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RESEARCH ARTICLE

FLIPPED CLASSROOM APPROACH IN SAUDI ARABIA CONTEXT : STUDENTS' EXPERIENCES IN A FLIPPED COMPUTER SCIENCE CLASSROOM IN HIGH SCHOOL

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ABSTRACT

The aim of this research is to study the impact of flipped classroom approach on students' experiences in a computer science class in high school in Saudi Arabia. The purpose of conducting this research is to encourage further studies in future in order to investigate the impact of flipped classroom approach in high schools, particularly in Saudi Arabia, so that this approach could become popular in the country. To address this aim and purpose, a mixed method research is conducted wherein interviews are conducted with 8 students to gather qualitative data and surveys are conducted with 35 students of computer science to gather quantitative data. The thematic analysis method and descriptive and graphical analysis methods are used to analysis the findings of the qualitative and quantitative data. From the findings of the research it has been examined that flipped classroom allow students to show more awareness, be more engaged and collaborative while studying in comparison of the traditional approach and thus it is concluded that the students have a good experience with flipped method and further research must be conducted on this topic to promote its application in schools in Saudi Arabia.

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INTRODUCTION

In the field of educational technology, the approach of the flipped classroom is considered as one of the new innovations. According to Bergmann and Sams (2012), the flipped classroom approach effectively helped teachers in developing a creative learning environment for the students. Furthermore, it helps in encouraging personalized learning through creativity (Bergmann and Sams, 2012). Per Bergmann and Sams (2014), there are two key principles of the flipped classroom approach, and firstly, it is important to use online video in order to present the classroom material, as it facilitates students to prepare for the classroom by studying at home. Secondly, it requires in-classroom activities, which give more time to students for discussion with their classmates and teachers (Bergmann and Sams, 2014). Thus, in flipped classroom approach, the students can be able to utilize the time of classroom to collaborate with peers to carry out the various activities. In addition, the flipped classroom approach involves the use of an explicitly student-centred education, which allows students to learn according to their own ability (Bergmann and Sams, 2012: 24).

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According to DeGiusti (2018), while implementing the flipped classroom approach, various challenges are countered by teachers, as it requires a change in their roles. However, the flipped classroom approach is considered useful for teaching computer science as the teaching methodology of computer science requires students to perform the content in the classroom (DeGiusti, 2018). Indeed, the technology was introduced in the schools of Saudi Arabia decades ago; however, still, the teacher-centred approach is influencing the process of teaching and learning in the classroom(ALRowais, 2014). Thus, this study aims to investigate the impact of flipped classroom approach in Saudi Arabia in order to utilizes technologically advances features and improve students' learning.

Research Aim and Objectives: In the light of the above discussion, the aim of this research is to study the impact of flipped classroom approach on students' experiences in a computer science class in high school in Saudi Arabia. Furthermore, the significance of the study is to encourage further studies in future in order to investigate the impact of flipped classroom approach in high schools, particularly in Saudi Arabia, so that this approach could become popular in the country. To address this aim, some objectives are developed. These are:

- To examine and compare the experiences of the students for traditional and flipped classroom
- To undertake a comparative study of the student participation in traditional and flipped classroom
- To study and compare the quality of learning gained by the students in a traditional and flipped classroom

Research Questions

What is the impact of using the flipped classroom approach on students' experiences in a computer science class in Saudi high school?. How do students prepare for the computer science classroom differ between the flipped classroom approach and the traditional approach in Saudi high school?. Do students participate more in the flipped computer science classroom than in the traditional computer science in Saudi high school?

BACKGROUND

The process of the flipped classroom approach helps students in attaining essential knowledge through practice. Due to the procedure of learning of flipped classroom approach, the base of this approach is social constructivism theory (Khanova e al., 2015). According toKukla (2013), social constructivism theory states that in the process of learning the knowledge is socially constructed, therefore, it is a socially active process (Kukla, 2013). The use of the flipped classroom approach by teachers provides space for students to interact with each other, which helps them in attaining knowledge through a social process. In the modern world, the schools are considered as an essential place for developing the technical knowledge of students by teaching computer science. Computer science is an included as a compulsory subject in the formal curriculum of many countries. As suggested by of Gunter and Gunter (2014), due to continuous advancement in technology, the curriculum of the computer is changing quickly, which has developed challenges for the teachers. Due to these challenges, the teachers will have to apply extra effort with advanced knowledge of technology in order to teach computer science to students (Gunter and Gunter, 2014). At the present time, various students possess extra knowledge of technology, which also develops a challenge for the teachers. In addition to this, teachers may face some other issues while planning different activities for teaching the subject. Per Carey *et al*. (2009), the problems in teaching computer science may arise due to the fact that this subject possesses a broad range of skills and concepts, which require highly effective teachers with excellent skills of developing activities, that facilitates students to practice the concepts of the subject in the classroom (Carey *et al*., 2009).

The Ministry of Education of Saudi Arabia has emphasized on the teaching of computer science from the last three decades. Furthermore, the computer science has been included in the curriculum at different levels in the education. According to Shoult (2006), the Ministry of Saudi Arabia is emphasizing of providing knowledge of computer and technology. Furthermore, the Ministry has made a separate course for computer science in the high schools, as knowledge of the subject would be beneficial for the students. Moreover, the knowledge of computer science will help students in the development of their career in a better way and would help in acquiring various job opportunities (Shoult, 2006). The flipped classroom approach has been proven beneficial in the teaching and learning process(Bishop and Verleger 2013, Al-Zahrani 2015, Hung 2015, Huang and Hong 2016, Graziano and Hall 2017). The approach has been used for teaching various subjects and is the most effective approach for teaching computer science, as it facilitates student to practice the concepts in the classroom. Furthermore, it facilitates students to discuss the concepts with their classmates and teachers in the classroom(Bergmann and Sams 2012, Davies, Dean et al. 2013). Therefore, it is an effective approach for successfully preceding the process of teaching and learning. According to of Keengwe and Jared (2014), the students actively participate in the teaching and learning process that is done through the flipped classroom approach (Keengwe and Jared, 2014). Al-Harbi and Alshumaimeri (2016) stated that the students participate actively in the flipped learning classroom approach rather than the traditional learning approach. In addition to this, the students-teachers and students-students interaction increases due to this approach (Jefferies and Cubric, 2015). The flipped classroom approach helps in developing a supportive classroom environment, which helps in improving the engagement of the students. The experience of the teacher for the flipped classroom approach is entirely different from the traditional approach of teaching. The traditional classroom approach that is the lecture method is quite easy for teachers, as it does not require practical knowledge so this approach is less challenging for them. However, McCallum *et al*. (2015)suggest that, challenges might arise in the flipped classroom approach, as it requires higher skills that are different from the skills required in the lecture method. The skills for the flipped classroom approach includes developing classroom learning activities, preparing a video of content to be taught in the classroom, and actively engaging the students in the learning process (McCallum *et al*., 2015).

In the viewpoint of Brahimi and Sarirete(2015), the teacher faces various difficulties in the flipped classroom approach due to the unavailability of online videos of various content. Furthermore, the workload of teacher increases due to this approach. For instance, if the teacher does not get an online video of any content, they have to develop it on their own (Al-Zahrani, 2015). However, the approach is practical for enhancing the potential of students and increasing the teacher-student interaction. Furthermore, the workload of teacher increases due to this approach. For instance, if the teacher does not get an online video of any content, they have to develop it on their own (Jefferies and Cubric, 2015). However, the approach is useful for enhancing the potential of students and increasing the teacher-student interaction.

RESEARCH METHODOLOGY

Research Methodology explains the key tools, procedures and methods applied in the research, to address the research aims, along with the underlying rationale and assumptions for introducing flipped classroom approach in high schools in Saudi Arabia. In this respect, this research uses mixed method research methodology, which is a systematic integration of the qualitative and quantitative methods for collection and analysis of data within a single research(Creswell 2011). The primary premise of the mixed methods research design is to ensure that such an integration allows for a more profound and systematic utilization of the available data for its analysis in comparison of either qualitative or quantitative methods for data collection and analysis (Edmonds and Kennedy, 2012). Mixed method has been applied in to this research. It would act as a potential

bridge between the paradigm, that is, the implementation of flipped classroom approach in high schools in Saudi Arabia and its impact on the students' learning in the long-run (Sajid *et al.,* 2016).The integration of qualitative and quantitative findings offers an increased support and certainty to the findings of the research, which will help in enhancing the authenticity of the outcomes of this research (Flick, 2011). It helps in drawing from the strengths and minimising the weaknesses of the qualitative and quantitative methods that are used in determining the experience of the students in respect of the flipped method in computer science classes (Remenyi, 2012). The application of mixed methods also allows for a detailed examination of the students' experiences with and perceptions towards flipped method through the use of qualitative methods that are more subjective, along with a critical analysis of the effectiveness of the flipped method through the application of quantitative method, which is more objective in nature. In respect of the mixed methods, this research follows the pragmatic paradigm because it supports the use of mixed methods to address a research problem and simultaneously ensure the independence of the researcher with the research method and tool used to conduct the research (Mitchell and Jolley, 2012). It allows the fusion of the qualitative and quantitative methods and facilitates the using different ways to interpret the research problem from multiple perspectives rather than relying on a single one (Edmonds and Kennedy, 2012).

Data methods and Procedure: In the context of the qualitative method, the research uses interview method to gather data, which is analyzed with the help of thematic analysis while for the quantitative method, survey is undertaken that is analyzed through descriptive and graphical data analysis method. A semi-structured interview is conducted with the 8 students of computer science selected with the help of convenience method to examine the experiences of the students under tradition and flipped methods, whose findings were recorded as audio transcripts and later examined with the help of thematic analysis (King and Horrocks, 2010). The primary objective of conducting a survey was to examine and compare the experiences, participation and quality of learning gained by the students in flipped classrooms. To ensure the collection of relevant data in a systematic and organized manner so that the research question is addressed, a survey questionnaire was developed, whose questions was developed with the help of the literature review (Edmonds and Kennedy, 2012).

The questionnaire consisted of 5 close-ended questions based on Likert scale that aimed at evaluation of the opinions and perspectives of the students regarding their experiences and quality of learning gained in flipped approach. The findings thus obtained from the surveys are quantified and presented in graphical format with the help of MS excel software. The graphs are examined and analyzed with the help of descriptive analysis. This survey was conducted with 35 students from mixed batches of computer science selected with the help of random sampling method. These 35 students formed the part of the group, who were taught under flipped approach and were surveyed for the research. Before conducting the interview and survey, a consent form was mailed to the schools selected for conducting the research to ensure that voluntary participation in the research and familiarize them with the purpose of the research and the participations has a consent form before participate in survey and interview (Flick, 2011).

Analysis: The findings gathered with the help of the survey have been examined and analyzed with the help of graphical and descriptive analysis have been analyzed using Microsoft Excel because it enables a comprehensive analysis and facilitates graphical presentation clearly. The findings of the interview have been undertaken by adopting a thematic analysis approach because it is quite useful in addressing the aim and objectives of this research in a comprehensive manner (Vaismoradi*et al.,* 2016).

Participants: In light of the research topic, its aim, and objectives, it is essential to state that the all participants will be selected from one class. These students would have already studied in a traditional classroom for two weeks, after will they will be introduced to a classroom that works on a flipped classroom approach. The study mentioned here was conducted in High School of industrial city of Jubail, situated in Saudi Arabia. The school is governed under the administration of the Royal Commission of Jubail in the Education Department. Jubail is an industrial city, whereby a large number of inhabitants work in oil factories. On the other hand, the school in the city of Jubail have a system for the management of educational services named as "Marefah". Marefah is a unified electronic system for learning, which is based on the participation of students and self-learning. Marefah has a feature that helps teachers in providing study materials to the students and provides a mode of communication between students and teacher along with many other services. In addition to this, service schools have all kinds of technological equipment like smart boards and computers installed in all the classrooms. Moreover, this school have two computer labs installed with approximately twenty five computers in each lab.

RESULTS AND DISCUSSION

The analysis of findings cab be done under different theme headings discussed as below:

Flipped classrooms are more engaging than traditional classrooms: From the findings of the survey, it has been examined that out of 35 students surveyed for this research, 35% students agreed that flipped classrooms are more engaging than traditional classrooms, 30% students strongly agreed to the statement while 5% of the students stated that they neither agreed nor disagreed with the statement. However, 20% students disagreed with the statement while the remaining 10% strongly disagreed with this statement. This findings highlight the significance of the flipped classrooms in keeping the students more engaged with the subject and discussions during the classes.

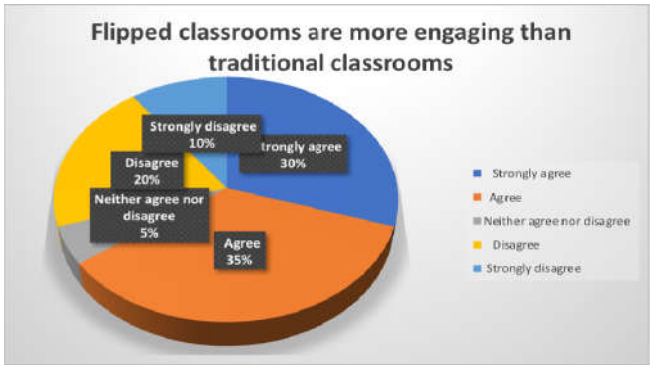

Figure 1. Students engagement

Communication with my classmate and teacher is more in flipped classroom (see Figure 2): Out of 35 students surveyed for the research, it was examined that 30% students agreed that their communication with the teacher and the classmates is more in flipped classrooms, 30% students stated that they strongly agreed to the statement while15% students were neutral in respect of this statement. 10% students were examined to disagree with the statement while the remaining 15% students were examined with strong disagreement. These findings highlight a majority of the students believe that flipped approach help them in increasing their interaction with the classmates and teacher, thereby highlighting a key advantage of this approach in respect of student participation in the classroom.

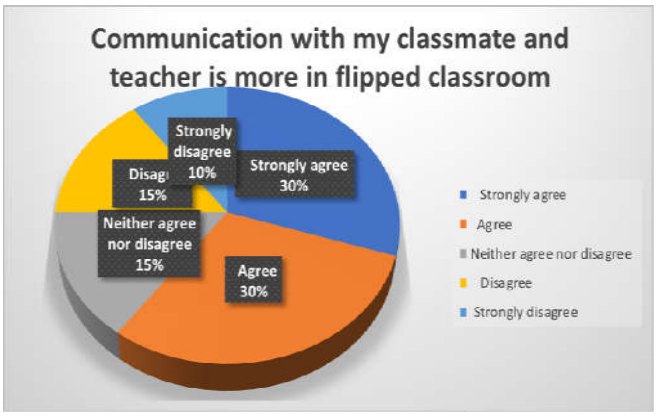

Figure 2. Students participation

Flipped classroom is more helpful for students to learn computer (see Figure 3): 40% of the total surveyed students strongly agreed that flipped classrooms are more helpful for students to learn computer, 50% agreed to the statement while 5% stated that they neither agree nor disagree to the statement. 5% of the students stated that they do not agree that flipped classrooms are more helpful for students to learn computer and there were no students who stated that they strongly disagreed to the statement. The findings thus highlight that almost all the students believed that flipped approach was more effective to study computer in comparison of the traditional approach which also signifies that the former approach is more helpful in improving the quality of learning gained by the students.

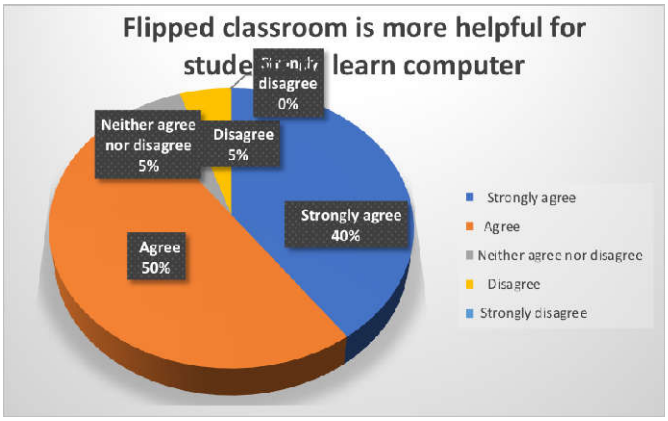

Figure 3. Students perception toward the flipped classroom as a helpful learning approach

Use of videos in the learning process (see Figure 4): From the findings of the survey it has been examined that out of 35 students, 30% students strongly agreed for the use of videos in the learning process, 35% of the students agreed to the use of videos in the learning process while 5% of the students stated that they neither agreed nor disagreed regarding the statement. It was also examined that 20% of the surveyed students disagreed regarding the use of videos for learning process while the remaining 10% of the students strongly disagreed for the statement. These findings highlight that a majority of the students were comfortable regarding the use of multimedia techniques in the learning process to make learning more interactive and interesting under the flipped approach, thereby also breaking the monotony of the traditional learning process.

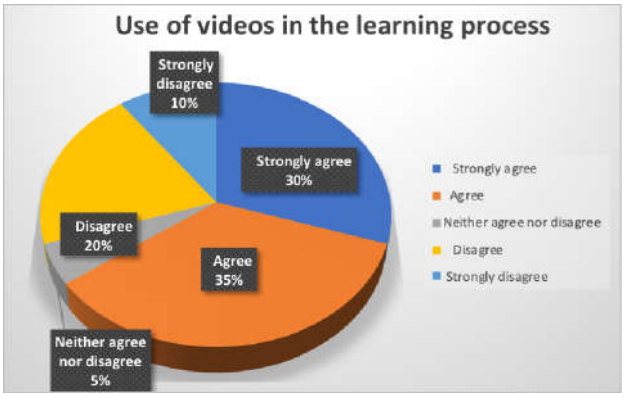

Figure 4. Use of instructional videos

Preference to take tests and quizzes via Moodle to test understanding (see Figure 5): The findings of the survey highlight that 30% of the students agreed that they prefer to take tests and quizzes via Moodle to test their understanding, 30% stated that they strongly agreed to the statement while 10% of the students stated that they neither agreed nor disagreed to the statement. It was also examined that 20% of the stated that they disagreed regarding the preference for the use of tests and quizzes via Moodle to test understanding while the remaining 10% of the students stated that they strongly disagreed regarding the statement. These findings again highlight the convenience and preference of the students to use technology improve the process of learning than being dependent on the traditional methods.

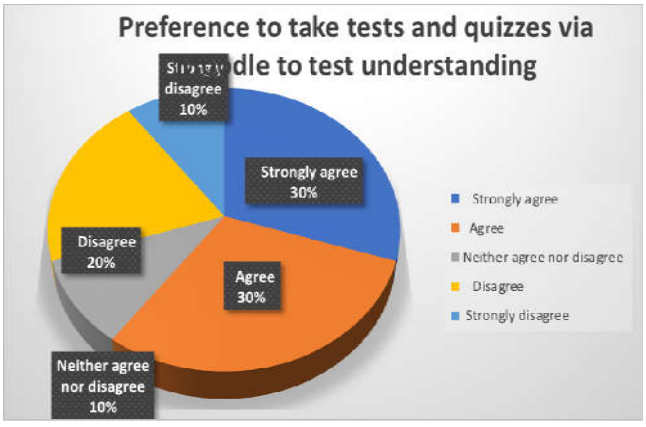

Figure 5. Use of quizzes in flipped classroom design

Role of flipped classroom approach in improving the performance in computer science tests and practical learning (Figure 6): The findings of the survey further highlight that out of the surveyed students, 40% of the students stated that they agreed that flipped classrooms are more helpful in improving the performance in computer science tests and

practical learning, 30% of the students stated that they strongly agreed to the statement while 10% stated that they neither agreed nor disagreed to the statement. 5% of the students stated that they disagreed regarding the role of flipped classrooms in improving the performance in computer science tests and practical learning, however, no students strongly disagreed with the statement. The findings thus clarify that the flipped approach is more effective in improving the quality of learning gained by the students in comparison of the flipped approach.

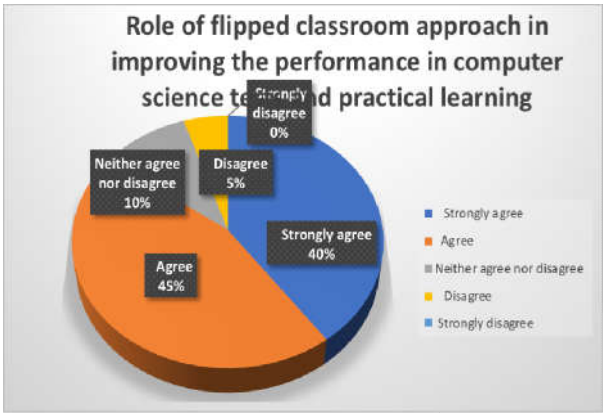

Figure 6. Students performance in flipped learning

Thematic Analysis

Theme 1: Experiences of the students for traditional and flipped classroom: The findings of the interview revealed that the students believe that preparing for the flipped classrooms with the help of videos is an effective and useful method for the students because it serves as an attractive method for them in comparison of the traditional method. In this respect, student 2 stated that, '*I have never prepared for any classroom but in the flipped classroom I did because it is untraditional and novel to watch a video about the lesson …*'. The students further stated that under the flipped classroom approach, the use of video material helps them in preparing and learning the new concepts based on their abilities and level of understanding. Student 4 stated,

'*I like the video, because I can repeat it three or four times until I get the idea. It is not the same as the lecture because the teacher mentions the information only once…*'. Student 6 confirm this opinion and stated, '*I can watch the video many times, and pause, stop the video at any point … That's the best way to learn for me …*'.

On the other hand, the students further stated that under the traditional approach the students find understand the concepts from the books quite difficult to understand. Student 3 stated, '*I tried to prepare before coming to the classroom, but when I opened the book, I struggled with the concepts, such as Core, CPU, RAM … I got fed up and did not continue with it …*'. Johnson (2012) have stated that the students found videos very interactive since they are substantially engaged in video-based and infographic content via their smartphones and other electronic devices. The students are inclined more towards the video content in the flipped classrooms, as it alleviates the process of learning and enable students to comprehensively understand the complex concepts associated with computer via interactive videos integrated with the teachers' detailed explanations.

Theme 2: Student participation in traditional and flipped classroom: The interview findings revealed that the classroom activities as organized under the flipped approach are very useful in increasing their participation and interaction of the students in the class. In this respect, student 4 stated, '*In the classroom, I had the chance to discuss the video content further with other group members…I asked them about the things I could not understand, and then we tried to solve the task…*'. The students also state that this method gives them more opportunities to interact and communicate with the teacher, which removes their hesitation with the teacher and helps them clarify all their doubts in a more appropriate manner. In this context, student 3 state, *'I liked the fact that I could talk to my teacher whenever I wanted to in the classroom … I hope all classes do the same instead of sitting around and listening to the teacher'*. On the other hand, in tradition classroom students' face a major problem in interacting with the teacher as one student 1 reveals, '*There is no interaction with the teacher and I cannot pay too much attention to his explanation or participate during his explanation'*. In this regard, the literature states that the students tend to be more participative in flipped classrooms than in traditional ones. Flipped classroom approach shows higher level of engagement in the classroom and that it provides them higher encouragement to attend the classes (Johnson, 2012; Amresh*et al*., 2013).

Theme 3: Quality of learning gained by the students in a traditional and flipped classroom: The interview findings highlight that according to the students, the use of flipped classroom approach serves to be helpful in equipping them in an appropriate manner to learn about the complicated concepts of computer and acquire high quality learning. This can be clarified with the student 5 opinion, who stated, '*My focus in learning about computer used to be zero but in flipped classroom is increased. I had different learning experience in computer class, I learnt in discussions, arguments, participation with students and conversation with teacher…*'.

On the other hand, the prevailing learning method or the tradition method highlighted the difficulty faced by them while trying to engage with the teacher in the class. In this respect, student 7 stated, '*All teachers come to class and stand in front of us to explain the lesson…Our role is to just listen to them … As a result, I always feel bored and I don't feel I want to learn about all subjects in the same way'*. Students face trouble in understanding the concepts of the computer because the teacher is not able to give their full potential in providing the lessons for the same. They may also be unable to answer the queries of students due to the time restrictions. These findings can be supported with the findings of the literature that highlights that the flipped approach has a positive impact on the performance of the students, as well as, a significant improvement in computing self-efficacy in comparison of the tradition approach (Amresh*et al*., 2013; Blatchford *et al*., 2011).

Conclusion

Based on the findings of the research gathered with the help of interview and survey, it has been examined that flipped classroom approach has a highly positive impact on the preparation of the students before coming for the classes and provides them the motivation to attend the classes. It is examined that in comparison of the tradition classroom approach, flipped approach improves the learning process for the students through the incorporation of participative and

engaging collaborative classroom activities that promote communication and interaction with the classmates and teachers. This helps in improving their learning experience, address their doubts and concepts and their knowledge about the subject. The flipped approach is also examined to be more effective in improving the scores and skills of the students in computer science than the traditional method. Based on these findings it can be concluded that the flipped method has a highly positive impact on the students and further research must be conducted on this topic to promote its application in the high schools in Saudi Arabia.

Implication for future research

The study demonstrates that the flipped classroom technique contributes to a positive influence on teachers and students of high school in the subject of computer science. This study has given some propositions by using the approach of the flipped classroom concept was applied stressfully. It can be referred from the study that the teachers should do hard work to acquire the required skills in order to make videos more instructional and improve their quality. This would ensure that the students are able to connect with the concerned videos and learn from them. The activities performed in the classroom should be in accordance with the students' wish, needs, and the decided curriculum. Moreover, the teacher should be given proper training so that they can make videos of instruction in good quality and give their help to design activities of the classroom. The student should be advised on the working process of the flipped classroom so that they can prepare themselves for the new process of learning. This study should be applied to scientific and non-scientific subjects so that it can check that it can check whether this study applies to both subjects or not. It can be more suitable, if the future studios in cooperates subjects like mathematics, wherein students have to take five classes in a week. This may help in developing a sensibility in students' experiences in the approach of the flipped classroom, which they are subjected to on a daily basis. Furthermore, the studies should evaluate observations for long-term to understand and encourage the students' interaction and participation in the flipped classrooms. The studies should perform to see, which kind of educational activities should be useful in the flipped classrooms for teachers**.** Finally, there is an urgent requirement for further research done in high school in regard to the constricted studies in this stream.

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Appendices 1

Questionnaire

Q1. Flipped classrooms are more engaging than traditional classrooms

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

Q2. I communicate with my classmate and teacher more in flipped classroom

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

Q3. I learn computer better in flipped learning classroom

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

Q4. What is your opinion regarding the use of video in your learning process

(f) Strongly agree
(g) Agree
(h) Neither agree nor disagree
(i) Disagree
(j) Strongly disagree

Q5. I prefer taking tests and quizzes via Moodle to test my understanding

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

Q6. My performance in computer science tests and practical improved since you are involving in Flipped classroom approach?

(a) Strongly agree
(b) Agree
(c) Neither agree nor disagree
(d) Disagree
(e) Strongly disagree

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