FLIPPED CLASSROOM IN HIGHER EDUCATION: HOW DOES IT IMPACT STUDENT ENGAGEMENT AND LEARNING SATISFACTION

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Abstract

This study aims to investigate the effect of FC towards student engagement and satisfaction in learning activities at the university level through experimental research with a random control trial for 10 weeks. Participants were allocated to FC (n = 20) and the control group (n = 20). There were main findings in this study. First, for male students, there were differences value in behavior engagement (p = 0.001, d = 0.81), emotional engagement (p <.001, d = 0.97), cognitive engagement (p < .001, d = 0.95) and satisfaction in teaching method (p <.001, d = 0.89), facilities in university (p < .001, d = 0.95) in the FC group at the pre-test and post-test. Whereas, in the control group, significant differences occurred in satisfaction towards facilities in university (p <.001, d = 0.98) but no difference found for other aspects. Second, for female students, there were differences value in behavior engagement (p = 0.003, d = 0.78), emotional engagement (p <.001, d = 0.88), cognitive engagement (p = 0.002, d = 0.73) and satisfaction in teaching method (p < .001, d = 0.93), facilities in university (p = 0.005, d = 0.72) in FC group at the pre-test and post-test stages. Whereas in the control group a significant difference occured in the behavior engagement (p < .001, d = 0.92) and satisfaction towards facilities in university (p = 0.002, d = 0.79). Thus, we emphasize that FC has proven effective in increasing the engagement and satisfaction of students at the university level.

Keywords: Flipped Classroom, Engagement, Satisfaction

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Introduction

The education system at the university level has involved sophisticated technology (Fadli et al., 2022; Hassan & Othman, 2021; Timotheou et al., 2023; Wang, 2023), due to todays requirement in education (Nurzhanova et al., 2024). Basically, technology has a positive impact on the learning process in university (Okoye et al., 2023). Data reported that technology such as smartphone, laptop (Haleem et al., 2022), Zoom Meeting platform, Webex (Jumareng et al., 2021), (Jumareng et al., 2022), and You Tube. All of these technologies could help in creating learning material to students. However, in order to ensure that all technologies can be implemented optimally during learning, an effective approach which according to current conditions is needed. Out of technology-based approaches models, flipped classroom (FC) turns out to be a trend and it is widely applied in the curriculum as a learning tool in several developing countries.

FC is an approach that requires learning activities to be carried out at home or outside the classroom then in the classroom (Han, 2022; Santos & Serpa, 2020; Kapur et al., 2022). Basically, FC has a learning concept that is more innovative than traditional learning, because FC presents a new breakthrough in todays education system, namely students can learn and gain knowledge independently at home through smartphone, laptop or computer technology (Låg & Sæle, 2019) in accessing various sources of information such as videos of lecture materials (Talan & Gulsecen, 2019), (Murillo-Zamorano et al., 2019), YouTube (Abdullah et al., 2019), or online learning sites (Julia et al., 2020). Based on their experience in study at home, the next day students students can discuss in a longer duration with the lecturer in the classroom (Limaymanta et al., 2021). According to Aljaraideh (2019), the main advantage of FC lies on the accessibility to prepare their study anytime and anywhere before face-to-face classes, so that students will have initial knowledge regarding the subjects that they will study. FC can provide student-centered learning (Hew & Lo, 2018; Martínez-Jiménez & Ruiz-Jiménez, 2020), because it is designed to encourage students to interact, ask questions to lecturers or classmates (Divjak et al., 2022). In addition, FC could foster responsibility and increase independence in learning (Fernández-Ferrer & Espinoza-Pizarro, 2022; Fornons et al., 2021). Previous research also reported and confirmed that FC has been proven to be a pedagogical tool in improving critical thinking (Akçayır & Akçayır, 2018), motivation (Ridwan et al., 2023), and student learning outcomes (Fadli et al., 2022). Despite the benefits generated by FC, it is currently unclear how FC can improve engagement and learning satisfaction at the university level.

Student engagement in learning activities is an important issue that obtain attention at the university level (Anuyahong & Pucharoen, 2023). Basically, learning engagement is a concept that describes students' willingness to participate voluntarily and actively in the learning process on campus (Wekullo, 2019; Boulton et al., 2019). Engagement in learning process is an important aspect that must be considered and developed, because it can be an important aspect that can determine their achievement in academics (Covas & Veiga, 2021). Student engagement in learning process covers three component concepts, namely behavior engagement to observe the level of interest shown by students in learning (Dubey et al., 2023), emotional engagement which is related to negative or positive sentiments from students towards learning activities (Cents-Boonstra et al., 2021), and finally cognitive engagement which expose students' efforts to implement their knowledge in understanding subjects (Schnitzler et al., 2021). Data from previous study reported that engagement was positively associated with academic achievement (Leslie, 2020; Stephenson et al., 2020). In addition, high student engagement is associated with school retention and student well-being (Bergdahl, 2022; Bergdahl & Nouri, 2020). Other research also reported that engagement is the main factor that help students to achieve optimal learning outcomes (Roy et al., 2023) , or conversely it can be a factor that cause decrease performance and drop out (Bond et al., 2020; Yang et al., 2022).

Learning satisfaction is the next issue that get attention at the university level, due to the effects of the presence of COVID-19 (Aznam et al., 2022; Suhandiah et al., 2022). Satisfaction can be described as a feeling of satisfy or dissatisfy towards the goals or desires (Hettiarachchi et al., 2021; Ramadhanu et al., 2019). According to She et al. (2021), students with a high level of satisfaction can be used as a parameter of lecturers' success in implementing teaching method in class. Apart from that, if the level of student learning satisfaction is low, it can be a reflection that the learning approach is less effective, tends to be traditional and boring and even no innovation (Aldhahi et al., 2022). Data from previous research reported that learning satisfaction is associated with high or low academic achievement (Prifti, 2022). Martin & Bolliger (2022), explained that satisfaction has been identified as an important factor for students, because it can influence motivation and graduation levels. On the other hand, satisfaction can trigger students to be actively involved in learning activities (Bismala & Manurung, 2021), and it can be an approach to minimize their low attendance on campus.

Although there had been extensive international research on FC (Agustini et al., 2022; van Alten et al., 2019; Asiksoy & Canbolat, 2021; Ay & Dağhan, 2023; Goedhart et al., 2019; Karaoğlan Yılmaz, 2022; Srichailard, 2023; Sojayapan & Khlaisang, 2020; Umar & Ko, 2022), but there was still a gap in previous FC research related to student engagement and satisfaction in learning process at the university level. Therefore, this research presents a novelty in terms of investigating the effect of FC towards the increment of student engagement and satisfaction in learning process at the university level through true experimental research with a 10-week randomized controlled trial design. This study aims to investigate the effect of FC on increasing student engagement and satisfaction at the university level through true experimental research with a 10-week randomized controlled trial.

Material and methods

Participants

This study involved students majoring in Religious Education, male (n = 30) and female (n = 32) at the Garut Institute of Technology (Indonesia). Participants were selected based on inclusion criteria, namely: (i) in a healthy condition and (ii) not participating other activities while the exclusion criteria are: (i) rarely present in the past 1 month. There was 40 out of 62 students, who were selected based on the inclusion criteria (Figure 1). Data was calculated using a priori power statistics with G*Power (v. 3.1.9.7). A sample size of at least 40 participants was required to have sufficient power (> 0.80) based on a chosen alpha of 0.05. Then students were allocated into the experimental group, namely FC (n = 20) and control group (n = 20) with random analysis (https://www.randomizer.org/). Data of age, height, weight and academic year of participants is presented in (Table 1).

Instrument

Engagement

The instrument that used to assess student engagement in learning process on campus was adopted from previous studies, namely the Student Engagement Schools Questionnaire (SESQ) (Boulton et al., 2019). This instrument has 10 questions from 3 indicators, namely: behavioral engagement (e.g., "I work as hard as I can"), emotional engagement (e.g., "I enjoy the lesson") and cognitive engagement (e.g., "I try to understand the lesson material as best as possible"). Participants answered all questions using a Likert scale from 1=strongly disagree to 5=strongly agree.

Satisfaction

The instrument that used to assess student satisfaction in learning was adopted from research by Wong & Chapman (2023). This instrument has 5 questions from 2 indicators, namely teaching method (e.g., "I am satisfied with how the lecturer explains the subject matter"), facilities in the university (e.g., "I feel satisfied with facilities in the university"). All questions were answered using a Likert scale from 1=strongly disagree to 7=strongly agree.

Design and Procedure

This true experimental research with a 10-week randomized controlled trial design was carried out from September to November 2023 (Ethics Committee of the Garut Institute of Technology (Indonesia) with number: 652/LPPM-ITG/2023). This research was carried out 3 times a week, namely on Monday, Wednesday and Friday at the Garut Institute of Technology (Indonesia). The first meeting was held on September 4 2023, all participants carried out a pre-test, by filling out engagement and satisfaction questionnaires from 09.00-10.00 am. The second meeting was held on 06 September 2023, the experimental group carried out the FC program while the control group only carried out non-FC (traditional) learning, the activities of both groups were carried out until 08 November 2023. The last meeting was on 10 November 2023, all participants carried out post-test by filling out engagement and satisfaction questionnaires from 08.00-09.00 in the morning.

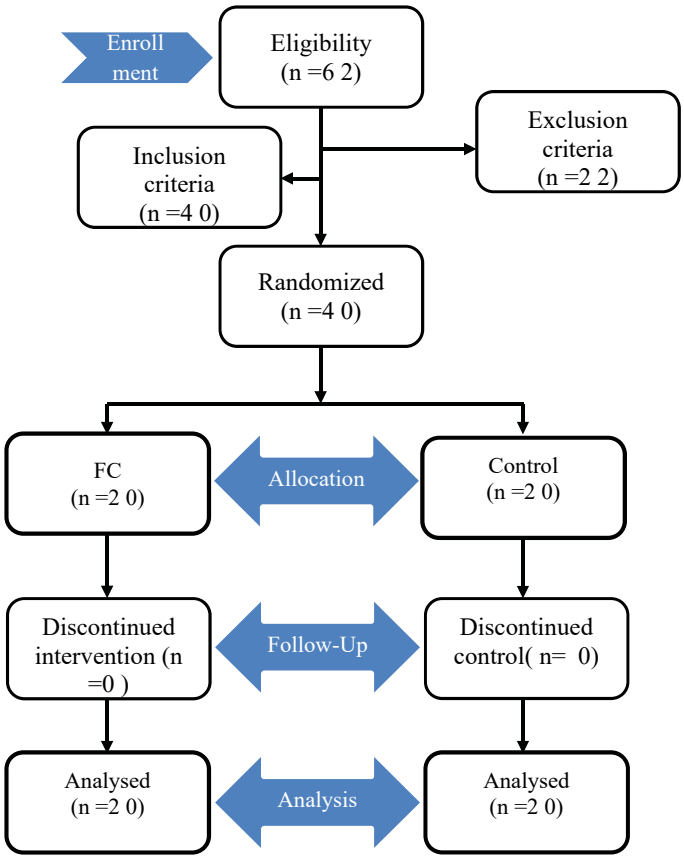

Figure 1. CONSORT diagram.

Table 1. Information on Participant Characteristics.

Characteristics	FC (n = 20)	Control (n = 20)
Gender		
Male	10(50%)	11(55%)
Female	10(50%)	9(45%)
Age (year)		
<18	9(45%)	11(55%)
19-20	7(35%)	6(30%)
21-22	3(15%)	2(10%)
23>	1(5%)	1(5%)
Height (cm)		
<150	1(5%)	0(0%)
151-152	2(10%)	3(15%)
153-154	6(30%)	5(25%)
155>	11(55%)	12(60%)
Weight (kg)		
<50	3(15%)	4(20%)
51-52	5(25%)	4(20%)
53-54	8(40%)	9(45%)
55>	4(20%)	3(15%)
Academic year		
1	10(50%)	13(65%)
2	5(25%)	3(15%)
3	3(15%)	3(15%)
4	2(10%)	1(5%)

FC Program

The FC intervention program was carried out in the morning during the lecture schedule at 08.00-09.00 am at the Garut Institute of Technology (Indonesia). The program was designed to facilitate students directly experienced learning through FC. This research was conducted in the 2023/2024 academic year for 10 weeks or 3 months. The detail of FC program activities is presented in (Figure 2).

Statistical Analysis

Descriptive Statistic (mean ± standard deviation) is presented in this study. Normality test via Shapiro-Wilk was assumed non-normal distribution. Non-parameteric analysis with the Mann–Whitney U test was chosen to test differences in engagement and satisfaction between the FC and control groups in men and women at the pre-test and post-test stages. The effect size (Cohen's d) was used in this research with the formula: trival: 0.00-0.19, small effect: 20-49, medium effect: 50-79, large effect: 0.80 > (Marques-Sule et al., 2023). All data were analyzed using the Jamovi v.2.3 tool and $p < 0.05$ was set as the significance level.

Results

Based on Table 2, for male in the FC group, there are differences in engagement scores related to behavioral engagement ($p = 0.001$, $d = 0.81$), emotional engagement ($p < .001$, $d = 0.97$), cognitive engagement ($p < .001$, $d = 0.95$) and satisfaction related to the teaching method ($p < .001$, $d = 0.89$), facilities in the university ($p < .001$, $d = 0.95$) in pre-test and post-test stages. In the control group, there are significant differences in satisfaction related to facilities in the university ($p < .001$, $d = 0.98$), but there are no differences for other aspects (Table 2).

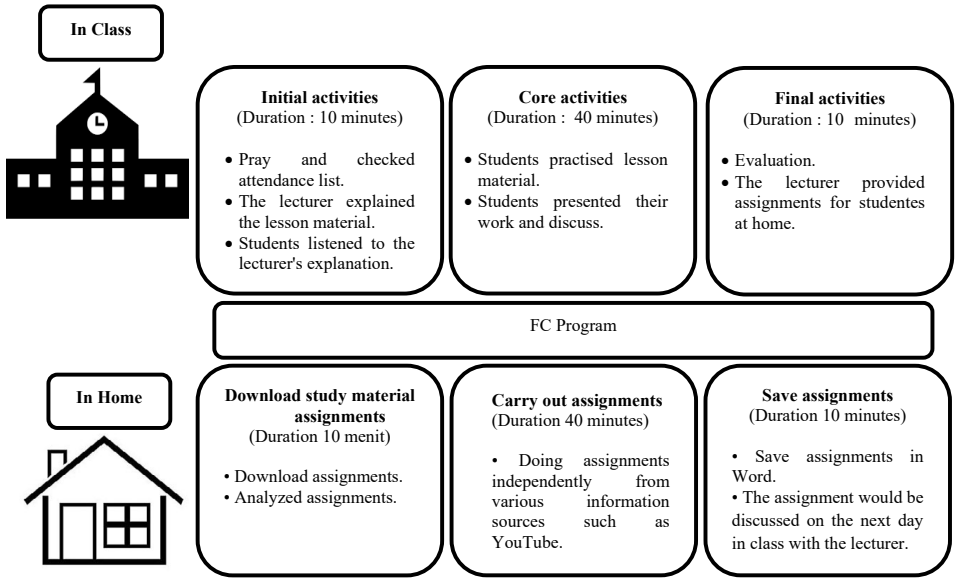

Figure 2. The conceptual FC program.

Table 2. Differences in engagement dan satisfaction between FC and control for males at the pre-test and post-test stages.

Variables	Stage	FC (n=10) M±SD	t	p	Cohen's d	Control (n=11) M±SD	t	p	Cohen's d
Student' engagement									
Behavioural engagement (score)	Pre-test	3.10±0.56	9.5	0.001*	0.81	3.10±0.56	40.5	0.399	0.19
	Post-test	4.40±0.69				3.40±0.69			
Emotional engagement (score)	Pre-test	2.70±0.67	1.5	< .001*	0.97	3.30±0.67	42.5	0.551	0.15
	Post-test	4.70±0.48				3.50±0.52			
Cognitive engagement (score)	Pre-test	2.50±0.52	2.5	< .001*	0.95	3.30±0.82	40	0.442	0.2
	Post-test	5.00±0.63				3.70±0.82			
Student' satisfaction									
Teaching method (score)	Pre-test	4.10±0.99	5.5	< .001*	0.89	4.70±0.67	39.5	0.415	0.21
	Post-test	6.30±0.82				5.00±0.81			
Facilities in the university (score)	Pre-test	4.30±0.82	2.5	< .001*	0.95	4.80±0.63	1	< .001*	0.98
	Post-test	6.50±0.70				6.80±0.42			

Note: M-Mean, SD-Standard deviation, FC- Flipped classroom. * p < 0.05.

Based on Table 3, there are differences in engagement scores related to behavioral engagement (p = 0.003, d = 0.78), emotional engagement (p < .001, d = 0.88), cognitive engagement (p = 0.002, d = 0.73) and satisfaction related to teaching method (p < .001, d = 0.93), campus facilities (p = 0.005, d = 0.72) for female in the FC group at the pre-test and post-test stages. Meanwhile, in the control group, significant differences occurr in behavioral engagement (p < .001, d = 0.92) and satisfaction related to facilities in the university (p = 0.002, d = 0.79), but no differences for other aspects.

Discussion

This study aims to investigate the effect of FC on increasing student engagement and satisfaction in studying at university level through true experimental research with a 10-week randomized controlled trial design.

There are two main findings in this study. First, the differences in engagement and satisfaction scores between pre-test and post-test in the male group after participating in the FC program. Meanwhile, in the control group, the difference only involved facilities in the university and no differences were found for other aspects. Second, the differences in engagement and satisfaction scores between pre-test and post-test in the female group after participating in the FC program for 10 weeks. Meanwhile, in the control group, there were differences in the behavioral aspects of engagement and satisfaction related to facilities in the university, but no differences were found for other aspects.

Based on these results, FC was proven better than control in increasing engagement and satisfaction of male and female students. This is because FC has a variety of learning programs which could not be provided in control (traditional), for example FC presents learning activities that involves technology (e.g., smartphones, laptops or computers) (Chen, 2021; Elian & Hamaidi, 2018; Cuetos, 2023) to search various information sources such as Google, YouTube, online learning sites (Abdullah et al., 2019;(Julia et al., 2020). In addition, FC provides student-centered learning, which encourage students learn independently at home to master the subject matter before face-to-face meetings in class (Ridwan et al., 2023), this is one of the factors that causes engagement (Meyliana et al., 2022), and high satisfaction among male and female students. A previous study also reported similar results, FC was applied to 160 students at a large university in Spain and the findings showed that FC had a positive effect on increasing student engagement in learning (Murillo-Zamorano et al., 2019). Apart from that, other research confirms that FC provides a very positive new experience in learning, which has an impact on a higher learning satisfaction level in students (Martínez-Jiménez & Ruiz-Jiménez, 2020; Chen, 2021). Basically, the positive things in FC are the main factors that can increase engagement and satisfaction in learning, for example FC can be carried out in class or at home (Mujtaba Asad et al., 2022; Srichailard, 2023), or outside the classroom (Karaoğlan Yılmaz, 2022), involving modern technology (Aljaraideh, 2019), and video (Ay & Dağhan, 2023; Limaymanta et al., 2021), student-centered learning (Fadli et al., 2022; Gu et al., 2022), longer duration for learning (Fornons et al., 2021; Sojayapan & Khlaisang, 2020), creating active learning (Abdullah et al., 2019; Limaymanta et al., 2021). On the other hand, research by Divjak et al. (2022), emphasized that FC could encourages students to actively ask questions, discuss or interact with lecturers or peers. Thus, this has the potential to increase student engagement and learning satisfaction from low to high.

Finally, the strength of this research is that it presents an FC program that provides students with more time to study, so that learning outcomes are achieved more optimally. However, this study is limited by the lack of various universities, this study only involved participants from the Religious Education department at one university in Indonesia. Future research needs to add participants from several universities in Indonesia or other countries.

Table 3. Differences in engagement dan satisfaction between FC and control for females at the pre-test and post-test stages.

Variables	Stage	FC (n=10)	t	p	Cohen's d	Control (n=9)	t	p	Cohen's d
		M±SD				M±SD			
Student' engagement									
Behavioural engagement (score)	Pre-test	2.60±0.84	11	0.003*	0.78	3.10±0.56	4	< .001*	0.92
	Post-test	4.20±0.91				4.60±0.51			
Emotional engagement (score)	Pre-test	2.40±0.51	6	< .001*	0.88	3.20±0.63	40.5	0.435	0.19
	Post-test	3.90±0.73				3.50±0.70			
Cognitive engagement (score)	Pre-test	2.30±0.48	13.5	0.002*	0.73	2.20±0.78	40	0.427	0.2
	Post-test	3.10±0.31				2.50±0.52			
Student' satisfaction									
Teaching method (score)	Pre-test	2.70±0.48	3.5	< .001*	0.93	4.60±0.51	46	0.772	0.08
	Post-test	4.20±0.63				4.70±0.94			
Facilities in the university (score)	Pre-test	3.80±0.78	14	0.005*	0.72	4.70±0.48	10.5	0.002*	0.79
	Post-test	5.00±0.66				6.10±0.87			

Note: M-Mean, SD-Standard deviation, FC- Flipped classroom.

Apart from that, there are Suggestions for the University and the Ministry of Education to organize a seminar/webinar or training program regarding the FC which aims to provide socialization and familiarize lecturers in the application of teaching all skills to students.

Conclusions

In conclusion, implementing FC for 10 weeks has proven to be effective in increasing the level of engagement and satisfaction in learning activities from male and female students at the university level. This research contributes information to lecturers and university staffs in all countries around the world about the importance of using FC in the learning process at the university level.

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