

# FROM THE HORSE'S MOUTH: EFFECTIVENESS OF FLIPPED CLASSROOM AS SEEN BY STUDENTS

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## ABSTRACT

*Flipped classroom is an experiential learning based pedagogical technique. In this paper, the authors discuss the theoretical foundations of a flipped classroom approach called Student Centric Flipped Classroom. In this approach, students act as co-creators and develop flipped activities for class to enhance student learning. The paper discusses the usefulness and learning from the approach as seen by students by linking student perceptions to learning styles and learning theories. A Multimethod research design was used whereby data was gathered using both qualitative and quantitative approaches. Data was critically analyzed to understand student perceptions of the approach. Results indicate that students have a mixed feeling about the approach immediately after going through the approach. However, over time, they realize the higher order benefits of the approach in making the concepts more relatable and applicable. It is recommended that future iterations of the approach use both lectures and flip in a balanced way with lectures being used to introduce terminology, and concepts of the course.*

## INTRODUCTION

*Give the pupils something to do, not something to learn; and the doing is of such a nature as to demand thinking; learning naturally results.*

*John Dewey*

This quote clearly explains the role of “hands-on” experience in the student learning process. This quote takes a more critical meaning for learners and educators in business related disciplines as the aim is to train future leaders who can make decisions that are based on sound knowledge learned during their business programs. Deslauriers et. al. (2019) reported a study in Physics where they demonstrated that active learning approaches results in higher **actual** learning in spite of traditional approaches being **perceived** to have resulted in higher learning. If active learning can demonstrate such superior performance among students in a STEM discipline like Physics, then the impact of active learning in a business discipline, where students are expected to be future decision makers, is likely to be meaningful and of immense interest to educators.

Bligh (1998) highlights that other approaches of teaching are at least as effective as lecturing to transmit information. He continues to indicate that lectures are less effective than discussion to promote thought. Lectures are also weak approaches to teach behavior or to change the attitude of students and concludes that lectures are not indispensable. Given the increased pressure from various entities (students, parents, accreditation agencies etc.) to bring about changes to students’ knowledge, skill and attitude through higher education, educators are being forced to look beyond traditional lecture approaches to ensure holistic learning for their learners. In this context, other forms of active learning based pedagogical approaches have been gathering support in the recent years. Flipped classroom is one such pedagogical approach. However, extant research on Flipped classroom and their effectiveness on student learning is limited (Abeysekera & Dawson, 2015).

In an attempt to address this research gap in evaluating student learning through flipped classroom, Kurthakoti (2017, 2019)

discusses a unique model of flipped classroom pedagogy called student centric flipped classroom where students are not mere participants in the flip but take on the role of co-creators for the flip in a classroom. Kurthakoti (2019) compares flipped classroom methodology with traditional lecture based approach in a principles of marketing class and concludes that flipped classroom resulted in higher order learning of students as demonstrated by grades on assignments dealing with integration and application of concepts. This research is an extension of Kurthakoti (2019) whereby the effectiveness of student learning is assessed through student feedback and perceptions.

The remainder of the paper will be organized as follows. First, learning theories that can be used to explain the student centric flipped classroom approach will be reviewed in brief. Second, the methodological approach of the current study to gather and analyze student feedback and perceptions will be discussed. Third, the student feedback and perceptions will be categorized into themes and an attempt would be made to link these perceptions to learning theories and learning styles. Finally, based on analysis of student perceptions and feedback on learning, a set of recommendations for modifying the approach to enhance student learning will be provided.

## REVIEW OF LITERATURE

Flipped classroom is a pedagogical approach where information transmission component (typically a lecture) is moved out of class time. This class time is now replaced with active, collaborative tasks (Abeysekera & Dawson, 2015). Unlike in a traditional classroom, students engaged in a flipped classroom engage with learning resources outside the classroom to cover material that would be covered in a class through traditional lecture. Class time is then effectively utilized to consolidate the learning and apply it to problem solving situations.

Kurthakoti (2019), in his research on the flipped classroom with marketing classes highlights the role of the flip in enhancing student learning as evidenced by grades on various assessments in the course. His version of the flip, called Student Centric Flip is based on Vargo & Lusch (2004) notion that consumer is a co-creator of value, where students get involved in the flipped classroom not as mere participants, but as active co-creators of the flip. Thus, a student centric flipped classroom allows for students to take the lead in developing an activity to be used in the flipped classroom. Students then engage with the activity led by the leading team and strategic intervention by the instructor to clarify concepts and enable smoother application. Students work in small groups on the activity and collectively reflect during debriefing session to make connections between concepts and application. This approach extends, in a more concrete way, Geddes et. al. (2017) notion that every learning activity is essentially co-created.

Various pedagogical and learning theories can be used as lenses to critically examine the flipped classroom (in general) and the student centric flip (in specific) as a pedagogical approach. Some of these theoretical lenses and bases on which the student centric flipped classroom is designed are;

### *Self Determination Theory (SDT)*

Student learning is a complex relation between intellect, ability and motivation. Self SDT (Deci & Ryan, 2008) focuses on the role of motivation in the learning process. As per the theory, learning is dependent on motivation which in turn depends on how well the cognitive needs of competence (mastery of knowledge and skills), autonomy (need for control, independence) and relatedness (social belonging). A flipped classroom is likely to satisfy the needs of autonomy and relatedness as a student centric flipped classroom provides opportunity for students to take a lead in designing and implementing the flip as well as be part of groups in problem solving and active learning through collaboration. SDT also makes a distinction about different types of motivation – intrinsic and extrinsic and how it relates to learning. A student centric flipped classroom is more likely to enhance intrinsic motivation among students by allowing them opportunities for autonomy (through flip design), competence (by allowing for extensive pre flip meetings with student groups to fill conceptual gaps) and relatedness (by making them work in groups that they self-select)

### *Latent Learning Theory*

This theory popularized by Tolman (1948) is based on the principle that learning happens even in the absence of rewards or motivation for the learners. According to Tolman, learning is the potential to perform and the actual performance is a manifestation of learning. The learning does not automatically manifest as a response to a stimulus but needs external circumstances that provide necessary motivation to manifest the learning in the form of behavior. The learning is not reflected in the learners' behavior at the time of learning, but becomes apparent when the need for application of the learning arises. Applying the latent learning theory to the student centric flipped classroom, students are expected to learn (concepts, definitions etc.) outside of the class. Any learning at this stage, combined with students' prior experiences, leads to the development of cognitive maps for the learner. During class time when the class is flipped, the circumstance (where students are required to work in groups to solve problems or answer questions) provides the necessary motivation for learning to manifest and result in a changed behavior for the participants. The new experience then helps reinforce or revise the cognitive maps built around the topic. These cognitive maps are then likely to be applied later when needed (e.g. during an internship or during a job). This latent learning is likely to also happen for the leaders who are responsible to flip the classroom. This responsibility gives the leaders the necessary motivation to develop and execute and activity for the class which is the behavioral manifestation of learning for the leaders.

## ***Zone of Proximal Development Theory***

Lev Vygotsky (1896-1934) developed a theory on how learning occurs. This theory called as Zone of Proximal Development (ZPD) has been used as a theoretical basis to explain the notion of cooperative learning (Dolittle, 1997). According to this theory, learning happens through internalization. Internalization begins with the learner experiencing an idea or a behavior in a social context by interacting with more knowledgeable others. This experience is then actively processed and modified (based on previous experiences) by the learner before integrating into their way of thinking resulting the learning being internalized. A student centric flipped classroom, thus fits into this notion of learning for students. The instructor who acts as the strategic facilitator of the flip, and the leaders who implement a flip take on the role of more knowledgeable others. When the flip is implemented in the classroom setting, students get an experience of the concept in a social setting as they are required to address the activity as small social groups. Thus collaborative learning occurs through socialization and interaction with more knowledgeable others. During the debriefing process, students are encouraged to openly discuss their thought process and rationale for various decisions they made during the activity. This debriefing process helps in active processing of the information by comparing with their past experiences and finally resulting in internalization of the information learned during the flip.

## **Experiential Learning Theory**

Experiential learning focuses on the process of grasping and transforming experiences to form knowledge. The theory as proposed by Kolb (1984) and further described in Kolb & Kolb (2005) envisions learning as a process involving four-stages - Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation. This four step process can be seen as encompassing two dimensions. The first dimension covers prehension which involves conceptualization and experience stages. The second dimension covers transformation which involves experimentation and reflection stages. Learning occurs and knowledge is created when prehension knowledge is transformed through meaningful experience. In a student centric flipped classroom setting, students leading the flip must first conceptualize the concepts relevant for the flip and then utilize said concepts to develop an experience for their topic, providing prehension knowledge. During the implementation of the flip, students test their (and the participants') understanding of the concepts and reflect on this experimentation through the process of debriefing, leading to the transformation of knowledge.

From the above discussion, it is clear that the student centric flip pedagogical approach is well grounded within the learning theories and achieving learning outcomes for the students' success is the primary goal of the pedagogical approach. However, as Lee Atwater said, Perception *is* reality. So it is not only important that the pedagogical approach be designed on sound principles aimed at effective student learning, but should also be perceived by the students that the pedagogical approach is valuable and leads to effective learning. The following sections will address the perceptions of students on the flipped classroom pedagogical approach and the learning through the approach.

## **METHODOLOGY AND DATA ANALYSIS**

To address student perceptions of the pedagogy and its effectiveness in achieving student learning, a multi method approach was adopted to gather and analyze data. Both quantitative and qualitative data were assessed to gather student perceptions and opinions about the pedagogy and the resulting learning from it. This section will describe the methodology adopted for each of the data collection approaches.

### **Qualitative data**

The first three authors are undergraduate students and have all undergone a course taught using the student centric flipped classroom approach. Thus there was a rich repository of perceptions about the approach and its effectiveness within the authors themselves. This information was critically examined by the authors through a self-reflection process guided by a set of probing questions. However, all the student authors had experienced the flipped classroom at the same time (Fall 2018). To address any possible bias resulting from this situation during self-reflection, the authors also decided to conduct semi-structured interviews with other students who had undergone the student centric flipped classroom approach at different points in time to get a broader set of perceptions related to the pedagogical approach. Interviews were conducted in a face to face situation and all interviews were recorded. Interviews were guided by the same set of questions that were used for the self-reflection process. (See Appendix A for the set of questions used)

### **Quantitative data**

Quantitative data was collected through two approaches from students underwent the student centric flipped classroom approach during Fall 2019 semester. First, after each student centric flip module, students were polled by the instructor to gauge their perceptions about the flip activity and its effect on learning. These were single item questions that were rated on a 5 point scale and assessed the extent to which the flip was creative, enjoyable, valuable and how well leaders led the flip. The intention was to identify areas for improvement of leaders (as seen by class participants) that could be provided as feedback for personal development. This data was made available by the instructor across all 6 flip modules for both sections of the class that went through the student centric flipped classroom in Fall 2019. Second, once all the flip modules were completed, the student authors administered a survey that sought student perceptions about the pedagogy and the resulting learning they achieved. Questions about the students' preferred style of learning was also used in the survey. Data from the survey and student poll were analyzed using mean tests, correlations and

ANOVA to understand the student perceptions about the pedagogy and its relation with learning styles. We will next discuss the findings from the qualitative and quantitative data analysis.

## RESULTS AND DISCUSSION

### Student Feedback immediately after each flip

Overall average for each of the polled question was computed across all six modules and the results are presented in Table 1. Table 1 also presents results of a one sample t-test where each of the means was tested against 3 (Neither agree/nor disagree).

**TABLE 1**  
Overall averages for feedback on flip (N=154), tested against Neutral rating (3.0)

Question	Mean	Std. Deviation	Std. Error Mean	t	Df	Sig
Flip was Creative	4.16	0.736	0.059	19.591	153	0.000
Flip was Enjoyable	4.34	0.820	0.066	20.354	153	0.000
Flip was Valuable	4.27	0.803	0.065	19.680	153	0.000
Flip Leaders did a good job in leading the flip	4.21	0.781	0.063	19.188	153	0.000

As one can see from the above, for each of the questions, related to the flip, students rated it positively. Especially important is the value of the flip and learning from it. The overall average was 4.27 and was significantly different from a neutral value of 3.

Comparing means across topics reveals interesting findings. As one can see from Table 2, students found significant differences between topics in terms of how creative or enjoyable the student centric flip activity was. However, students did not find any significant differences between the value and learning from the flip or the quality of leading done by the leaders.

**TABLE 2**  
ANOVA comparing means across topics for flipped classroom

Question		Sum of Squares	df	Mean Square	F	Sig.
Creative	Between Groups	14.558	5	2.912	6.301	0.000
	Within Groups	68.384	148	0.462		
	Total	82.942	153			
Enjoyable	Between Groups	10.526	5	2.105	3.378	0.006
	Within Groups	92.234	148	0.623		
	Total	102.760	153			
Valuable	Between Groups	4.338	5	0.868	1.363	0.242
	Within Groups	94.208	148	0.637		
	Total	98.545	153			
Leader	Between Groups	0.529	5	0.106	0.169	0.974
	Within Groups	92.822	148	0.627		
	Total	93.351	153			

For creativity, students found promotions/products to be the most creative modules and pricing /consumer behavior to be the least creative. This is understandable as Consumer behavior was the first student centric flip module and students were still early in their learning curve on leading a flipped module for the class. Pricing as a topic had numerous concepts (mostly quantitative) that could have probably restricted the extent to which one could get creative while also achieving learning outcomes. Similarly, students found channels/pricing to be least enjoyable flips whereas products/segmentation/promotions were more enjoyable.

### Survey on learning from the flip and student learning styles

Viewing the data collected from the survey, it was found that the majority of students perceived the flip classroom approach

with an overall negative sentiment. This is particularly noted when presented with the notion that “the flipped classroom approach enhanced my learning experience,” which acquired an overall average score of 2.79 out of 5. However, this mean was not statistically different from a neutral value of 3.0. Similar, generally negative sentiment is seen in multiple analogous questions all of which result in similar dispositions. Lowest score was recorded for the item “The flipped classroom approach clarified any confusion I had about the concepts” with a score of 2.52 and was significantly different from a neutral value of 3.0 indicating that students did disagree with that question. Students agreed that the pedagogy provided a conducive environment to express their thoughts and opinions freely as well encouraged them to participate in the class. It is interesting to note that these results contrast significantly from the poll results obtained immediately after every flip activity.

In addition to comparing the students opinion about the flip, the survey also assessed how students perceived their own learning styles. These questions were presented on a sliding scale from 1 to 5 to portray their feelings towards certain aspects that were pertinent for the flipped classroom approach. Means of the various learning styles are presented in Table 3. The 8 items related to the flipped classroom were combined to create a summated scale (Cronbach  $\alpha$ = 0.884) and the mean of the summated scale is also included in Table 3.

**TABLE 3**  
**Mean responses relating to learning styles and opinion about flipped classroom (N=31)**

	Mean	Std. Deviation	% rating 4 or more
LS Example	4.06	0.772	81.80
LS Talking through	4.19	0.749	87.50
LS Reading <sup>#</sup>	2.77	1.117	30.30
LS Writing	3.87	1.024	69.70
LS See patterns	3.68	0.945	57.50
LS Teaching	3.55	1.060	57.60
LS Observing <sup>#</sup>	2.87	1.204	33.30
LS Group <sup>#</sup>	3.26	1.064	43.80
LS Alone	3.68	0.945	63.70
LS Lectures	3.97	0.706	75.80
Flipped Classroom (Average of 8 items) <sup>#</sup>	3.12	0.760	06.00

**Note:** # denotes those variables whose mean was not found to be significantly different from 3.0 (Neutral). All other items were significantly different from 3.0

When comparing survey results from students, Table 3 shows that students saw learning through examples, learning through talking about concepts, learning through patterns, and learning through teaching as positive methods of learning. However, these aspects are germane to the flipped approach, which students perceived as a relatively neutral experience. An essential element of student centric flipped classrooms was that students were required to complete readings before class sessions; however, students that prefer learning through readings had a weaker correlation with the flipped classroom ( $r=-0.071$ , NS). Students that prefer learning through lectures have a strong negative correlation with learning in a flipped classroom, which is expected because the student centric flipped classrooms does not involve lectures in the traditional format.

### Overall Discussion

When the quantitative results are combined with the findings of self-reflection and personal interviews, one can begin to understand many of the apparent differences and contrasting results of the quantitative data.

Self-reflection and student interviews indicated that students are acclimatized to learn in lecture-based, small interpersonal classrooms before entering the flipped classroom. These (traditional) classrooms allow professors to introduce new topics then reinforce the material through examples and assigning readings, creating a cognitive map of topics for students. Learning approaches in a traditional classroom are memorization, readings, and practice problems. A mixture of these three approaches is used by students for subjects that range widely in the nature of content (from language to math). Students have probably undergone a similar approach to learning most of their lives as a learner making the transition harder.

For a subject like marketing, both knowledge and application of concepts are crucial. While students recognized their understanding of marketing concepts and its application was greater after participating in the flipped classroom, it was not

immediately evident and some still preferred traditional classrooms. This could be because of the demands of the pedagogy on student learners. In the flipped classroom, students need to have higher intrinsic motivation to learn new topics and reflect upon previous experience while keeping concepts in mind. The instructor's guidance and point-of-views were not given until the end of a lesson, creating frustration for some students used to a more traditional approach of learning through instruction. Without the initial input of the instructor through didactic instruction, students were forced to formulate their own understanding of a concept by relying on previous experience and readings. However, the instructor's input at the end of the lecture helped clear any misunderstandings that students may have and enhance their perception of concepts. But in some cases this might have been too late affecting students' motivation to learn the concepts and could be a reason why we see a low score for this item in the survey.

Inclination towards traditional classrooms is due to reliable study techniques that have been perfected over the years to succeed in such a traditional learning environment. Students who learn through examples, discussing concepts and patterns, and teaching others should have experienced flipped in a positive light as the student centric flipped class provides all these opportunities to learn. However, preference towards the flipped classroom is lower than expected. One possible reason for this could be due to naming the classroom as flipped. Using this new terminology as a pedagogical approach could send a signal of *change* to the students who, given their busy work/class schedule get anxious about adjusting to a change to do well in the course. Those who do additional research about flipped classroom, are likely to find that they would have to rely on themselves to learn new topics, from the beginning of the course. The name is also likely to discourage students who might be having lower intrinsic motivation and instead depend on instructors' viewpoints to help memorize and succeed in the course.

Students that prefer learning through reading may have not learned through the flipped classroom due to a lack of in-depth discussion and instructor's views that reinforces the concepts in reading and aids in memorization. Quizzes, an extrinsic motivation, on reading materials were given before each topic in order to ensure that students were reading and understanding the material, but did not emphasize material enough and became predictable which might have reduced the extent of motivation to read before classes.

Success of the flipped classroom approach rests on the expectation that students would read the materials related to topics before hand and use the class time to clarify any confusions related to concepts by bringing out their concerns for class discussion. When the students' engagement with class materials on LMS was analyzed, it was found that, students that earned a higher grade had a higher average time per week participating in engaging with the course material outside of class than those students that earned lower grades. While the participation times of students varied dramatically in both groups, those with higher grades engaged with the class materials almost every week. Those with lower grades showed a more sporadic engagement pattern when it came to weekly use of out of class materials and their engagement seemed to spike more just before the dates of the test. This further supports the findings from qualitative study where preference was expressed for traditional pedagogies which mostly tend to rely more on tests to assess learning.

Further, from table 3, it appears that most students prefer to learn by talking things through, using examples, or through lectures. From a VARK perspective, this means students in the sample preferred Mostly Auditory (Lectures, talking things through) and Kinesthetic (examples and application). As discussed before, the theoretical basis of the student centric flipped classroom provides opportunities to talk things through with an expert (flip leader – ZPD theory) as well as do hands on activities (through the flip activity - Kolb's experiential learning model) providing ample opportunities for the students to learn in their preferred styles.

However, when the favorability toward the flipped classroom is viewed, we see that only a tiny fraction of the participants found the flipped classroom to be very effective in their learning process. This finding thus adds to the literature that raises a lot of questions on the validity of learning styles and their relevance in higher education. As Kirschner (2017) points out, learning preference is not the same as learning style and learning preference does not necessarily lead to effective learning. This is supported by Kurthakoti (2019) who found that students going through the flipped classroom demonstrated more effective learning as evidenced by course grades compared to a more traditional approach that is conducive to the stated learning style preferences of the group. Husmann & O'Loughlin (2019) provide additional support by demonstrating that there was no correlation between perceived learning styles and study strategies or course outcomes.

Additionally, learning styles, if valid and reliable, should put students into distinct clusters based on the style that leads to the most effective learning for those individuals (Kirschner, 2017). As one can see from Table 3, that is not the case and it appears that our sample prefers a multi-modal learning which further supports preference for a style of learning rather than a style for effective learning.

## **RECOMMENDATIONS AND CONCLUSION**

The value of experiential learning through flipped classroom is not immediately apparent as it is such a new concept for students. Given all the information to grasp topics freely with little advice was met with positive reactions from students. It is therefore recommended that some lecture-based learning should be included in order to ease into the flip, especially to introduce and clarify concepts which could then be leveraged in the flip to enhance higher order learning. Learning from experimentation was seen as overall beneficial, but students do add that some lecture based knowledge to start would be helpful. The current approach in the student centric flip of having recorded online lectures is a good start, but may not be enough.

Based on our discussions with respondents, it is suggested that having formal lectures (even if they are brief and not as elaborate as the online lectures), might help alleviate the anxiety of not having any lectures in the class and also increase motivation

to learn through the flip. Lectures could be compressed and delivered within the initial weeks of the semester to allow for smooth transition into the student centric flip. This is likely to also help bring the entire class on the same level in terms of knowledge and comprehension and allowing for better higher order learning.

As seen from Table 3, there seems to be a disconnect between the preferred learning styles of students and their attitude about the student centric flip methodology. Although student centric flip incorporates the same components that is preferred by many students to learn, the pedagogy is still not perceived positively. Spending significant time at the beginning of the semester to describe and make clear connections between the aspects of flip and what learning styles it assists could be a possible way to bridge this gap. Instructors should therefore make it very clear to the students as to how the flip is likely to enhance and aid in their learning and what learning styles are conducive to obtain maximum value from the class.

In conclusion, this study aimed to further the findings of Kurthakoti (2019) by providing a student perspective on learning from a student centric flipped classroom. The objective was to be able to see if the theoretical basis of the flipped classroom aligns with student learning styles to make effective learning happen. Based on quantitative and qualitative research design, it was found that students who go through the student centric flipped classroom do not view the approach favorably immediately after the course in spite of the pedagogy providing opportunities to learn using the stated learning style preferences. However, in retrospect, students do find value in the flipped classroom approach. Drastic change from acclimatized pedagogies, and anxiety related to new concepts in a new course were identified as possible reasons for the initial lower reception for the pedagogy. It is therefore recommended that a balanced combination of lectures and flip be used to gain student buy-in for the approach. Lectures are likely to be more beneficial in the early phases of the course to introduce concepts and ease the students into the flipped pedagogy.

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## APPENDIX A

### Questions Used for Personal Reflection and Semi Structured Interview

The following list of questions were used as a guide by the student researcher while interviewing and gathering data for this research project. Some questions were also used as students were engaged in self-reflection.

#### Introductory Questions

1. How do you feel about learning at Arcadia? Do you think you are learning and gaining more knowledge about your major?
2. What makes you believe that you are learning here at Arcadia?

#### Learning/pedagogy related

1. How do you typically understand and learn new information on a subject or topic?
2. Do you follow the same approach to learn new information in any subject or topic? Do you use different strategies to gain an understanding of different topics (ex. Quant vs language heavy topics)?
3. For a discipline like marketing that is more action oriented, what approach do you find very beneficial to gain an understanding of the topic.
4. In what way did the flipped class in marketing help or hinder your learning process? What suggestions do you have for course design to ensure improved learning for students.
5. Do you think your suggestions will be equally effective for all students? What type of students will benefit from your suggestions and what type of students will not?

## APPENDIX B

### Survey Questions to Assess Student Opinion about Flipped Classroom and their Own Preferred Learning Style

All questions were rated on a 5 point scale with higher number indicating higher degree of agreement (1= Strongly Disagree; 3= Neither Agree, Nor Disagree and 5 = Strongly Agree)

#### Questions related to opinion about Flipped Classroom

1. The flipped classroom approach increased my enthusiasm for the course
2. The flipped classroom approach enhanced my learning experience
3. The flipped classroom approach helped me better understand the concepts such that I could explain them to others
4. The flipped classroom approach clarified any confusion I had about the concepts
5. The flipped classroom approach provided a conducive environment to freely express my thoughts and opinions
6. The flipped classroom approach encouraged me to participate in class
7. The flipped classroom approach made me feel empowered in this course
8. I had a positive experience in this course

#### Questions related to learning style

1. I prefer to learn using examples and applications
2. I prefer to learn by talking things through
3. I prefer to learn by reading
4. I prefer to learn by writing things down
5. I prefer to learn by seeing patterns in things
6. I prefer to learn by observing others
7. I prefer to learn by teaching others
8. I prefer to learn by working in a group setting
9. I prefer to learn by working alone
10. I prefer to learn by listening to traditional lectures