Research Article

Medical Students' Perception Regarding Flipped Class in Northern Border University, Saudi Arabia

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Abstract

Background: Flipped classroom is widely used as a learning model in the medical school, which is interactive student-centered strategy. Since flipped classroom is recently applied teaching strategy in our Faculty of Medicine, Northern Border University, the students feedback is crucial for evaluation and further improvement.

Objective: The objective of the present study is to evaluate the perception of medical students regarding flipped classes model through structured questionnaire based on graded five points Likert's scale.

Methods: A structured questionnaire was distributed among the willing medical students of the fourth and fifth years who had completed the diagnostic surgical pathology module with flipped class strategy in the faculty of medicine – Northern Border University Arar – KSA. The questionnaire covered the areas of students' feedback about the course prepared electronic material, the impact of the flipped classroom model in their performance in the course and their general attitude toward the learning model.

Results: A total of seventy-eight students filled the responses which include 36 female students and 42 male students. Most of the medical students were satisfied about the prepared electronic material of the course (3.7/5) mainly for the legibility of the text and fonts in the recorded video and learning material. Also, students were satisfied about the impact of the flipped strategy in their performance (3.8/5) and showed positive attitude toward the flipped class room learning model (3.2/5). Students gender does not show significant effect on the study outcomes.

Conclusion: Based on students' feedback, the flipped class teaching strategy is very good methodology for the learning process. The finding of the present study supports the concept that the active learning techniques are better than the passive learning strategies.

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Introduction

Teaching and learning process have been considered as an integral component of the developmental strategies for the growth of the society since

ancient times. Classes are the corner stone of the teaching-learning process, without fundamental changes.[1] Traditional classes are based on the teacher centered theoretical presentation of the content by the teacher.[2] Among the main limitations of the traditional classes was the student's ability to concentrate and apprehend information decreases after about an hour[3]. Likewise, interaction with the student is very low, which hinders, for example, the questioning of the student, while the expected passivity of the student reduces his/her interest and ability to apprehend knowledge. [3]

Recently, with the great advance in the digital culture among students, the teacher must have in mind the available technological resources in teaching strategies for a better knowledge construction.[4] The development of electronic teaching material could facilitate the learning process in different learning strategies such as flipped class and blended learning.[5] Based on this concept, flipped classroom became widely accepted interactive digital based teaching model.

Flipped classroom teaching strategy was widely assessed in the literature.[6-8] Abeysekera and Dawson (2015) define the flipped classroom as a student-centered learning approach that consists of two components: individual computer-based instruction outside of the classroom and interactive learning activities during the session[9]. It is a learning paradigm where students view videos, listen to podcasts, and read articles to get ready for the lecture[10]. This method seeks to increase the effectiveness of instruction by imparting knowledge to students through conversations, group projects, films, and applications during the course.[11] Additionally, this strategy was thought to promote active learning and allows students to apply their knowledge in a classroom setting under the direction of their teacher.[12] Furthermore, the flipped classroom model is one that teachers employ to offset students' needs by utilizing various tools rather than a predetermined one. The flipped classroom concept was changed to the flipped classroom approach since educators in different nations use flipped classroom in different ways.[13]

There are many advantages of flipped classroom including increased the interactivity period in the class among the learners and the teacher with more interactive discussion which satisfy the students' learning and emotional demands and support the teamwork values.[14] Also, students have more time to access the prepared lecture videos whenever and wherever they want, so they can learn at their own speed. In addition, this strategy was suggested to support the inventive research.[15]

For the assessment of the effectiveness of the teaching techniques, it would be necessary to have the feedback from the students as it would assist in finding the strengths and weakness of the strategy. In the light of feedback, further improvement in the process and its methodology may be made. In the present study, the flipped class teaching strategy had been evaluated in the light of students' feedback regarding its impact on the learning environment and learning process. The main objective of the current study is to find out the perception of learners regarding the learning in the flipped classes.

Methods

The current study was conducted after getting the ethical approval from the local bioethics committee (Reference number 441030271) to find out the perception of learners regarding the learning in the flipped classes in the course of diagnostic surgical pathology which is an elective module delivered to the fourth year medical students and based on flipped classroom learning model for the last two years. The recorded videos of the lectures of diagnostic surgical pathology module have been uploaded on the learning management system of the university and links were provided to the students ahead of the scheduled timetable of the lectures. The students studied the learning content of the lectures at least a day before the scheduled time of class and during the class there was discussion about the learning outcome of the lecture particularly the complex topics of the lectures.

The study was conducted via a structured questionnaire, which had been distributed among the students who were fulfilling the inclusion criteria which were willing medical students in the fourth and fifth years, who had

finished the elective course of diagnostic surgical pathology within the last two years with flapped classroom strategy, irrespective to their grades in the course. All other participants not fulfilling the inclusion criteria were not included in the analyzed collected final data. The questionnaire contains seventeen questions which are related to flipped class. No personal information such as name, identification number, phone number or email address of the participants was collected. The questionnaire was validated via distribution to 10 volunteers to be sure that the questions are clear and the questionnaire can be self-administrated by the target group. Data for validation were not included in the final analyzed data sheets.

A total of 91 medical students completed the module and questionnaire was distributed in the students lecturing halls. Raosoft's sample size calculator was used to calculate the sample size (Raosoft Inc., Seattle, Washington, United States), and 73 individuals were required to reach a 95% confidence interval with a margin of error of 5%. Only participants consented to participate were included in the study after understanding the aim of the study. Confidentiality was kept in all phases of the research project.

Data were collected in excel file (Microsoft office 365 excel file) and checked for fulfilling the study inclusion criteria. Then data were analyzed using GraphPad Prism 5 (GraphPad Software Inc., San Diego, CA, USA) Column statistics and Chi-square test were used for the data analysis. 5% will be taken as a statistical level of significance.

Results

The flipped classes were conducted in the diagnostic surgical pathology module which is an elective module taught in fourth year MBBS. Ninety one students studied this module as elective module during the academic year 2023. The questionnaire was distributed among these students. A total of seventy-eight willing participants filled the responses which include 36 (46.2%) female students and 42 (53.8%) male students. The response rate is 85.7%.

The feedback of the students regrading the quality of the digital material supplied for the course was generally satisfactory (3.7/5) ranging from 3.62-3.74. The lowest satisfaction was to the area about the recorder audio quality while the highest satisfaction was about the legibility of the text and fonts in the recorded video and learning material, which was the main area of the females satisfaction. The contents organization was the most satisfactory for male students enrolled in the study (Table 1).

The feedback of the students regrading the effect of the flipped class room learning model n their performance in the course, data showed that students were generally satisfied (3.8). The lowest satisfaction was to the area about the flipped class rooms were less stressful than the traditional classes (3.55), while the highest

Table 1: *The Analysis of Students' Opinion Regarding the prepared study materials for Flipped Class*

No	Question	Female			Male			Total		
		Mean	Std. Dev.	Std. Error	Mean	Std. Devi.	Std. Error	Mean	Std. Dev.	Std. Error
1.	The recorded video of the lecture contains the sufficient learning material	3.67	1.35	0.23	3.67	1.41	0.22	3.67	1.37	0.16
2.	The presentation of the content of lecture in the recorded video was well organized	3.67	1.35	0.23	3.79	1.32	0.20	3.73	1.33	0.15
3.	The legibility of the text and fonts in the recorded video and learning material was good	3.86	1.42	0.24	3.64	1.32	0.20	3.74	1.36	0.15
4.	The quality of the photographs used in the video was fine	3.67	1.31	0.22	3.62	1.38	0.21	3.64	1.34	0.15
5.	The quality of audio of the recorded video was fine	3.67	1.33	0.22	3.57	1.36	0.21	3.62	1.34	0.15
	Overall satisfaction	3.7			3.7			3.7		

Table 2: *The Analysis of Students' Opinion Regarding the impact of Flipped Class on their performance in the courses*

No	Question	Female			Male			Total		
		Mean	Std. Dev.	Std. Error	Mean	Std. Devi.	Std. Error	Mean	Std. Dev.	Std. Error
1.	Listening to the recorded video of the lecture content was very useful in understanding the topic of subject	4.33	0.89	0.15	3.81	1.29	0.20	4.05	1.15	0.13
2.	Listening to the recorded video a day before the class was very helpful in the discussion during the class	3.92	1.23	0.20	3.69	1.35	0.21	3.79	1.29	0.15
3.	Listening to the recorded video of the lecture was very useful in memorizing the important data about the diseases	4.14	1.17	0.20	3.86	1.32	0.20	3.99	1.25	0.14
4.	It was very convenient to learn the things by listening to the recorded video of the lecture	3.75	1.44	0.24	3.81	1.27	0.20	3.78	1.35	0.15
5.	The provision of recorded video of the lectures some days before the class makes the classroom more interesting for the learning purpose	3.58	1.44	0.24	3.57	1.29	0.20	3.58	1.35	0.15
6.	Flipped classroom teaching strategy would help me in improving my exam scores	3.72	1.52	0.25	3.83	1.38	0.21	3.78	1.44	0.16
7.	Flipped classroom teaching strategy is less stressful for me as compared to traditional lectures	3.36	1.66	0.28	3.71	1.45	0.22	3.55	1.55	0.18
8.	This teaching strategy improved my scientific thinking ability	3.86	1.38	0.23	3.71	1.29	0.20	3.78	1.33	0.15
9.	Flipped class has improved my capability to express my opinion	4.11	1.12	0.19	3.83	1.31	0.20	3.96	1.22	0.14
10.		3.86			3.75			3.8		

Table 3: *The Analysis of Students' attitude toward Flipped Class learning model.*

No	Question	Female			Male			Total		
		Mean	Std. Dev.	Std. Error	Mean	Std. Devi.	Std. Error	Mean	Std. Dev.	Std. Error
1.	I would prefer to have such recorded video of the lectures in the other subjects	3.69	1.45	0.24	4.00	1.23	0.19	3.86	1.34	0.15
2.	How satisfied are you with this flipped class learning	3.42	1.38	0.23	3.71	1.33	0.21	3.58	1.35	0.15
3.		3.5			3.85			3.72		

satisfaction was about the usefulness of the supplied materials to understand the learnt topics (4.05). While the most satisfactory area for enrolled male students was that the recorded videos improved their memorization of the taught contents (Table 2).

Interestingly, the enrolled students showed satisfactory attitude toward the flipped class teaching model (3.72) with higher positive attitude in male (3.85) participants in comparison to the female students (3.5) (Table 3).

Regarding male and female responses, their was no significant difference between the responses frequency distribution in all question except in the question covering the usefulness of the supplied learning material for the class discussions (p=0.042) (Table 4).

Table 4: *Frequency distribution of the participants response to the questionnaire questions and the effect of their gender on their responses*

	Question	Gender	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Chi square X2- *P*
			n	%	n	%	n	%	n	%	n	%	
Section (1): Students' Opinion Regarding the prepared study materials for Flipped Class													
1.	The recorded video of the lecture contains the sufficient learning material	Female	3	8.3	5	13.9	7	19.4	7	19.4	14	38.9	7.236, 4
		Male	5	11.9	2	4.8	14	33.3	2	4.8	19	45.2	0.1239
2.	The presentation of the content of lecture in the recorded video was well organized	Female	4	11.1	2	5.6	10	27.8	6	16.7	14	38.9	3.628, 4
		Male	3	7.1	3	7.1	14	33.3	2	4.8	20	47.6	0.4586
3	The legibility of the text and fonts in the recorded video and learning material was good	Female	4	11.1	3	8.3	5	13.9	6	16.7	18	50.0	6.568, 4
		Male	4	9.5	2	4.8	16	38.1	3	7.1	17	40.5	0.1606
4	The quality of the photographs used in the video was fine	Female	2	5.6	6	16.7	8	22.2	6	16.7	14	38.9	4.770, 4
		Male	4	9.5	4	9.5	14	33.3	2	4.8	18	42.9	0.3118
5	The quality of audio of the recorded video was fine	Female	3	8.3	5	13.9	6	16.7	9	25.0	13	36.1	3.153, 4
		Male	4	9.5	5	11.9	12	28.6	5	11.9	16	38.1	0.5325
Section (2): Students' Opinion Regarding the impact of Flipped Class on their performance in the courses													
1	Listening to the recorded video of the lecture content was very useful in understanding the topic of subject	Female	1	2.8	1	2.8	7	19.4	7	19.4	20	55.6	3.232, 4
		Male	3	7.1	3	7.1	12	28.6	5	11.9	19	45.2	0.5197
2	Listening to the recorded video a day before the class was very helpful in the discussion during the class	Female	1	2.8	5	13.9	7	19.4	6	16.7	17	47.2	9.887, 4
		Male	4	9.5	2	4.8	16	38.1	1	2.4	19	45.2	0.0424
3	Listening to the recorded video of the lecture was very useful in memorizing the important data about the diseases	Female	2	5.6	1	2.8	7	19.4	6	16.7	20	55.6	3.097, 4
		Male	3	7.1	3	7.1	12	28.6	3	7.1	21	50.0	0.5417
4	It was very convenient to learn the things by listening to the recorded video of the lecture	Female	5	13.9	1	2.8	9	25.0	4	11.1	17	47.2	4.649, 4
		Male	2	4.8	4	9.5	14	33.3	2	4.8	20	47.6	0.3253
5	The provision of recorded video of the lectures some days before the class makes the classroom more interesting for the learning purpose	Female	5	13.9	4	11.1	5	13.9	9	25.0	13	36.1	5.732, 4
		Male	3	7.1	5	11.9	14	33.3	5	11.9	15	35.7	0.22
6.	How satisfied are you with this flipped class learning	Female	4	11.1	6	16.7	8	22.2	7	19.4	11	30.6	6.668, 4
		Male	3	7.1	4	9.5	14	33.3	2	4.8	19	45.2	0.1545
7.	Flipped classroom teaching strategy would help me in improving my exam scores	Female	5	13.9	4	11.1	5	13.9	4	11.1	18	50.0	6.108, 4
		Male	4	9.5	2	4.8	13	31.0	1	2.4	22	52.4	0.1912
8	Flipped classroom teaching strategy is less stressful for me as compared to traditional lectures	Female	9	25.0	2	5.6	7	19.4	3	8.3	15	41.7	4.546, 4
		Male	6	14.3	1	2.4	14	33.3	1	2.4	20	47.6	0.3371
9	This teaching strategy improved my scientific thinking ability	Female	4	11.1	2	5.6	6	16.7	7	19.4	17	47.2	2.819, 4
		Male	5	11.9	1	2.4	12	28.6	10	23.8	14	33.3	0.5885
10	Flipped class has improved my capability to express my opinion	Female	1	2.8	3	8.3	5	13.9	9	25.0	18	50.0	5.883, 4
		Male	4	9.5	1	2.4	12	28.6	6	14.3	19	45.2	0.2081
Section (3): Students' attitude toward Flipped Class learning model													
1.	I would prefer to have such recorded video of the lectures in the other subjects	Female	4	11.1	4	11.1	8	22.2	3	8.3	17	47.2	1.721, 4
		Male	2	4.8	3	7.1	10	23.8	5	11.9	22	52.4	0.7868
2.	I like this teaching strategy	Female	7	19.4	2	5.6	7	19.4	6	16.7	14	38.9	2.764, 4
		Male	4	9.5	2	4.8	13	31.0	5	11.9	18	42.9	0.5981

Discussion

The analysis of the students' perception regarding the flipped class revealed that the majority of the medical students liked this teaching strategy as this technique helped them in better understating of the taught subject. The flipped class also facilitated the students in memorizing important information regarding the diseases.

A study conducted in Taiwan revealed that the comprehension level of students was better who were engaged in flipped class teaching.[15] A study published from Jordan which was conducted in the private universities of the country also showed that the flipped class encouraged the students for critical and creative thinking.[16]

A study carried out by Seitz CM & Orsini MM, in which the students expressed their satisfaction on the flipped class teaching[17]. In this study, the students liked the easy availability of video lectures which they could study whenever they want to study at their own pace. And they could also rewind to repeat the learning content. The availability of video lecture before the schedule time of class helped the student to have better preparedness for the upcoming class and they had more interaction with the teachers during the class.[16]

In our study, the significant majority of the students had expressed that the flipped classroom teaching strategy helped them in improving their exam scores. A similar finding has been observed in the study published by Cho HJ et al.[18]

A study published from Spain revealed that majority of the students (81.99%) think that flipped class methodology facilitated the learning process.[19] In the current research project, the majority of the students expressed satisfaction for the flipped class teaching. This finding is in accordance with the observation narrated in a published study by Noroozi A et al.[20] A study conducted by Zhang Y et al revealed that the provision of learning materials such as slides of lectures and videos to the students before the commencement of course generates more students' interest and improves their academic achievements.[21] An advantage of electronic learning is that it provides seamless access to learning resources.[22] According to the results of another Malaysian study, the majority of enrolled students recommended that flipped movies be shorter, more interesting, and placed in an authentic setting. Additionally, they provided evidence that flipped learning had a favorable effect on quiet, reserved students, foreign students who lacked fluency in English, and full-time students who had more time for learning. Part-time students, on the other hand, encountered difficulties with the flipped classroom model because they were pressed for time to engage with the material and prepare for the class.[23]

In another study from Ghana,[24] Students flipped class room model is more beneficial than the traditional model in terms of engagement, usefulness, efficacy, expectations, and satisfaction. Positive learning outcomes from the flipped classroom also included motivation, accomplishment, critical thinking, and cooperative learning. However, a lack of materials to support their learning caused some difficulties for the students when they were learning in the flipped classroom setting. The study adds to the scant body of knowledge already available to stakeholders in developing nations on flipped classrooms.

One of the limitations of flipped class teaching is lack of three-dimensional representation which could be possible in face-to-face classroom teaching.[25] But now with the availability of three-dimensional learning material, it becomes possible to overcome this limitation.

The main limitation of the current study include that it has been conducted in the one module. This could be repeated in the multiple modules and also in different medical colleges which could yield more important information regarding this learning technique. Also the study have the limitation of the questionnaire based studies as response biase, limited information, possible question misinterpretation, and potential for response fatigue. However, Questionnaire are widely used tools for cross sectional data collection with time saving, convenient sampling, easy accessibility, and standardization across studies.[26]

Conclusion

The findings of the present study revealed that the majority of the medical students liked the flipped classroom teaching technique. This learning strategy helped the students in the better comprehension of complex learning topics of the subject. The flipped class made their learning process more convenient for them. The availability of recorded lectures before the commencement of module would provide the students to study the lear-

ning material at their convenience and they may study it anywhere and at any time. Most of the students expressed their opinion that the study of lecture's learning content by watching the recorded video of the lectures some days before the class makes the classroom more interesting for the learning purpose.

Ethical approval: The local committee of Bioethics at Northern Border University, , Kingdom of Saudi Arabia, approved this study vide (Reference number 441030271).

Conflict of Interest: The authors declare no conflict of interest.

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Author Contribution

SSHS: Conception & design, drafting of article, critical review of version to be published

AS: Conception & design, questionnaire preparation, data analysis, drafting of article

EE: Conception & design, data analysis & interpretation, critical review of version to be published

AB: Conception & design, analysis & interpretation, drafting of article

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