grand Mean							3.46

From table 2, majority of the pre-service science NCE teachers agreed that they like flipped methodology of instruction (394, 82.77%) while minority of 82(17.23%) disagreed with the statement. 409 (85.92%) agreed that the flipped methodology lecture note are easy to understand while the minority of 67 (14.08%) disagreed with the assertion. 436 (91.60%) agreed that flipping

methodology helps science contents mastery while the remaining 40 (8.40%) disagreed with the statement. 429 (90.13%) agreed that flipped methodology have videos that add meaning to lectures while 47 (9.87%) disagreed that flipped methodology gave videos that add meaning to lectures. 422 (88.66%) agreed that science contents are easy to learn with flipped methodology whereas 54 (11.34%) disagreed with the statement. 429

(90.13%) agreed that flipped methodology makes them more active in science classroom while 47 (9.87%) disagreed with the assertion. 425 (89.29%) agreed that flipped methodology encourages interactions with peers and lecturers, whereas 51 (10.71%) disagreed with the statement. 424 (89.08%) agreed that flipped methodology enhances their minds and hand-on in science instruction whereas 52 (10.92%) disagreed that flipped methodology enhances their minds and hands-on in science instruction. 426 (89.50%) agreed that flipping science instruction enables quick objectives attainment while 50 (10.50%) disagreed with the assertion. 425 (89.29%) agreed that flipped methodology helps science lesson effective evaluation whereas 51 (10.71%) disagreed with the statement.

Research Question 2: Do the pre-service source NCE teachers prefer flipped instructional

methodology to the regular conventional lecture method?

From the interview conducted, the majority of the pre-service science NCE teachers preferred the flipped methodology to the regular conventional lecture method. They averred to the fact that the flipped methodology makes the contents of instruction down to earth; it enhances their active participation in the class, it exposes them to the nitty-gritty of the course and thus encourage maximum understanding of the course contents.

Hypotheses Testing

Ho₁: “There is no significant perception of flipped instructional methodology of pre-service science NCE teachers in Emmanuel Alayande Collede of Education, Oyo”

Table 3: T-test Analysis of Pre-service Science NCE Teachers’ Perception of Flipped Methodology

Flipped Methodology Perception	N	Mean	SD	df	t	Sig.	R
Pre-service science NCE teachers	476	34.60	7.39	475	35.71	.001	*S

Table 3 reveals that there is significant pre-service science NCE teachers’ perception of flipped methodology in Emmanuel Alayande College of Education, Oyo (N = 492, \bar{x} = 34.60; SD = 7.39; df = 475, t = 35.71, p < .05). Therefore, the null hypothesis that says there is no significant pre-

service science NCE teachers’ perception of flipped methodology

Ho₂: “There is no significant gender difference of pre-service science NCE teachers’ perception of flipped instructional methodology”

Table 4: T-test Analysis of Gender Difference in Pre-service Science NCE Teachers Perception of flipped methodology

Flipped Methodology Perception	N	Mean	SD	df	t	Sig.	R
Male	159	35.26	7.39	474	1.75	.051	NS
Female	317	34.89					

Table 4 indicates that the t-test analysis of gender difference in pre-service science NCE teachers perception of flipped methodology in Emmanuel Alayande College of Education, Oyo is not significant (t = 1.75, df = 474; p > .05). Therefore, the null hypothesis that says there is no significant gender difference in the pre-service science NCE

teachers’ perception of flipped methodology is accepted.

Ho₃: “There is no significant age difference in pre-service science NCE teachers’ perception of flipped instructional methodology”

Table 5: Analysis of Variance of Age Difference in Pre-service Science NCE Teachers’ Perception of Flipped Methodology

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	Remark
Treatment	628854.00	473	1328.501	2,071	.500	NS

Between	1282.793	2	641.397
Total	630136.793	475	

Table 5 revealed that the analysis of variance of age difference in the pre-service science NCE teachers' perception of flipped methodology is not significant ($F_{(473,2)}=2.071, p>.05$). Therefore, the null hypothesis that says there is no significant age difference in pre-service science NCE teachers' perception of flipped pedagogy was accepted.

Discussion

From the answered research question, it was identified that the pre-services science NCE teachers preferred the flipped methodology to the regular conventional lecture method. This is because the methodology, flipped strategy is novel, learners' centered heuristic and interactive mode of instruction. The reasons for this result is found in Asad, Ali, Churi and Moreno-Guerrero (2022) that the flipped classroom is a practical learning approach that enhances student engagement, performance, and learning in the class. This finding finds supports in Blair, Maharaj and Primus (2015), Aljaraidh (2019), Nasera Putrl and Purwaningsih (2021) that majority of the learners' perceived flipped pedagogy better than the conventional instructional strategy. It equally corroborate the findings of Martín-Gutiérrez, and Hervás-Gómez (2022) that there were differences in the acquisition of knowledge after the application of the flipped pedagogy and that there was a high impact on the students' competence levels and satisfaction in different concepts. From the tested hypothesis, it was found that there is significant pre-service science NCE teachers' perception of flipped pedagogy. This results corroborate the findings of Birgili Seggie and Ogniz (2021), Rashner and Schier (2020) that flipped methodology raised students' perception of their leaning experiences above the minority benchmarks. Additionally, from the tested hypothesis, it was identified that the pre-service science NCE teachers' perception of flipped methodology was not influenced by gender. This finding agrees with the reports of Raimi, Bolaji and Adesina (2013), Wonu and Anakwe (2014) that gender did not influence students' perception of methodology efficiency. The inconsistencies in gender effects on students' perceptions of instructional methodology by Lu (2021) and Yu (2021) were equally clarified by the finding that indicated that gender had no significant

effect on pre-service teachers' perception of flipped instructional methodology.

Furthermore, the pre-service science NCE teachers' perception of flipped methodology was not beclouded by age differences. This is owing to the fact that the novel methodology flipped pedagogy is both acceptable to the adult and youths alike. This finding is converse to the report of Ma, Chan and Teh (2020) that generational perspective of the older persons was better than the younger ones. Also, the results contrast the findings of Gomez-Garcia et al (2020) that age differentiated mathematician teachers' perspective on ICT training and utilization.

Conclusion

From the answered research question and tested hypotheses, it can be sincerity concluded that:

1. Pre-service science NCE teachers' prefer flipped methodology than (to) the regular conventional lecture method.
2. The preference of flipped methodology by the pre-service science NCE teachers' was not beclouded by gender and age.

Recommendations

From the conclusion reached in the study: the following are recommended:

1. Tertiary Institutions' lecturer should adopt flipped methodology to interact with their students as it is widely preferred by the majority of the students compared to the conventional lecture mode.
2. The tertiary institutional management to organize seminars, symposia, lectures and workshops on the strategies to implement effectively the flipped methodology by the lectures.

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