RESEARCH ARTICLE

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Implementation of the Flipped Classroom Model in a Higher Education Institution (HEI): Sultanate of Oman

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ABSTRACT

The pilot study was conducted in one of the Sultanate of Oman's government universities. In an isolated case, the researchers conducted one whole course only using a flipped classroom set-up for an entire semester. Advanced lectures were given in the form of short videos and reading materials to the students. Class time was spent for follow-up, assessment, and reinforcement of learning and was conducted by giving classroom activities ranging from group work, self-assessment exercises, case studies, muddiest point assessment, etc. The study revealed five explanatory variables to flipped classroom effectiveness and through focus group discussions, the common learning challenges faced by the students were also determined.

Keywords: Flipped Classroom, Flipped Classroom Effectiveness, Learning Challenges.

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I. Introduction

Higher education institutions are starting to use various student-centered learning that is more modern and address present-day learning challenges and opportunities. As such, teachers are encouraged to include teaching pedagogies that will encourage students to be co-creators of their own education, by engaging them in decisions about what, when, and how they learn the learning outcomes in their respective courses. This is the essence of student-centered learning.

One interesting pedagogy that encourages student-centered learning is the inverted classroom model or more commonly termed the flipped classroom methodology. In this approach, the lectures are done outside of class, by providing pre-recorded videos prior to in-class sessions. By doing this, teacher-student contact hours are replaced by more student-centered, active learning activities such as problem-solving discussions, presentations and debates (Bishop, 2017).

The flipped classroom is a teaching and learning approach where learners study at home or outside the class through distance learning and have hands-on activities in the class. Flipped classroom or reverse classroom is an element of blended learning. This integrates face-to-face classroom learning through group discussions and distance learning methods such as watching asynchronous video lessons and collaborative online activities (Halili & Zainuddin, 2014).

In the case of the higher education institution under study, the flipped classroom model of learning is sporadically implemented and therefore has not been institutionalized as a learning model that can be universally adopted. As such, no clear studies that assess its applicability, effectiveness, or studies that illuminate stumbling blocks, impediments, or antecedents to effectiveness have been carried out. These research themes are of utmost importance as they can help in fine-tuning and ensuring the effective and widespread adoption of the flipped classroom teaching and learning model.

A. Related Studies

Several researchers claim that flipped teaching can stimulate underachieving learners' active learning and consequently enhance learning effectiveness. Some studies showed that students who participated in the flipped teaching models demonstrated better comprehension levels with the teaching content due to this change in learning style and attitude. This evidence suggested further developments regarding active learning ability and enhanced learning effectiveness, and the prompting of creativity resulting in a shift from passive learner to the active learner has been proposed (Chou *et al.*, 2021).

Flipped classroom enhanced job satisfaction on the part of the teacher and students improved learning performance. Students' learning attitudes also improved and encouraged teachers to continuously apply the flipped learning model (Mystica, 2018).

Proponents of the flipped classroom model emphasize that flipped classroom is better than traditional teaching models. They argue that it is a more personalized teaching and learning method (Bergmann & Sams, 2012; O'Flaherty & Phillips, 2015), enables better use of class time and flexible technology (Herreid, Schiller, Herreid, & Wright, 2014), and permits students to become more responsible for their own learning (O'Flaherty & Phillips, 2015). Although

these certainly seem like advantages, there is not yet conclusive evidence linking them to any effects of flipping the classroom on student learning or satisfaction.

However, there are also a handful of researchers that claims that the flipped classroom models were not always beneficial. In a comparison between traditional classrooms, Strayer, (2012) and Davies *et al.* (2013) found that learning outcomes in the flipped classroom model showed no significant difference. Similarly, Blair et al. found that learners' attitudes towards the two models were not significantly different (Blair, Maharaj & Primus, 2016).

Furthermore, Mason *et al.* argue that students needed more time to adjust and accept flipped classroom learning styles. (Mason *et al.*, 2013). Bishop and Verleger, even indicated that there were cases of strong dislike of the flipped classroom's teaching model among the learners (Bishop & Verleger, 2013). While Strayer (2012) hinted in his research that students perceived significantly less structural support to facilitate them during flipped events.

These disparities in results indicate that there are variables that contribute to the success or failure of a flipped classroom learning intervention. Yanqing (2021) found that social presence has the most significant influence on learners' perceived learning performance. In the same research, he noted that learning presence does not have a direct influence on learner perception of the learning performance and that cognitive presence acted as a partial mediator together with social presence & learning performance, and a full mediator between social presence & learning performance.

Teaching presence or tutor support also was theorized to have an impact on flipped classroom model success. Teaching presence refers to the designing, facilitating, and directing of cognitive and social processes to achieve meaningful and educationally worthwhile learning outcomes (Anderson *et al.*, 2001). It consists of three categories of activities, namely design and organization, facilitating discourse, and direct instruction. Designing and organization refers to the process of planning and setting the curriculum, organizing the study space and resource requirements, and assessing. Direct instruction refers to the presentation of questions, explaining, providing constructive feedback, summarizing ideas, and providing content knowledge from diverse resources. The last component, facilitation is about sharing meaning, focusing the discussion and settling areas of disagreement, and establishing an agreement.

A qualitative analysis of the factors affecting flipped classroom effectiveness conducted by Oudbier and Timmermans (2021) revealed six main factors that affect the effectiveness of the flipped classroom. These include such factors as student characteristics, teacher characteristics, implementation methods, activity characteristics, off-campus activities, and in-class activities. These factors are mediated by factors such as the student's self-regulated learning tolerance, teacher's role, and motivation, assessment techniques, and feedback mechanisms and guidance.

B. Objectives

To initiate a more-comprehensive study about the implementation of the flipped classroom model, a pilot study is conducted in a few of the courses that were given permission to conduct a flipped classroom on a wider scale in the courses offered by the Business Studies Department. Primarily, the study aims to identify themes that contribute to the learning of students under a flipped classroom set-up and assess the performance of the students who are subjected to flipped classroom model of learning. The research is also designed to find out the learning-related challenges that the students faced during the implementation of a flipped classroom.

II. Methods

The pilot study was conducted for the entire duration of a semester for a specific course that was subjected to a flipped classroom teaching method. Short reading materials, video clips, and pre-tests were assigned to the students in advance for them to learn off-campus and at their own pace. A clear course delivery plan was provided to the students, thus making them aware of what to expect to learn during class hours. Class discussions about short case studies, practical learning exercises, and other learning activities, (i.e., muddiest point, surveys, class presentations, individual and group exercises, etc.) were performed in the class with the intention of assessing the level of learning, encouraging class participation, clarification of inquiries, and summarizing learning of the specific course learning outcomes.

A. Participants

The study was conducted in one of the courses under the Business Studies Department of a government university in the Sultanate of Oman. There were 31 students who learned through a flipped classroom model for an entire semester. This cohort was chosen to be the participants of the study. This cohort's performance is measured against the performance of 31 students who took the same course in the previous semester.

B. Data Gathering Procedure

The research follows a qualitative-quantitative approach, where flipped classroom antecedent themes were analyzed from data coming from a questionnaire and the learning-related challenges obtained through a focus group discussion. The data used in the study came from a self-structured questionnaire. The items in the questionnaire were derived from previous studies that were conducted about the subject. From these past researches, a set of antecedent themes were used to frame the questionnaire. On the other hand, a focus group discussion (FGD) was conducted with seven of the participating cohort to find out the common learning-related challenges that they experience in flipped classrooms.

The gathering of data was conducted a few weeks before the final examination. Data gathering was purposely scheduled for that period to allow the students to form a better perception of the experience of the flipped classroom.

TABLE I: RELIABILITY STATISTICS

Latent Variable	No. of Observed Items	Cronbach Alpha
Relevance of the Course	4	0.78
Application of Critical Thinking	4	0.77
Interactivity	4	0.88
Tutor Support	4	0.74
Class Participation	7	0.93

TABLE II: MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0,475[a]	0.326	0.033	14.23790

a.Predictors: (Constant), Relevance, Application of Critical Thinking, I.

C. Data Gathering Instrument

The research made use of a researcher-designed questionnaire which is adopted from the works of Chou *et al.*, (2021), Mystica (2011), Bergmann *et al.,* (2012), and Herreid *et al.*, (2014). Their individual works provided the elements that were examined to be factors that contribute to effective flipped classroom learning. There were six factors (latent variables) that were observed to be the factors that affect effective flipped classroom implementation. These are:

1. Relevance of the course to student interests
2. Application of critical thinking skills
3. Quality and quantity of tutor support
4. Interactivity
5. Interpretation of the course

1) Reliability of Data

The internal consistency of the observed variables for the five latent variables was checked and a summary table of the results is presented. To improve the internal consistency, particularly for the latent variable Tutor Support, one observed variable was deleted. The rest of the latent variables showed credible Cronbach Alpha coefficients and therefore did not have to undergo any alterations.

III. RESULTS AND DISCUSSION

A. Factors that Affect Flipped Classroom Effectiveness

A multiple regression analysis was performed to predict how class performance as measured by the student's final marks values will change as course relevance, encouragement of critical thinking, classroom interaction, tutor support, and student class participation levels change. The magnitude of the effect of the explanatory variables was also predicted. These are all summarized in Table II, Table III, and Table IV.

The initial analysis shows a moderately weak correlation between the dependent variable, class marks, and the five identified explanatory variables. This is evidenced by a coefficient of association, R = 0.475. The coefficient of determination, R-Square (0.326) indicates that 32.6% of the variance in the dependent variable is attributed to the same explanatory variables that were laid down.

The initial regression analysis has shown that the identified explanatory variables p-values < 0.05, i.e. course relevance (p-value = 0.016), encouragement of critical thinking (p-value = 0.017), classroom interaction (p-value = 0.037), tutor support (p-value = 0.012) and class participation. This suggests that these variables have a statistically significant effect on class performance i.e. final marks. The regression model can be written as follows;

CP= 68.74 + Relevance (2.251) + CritThink (1.958) + Interactivity (0.386) + Tutor Support (3.84) + Class Participation (2.131)

The VIF (Variance Inflation Factor) values for all the variables involved are all below 5.0. This indicates that there is a very low case of multicollinearity among the variables – an essential assumption for any regression analysis.

These results are fairly consistent with the findings of previous research conducted about the explanatory variables for flipped classroom effectiveness. Liam *et al.* (2001) who claimed that teacher or tutor support significantly affects flipped classroom effectiveness cited the same results were also found in the present in this research. Of the six contributory factors that Oudbier and Timmermans (2021) revealed, activity characteristics, off-campus activities, and in-class activities which characterize interactivity was found to be contributory factors in the present study as well. Further similarities in findings with previous research which cited that design and organization, facilitating discourse, and direct instruction are major factors to flipped classroom effectiveness as well.

B. Differences in Class Performance

The flipped classroom cohort's overall class performance was compared with the overall class performance of a previous batch of students who studied the same course. For identification purposes, the previous class is labeled "Previous". Except for the methodology of delivery (pure flipped classroom), everything else in the course outcomes delivery was the same e.g. assessment methods such as quizzes, major exams, and class activities, number of hours spent on the learning outcomes, number of learning outcomes, etc.

TABLE III: REGRESSION ANALYSIS

Variables	Unstandardized Coefficients		Sig.	Collinearity
	B	Std. Error		VIF
Class Performance (Constant)	63.731	15.705	0.000	–
Relevance	2.251	1.068	0.016	2.146
CritThink	1.958	0.386	0.017	2.612
Interactivity	0.386	0.043	0.037	2.535
Tutor support	3.842	1.409	0.012	2.462
Class Participation	2.131	1.465	0.029	3.081

TABLE IV: GROUP STATISTICS

	Section	N	Mean	Std. Deviation	Std. Error Mean
Class Performance	Previous	31	62.58	10.96	1.96845
	Flipped Class	25	76.48	9.75	1.95032

TABLE V: INDEPENDENT SAMPLES TEST

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
Class Performance	Equal variances assumed	0.143	0.707	–4.95	54	0.000	–13.90	2.81	–19.53	–8.28
	Equal variances not assumed	–	–	–5.02	53.44	0.000	–13.90	2.78	–19.46	–8.34

This was an attempt to eliminate the impact of potential extraneous variables during performance analysis. After minimizing these extraneous variables, a t-test was conducted. Its results are presented in Table IV and Table V.

Table IV reveals that the mean of the Flipped Class is higher than the previous batch with the Flipped class having a mean of 76.48 compared to 62.58 from the previous class. This could indicate that a flipped classroom could result in better class performance. This finding corroborates with the works of Chou *et al.* (2021) and Mystica (2018) who found out that a flipped classrooms students demonstrated better comprehension levels with the teaching content due to the change in learning style and attitude and that flipped classrooms enhanced job satisfaction on the part of the teacher and students improved learning performance.

A T-test was conducted to determine if the differences in performance between the flipped class and the previous batch were not due to coincidence or happenstance. Levene's Test for Equality of Variances shows that the sample groups' class performance variance has a p-value of 0.707 which leads to the conclusion that the assumption of equal variance is present between the two groups. The T-test revealed that the Flipped Class N (25), (M = 76.48, SD = 9.75) is higher than the Previous Batch N (31), (M = 62.58, SD = 10.96), t(54) = –4.95, p = 0.000, therefore the null hypothesis that there is no significant difference in the class performance of the two groups is rejected and that the mean difference is –13.90.

C. Learning Related Challenges

Three focus group discussions were implemented to determine the learning-related challenges that were encountered by the flipped class cohort during the entire semester. These FGDs enabled the researchers to unearth the challenges that the students faced in a flipped classroom method of course delivery.

The FGD groups were in unison that the biggest hurdle that they face is the language barrier that they have to contend with. Since most of the study materials given to them were in English, quite a handful of the students struggled to understand the materials. Even if they can run some of the documents they study through translating software or applications, the means available to them are not that accurate and at times can even be misleading too. As a consequence, there are several instances that the students fail to perform well during in-class assessment exercises, prompting the lecturer to explain the learning material to the students. This defeats the purpose of a flipped classroom.

The second problem that the flipped class cohort aired is the insufficiency of time. Ironically, while proponents of this methodology emphasized that a flipped class gives more opportunity to learn since they have the freedom to choose their study time, the flipped classroom cohorts' had a different experience. Residing in places far from the university, the learners complained that they are tired already when they get home from class and had to run errands or do other household chores. Thus, instead of watching the assigned tutorial videos or reading notes, they shift their attention to something else.

Finally, a handful of the FGD participants also complained about internet connection issues that they experience. Relatively, network issues are not much of a problem in most areas, there are still areas where students experience poor internet connections, which detrimentally affects their learning efforts.

Other challenges encountered include the uncooperativeness of group members when assigned to do teamwork and other personal or family issues.

Even though the flipped class experience these challenges, they still prefer the flipped classroom method of learning over traditional learning pedagogies.

IV. CONCLUSION

The pilot study revealed that a flipped classroom method of learning produces results in better class performance. The learners, once given the chance to learn in advance, through short lecture videos or reading materials, perform better in class activities and on the major examinations. This can be attributed to the more time given to the students to study and the learning reinforcement provided by in-class activities (muddiest point, group activities, mini case studies). Students also become more active in class compared to traditional learning methods where they just have to listen to class lectures. The flipped classroom also enables students to learn with their classmates which further motivates them to study more and understand the learning materials better.

The study also reveals that flipped classroom effectiveness relies on the five factors that were hypothesized as explanatory variables in the study.

First, the students should realize the course's relevance and agree on it. The course should connect with the prospects of the learners.

Second, the flipped class should also encourage critical thinking. Students should be challenged with interesting activities related to the topic.

Third, the level of interaction between the students and the tutor (tutor support) should be greatly present as well. Interactivity and tutor support are avenues for students to

raise their concerns or clarifications about the topic that was given to them.

Finally, class participation should also be encouraged. It is through class participation that the tutor will be able to gauge the level of knowledge that the students have gained from the study materials that were handed to the students in advance.

With respect to the challenges encountered, the student's level of comprehension of the English language still proves to be the most common concern of the learners, followed by the lack of time that they can allot for studying.

RECOMMENDATIONS

A flipped classroom set-up can be made better if the learners are given study materials that are relevant, interesting, and concise to keep them engaged. The materials structure and content should be easy to understand and straightforward. As good as the results of the study is, it cannot be surmised that a flipped classroom can be universally adopted across courses and fields and need to be conducted with precaution.

This study should be magnified in the sense that more participants should be involved in the study. This will enable future researchers to conduct a more thorough investigation of the explanatory variables to flipped classroom effectiveness through factor analysis. Similarly, future researchers can look into the learning issues of the students and devise ways how to improve the development of course materials.

REFERENCES

Anderson, T. L. (2021). Assessing Teacher Presence In a Computer Conferencing Context. *Journal of Asynchronous Learning Networks*, 1-17.

Bishop, J. L. (2017). The flipped classroom. *ASEE National Conference.* Atlanta, Georgia.

Bishop, J. L. (2018). 120th American Society of Engineering Education Annual Conference & Exposition. Atlanta, Georgia, USA.

Blair, E. M. (2016). Performance and Perception in Flipped Classroom. *Education in Information Technology*, 1465-1482.

Chou, C. P., Chen, K. W., & Hung, C. J. (2021). A Study on Flipped Learning Concerning Learning Motivation and Learning Attitude in Language Learning. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.753463.

Davies, R. S., Dean, D. L., & Ball, N. (2013). Flipping the Classroom and Instructional Technology Integration In a college-level information systems spreadsheet course. *Educational Technology Research and Development, 61*. 563-580. https://doi.org/10.1007/s11423-013-9305-6.

Halili, S. H., & Zainuddin, Z. (2014). Enhancing Collaborative learning in Flipped Classroom. *Australian Journal of Basic and Applied Sciences*, 147-149.

Herreid, C. F. (2014). A chat with the survey monkey: Case studies and the flipped classroom. *Journal of College Science Teaching*, 75-80.

Hwang, G. J., Lai, C. L., & Wang, S. Y. (2015). Seamless flipped learning: a mobile technology-enhanced flipped classroom with effective learning strategies. *Journal of Computers in Education*, *2*(4), 449–473. https://doi.org/10.1007/s40692-015-0043-0.

Mystica, A. (2018). Flipped Classroom: engaging the Student in Active Learning. *Journal of Legal Studies Education*, *35*(2), 277-300.

O'Flaherty, J. P. (2018). The Use of Flipped Classrooms in Higher Education: A Scoping Review. *The Internet and Higher Education*.

Oudbier, J. S. (2021). Enhancing the effectiveness of flipped classroom in health science education: a state-of-the-art review. . *BMC Med Educ*.

Rianne A.M. Bouwmeester, R. A. (2019). Flipping the medical classroom: Effect on workload, interactivity, motivation and retention of knowledge,. *Computers and Education*, *139*. 118-128.

Strayer, J. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research*. 171-193.

Verpoorten, D. W., Westera, W., & Specht, M. (2011). Infusing reflective practice in eLearning courses—Can widgets help? *International Journal of Technology Enhanced Learning, 3*(1). 93-109.

Yanqing, W. (2021). Factors Affecting Learning Performance in Flipped Classroom: an Emperical Study Based on RCOI Framework. *Revista De Educacion*.