

Understanding the Effectiveness and Impact of Flipped Learning Methodology of ICT in Secondary Education

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Abstract:

The flipped learning methodology is widely used by the teachers to the students of secondary education to make the learning more interesting and effective. The flipped learning methodology is widely becoming more popular in the study of secondary education as it promotes critical thinking and helps the students to get time for learner-centred activities which includes problem-based learning. Flipped learning methodology of ICT provides various advantages to the teachers as well as students by focusing on active dynamic learning which is quite interesting as compared to traditional learning. Different ICT applications such as software and interactive tools support the flipped learning methodology in secondary education. The relationship between the teachers and the students in secondary education gets much interesting with the flipped learning methodology in ICT. Flipped learning methodology of ICT in secondary education enhances the subject learning by adding a lot of value in the key learning areas. The flipped learning methodology of ICT brings the students together where they can discuss the problems and talk about their work which increases the collaboration among them.

1. Introduction

Importance

The flipped learning methodology is widely used by the teachers to the students of secondary education to make the learning more interesting and effective. The flipped learning methodology is widely becoming more popular in the study of secondary education as it promotes critical thinking and helps the students to get time for learner-centred activities which includes problem-based learning. Flipped learning methodology of ICT provides various advantages to the teachers as well as students by focusing on active dynamic learning which is quite interesting as compared to traditional learning. Different ICT applications such as software and interactive tools support the flipped learning methodology in secondary education. The relationship between the teachers and the students in secondary education gets much interesting with the flipped learning methodology in ICT. Flipped learning methodology of ICT in secondary education enhances the subject learning by adding a lot of value in the key learning areas. The flipped learning methodology of ICT brings the students together where they can discuss the problems and talk about their work which increases the collaboration among them.

Flipped Classroom and scope

Flipped classrooms provide various advantages to the teachers as well as the students. According to El Miedany (2019), using flipped classrooms make the students less frustrated while doing their task as they will be able to watch the lectures at home while completing their tasks. Flipped classroom allows the students to clear their doubts immediately by asking questions outside the class which increase their interest in learning things. Flipped classrooms also help the students to learn the subjects deeply as compared to traditional classrooms. The teachers of secondary education also get various advantages with the flipped classroom as they can provide active learning to the students and support the students in learning the concepts through the practical application (Karabulut-Ilgu et al. 2018).

Flipped classrooms help the teachers to reuse their lectures several times which save their time. The scope of the flipped learning methodology of ICT in secondary education is to make the students focus on activity-based things rather than focusing on the theoretical concepts. The flipped learning methodology of ICT provides an active learning environment to the class. Flipped learning methodology can be used where the students want to learn things at their own pace. Flipped learning methodology of ICT can be used where each student can get the opportunity to get the time of teachers. According to Tomas et al. (2019), flipped learning methodology of ICT enhances the collaboration time of the students and the teachers.

2. Significance/Purpose of the Study

The purpose of the study is to understand the effectiveness and impact of flipped learning methodology of ICT in secondary education. According to Bond (2020), the study focuses on reducing the technological gap between the students and teachers of secondary education by using the ICT and smartphones in the classroom which helps to implement the flipped classroom techniques in secondary education. The purpose of the study is to make the students able to learn things deeply through the flipped classroom and they should focus on the practical concepts rather than the theoretical knowledge. The significance of the study is to make education more interesting for the students and the teachers (Chang and Hwang 2018).

The implementation of flipped classrooms with ICT makes the students complete their task outside the classroom which develops an interest in learning the things among them. The purpose of the study is to reduce the frustration of students and teachers while learning and teaching things by reusing the lectures several times. According to Lee and Wallace (2018), the purpose of the study is to approach the reality of the students by offering them various subjects and they can learn according to their choice. The study focuses on reducing the frustration of the traditional classroom while learning things.

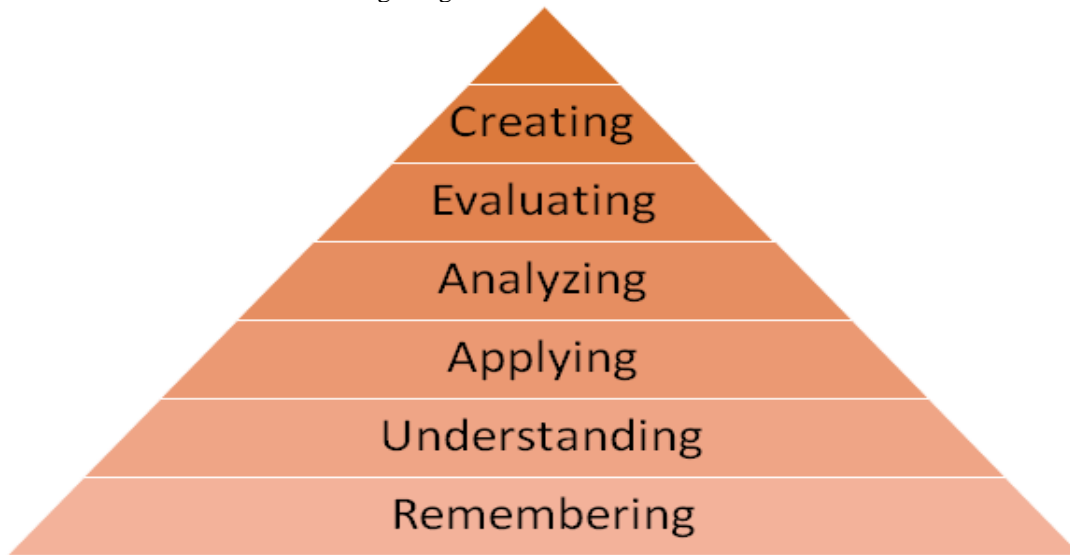


Figure 1: Taxonomy in the flipped classroom
(Source: vanAlten et al. 2020, p.756)

3. Objective of the study

- To enhance the interest of students in learning things.
- To reduce the frustration of students while learning
- To reduce the technological gap between the students and teachers while learning through flipped classrooms.
- To introduce ICT application for the deeper implementation of flipped classrooms
- To provide reuse of the teacher's lecture until it becomes outdated
- To enhance collaboration among the students and teachers
- To focus more on the practical concept rather than the theoretical concepts
- To help the students to learn the things according to their own pace
- To allow the teachers to give equal time to each student in the flipped classrooms

4. Hypothesis of the study

H1. The flipped learning methodology of ICT has an impact on the effectiveness and understanding of the students of secondary education.

H0. The flipped learning methodology of ICT does not impact the effectiveness and understanding of the students of secondary education.

5. Methodology

(Population/Sample)

Population in this study is used to find the impact and effectiveness of flipped learning methodology of ICT in secondary education. According to Moreno-Guerrero et al. (2020), the study is conducted in an educational institute of secondary education. The school's community including faculties, staff, professors and students were the targeted population for completing this study. The target population for this study was approx 570 on which the study was to be completed. Among the targeted population, the accessible population was 100. Out of 100 accessible populations, 50 participants belonged to the students of secondary school and the rest 50 participants were considered as faculties, professors and staff of that school. The accessible population was asked various questions by the researchers to complete the study. The accessible population was differentiated from the targeted population based on their knowledge, interest and age (Brewer and Movahedazarhouligh 2018).

The targeted population was asked to participate in the study and the accessible participants were chosen for completing the study. In the school institute, the population can be counted easily and they are considered as a finite population which easily helps to identify the accessible population. It's become much more difficult to complete the study with a large number of populations therefore it is important to find an accessible population. According to Hinojo et al. (2020), the accessible population was asked various questions to know what they feel about the flipped learning methodology on ICT. The accessible population shared their experience regarding the flipped learning and flipped classroom how they are positively or negatively impacted by the flipped learning methodology. The teachers who participated in the study were also asked questions and they shared their experiences of traditional classroom teachings and flipped classroom teaching. The experiences of the teachers and the students were noted down which helps to complete the study.

The sample size of the study was 100 in which 50 belonged to the student’s category and 50 belonged to the faculty categories. According to Parra et al. (2020), the sample size helps in completing the study and used for the data collection. In the sampling size, a certain group from the population is chosen and based on sampling size, the data is collected for completing the study. The small group from the population is considered as a sample. It is the small portion of the sample that helps in the data collection for completing the objectives of the study. According to Pozo Sanchez et al. (2019), the sample used in the population represents the characteristics of the participants and their view regarding the effectiveness of the flipped learning methodology of ICT in secondary education. The sample size helps to understand how much ICT applications are in implementing the flipped classroom for secondary education.

6. Sampling design

According to Hwang et al. (2019), Sampling is the way of selecting the accurate group or unit from the population selected for completing the student. To complete this study, 100 respondents from the population were chosen as a sample size. The sampling helps to collect the data for fulfilling the objective and purposes of conducting the study. The sampling in the study helps to decide the exact representation of the sample which has been selected for completing the study. Sampling design provides a road map to complete the study by providing a basis for selecting the sampling size. Two types of sampling design are used for completing the study based on the nature of the study. According to Jenkins et al. (2017), probability sampling design and non-probability sampling design are the two types of sampling used in different studies based on the different nature of the study. In this study, for knowing the effectiveness of flipped learning methodology of ICT in secondary education we have used probability sampling.

The reason for choosing probability sampling is it provides ease for use and it facilitates the conveniently collecting of the data. Probability sampling helps to fulfil the objective of the study as they are highly representative of the population. In probability sampling designing there is no need for generating random numbers for collecting the data. Various types of probability sampling are used for completing the study. According to Belmonte et al. (2019), simple random sampling, Stratified Random Sampling, Systematic Sampling and Cluster Random Sampling are used in this study to know the effectiveness and impact of flipped learning methodology of ICT in secondary education. Multi-stages random sampling is a type of probability design sampling which is the combination of all types of probability sampling which collect the data in a very easy manner. The probability sampling design is a random way of selecting the sample from the population. All the population are assigning the numbers and by using random number generators samples are chosen from the population.

7. Data collection Techniques

Data collection Techniques are used for collecting the data for fulfilling the objectives of the study. According to Lo et al. (2020), the data are collected through the participants who participate in the study. In this study, 100 respondents participated to share their experience about the flipped learning of ICT. Out of 100, 50 participants belong to the student's section and 50 belong to the teachers and staff section of secondary education schools. Various data collections techniques have been used to collect the data for fulfilling the aim of the study. In this study, both primary and secondary data collections techniques have been used for getting information regarding the study. The primary data collection techniques used in this study are interviews, questionnaires and surveys, observations and SMS. The secondary data collection techniques used pdf, articles, books and journal (Amiryousefi 2019). The primary and secondary data collection techniques help to complete the objective of the study.

The participants were given a set of questions and asked questions regarding the effectiveness of flipped learning methodology of ICT in secondary education. Four sets of questionnaires were given to all the participants. The respondents who were students got different sets of questionnaires and teachers got different sets of questionnaires. The students respond by sharing their experience of learning in the flipper class and teachers also share their experience of teaching in the flipped class. The interviews were conducted in which the respondents shared their experience which helps in collecting the data for the study. The survey was also conducted to knowing the experience of the respondents regarding the flipped learning with ICT applications. The participants who did not come for the questionnaires and interviews were sent SMS on their phones in which they responded to their answer in the form of agreeing or disagree with flipped learning.

8. Results of the data tables

Questions for Teacher

1. Do you agree that the flipped learning methodology of ICT is useful for students?

Responses	Number of Respondents
Disagreed	5
Strongly disagreed	4
Neutral	6
Agreed	15

Strongly agreed	20
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2. Do you agree that a proper structure of the school is required to maintain flipped learning?

Responses	Number of Respondents
Disagreed	3
Strongly Disagreed	2
Neutral	3
Agreed	22
Strongly Agreed	20

3. Do you believe that flip teaching tools can improve the performance of students?

Responses	Number of Respondents
Disagreed	5
Strongly disagreed	3
Neutral	6
Agreed	16
Strongly agreed	20

Questions for Students

1. Do you believe that the learning interest of the student is maintained by flipped learning methodology of ICT?

Responses	Number of Respondents
Disagreed	2
Strongly disagreed	4
Neutral	4
Agreed	25
Strongly agreed	15

2. Do you agree that the effectiveness of students is impacted by flipped learning?

Responses	Number of Respondents
Disagreed	2
Strongly disagreed	4
Neutral	5
Agreed	20
Strongly agreed	19

3. Do you believe that flipped learning methodology can maintain innovative educational practices of students?

Responses	Number of Respondents
Disagreed	1
Strongly disagreed	3
Neutral	5
Agreed	23

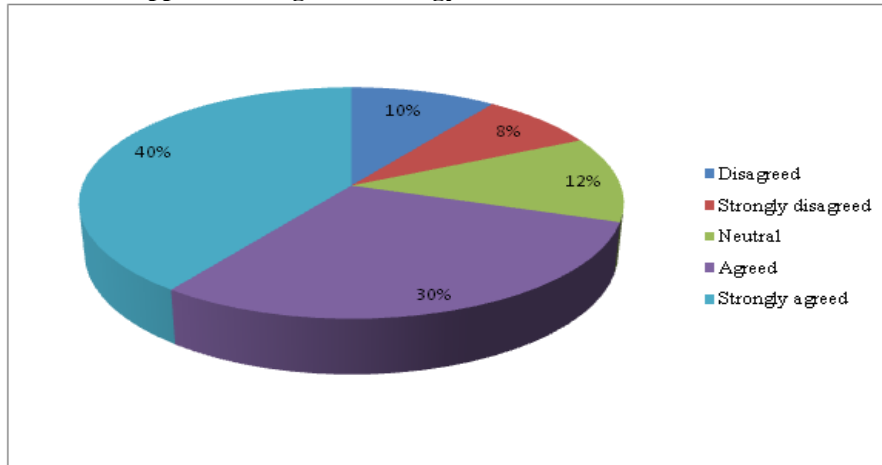
Strongly agreed

18

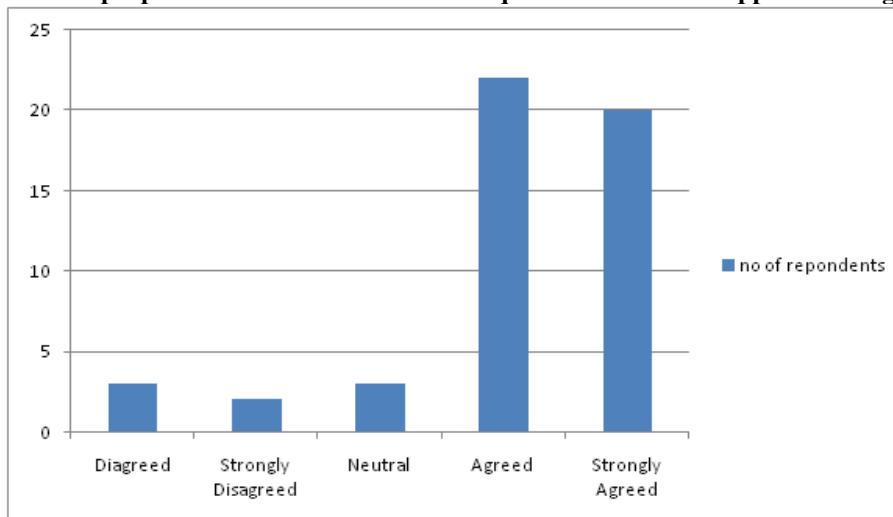
9. Graphical Representation

Questions for teachers

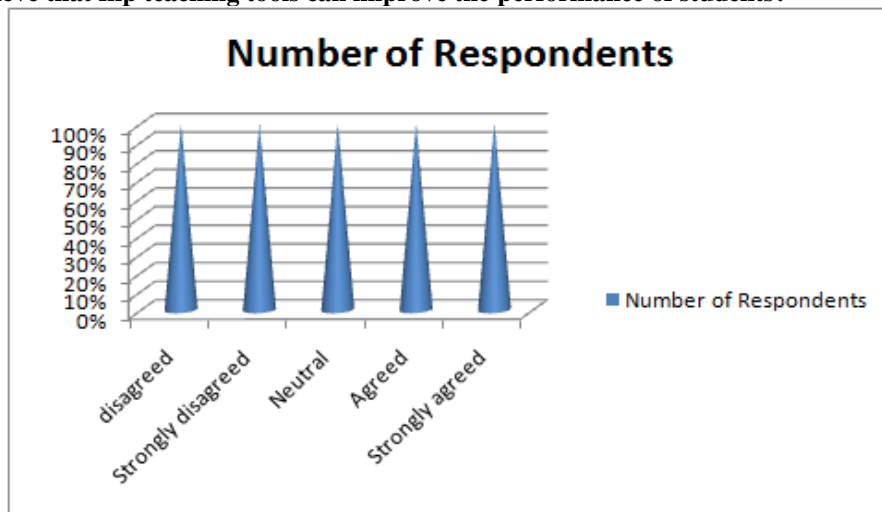
1. Do you agree that the flipped learning methodology of ICT is useful for students?



2. Do you agree that a proper structure of the school is required to maintain flipped learning?

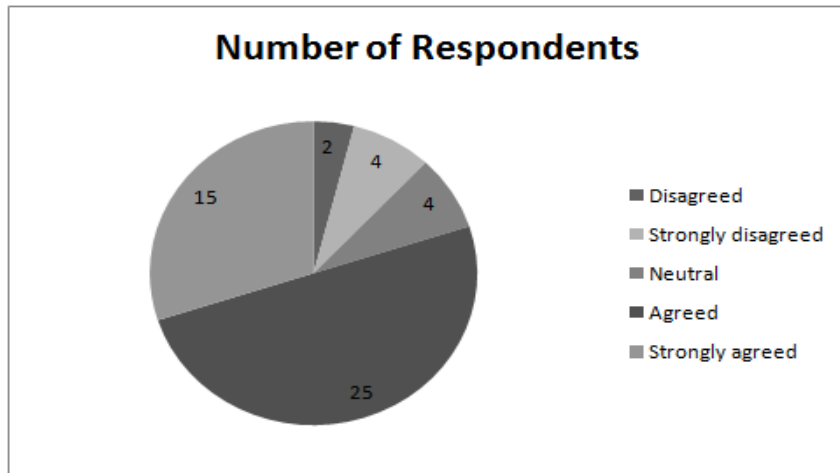


3. Do you believe that flip teaching tools can improve the performance of students?

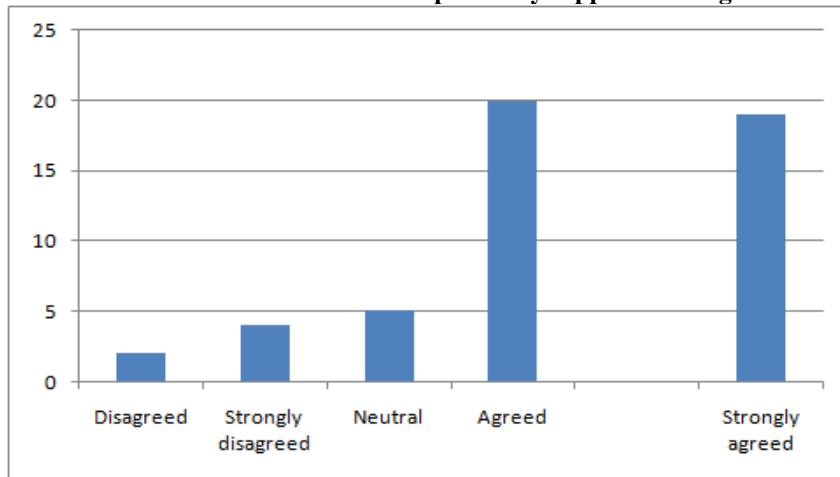


Questions for Students

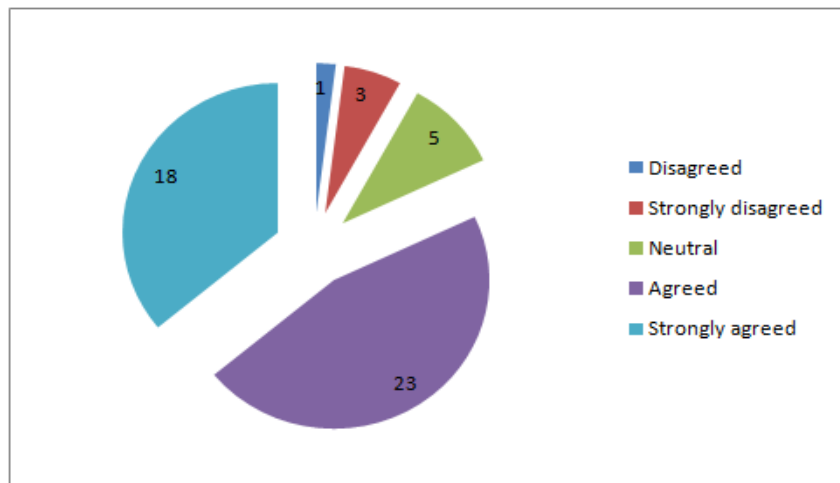
1. Do you believe that the learning interest of students is maintained by the flipped learning methodology of ICT?



2. Do you agree that the effectiveness of students is impacted by flipped learning?



3. Do you believe that flipped learning methodology can maintain innovative educational practices of students



10. Analysis of the data

The data we see in the table shows that most teachers who act as respondents strongly agreed that flipped learning methodology of ICT helps the students in enhancing their study. Out of 50 respondents, only 4 strongly disagreed with the effectiveness of flipped learning which shows that implementation of flipped learning will slightly affect the faculty. In the second table of teachers, we found that the proper structure of the school is mandatory for implementing flipped learning. Out of 50, 20 teachers support that the structure of the school is the important factor for implementing flipped learning. 3 teachers were not sure about the importance of structure as a result they were neutral. The data of the Third table of teachers shows that maximum teachers agree that the performance of the students can be improved through flip teaching.

They believe that flipped teaching provides better materials that can improve the performance of the students. The data of the students in table 1 show that students were accepted that their learning skills have been improved through the flipped learning methodology of ICT. 15 students were strongly agreed where 4 students were neutral that their performance has been increased through flipped learning. The data of the student's table 2 shows that 19 students agreed that their performance has been impacted through flipped learning. Table 3 of

student's shows that 18 students strongly agreed that flipped learning methodology has maintained the innovative educational practices of students. 5 students have no idea regarding the importance of innovative educational practices of students in flipped learning.

11. Findings of the study and Results

The findings of the study are flipped learning methodology of ICT in secondary education is very useful for the students and the teachers. The finding says that the flipped learning methodology of ICT creates a positive environment for the teachers and the students for learning. The proper structure for the implementation of the flipped learning helps in creating a value-based environment where the students can get active based knowledge. The results say that effective implementation of flipped learning methodology of ICT provides various advantages to the students and the teachers. The performance of the students will be enhanced through the flipped education. According to Zou et al. (2020), flipped teaching can improve the interest of the students in learning. Innovative educational practices of students can be maintained through the flipped learning.

12. Discussion

Learning and teaching have been changed due to the arrival of ICT. The arrival of ICT is reducing the technological gap among the students and teachers in secondary education. The ICT promotes various innovative educational practices to make learning and teaching more interesting. ICT and its applications help in implementing the flipped class which are becoming more popular among the students and the teachers in recent times. The introduction of flipped learning in ICT increased motivation among the students as well as increased the commitment among the students to complete their task. Flipped learning increases collaboration among the students. The study focuses on knowing the impact and effectiveness of flipped learning methodology of ICT in secondary education and we found the flipped learning and classroom has a positive impact on the learning and teaching ability. The flipped learning is completely based on innovative technology practices which help the students to learn active based things rather than theory-based things. The flipped learning helps the students to complete their task by watching the lectures of the teacher outside the class.

13. Conclusion

Flipped learning methodology of ICT in secondary education is becoming popular day by day due to its innovative technological practices. ICT helps in the deeper implementation of the flipped learning in the structure. The proper structure is required for implementing flipped learning in the schools. The students and the teachers get various advantages of the flipped learning and flipped class. Flipped learning allows the students to complete their task interestingly. Teachers also reuse their one lecture again and again which saves time. The survey was conducted to know the importance of flipped learning in secondary education in which 100 respondents participated. The findings say that flipped learning brought a positive impact on the education system.

14. Recommendations/Suggestions

Flipped learning can be effectively used by the proper knowledge of gadgets and the internet. Flipped learning can give proper benefit when the students and teachers are digital active as it is technology-based learning. It is important to be digitally knowledgeable before getting flipped learning. Flipped learning also increases the time spent on the computers by the students which may affect their health. It is important to take care of their eyes and health during flipped learning. Students may feel technological difficulties when they reuse the lectures provided by the teachers. It is important to have a strong internet connection for getting the full benefit of flipped learning. Before getting flipped learning and teaching the teachers and students should be aware of the use of smartphones and gadgets in proper ways. Flipped learning can provide a better and innovative form of education when it is used with some imitations.

References

1. Amiryousefi, M., 2019. The incorporation of flipped learning into conventional classes to enhance EFL learners' L2 speaking, L2 listening, and engagement. *Innovation in Language Learning and Teaching*, 13(2), pp.147-161.
2. Barral, A.M., Ardi-Pastores, V.C. and Simmons, R.E., 2018. Student learning in an accelerated introductory biology course is significantly enhanced by a flipped-learning environment. *CBE—Life Sciences Education*, 17(3), p.ar38.
3. Belmonte, J.L., Sánchez, S.P. and del Pino Espejo, M., 2019. Projection of the flipped learning methodology in the teaching staff of cross-border contexts. *Journal of New Approaches in Educational Research (NAER Journal)*, 8(2), pp.184-200.
4. Belmonte, J.L., Sánchez, S.P. and del Pino Espejo, M., 2019. Projection of the flipped learning methodology in the teaching staff of cross-border contexts. *Journal of New Approaches in Educational Research (NAER Journal)*, 8(2), pp.184-200.
5. Bokosmaty, R., Bridgeman, A. and Muir, M., 2019. Using a Partially Flipped Learning Model To Teach First-Year Undergraduate Chemistry. *Journal of Chemical Education*, 96(4), pp.629-639.
6. Bond, M., 2020. Facilitating student engagement through the flipped learning approach in K-12: A systematic review. *Computers & Education*, 151, p.103819.
7. Brewer, R. and Movahedazarhouli, S., 2018. Successful stories and conflicts: A literature review on the effectiveness of flipped learning in higher education. *Journal of Computer Assisted Learning*, 34(4), pp.409-416.

8. Chang, S.C. and Hwang, G.J., 2018. Impacts of an augmented reality-based flipped learning guiding approach on students' scientific project performance and perceptions. *Computers & Education*, 125, pp.226-239.
9. El Miedany, Y., 2019. Flipped learning. In *Rheumatology Teaching* (pp. 285-303). Springer, Cham.
10. Fuentes Cabrera, A., Parra-González, M.E., López Belmonte, J. and Segura-Robles, A., 2020. Educational potentials of flipped learning in intercultural education as a transversal resource in adolescents. *Religions*, 11(1), p.53.
11. Hinojo Lucena, F.J., Lopez Belmonte, J., Fuentes Cabrera, A., Trujillo Torres, J.M. and Pozo Sanchez, S., 2020. Academic effects of the use of flipped learning in physical education. *International journal of environmental research and public health*, 17(1), p.276.
12. Hwang, G.J. and Lai, C.L., 2017. Facilitating and bridging out-of-class and in-class learning: An interactive e-book-based flipped learning approach for math courses. *Journal of Educational Technology & Society*, 20(1), pp.184-197.
13. Hwang, G.J., Yin, C. and Chu, H.C., 2019. The era of flipped learning: promoting active learning and higher-order thinking with innovative flipped learning strategies and supporting systems.
14. Jenkins, M., Bokosmaty, R., Brown, M., Browne, C., Gao, Q., Hanson, J. and Kupatadze, K., 2017. Enhancing the design and analysis of flipped learning strategies. *Teaching & Learning Inquiry*, 5(1), pp.1-12.
15. Karabulut-Ilgu, A., Jaramillo Cherez, N. and Jahren, C.T., 2018. A systematic review of research on the flipped learning method in engineering education. *British Journal of Educational Technology*, 49(3), pp.398-411.
16. Lee, G. and Wallace, A., 2018. Flipped learning in English as a foreign language classroom: Outcomes and perceptions. *TESOL Quarterly*, 52(1), pp.62-84.
17. Lo, C.K. and Hew, K.F., 2020. A comparison of flipped learning with gamification, traditional learning, and online independent study: the effects on students' mathematics achievement and cognitive engagement. *Interactive Learning Environments*, 28(4), pp.464-481.
18. Moreno-Guerrero, A.J., Romero-Rodriguez, J.M., Lopez-Belmonte, J. and Alonso-Garcia, S., 2020. Flipped learning approach as an educational innovation in water literacy. *Water*, 12(2), p.574.
19. Parra-González, M.E., López Belmonte, J., Segura-Robles, A. and Fuentes Cabrera, A., 2020. Active and emerging methodologies for ubiquitous education: Potentials of flipped learning and gamification. *Sustainability*, 12(2), p.602.
20. Pozo Sánchez, S., López Belmonte, J., Fuentes Cabrera, A. and López Núñez, J.A., 2020. Gamification as a methodological complement to flipped learning—an incident factor in learning improvement. *Multimodal Technologies and Interaction*, 4(2), p.12.
21. Pozo Sanchez, S., Lopez Belmonte, J., Moreno Guerrero, A.J. and Lopez Nunez, J.A., 2019. Impact of the educational stage in the application of flipped learning: A contrasting analysis with traditional teaching. *Sustainability*, 11(21), p.5968.
22. Tomas, L., Doyle, T. and Skamp, K., 2019. Are our first-year students ready for a flipped classroom? A case for a flipped learning continuum. *International Journal of Educational Technology in Higher Education*, 16(1), pp.1-22.
23. van Alten, D.C., Phielix, C., Janssen, J. and Kester, L., 2020. Self-regulated learning support in flipped learning videos enhances learning outcomes. *Computers & Education*, 158, p.104000.
24. Zou, D., Xie, H., Wang, F.L. and Kwan, R., 2020. Flipped learning with Wikipedia in higher education. *Studies in Higher Education*, 45(5), pp.1026-1045.