

# Using Flipped Classroom Model: Factors Influencing Students' Satisfaction

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## ABSTRACT

The traditional lecture-based method has been used in universities, colleges, and schools to assimilate the knowledge. A modern method of teaching is needed to overcome the limitations and challenges of the traditional lecture-based method, to improve students' satisfaction and to increase learning outcomes. Among the modern methods of teaching, a flipped classroom (FC) model has recently been implemented as an alternative method of teaching. To explore students' satisfaction in a flipped classroom model, a quantitative approach with a questionnaire as an instrument was used for data collection from an accessible sample size of 110 students. The results from a Partial Least Square Structural Equation Modelling (PLS-SEM) indicated that perceived value has positively influenced students' satisfaction. However, the results further revealed that instructor-generated video content, perceived usefulness, and perceived ease of use were found to have no positive influence on students' satisfaction. The study makes some recommendations that aid in the design and implementation of the FC model. It also offers additional information for those who wish to adopt the FC model in their institutions.

**Keywords:** flipped classroom model, flipped learning, instructor-generated video content, perceived usefulness, perceived ease of use, perceived value, higher education

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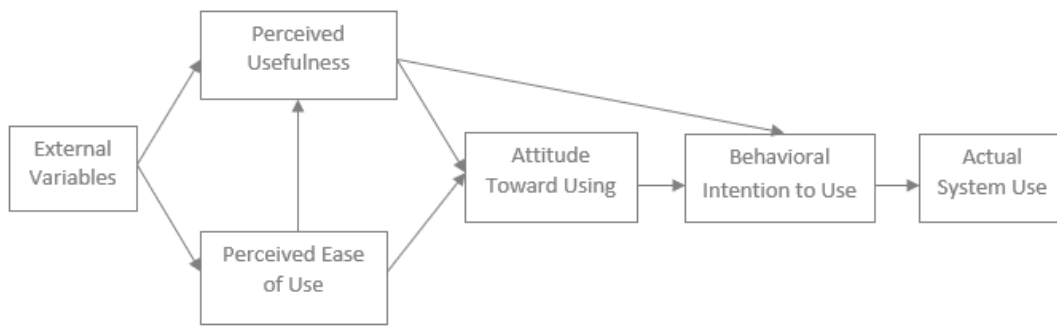
## INTRODUCTION

Contemporary learning approaches in higher institutions such as e-learning, blended learning, and flipped classroom have been continually advancing by the increased availability of the Internet, video technology, and computer-based learning. Among the new methods, flipped classroom model has emerged as one of the influential models (Lai & Hwang, 2016); improving students' learning outcomes (Wen, Zaid, & Harun, 2017). Flipped classroom (FC) model is a pedagogy in which the lecture materials are being given to the students before class time while classroom time is used for discussion, problem-solving, assessment, individual learning, and presentation (O'Flaherty & Phillips, 2015). In the FC model the role of the teacher includes preparing recorded lecture materials, guiding, facilitation, supporting, giving feedback, and evaluating the learning process (Lizhu et al., 2018) and provide a conducive environment for individualized learning (Lai, 2015). The student's role in FC model is to watch pre-recorded video content, complete learning activities and participate actively in the online discussion before the class hour. During classroom time the students should be active constructors of knowledge (Bergmann & Sams, 2012; Elian & Hamaidi, 2018).

The objective of the FC model is to overcome the challenges and limitations of traditional teaching methods by ensuring students learn

at their own pace and making learning interactive, flexible, and collaborative (Yilmaz, 2017). The model allows students to review recorded lectures repeatedly (Heijstra & Sigurðardóttir, 2018), supports student-centered learning (Kim et al., 2014), encourages active learning, and offers adequate time for students to collaborate and work with peers in the classroom (Ozdamli & Asiksoy, 2016; Toto & Nguyen, 2009).

There are studies reported multiple advantages of FC model, some studies disclosed the limitations and challenges of the FC model. For example, FC model requires a monetary investment and time to develop flipped classroom courses (Wu, Hsieh, & Yang, 2017). FC model could not be suitable for students with low self-directed learning skills and poor self-regulated learning behavior (Lai & Hwang, 2016), inability of the students to complete their pre-class learning activities ahead of the class (Lo, Lie, & Hew, 2018; Manoj, Renumol, & Murthy, 2019; Zainuddin et al., 2019). These issues raise a serious concern over the students' satisfaction in the FC model (Bishop & Verleger, 2013; Zhai et al., 2017). The problem of inadequate literature on the relationship between technological and social factors with students' satisfaction in the FC model has not been well explored (Zhai et al., 2017). Therefore, this study covers the existing gap by exploring students' satisfaction in the FC model.



**Figure 1.** Technology Acceptance Model (TAM)

This study investigates the influence of perceived usefulness and perceived ease of use, perceived value, on students' satisfaction. In achieving this, Perceived usefulness was adopted from the technology acceptance model (TAM). It reflects the extent to which students believed that using FC strategy enhanced their academic achievements (Zhai et al., 2017). Perceived ease of use was adopted from TAM, of which it refers to as the degree to which students are convinced that the FC model is easy and effortless to adopt (Zhai et al., 2017). Perceived value is the students' evaluation of the importance of an FC model and its ability to meet the needs and expectations, particularly when compared with traditional methods (Al-Debei & Al-Lozi, 2014). Instructor-generated video contents are learning materials prepared by the instructor in video format for students to study while at home.

This research examines four research questions as stated below:

1. What is the influence of instructor-generated video content on student's satisfaction in flipped classroom model?
2. What is the influence of perceived usefulness on student's satisfaction in flipped classroom model?
3. What is the influence of perceived ease of use on student's satisfaction in flipped classroom model?
4. What is the influence of perceived value on student's satisfaction in flipped classroom model?

The answer to these questions is important because it helps in the design, implementation, and assessment of the FC model. The answer could also be used to explain what factor is the most needed for students' satisfaction particularly in FC model.

## THEORETICAL BACKGROUND

The theoretical background gives an overview of the theories used in the study. It comprises the models that form the foundation, and justifications for the research questions and hypotheses.

### Technology Acceptance Model (TAM)

The model argues that when students are presented with an innovation, several elements influence their decisions about when and how they will use it. TAM (1989) is a well-known information technology theory for evaluating individual's acceptance of technology and use of emerging technologies (Portz et al., 2019) and has been widely utilized to investigate students' satisfaction in the multimedia learning environment (Al-hawari & Mouakket, 2010). The TAM proposes that perceived usefulness and perceived ease are the main elements used in determining students' attitude, while attitude is the

main factor for determining behavioral intention and behavioral intention influences usage (see Figure 1).

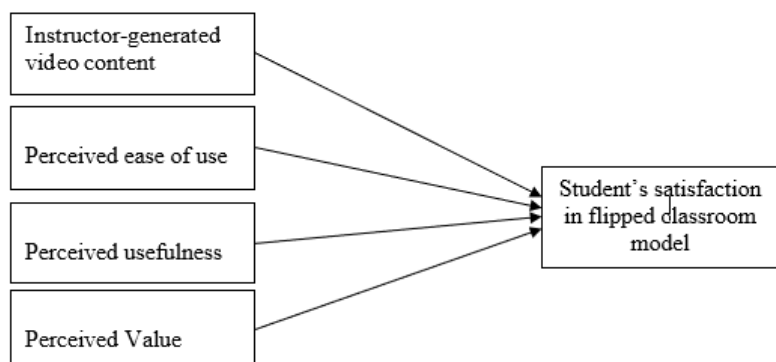
This model has been modified to fit different studies. The modification of the model was mostly the removal or addition of constructs and in some cases the addition of mediators or moderators. However, the model has limitations identified in the previous studies such as TAM's inability of recognizing other issues. For instance, structural imperatives and cost that push students to adopt and utilize an innovation. Despite the limitations, many studies (Rahman et al., 2015; Zhai et al., 2017) used the TAM to examine students' satisfaction when implementing new instructional technologies. Because of the TAM's simplicity and implication, this study adopts it to achieve the stated objectives.

### Flipped Classroom (FC) Model

FC model is a modern method of teaching and learning in which the lectures are being delivered ahead of class time via asynchronous online video content and employs a group-based learning approach in the classroom (Bishop & Verleger, 2013). This method has been recommended as the effective modern pedagogy that develops learning experience for both instructors and learners in the twenty-first century (Lai, 2015). It is rapidly adopted and implemented in different categories of education (Missildine et al., 2013). Research suggested that the FC model is flexible and offers different learning styles, allows teachers to create a learning space in which the students can select where, when, and how to learn (Ahuja, 2020). Previously, flipped learning network study reported that students were better-off with flipped classroom mode than the traditional lecture-based method (Sams et al., 2014). Another study revealed that the FC model increased teacher-student interaction and improved class attendance and student mastery (Cheng et al., 2017). Although previous studies explained that students had a positive perception and attitude toward flipped classrooms than traditional instruction (Onojah et al., 2019), the literature for students' satisfaction in FC model is scant. Most of the studies focused on the effectiveness and efficacy of the FC model with less effort on investigating the cause of students' satisfaction in FC model.

### Students' Satisfaction and FC Model

Satisfaction is the extent to which an individual satisfies that a specific service is reliable (Ong, Day, & Hsu, 2009). Satisfaction plays a significant role in deciding whether the user continues to use the system or not (Tarafdar, Tu, & Ragu-Nathan, 2010). Users' satisfaction with the FC approach is an important measure that reflects the success of this approach in serving students. The factors affecting users' satisfaction



**Figure 2.** Conceptual model of the study

had long been explored in the field of blended learning and e-learning (Chen & Tat Yao, 2016; Hammouri & Abu-Shanab, 2018; Ibrahim et al., 2019; Mtebe & Raphael, 2018; Nortvig, Petersen, & Balle, 2018). These studies argued that students' satisfaction would increase system usage, improve system acceptance and adoption. Therefore, the study of students' satisfaction may provide more insights concerning flipped learning strategies.

## FACTORS AND STUDENTS' SATISFACTION IN FC CONTEXT

There is a need to explore the best factors relating to the student's satisfaction in the FC model. The factors selected for investigation are instructor-generated video content, perceived usefulness, perceived ease of use, and perceived value.

**Figure 2** is a conceptual model of the research which shows the direct relationship between independent variables and dependent variable.

### Instructor-Generated Video Content and Students' Satisfaction

Most of the studies (Murillo-Zamorano, López Sánchez, & Godoy-Caballero, 2019; Yilmaz, 2017; Zhai et al., 2017) evaluate the relationship between factors (such as e-learning readiness, perceived quality, perceived value, knowledge, and skills) and students' satisfaction. Little or no research investigates the influence of instructor-generated video content on students' satisfaction in the FC environment. Instructor-generated video lectures are lecture materials that the teacher or instructor prepares in a video format for students to watch and learn before the class hour. The video helps the students to acquire basic knowledge and engages them during pre-class learning activities (D'Aquila, Wang, & Mattia, 2019). Nevertheless, many teachers believed that third-party recorded video lectures adopted either from YouTube, Vimeo, or Khan Academy are also sources of learning content for the FC (Panopto, 2015).

A study investigated the effect of instructor-generated video content on students' satisfaction. Results showed that students were more satisfied with instructor-generated video content than the third-party video content (Draus et al., 2014). The results further revealed instructor-generated video content was among the critical elements that had significantly influenced students' satisfaction in online courses. Another study was carried out to assess the influence of instructor-generated video on students' satisfaction in an undergraduate Accountancy course. The findings showed that instructor-generated

video techniques had a strong significant influence on students' satisfaction (Yusuf & Prasad, 2017). To address the issue of lack of social presence in online teaching and learning; Miller and Redman (2010) used self-recorded videos to teach online astronomy courses in a University. Results showed that self-recorded videos had proven to increase students' satisfaction, performance, and perception. There is a research reported that instructor-generated video content motivates and engages the students to watch video content during pre-class activities (Panopto, 2015) more than the unverified third-party video content in online learning. This makes the use of instructor-generated video content within online education a vital factor to study (Revere & Kovach, 2011; Robinson & Stubberud, 2012). Based on the literature, the researchers formulated the following hypothesis:

**Hypothesis 1:** Instructor-generated video has positively influenced students' satisfaction.

### Perceived Usefulness and Students' Satisfaction

Perceived usefulness (PU) is one of the key constructs of the technology acceptance model (TAM) and has been regarded as the crucial factor for predicting students' satisfaction in an online and blended learning environment. It is defined as the extent to which an individual believes that technology will improve his or her job performance and satisfaction (Davis, 1989). According to Hammouri and Abu-Shanab (2018), perceived usefulness can be described as the degree to which students agreed that using an e-learning system would give them chances to learn at their own pace, enhance their performance and save more time. In the flipped classroom context, PU is the extent to which students believe that using online video and interactive platform will improve their academic performance (Zhai et al., 2017). PU is the extent student believes flipped learning pedagogy helps him or her to achieve learning goals and desires. To fully assess the efficacy of the FC model, researchers have begun to investigate students' satisfaction in FC. For instance, a study conducted by Yoshida (2016) reported that the perceived usefulness of flipped classroom model could not only enhance students' understanding but improve the quality of classroom lessons. This could lead to students' satisfaction in FC.

**Hypothesis 2:** Perceived usefulness has positively influenced students' satisfaction.

### Perceived Ease of Use and Students' Satisfaction

Perceived ease of use (EU) is a core construct of TAM and has been defined as the extent to which an individual believes that technology or a system is easy and effortless to use (Davis, 1989). Because of the partial

literature on the relationship between EU and students' satisfaction in the FC setting, researchers refer to the existing studies of blended learning as FC is a subset of blended learning. Both blended learning and flipped classroom allow students to take online courses before the main class. In an FC context, EU is the extent to which learner believes that it is easy to access online recorded videos and interact with learning materials before the class hours (Zhai et al., 2017). Most of the previous studies had focused on the effect of EU on students' satisfaction in a blended learning setting (Rahman, Hussein, & Aluwi, 2015; Shah & Attiq, 2016). These studies revealed that perceived ease of use had a strong influence on students' satisfaction. Limited empirical pertaining to the impact of EU on students' satisfaction in the flipped classroom is available. For example, Zhai et al. (2017) investigated the effect of selected factors on students' satisfaction in the flipped classroom context. The results showed that perceived ease of use played a critical role in students' satisfaction. As a result, the following hypothesis was derived.

**Hypothesis 3:** Perceived ease of use has positively influenced students' satisfaction.

### Perceived Value and Students' Satisfaction

The concept of perceived value is being used in different fields and has been defined as the students' evaluation of the merits of a service or a product, and its ability to meet their expectations and desires, especially in comparison with its peers (Al-Debei & Al-Lozi, 2014). Perceived value is a crucial indicator that requires special consideration when examining students' learning satisfaction (Gallarza & Saura, 2006; Lin, Lee, & Chen, 2005). Whenever implementing a new learning system such as flipped learning, students are expected to achieve their learning goals effectively. They may carefully consider how they spend versus how much they receive. A study was conducted to assess the factors affecting students' satisfaction in FC. The findings showed that perceived value played a significant role (Zhai et al., 2017). Another study revealed that perceived value was a strong determinant of students' satisfaction (Rahman et al., 2015). The following hypothesis was formulated:

**Hypothesis 4:** Perceived value has positively influenced students' satisfaction.

## METHODOLOGY

Flipped classroom (FC) approach is used to teach undergraduate Information and Communication Technology (ICT) course during the second semester at one of the well-established universities in Nigeria. This study employed a quantitative approach to assess students' responses. There were a total population of 167 students from the Faculty of Education of the researched university. Based on Krejcie and Morgan (1971), a sample size of 115 was used. A questionnaire consists of two parts. The first part entails demographic information (gender, age, and program). The second part consists of 21 items to measure the four independent variables (instructor-generated video content, perceived ease of use, perceived usefulness, and perceived value) and a dependent variable (students' satisfaction). A five-point Likert scale was used to assess each item. The scale ranges from strongly disagree 1 to strongly agree 5. The questionnaire was adopted from Zhai et al. (2017) and Draus et al. (2014) and modified to meet the study needs. Upon completing the course, the students were asked to complete the

questionnaire anonymously. A total of 110 questionnaires were valid for analysis. Partial Least Square Structural Equation Model (PLS-SEM) was employed to run exploratory and confirmatory analyses to further confirm the suitability and reliability of the questionnaire. Factors that loaded below 0.7 were deleted as suggested by Hair (2015, 2017). Fifteen items across the four constructs were valid and used for the path analyses.

## ANALYSIS AND FINDINGS

### Demographic Information

Descriptive statistics show that males have the highest number of respondents ( $n=61$ , 55.5%) compared to the female who has less population ( $n=49$ , 45.5%). Age was divided into four categories, and the majority of the respondents fell within the 22-24 range, representing a total of 36 (32.7%), followed by the respondents whose age was fallen within 25-27 category ( $n=26$ , 23.6%), the least respondents were students with age of 19-21 category and 28 and above who have the same number ( $n=24$ , 21.8%). In terms of the program, most of the respondents were from the department of Chemistry Education ( $n=30$ , 26.1%), followed by Computer Science Education ( $n=24$ , 21.8%). A less majority of the respondents were from department of Mathematics Education ( $n=21$ , 19.1%) and Biology Education ( $n=19$ , 17.3%). The least representation of the respondents was from Physics Education ( $n=16$ , 14.5%).

### Model Analysis

A partial least square structural equation model (PLS-SEM) had been used for estimating (complex) path models with latent variables and their relationships (Sarstedt, Ringle, & Hair, 2020). Therefore, PLS-SEM was used to analyze the data in this research. Initially, the PLS-SEM algorithm was run to assess the factor loadings of each item (see [Figure 3](#)). About seven items with low factor loadings were deleted as suggested by Hair, Hult, Ringle, and Sarstedt (2017). Secondly, Cronbach's Alpha, rho\_A, composite reliability average variance extracted (AVE) were assessed as recommended by Hair et al. (2017), as shown in [Table 1](#).

From [Table 1](#), the Cronbach's Alpha values of the variables were ranged between 0.744 and 0.781. Rho\_A values array within the range of 0.748 and 0.875. Composite reliability is more dependable than Cronbach's Alpha ranged between 0.852 and 0.898. The above values demonstrate a good internal consistency. According to Hair et al. (2017), if the value of indicators is above 0.702, the internal consistency of the measurement model is good and acceptable. The average variance extracted (AVE) values of 0.5 and above demonstrate a good internal consistency measurement model (Hair et al., 2017). The values of AVE fall between 0.659 and 0.815 meet the threshold of internal consistency. The overall reliability of the instrument is Cronbach's Alpha of 0.759 which is the average of all the variables' Alpha coefficient shows a good instrument for the measurement model.

### Discriminant Validity

Discriminant validity is a type of construct validity that is recognized when measures of different constructs are demonstrated to be uncorrelated with each other (Rocheffort, Baldwin, & Chmielewski, 2018). Discriminant validity assumes that items should correlate higher among them than they correlate with other items from other constructs

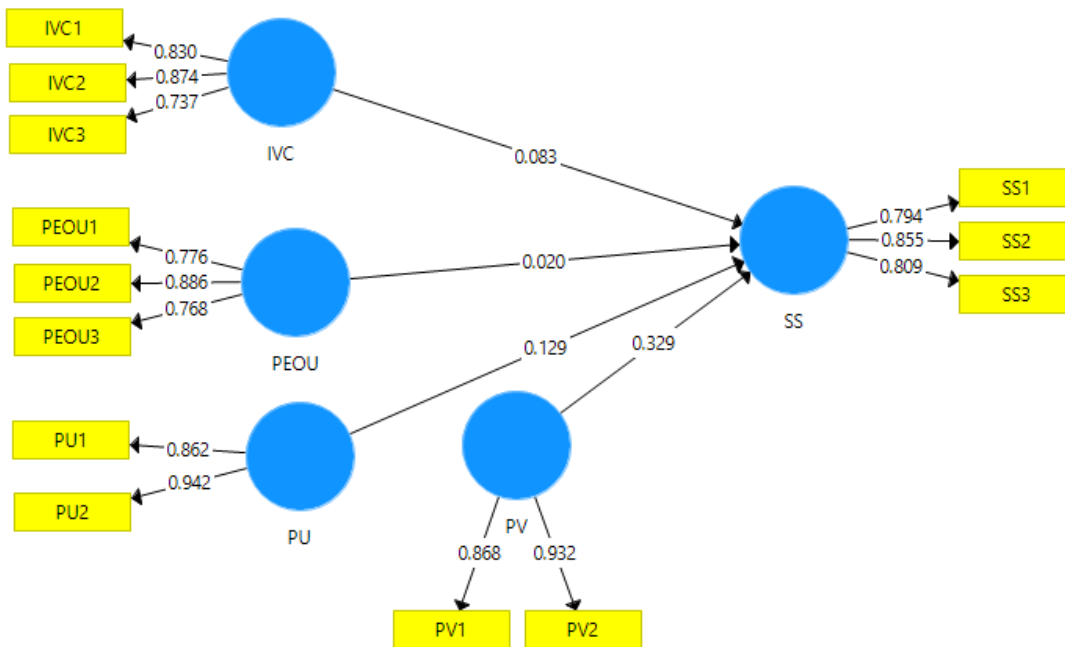


Figure 3. PLS algorithms for confirmatory factor analysis

Table 1. Reliability and Validity

Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
IVC	0.745	0.748	0.856	0.665
PEOU	0.744	0.783	0.852	0.659
PU	0.781	0.875	0.898	0.815
PV	0.771	0.825	0.895	0.810
SS	0.757	0.768	0.860	0.672

Table 2. HTMT Results

Variables	IVC	PEOU	PU	PV	SS
IVC	0				
PEOU	0.216	0			
PU	0.263	0.326	0		
PV	0.368	0.369	0.206	0	
SS	0.258	0.195	0.253	0.482	0

Table 3. Collinearity Statistics

Variables	IVC	PEOU	PU	PV	SS
IVC					1.112
PEOU					1.130
PU					1.086
PV					1.176
SS					

that are theoretically supposed not to correlate (Zait, Alexandru, & Cuza, 2011, p. 1). Henseler, Hubona, and Ray (2016), and Hair et al. (2017) suggested that Heterotrait-Monotrait Ratio (HTMT) should be used to determine the discriminant validity. The results of HTMT are depicted in Table 2.

Results in Table 2 show that the discriminant validity is good and acceptable because all the corresponding loadings between two different variables were less than 0.85 as suggested by (Hair et al., 2017; Henseler et al., 2016). All the diagonal loadings are also zero. Therefore, no variables redundancy in the model.

### Collinearity

Multicollinearity occurs when there is a high association or correlation between dependent variables or independent variables (Kim, 2019). High collinearity between variables affects the reliability and quality of the results (De Marco & Nóbrega, 2018). To detect the collinearity of the data, Kock (2015), and Hair et al. (2017) proposed the use of a test of the variance inflation factors (VIF). Below are the results of the VIF analysis offered in Table 3.

Results in Table 3 show that all the VIF values are within the range of 1.086 and 1.176. They are below 3.3 and good for the model as

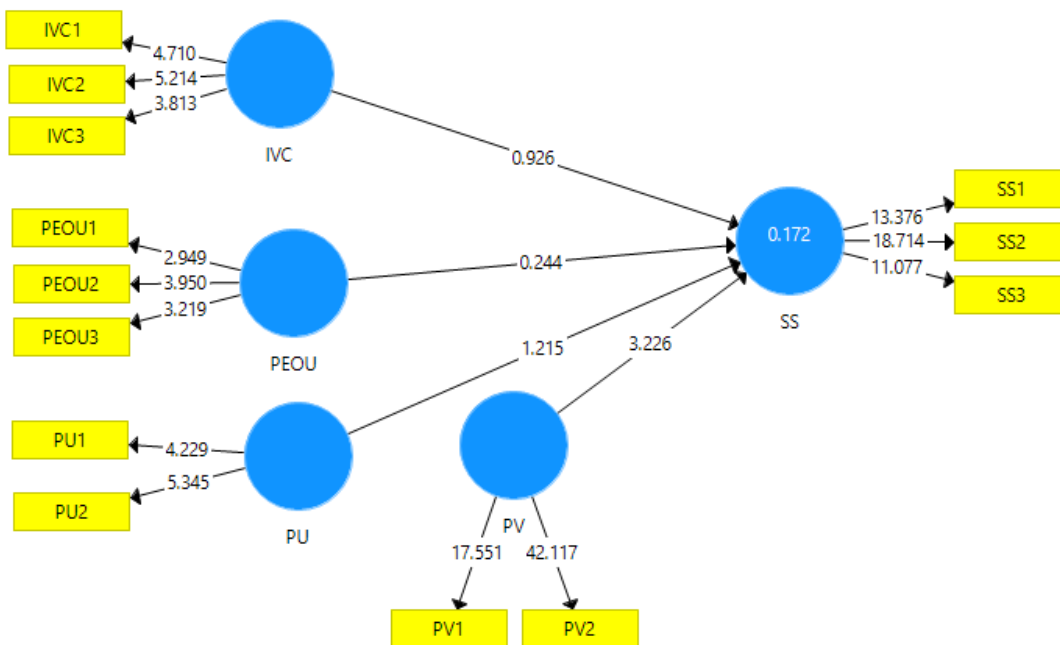


Figure 4. Bootstrapping results for path analysis

Table 4. Direct path analysis

Relationship	Beta-values	Sample Mean (M)	Standard Deviation (STDEV)	t-values	p-values
IVC -> SS	0.089	0.113	0.096	0.926	0.355
PEOU -> SS	0.025	0.055	0.104	0.244	0.807
PU -> SS	0.131	0.129	0.108	1.215	0.225
PV -> SS	0.325	0.319	0.101	3.226	0.001

recommended by Hair et al. (2017). The results indicated no disturbances in the data.

### Structural Model Analysis

This study used structural model analysis to assess the relationship between the latent variables. Scholars recommended structural model analysis to analyse complex data in social science research (Hair et al., 2017; Henseler et al., 2016). For researchers to examine path relationship, the 5000 samples bootstrapping in PLS-SEM was run as suggested by Hair et al., (2017). The results of the path analysis are presented in Figure 4 and tabularized in Table 4.

Results of direct path analysis in Table 4 show that only one hypothesis has significantly influenced students' satisfaction. For instance, perceived value (PV) has significantly influenced students' satisfaction at  $t=3.226$ ,  $p<0.05$ . However, three of the hypotheses were found to have no significant influence. For example, instructor-generated video content (TC) has no significant influence on students' satisfaction at  $t=0.926$ ,  $p=0.355$ , perceived ease of use (PEOU) found to have no significant effect on students' satisfaction at  $t=0.244$ ,  $p=0.807$ . The results also reported perceived usefulness (PU) has no effect on students' satisfaction at  $t=1.215$ ,  $p=0.225$ .

## DISCUSSION

The traditional lecture-based method has been used in African countries. In this method, the teacher is the main actor in the classroom, and students are partially involved in the learning process. Under this circumstance, students might not attain maximum learning

achievement and satisfaction. Therefore, it is critical to investigate the students' satisfaction to determine the efficacy of this FC model.

Results revealed that perceived value had a significant influence on students' satisfaction in the FC model. This finding is in line with that of Zhai et al. (2017), and Rahman, Hussein, and Aluwi (2015), who argued that perceived value played a vital role in students' satisfaction. The result further interprets that if the students believe their learning is interested, valuable, and enjoyable, their satisfaction increases. Students agreed that flipped classroom model meets their expectations and needs more than the traditional lecture-based method. It is also an indication that students learn more, achieve more, and satisfy more in a flipped classroom model.

The effect of instructor-generated video content has not been deeply explored in the field of flipped classroom model. Therefore, this study examines the influence of instructor-generated video content on students' satisfaction. The result shows that instructor-generated video content had no impact on students' satisfaction. It infers that video learning materials of flipped classroom model could be sourced from YouTube, Khan Academy, or Vimeo not necessarily made by the instructor (instructor-generated video content). Nevertheless, Draus et al. (2014), Yusuf and Prasad (2017), and Miller and Redman (2010) argued that instructor-generated video content had a significant influence on students' satisfaction. Perceived ease of use (PEOU) reflects how flipped learning model is easy to use and free from effort. This factor is critical in determining students' satisfaction in the flipped classroom, blended learning, and online learning (see Rahman et al., 2015; Shah & Attiq, 2016; Zhai et al., 2017). However, for this study, the perceived ease of use was found to have no significant effect on students'

satisfaction. It could be due to the students' experience in blended learning and online learning as they are used to having online materials such as video lectures to study before the class hour and having face-to-face lectures inside the classroom. This factor shows no impact on students' satisfaction because most of the students are technology savvy and the learning model (flipped classroom) is fully technology oriented. The result further indicated that perceived usefulness had no significant influence on students' satisfaction. This result is supported by the research of Zhai et al. (2017) who found that the correlation between perceived usefulness and students' satisfaction was not significant.

## IMPLICATION OF THE STUDY

The finding shows that only perceived value exhibits a certain level of positive implication towards students' satisfaction. Instructor-generated video content, perceived usefulness, and perceived ease of use were found to have no significant impact on students' satisfaction. This study contributes to the existing literature because there are few related studies. Institutions or educators might consider these findings before the implementation of the flipped classroom model. Students should be made to know in detail the advantages and disadvantages of this learning model, and how it can improve their learning performance compared to the traditional lecture-based methods. While implementing the flipped classroom model, the instructor can adapt the instructional videos from a third party such as YouTube, Khan Academy, or Vimeo. There was no difference between self-recorded video (instructor-generated video content) and third-party video lectures.

## LIMITATIONS AND RECOMMENDATION FOR FUTURE STUDIES

Due to the limited research sample, this study did not cover other populations as students from other institutions might have different opinions on satisfaction on flipped classroom model. Therefore, future researches need to be conducted to overcome the limitations. Future research should include larger sample size to extend the scope to generalize the findings to other sets of students with similar characteristics. More constructs and items could be incorporated to strengthen the quality of the research. Apart from that, mixed-method approach is recommended for data collection in future research.

## CONCLUSION

The study explored the effect between factors (instructor-generated video content, perceived usefulness, perceived ease of use, and perceived value) and students' satisfaction. Within the context of this study, perceived value is the most significant element in determining students' satisfaction. However, instructor-generated video content, perceived usefulness, and perceived ease of use are irrelevant in determining students' satisfaction. This study concluded that students prefer flipped classroom model more than the traditional lecture-based method. Hence, the importance of the flipped classroom model as one of the newly effective teaching and learning pedagogy is observed. This study suggested that flipped classroom model can be an alternative to the traditional lecture-based method. Flipped classroom model can also

improve the quality of learning by exposing students to different learning styles.

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