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The Use of Flipped Classrooms in a Higher Education Setting: Students' Perspectives

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Abstract

This study investigates students' perceptions and attitudes toward the use of flipped classrooms in a higher education institution in Brunei. Twenty-four first-year students undertaking a module titled, Professional Communication, took part in the flipped classroom exercise. Three flipped classroom sessions were conducted over 14 weeks. All students had to study the course materials and do research prior to the classes. A pre-questionnaire was administered at the start of the semester to investigate students' knowledge of flipped classrooms. Three post-questionnaires were subsequently delivered after each exercise to investigate the students' experiences with the flipped classroom. Prior to the exercise, none of the students had an accurate understanding of the flipped classroom. All students have used various means of online learning resources although they were somewhat indifferent towards the use of technology as part of their learning. The findings showed that most students expressed positive attitudes towards flipped classrooms as they encouraged collaboration and motivation, and allowed students to learn at their own pace, promoting independent learning. Whilst it is conclusive that students found the flipped classroom approach favourable in the present study, the results indicate that it may not be suitable for all learning styles or subjects in higher education and its effective use is dependent upon students' learning attitudes and course content.

Keywords: flipped classroom, students' perspectives, students' attitudes, teaching and learning, higher education

Introduction

The use of flipped teaching is an increasingly popular way to impart information to students and increase participation and interaction during teacher-led sessions. Traditionally most in-class teaching approaches have involved the lecturer imparting knowledge to students through oral and visual means with little or no direct interaction between themselves and students. In a flipped classroom approach, the information is primarily imparted outside the formal teaching session through a range of media, and the in-class time is used for students to apply their gained knowledge in a range of student-focused activities. This rationale is that this leads to an increase in student engagement

with the learning material and fosters a deeper understanding of the content and its application.

There has been some work looking at the relationship between gender and culture within Brunei (Low & Zohrah, 2013) however, there is little literature available on the impact of these factors on student learning within a South East Asian context and previous work on peer and self-assessment by Hassell and Lee (2019) identified differences in student response between Bruneian and western students.

Literature Review

In a recent study of existing literature on second language teaching (Vitta & Al-Hoorie, 2020), it was found that in general flipped classrooms outperformed traditional classrooms, although effects were variable and biased based on the type of publication and student proficiency level. Results were reported to be independent of the medium used for the flipped delivery, and longer interventions resulted in a slight reduction in effectiveness. Another Meta-analysis of 174 studies (Strelan et al., 2020) found that the application of a flipped classroom was beneficial regardless of discipline, and suggested that the primary contributing factor to the flipped classroom effect was the opportunity it provides for structured, active learning and problem-solving. Turan and Akdag-Cimen (2020) found that this structured approach led to increased student engagement whilst Sosa Díaz et al. (2021) found that students valued the approach from academic competence, personal and social perspectives. Nevertheless, this same study also identified a small minority of students critical of the model which they reported was due to the lack of habit using active methodologies and establishing the learning commitment required by such methodologies.

Studies of the application of flipped delivery for foreign language teaching have found similar trends in the technique's effectiveness. Teng (2017) argued that the flipped classroom model could be a useful and promising pedagogical approach for the delivery of English as a Foreign Language (EFL) in their study in Hong Kong. Chuang et al. (2018) undertook work in Taiwan and found that the effectiveness of flipped teaching was dependent on the student's character traits and learning style, which was corroborated by work in Korea by Lee and Wallace (2018) and Kim (2021). Lee and Wallace (2018) reported that the flipped approach positively impacted students learning where students exhibited a relatively high level of English ability, were motivated and possessed strong study skills, whilst Kim (2021) reported that the success of Flipped Learning is dependent on learner autonomy as not every student will engage with it.

As a result, models such as that presented by Lee (2021) have been developed on flipped instruction, in this case for the second language (L2) development, using instructor scaffolding to provide students with an environment in which they have agency over their own learning whilst engaging with peers in meaningful interactions. The small negative effect of duration identified within the study by Vitta and Al-Hoorie (2020) suggests that potentially as the novelty of the approach wanes its effectiveness as well. Results presented by Horvath and Brzozowski (2020) for psychology statistics students found that their attitude towards the flipped classroom approach was less positive at the end of their semester than at the beginning. This effect of novelty has been seen elsewhere in teaching pedagogy in the applications of Wiki-based coursework (Hassell & De

Focatiis, 2016) and it has been previously reported that students perceive new teaching methods positively because of the use of technology and flexibility they offer.

Whilst the generally positive attitude and impact on students of a flipped classroom approach is accepted within the literature, what is less well known is how students' perceptions evolve as they develop their understanding, knowledge, and experience of the approach, and how culture combined with gender impact student acceptance. Culture and gender have both been found to impact students' acceptance of other non-traditional teachings, such as game-based learning (Jossan et al., 2021). Whilst there was no evaluation of cultural or gender differences in the review by Vitta and Al-Hoorie (2020), gender was not found to be a factor in other work evaluating the effectiveness of flipped teaching on learning performance (Chen et al., 2019). This conclusion conflicts with a number of studies from the Middle East where gender was found to impact the effectiveness of the flipped approach. Namaziandost and Çakmak (2020) found that female students preferentially benefitted from an increase in confidence in producing specific or requested performance in language learning while engaged in the flipped classroom. In another comparison, this time from two student sample populations within the Middle East, males perceived relative advantage, enjoyment, creativity, and collaboration gains as higher in the context of flipped classrooms than females (Abu-Shanab, 2020). Gender was also found to impact the effectiveness of a flipped methodology for engineering students in Spain, with females benefitting more from the implementation than males (Chiquito et al., 2020).

Whilst Chen et al. (2019) did not report gender bias in their studies, they did find that there was, perhaps unsurprisingly, a strong influence of students learning strategies and cognitive styles on the effectiveness of a flipped classroom. As such, it could be implied that the formative experience gained within a culture by either gender can subsequently impact their ability to take advantage of the learning opportunities offered by flipped teaching. It has been previously reported that not all students like to work in groups, and cultural and societal issues could hinder the adoption of such methods within the classroom setting (Furumo et al., 2011). Tarhini et al. (2014) identified that at an English University, female students tended to place more emphasis on ease of use of the system when deciding whether to adopt the system, and these differences in perception and approach can influence the effectiveness of teaching pedagogy.

Research Questions

The purpose of this study was to investigate the effectiveness of flipped teaching, evaluate the impact of gender and culture, and qualitatively capture students changing perceptions of the technique as they gain experience with it. The research questions subsequently addressed are:

- What are the differences in the learning approach of male and female students in Brunei?
- Does gender impact students' perception of the use of a flipped classroom and if so, is this dependent upon students' individual learning styles and willingness to use technology?

- Does cultural background, specifically a Bruneian background, impact students' perception and adoption of a flipped classroom approach?

Methodology

Research Context

This study was set in a higher education institution in Brunei Darussalam, Universiti Teknologi Brunei (UTB). The University runs full-time programmes over two semesters per academic year, and each semester runs for 14 weeks. The present study investigated the students' perceptions towards the implementation of flipped classroom enrolled in the module, Effective Communication (EC) in the academic year 2020/2021. In this module, students learned about the fundamental concepts and principles of communication theories that are essential to the development and enhancement of their communicative abilities.

Participants

27 first-year students from the School of Applied Sciences and Mathematics (SASM) took part in the study initially, however, this progressively dropped to 24 over the course of the sessions; one student withdrew from the programme whilst two opted to be excluded from the study. The students were chosen based on convenience sampling. Table 1 provides a breakdown of the participants based on age and gender and subsequent results are presented for 9 male students and 15 female students, whilst any cohort averages are presented for all 24 students.

Table 1
Summary of participants

Age groups	Male		Female	
	No. of students	%	No. of students	%
16 – 20 years old	7	30.4%	14	56.5%
21 – 25 years old	2	8.7%	1	4.3%

Design and procedure

The students were introduced to the flipped classroom approach in Week 1, and students completed a questionnaire (Pre-FC) to identify their prior experiences with flipped classroom techniques. In Week 2 of the semester, the groupings were finalised and the students were introduced to their first exercise and provided with two weeks to prepare before the in-class exercise. There were three consultations/in-group discussions in Week 3 where the students could ask for clarification from the facilitator and in Week 4, the flipped classroom exercise was implemented by each group. The second flipped classroom exercise was implemented in Week 10 and the third exercise was implemented in Week 14.

Data for the study was collected through four questionnaires: pre-flipped classroom (Pre-FC); post-flipped classroom exercise 1 (Post-FC1); post-flipped classroom exercise 2 (Post-FC2) and post-flipped classroom exercise 3 (Post-FC3) on students' perceptions and experience with the flipped classroom exercise. The questionnaires were administered to the students in Week 1 (Pre-FC) and at the end of every flipped classroom exercise in Week 4 (Post-FC1), Week 10 (Post-FC2), and Week 14 (Post-FC3). Students were asked to rate their level of agreement with each statement using a 7-point Likert Scale measurement (Likert, 1932) ranging from Strongly Disagree (1) to Strongly Agree (7) and Neither Disagree or Agree (4).

Data analysis

Basic descriptive data analyses such as mean and standard deviation were calculated using Microsoft Excel. To evaluate whether there were significant differences between the means of the two groups, a t-test was performed with the null hypothesis rejected unless the results indicated the two-tailed $\alpha \leq .05$. Correlation analysis was carried out using Spearman's correlation coefficient to identify qualitative trends within the data. A value of 1 illustrated a perfect correlation between both variables, meaning that an increase in one was found to indicate an increase in the other, whilst a value of –1 indicated a perfect anti-correlation between the variables, indicating that as one variable increased the corresponding response for the second variable decreased. As the significance of the coefficient varies with sample size, results were taken to be statistically significant based on the data provided in Zar (1984) using $\alpha \leq .05$.

Results

Students' participation, pre-conceptions, and implementation

Response to open questions revealed that all but one student used online resources or social media platforms as part of their learning, with most students citing resources such as YouTube and Wikipedia. Analysis of the qualitative student responses indicated that none of the students had prior experience of, or familiarity with, a flipped classroom approach.

Table 2 provides a summary of the student cohort's perceptions of their learning style and preferences for study and learning.

Table 2
Responses to the questionnaire provided prior to the implementation of the flipped teaching

Statements	M	SD	Disagree (1-3)	Neutral (4)	Agree (5-7)
1. I prefer to study alone.	4.79	1.32	4	5	15
2. I prefer lectures to be delivered in person	4.92	1.56	2	9	13
3. I prefer to listen and not to participate in class.	3.88	1.42	9	6	9

4. I prefer to use technology in my learning.	4.71	1.27	2	8	14
5. I prefer to be active and collaborate with other students in class.	4.75	1.15	3	6	15
6. I prefer online lectures only.	3.17	1.52	15	5	4
7. I do not like to use technology in my learning.	3.21	1.35	13	7	4
8. I prefer to work individually.	4.46	1.06	2	13	9
9. I prefer to learn on my own pace.	4.46	1.06	2	13	9

The results in Table 2 indicate that students demonstrated a preference for lectures to be delivered in person (M = 4.92) with active collaboration with other students in the class (M = 4.75). Whilst in general students also expressed a desire to study alone (M = 4.79) and independently (M = 4.46). Evaluation of the responses to the pre-questionnaire based on gender is shown in Table 3, where a t-test was used to identify when responses to the questionnaire were statistically different between both genders.

Table 3
Evaluation of difference in response based on gender

Statement	t-test	
	t-value	*p-value*
1. I prefer to study alone.	-.0122	.990
2. I prefer lectures to be delivered in person.	.172	.865
3. I prefer to listen and not to participate in class.	-.0980	.923
4. I prefer to use technology in my learning.	2.19*	.0383
5. I prefer to be active and collaborate with other students in class.	-.518	.609
6. I prefer online lectures only.	.377	.710
7. I do not like to use technology in my learning.	-1.65	.112
8. I prefer to work individually.	-.439	.665
9. I prefer to learn on my own pace.	.0932	.927

*Correlation is significant at the 0.05 level (two-tailed)

It was found that there was no difference in response with relation to gender for all but one statement, which was “I prefer to use technology in my learning” ($r(22) = 2.19$, $p < .05$). A Spearman correlation test was carried out to evaluate the perceptions of the students prior to implementation of the flipped classroom approach to evaluate whether there were any qualitative trends between responses to any two questions. This is illustrated in Table 4.

Table 4
Spearman rank r_s. correlations between questions before the implemented flipped classroom approach

	1	2	3	4	5	6	7	8	9
1. I prefer to study alone.	-								
2. I prefer lectures to be delivered in person	.46*	-							
3. I prefer to listen and not to participate in class.	.11	-.14	-						
4. I prefer to use technology in my learning.	0.12	.076	.21	-					
5. I prefer to be active and collaborate with other students in class.	-.30	.083	-.44*	.12	-				
6. I prefer online lectures only.	-.35	-.41*	.29	.071	.27	-			
7. I do not like to use technology in my learning.	.10	-.011	.035	-.56*	-.16	-.0085	-		
8. I prefer to work individually.	.53*	.53*	.71	-.075	-.17	-.17	.065	-	
9. I prefer to learn on my own pace.	.47*	.28	.20	.072	-.067	.11	-.14	.43*	-

*Correlation is significant at the 0.05 level (two-tailed)

Analysis from Table 4 demonstrates that within the student cohort, there was a positive correlation between students' preference for in-person lectures and their preference to study alone and work individually. Similarly, and perhaps unsurprisingly, there was a positive correlation between students preferring to work alone/individually and preferring to work at their own pace and there was a negative correlation between their preference for in-person lectures and preference to be active and collaborate with others in the class.

Throughout the application of the flipped classroom approach, students were asked to answer a series of questions that probed various aspects of their perceptions of the implementation of the approach. The result is presented in Table 5 for both genders and indicated that the students felt they had been provided with clear instructions, helpful pre-reading, sufficient time in which to prepare for the tasks, and accessibility to the

lecturer during the flipped classroom session. Generally, females were a little more positive than males, however, responses varied somewhat between the three sessions.

Table 5
Student responses relating to the implementation of the flipped approach.

Question	After first flipped session				After second flipped session				After third flipped session			
	Male		Female		Male		Female		Male		Female	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
The instructions for the flipped classroom exercise were clear.	6.11	0.6	6.11	1.13	6.11	0.6	5.94	1.18	6.11	1.05	6.60	0.63
The pre-reading materials were helpful as a guide.	5.78	0.67	5.89	1.23	5.56	1.51	6.13	0.89	5.78	1.20	6.60	0.51
There was sufficient time to prepare and complete the task.	6.00	1.32	6.56	1.04	5.33	1.66	5.38	1.59	5.89	0.93	6.4	0.51
The lecturer was available for discussion during/in the flipped classroom.	6.11	0.93	6.11	1.41	6.11	1.05	6.19	1.05	5.89	1.17	6.33	0.62

Table 6 outlines the average student responses, split by gender, over the three flipped classroom sessions to questions relating to motivation, learning, and pedagogical preference. Students reported a good level of motivation throughout the three sessions,

however for both genders, there was a reduction in motivation with increasing exposure to the technique. After the first flipped exercise, students had a slight preference for the flipped approach, however, this changed over the course of the three flipped sessions. Students were more inclined towards traditional teaching after the third flipped exercise. The result showed that increasing student exposure to the technique also led to a slight increase in preference for more traditional teaching. After all three flipped exercises, students of both genders reported an increased understanding of the topic after the flipped exercise, with female responses being slightly more positive than males.

Table 6
Student responses to questions relating to their individual experience

Question	After 1st flipped session				After 2nd flipped session				After 3rd flipped session			
	Male		Female		Male		Female		Male		Female	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
I am more motivated to learn this module using the flipped classroom approach.	5.78	0.97	4.83	1.72	5.44	1.24	4.75	1.00	5.44	1.24	4.40	1.06
I prefer the lecturer delivering the lecture rather than the flipped classroom approach.	3.44	1.01	3.94	1.02	4.11	0.78	3.88	1.02	4.33	1.50	4.67	1.29
Learning through flipped classroom increased my understanding in the topic.	5.22	1.30	5.61	0.92	4.78	1.20	5.31	0.87	5.11	1.17	5.53	0.74
The flipped classroom activity does not add value to my learning.	2.00	1.22	2.11	1.37	2.78	1.20	2.63	0.81	2.78	1.09	2.20	0.77

Table 7 outlines average student responses, again split by gender, over the three flipped classroom sessions to questions relating to collaboration, independent learning, and engagement. Students of both genders very strongly supported the notion that the

flipped classroom approach was engaging, supported them in becoming independent learners, and promoted collaboration amongst peers. There is no clear trend in relation to increasing or decreasing impact as students progress throughout the three sessions, and the students reported finding it more engaging and interactive than traditional lectures.

Table 7
Student responses to questions relating to their perception of flipped classroom in general

Question	After 1st flipped session				After 2nd flipped session				After 3rd flipped session			
	Male		Female		Male		Female		Male		Female	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
The flipped classroom exercise promotes collaboration amongst peers.	6.78	1.00	6.67	0.49	6.00	1.00	6.06	0.85	6.56	0.53	6.27	0.80
The flipped classroom approach supports students to become independent learners.	6.11	0.93	5.78	1.22	5.44	0.73	5.88	0.72	5.33	0.71	5.80	0.86
The flipped classroom is more engaging and interactive than lecture.	5.33	0.87	5.78	1.22	5.44	1.33	5.56	1.03	5.78	1.20	5.60	0.99

Table 8 outlines average student responses split by gender over the three flipped classroom sessions to questions relating to whether the flipped classroom approach should be adopted in other modules. Students of both genders were generally neutral to implementation after the first flipped exercise, however, the male students became increasingly negative in their response following exercises 2 and 3 (M = 2.67 after 3rd flipped exercise) whilst there was also a slight drop seen in the female students' response (M = 3.67). Students reported being more positive about the notion of recommending the approach to other teaching staff, however, this response was seen to become less positive between the 1st and 3rd flipped exercises.

Table 8
Student responses to questions relating to their recommendations for future action

Question	After 1st flipped session				After 2nd flipped session				After 3rd flipped session			
	Male		Female		Male		Female		Male		Female	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Other modules should be conducted through the flipped classroom approach.	4.11	1.27	4.00	1.28	3.78	1.92	4.38	1.54	2.67	1.66	3.67	1.80
I would recommend the use of flipped classroom to other teaching staff.	4.78	0.67	4.61	1.20	4.78	1.39	4.75	1.06	4.22	1.56	4.07	1.53

Table 9 outlines Spearman rank coefficients between questions relating to student motivation throughout the flipped classroom implementation and whether they would recommend a flipped classroom approach to other academic staff or prefer it in their own subsequent modules. Results indicate a number of positive correlations between students' motivation and both questions (other modules should be conducted through the flipped classroom approach and recommend the use of flipped classrooms to other teaching staff).

Table 9
Spearman rank rs between questions after all three flipped classroom exercises.

Question	I am more motivated to learn this module using the flipped classroom approach.					
	After 1st flipped session		After 2nd flipped session		After 3rd flipped session	
	Male	Female	Male	Female	Male	Female
Other modules should be conducted through the flipped classroom approach.	.17	.50	.59	.86*	.20	.55*
I would recommend the use of flipped classroom to other teaching staff.	.54	.57*	.90*	.66*	.58	.48

*Correlation is significant at the 0.05 level (two-tailed)

Spearman correlation tests were carried out to evaluate the perceptions of the students prior to the implementation of the flipped classroom approach and at various stages during the flipped classroom implementation. This is shown in Tables 10 and 11 and provided an understanding of whether there was a trend between students' perceptions prior to the implementation of the flipped classroom and their subsequent experiences during it.

Table 10
Spearman rank rs between pre-implementation questions and reported motivation to learn through the three flipped classroom exercises.

Pre-implementation Questionnaire question	Post-FC: I am more motivated to learn this module using the flipped classroom approach.					
	After 1st flipped session		After 2nd flipped session		After 3rd flipped session	
	Male	Female	Male	Female	Male	Female
I prefer to be active and collaborate with other students in class.	.11	.32	-.028	.16	.019	.16
I prefer to study alone.	-.073	-.17	-.32	.015	-.33	-.23
I prefer to work individually.	-.15	-.37	-.37	.12	-.74*	-.19

*Correlation is significant at the 0.05 level (two-tailed)

Results in Table 10 demonstrate that for both genders there is no correlation between students' preferences prior to the implementation and their motivation during the classes other than for their preference to work individually. For this characteristic, there is an increasingly negative correlation for males between their desire to work independently and their motivation as the progress of their experience, with the correlation becoming statistically significant after the third flipped session.

Table 11
Spearman rank rs between pre-implementation questions and students' preference for delivery through the three flipped classroom exercises.

Pre-Flipped Questionnaire question	Post FC: I prefer the lecturer delivering the lecture rather than the flipped classroom approach.					
	After 1st flipped session		After 2nd flipped session		After 3rd flipped session	
	Male	Female	Male	Female	Male	Female
I prefer to listen and not to participate in class.	.23	.57*	-.18	.20	-.20	.24
I prefer to study alone.	-.43	.21	.24	.15	.018	.13
I prefer to work individually.	-.14	.28	.51	.56*	.27	.59*

I prefer lectures to be delivered in person	.30	-.14	.17	-.012	.48	.26

*Correlation is significant at the 0.05 level (two-tailed)

Results in Table 11 compare initial student perceptions to their developing opinion on the question, "*I prefer the lecturer delivering the lecture rather than the flipped classroom approach*". It illustrates that for female students who reported that they prefer to listen passively in class there is an initial statistically significant correlation with their preference for traditional teaching approaches, however, this correlation decreases after increasing exposure to the flipped classroom approach. As female students gain experience with the flipped classroom approach there is also an increasingly positive correlation between their initial preference to work individually and their preference for traditional lecturers over the flipped approach. This response is not seen in the male students.

Discussion

Perceptions of student cohort prior to study

Student responses in the pre-questionnaire indicated that the students' desire for in-person active collaboration could lead to a positive response to the use of the flipped classroom approach. The bias between female and male students with respect to their preference for technology in their learning (M = 5.18 female, M = 4.11 male) could also indicate an expected preference for engagement and acceptance amongst female students in the cohort.

These results, along with those indicated elsewhere (such as Chuang et al., 2018; Kim, 2021; G. Lee & Wallace, 2018), showed that the students within this study exhibit varying preferences and these could impact the effectiveness of implementing a flipped classroom approach. Whilst in general, students in this study demonstrated perceptions and preferences which should lead to a positive response to a flipped classroom approach, the pre-flipped survey results also imply one potential barrier to acceptance. Students would be exposed to an increase in their peer-to-peer interaction, resulting in working at a pace no longer determined exclusively by themselves, which was something they indicated they preferred. There is no correlation between students preferring to study alone and preferring to work individually, which implies that students understood the difference between studying alone outside class and always working individually including during in-class sessions. In any case, the willingness to adopt technology and desire for in-person active collaboration indicates that the Bruneian students irrespective of gender were well placed to adopt and adapt to the transition from traditional lectures to a flipped classroom approach.

Impact of flipped exercise on students

Student responses towards the implementation of the flipped approach were undertaken in a clear and supportive manner. There was no obvious trend in students'

perception of the implementation as students progressed through the study and the conclusion drawn is that the students were positive about the implementation process throughout their participation in the flipped classroom exercise. Poor implementation of the approach could lead to a bias in the students' response, however, the indication here is that students' perceptions in subsequent flipped classroom exercises are influenced by the approach itself and there is no negative bias associated with the implementation of the flipped classroom exercises.

Analysis of students' experience of the flipped classroom approach indicated that whilst the female students found the instructions to be clear, easier to follow, and the pre-reading more helpful, they reported being less motivated to learn in comparison to the male students. Whilst both male and female students reported good levels of motivation, this higher motivation in male students is different from that reported by Tarhini et al. (2014). This increased male motivation is also somewhat counterintuitive given that females reported an increased perception than males that the flipped classroom learning increased their understanding and added value to the learning. Whilst the discrepancy between gender responses here and in Tarhini et al. (2014) could be a result of the different cultural settings, there are similarities in the educational system in both cultures given the close historical links between England and Brunei. In addition, the female students in this study previously reported a higher preference for technology in their learning than the male students, and their motivation progressively dropped as the students progressed through the flipped classroom exercises and their experiences varied. This is similar to that observed elsewhere for Wiki-based coursework (Hassell & De Focatiis, 2016) and the use of Google Docs in collaborative writing (Lee & Hassell, 2021) where increasing exposure to a new approach leads to a diminishing impact. As such, it is possible that this reduced motivation and the differences between the students' responses here and in the work by Tarhini et al. (2014) is not a result of the approach itself, but rather a psychological response to the reduced novelty of the activity or experience. This would call into question the influence of culture and gender in student uptake of pedagogical techniques, and rather imply that any correlation between these aspects is actually a correlation with the dominant personalities prevalent within these categories rather than the category itself. This would agree with the results reported by Chuang et al. (2018), Lee and Wallace (2018), and Kim (2021) where it is personal character traits rather than specific culture or gender which influence the students' response. Given these results, one implication to consider would be the implementation of a structured intervention to increase the acceptance and impact of the flipped classroom exercise, in a similar manner to the use of goal setting by Schippers et al. (2015) to close the gender achievement gap.

The results in this study indicate that the flipped classroom experience had a positive impact on the students, being engaging, supporting independent learning, and promoting peer-to-peer collaboration. Peer-to-peer learning and teaching have been demonstrated to have a multitude of benefits for students (Stigmar, 2016) and the results reported here indicate positive benefits for students in a range of soft skill areas. It is therefore surprising that students of both genders were increasingly negative towards the flipped classroom implementation in other modules as their experiences developed. This is again similar to the findings of Hassell and De Focatiis (2016), and Lee and Hassell (2021) during the implementation of other techniques in similar cultural settings, and further highlights the impact of increased exposure leading to a diminishing impact. Both

male and female students did not think that the flipped classroom technique should be implemented in other settings, with an increasingly negative perception with increasing experiences with the flipped classroom approach similar to findings reported by Vitta and Al-Hoorie (2020). The perceived contradiction in students' opinions above seems to be independent of pedagogical approach or culture and provides academics with a dilemma, as there seems to be a direct discrepancy between what the students report as developing engagement, interaction, and independent learning and what teaching approach students prefer. To further confuse the matter, the results illustrate that both male and female students would recommend the use of flipped classroom approach to other academic staff, with some instances of correlation between this and reported motivation. Whilst somewhat conjecture as no questions directly addressed this point, it is possible that students do not want to engage with techniques that put them in difficult or awkward situations irrespective of the positive impact they know these approaches bring. Another possibility is that engagement, collaboration, and development to become independent learners are all perceived as soft skills rather than core to the content of the modules, and that the students do not see the direct benefit to them in relation to their assessed learning. Further work is required to understand more fully why students are negative about further implementation and identify whether methods are required to reduce this resistance to this technique, or whether their response is a natural one caused by discomfort associated with being pushed into unfamiliar methods of learning. In either case, it is obvious that students have reported direct benefits to their development and the further pursuit of this approach to learning within Brunei has benefits.

The negative correlation found in this study for the male students between their motivation and Pre-FC questionnaire response to working independently could well be a result of their reliance on personal predispositions, with the female students placing more emphasis on ease of use of the system when deciding whether to adopt the system, as reported by Tarhini et al. (2014). Whilst inconclusive, it does indicate that for two samples having the same initial perceptions (as shown in Table 3), there is a gender bias in the impact that this perception has on subsequent students' motivation. This is different from the previous discussion on students' motivation and indicates that whilst some differences between the results reported here can be put down to individual personalities independent of gender, there are gender-specific learning approaches that can influence and skew students' perception and adoption of teaching approaches. Academics should be aware of both these when developing pedagogical approaches, it is important to accept and acknowledge that student cohorts comprise a wide range of personalities and learning patterns, and this should take this into account when developing teaching material.

The female students in this study also demonstrated over time a statistically significant correlation between their desire to work individually and their preference for traditional lectures. There was no similar correlation amongst the male students, and these findings somewhat contradict those presented in Table 9 which demonstrated a negative correlation in the male students between their desire to work individually and their development of motivation to learn, but not for the female students. Given the observation by Chen et al. (2019) that there is a strong influence of students learning strategies and cognitive styles towards the impact of a flipped classroom approach, alongside the preference by female students in this study to use technology in their learning, it is rather surprising that this has not had an obvious impact on the effectiveness of a flipped classroom approach to motivate and encourage the female students. The society within

Brunei demonstrates a very high social media penetration (Omar, 2020) and this willingness to access technology within their daily lives could imply a preference for adopting new techniques and technologies. The results of this study indicate that whilst there is a preference from some Bruneian students for the use of technology in their learning, with a gender bias towards female students, there is no corresponding increase in motivation associated with the implementation of a flipped classroom approach utilising technology. As such, knowledge or interest in technology is not in itself a reason for student acceptance of new teaching approaches which utilise technology.

What is clear from this study is that the students indicate that they found the flipped classroom approach engaging, promoted collaboration amongst peers, and supported them in becoming independent learners. There is limited evidence that the results presented in this study exhibit differences associated with the cultural background of the students, and instead, differences and trends are more likely to be the result of students' learning preferences in a similar fashion to results reported in other studies (Chuang et al., 2018; Kim, 2021; G. Lee & Wallace, 2018). Given the small sample size of this study, it is important to acknowledge that whilst initial student perceptions of the implementation of a flipped approach have been identified, a wider range of studies on the flipped classroom implementation over a wider range of subjects is required. This would both increase the students' sample size and hence increase the validity of the results, whilst also extrapolating to a wider range of study subjects and the potentially different student character traits associated with those subjects.

Conclusion and Implications

This study intended to investigate the effectiveness of flipped classroom teaching over three sequential sessions for higher education students within Brunei who had not been previously exposed to the technique. It captured qualitatively the impact of gender and culture on students changing perceptions of the technique as they developed their experiences with it. The pre-implementation questionnaire identified that students of both genders gave statistically similar answers to questions on preference for learning, with students showing a bias towards studying alone and working independently. The one discrepancy was for females to indicate a greater preference for utilising technology in their learning. Students of both genders reported being positive about the way the flipped technique was implemented in their studies, receiving clear instructions, helpful pre-reading materials, sufficient time in which to prepare for the tasks, and good lecturer accessibility during the sessions. After experiencing a flipped classroom approach, the students felt that the flipped classroom approach was more engaging and interactive than traditional lectures, supported them in becoming independent learners, and promoted collaboration amongst peers. These positive impacts, including enhanced experiences related to students' soft skills, indicate the positive impact that the flipped classroom technique had on students of both genders. Students reported being generally positive in relation to their motivation to learn, however, motivation for females was lower than that for males despite their preference for technology indicating that a prevalence of technology did not automatically lead to acceptance and impact of technology-based teaching approaches. Student motivation from both genders was seen to drop as their experiences with the flipped approach developed across the three sessions. There were no

obvious reasons for this, and no significant correlations between pre-implementation and post-flipped questionnaires could identify a rationale behind these results. Of concern for those interested in implementing different teaching methodologies, despite the range of positive impacts of the flipped classroom on students' learning during this study, students did not want to see it implemented in other modules. This reluctance to see it implemented elsewhere was found to correlate with students' motivation to learn during the sessions, and for males, this motivation was found to be increasingly impacted negatively over time by their initial preference to work independently. These results indicate that there are differences in the way Bruneian males and females experience and perceive the implementation of a flipped classroom approach within Brunei, and whilst there were responses that were different from those reported elsewhere in other cultures there was not enough evidence to draw conclusions based on culture alone. Instead, the results underline the strong positive impact that a flipped classroom approach can have in this academic setting, and whilst students' reluctance to embrace the flipped classroom technique in subsequent modules is a concern, it should not detract from the positive impact that implementation of the flipped classroom approach has on important educational skills such as independent learning. As such, this technique should be implemented on a larger scale within Brunei, and further work is required to understand further the impact over the long term on both genders and to provide a sound methodology with which to enthuse students to understand and champion this methodology for which they report a series of positive learning outcomes.

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