Harnessing Facebook flipped learning model for teaching and learning science in Islamic higher education

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Harnessing Facebook Flipped Learning Model for Teaching and Learning Science in Islamic Higher Education

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Abstract. Emerging technologies are omnipresent and transforming instructional models for science in higher education. They enable the creation and sharing of knowledge among students and between lecturer and students, allowing for interaction with distance participants (asynchronous interaction). This paper aims to observe the effectiveness of the Flipped Learning on Facebook (FLoF) model in enriching the perception of students towards flipped learning. This study followed the one group case study approach involving thirty students from the science faculty of the UIN Sultan Maulana Hasanuddin Banten. The results showed that using the Flipped Learning on Facebook (FLoF) model is effective in improving students' perception of flipped learning. Students developed a positive perception of the flipped learning approach by experiencing the FLoF model in learning science lessons. Prospects for using FloF model to enhance science teaching and learning need more research confirmations in other institutions.

INTRODUCTION

The last few decades have witnessed the growth of Facebook as a popular and cross-platform social media. Facebook has the potential to augment the efforts of instructors and learners because it simplifies learning and increases the worth of education [1], implicating learners vigorously entangled in doing on diverse tasks, distributing learning materials, communicating and cooperating actively in group [2], conducting multitasking [3], serving a flexible instructional process, raising communication in between [4], furnishing more occasion for learners to convey the message and work closely to construct their knowledge and extend their contemporary ability to subsist and study via group [5]. In addition, Facebook does outstandingly good in enlarging teamwork among all type of collaborators [6].

Based on the results of an earlier study, a large number of students of the Biology program course and lecturers at UIN (State Islamic University) Sultan Maulana Hasanuddin (SMH) Banten Indonesia, own Facebook accounts and use mobile devices to access it. However, the usage of social networks was only limited to information, including information concerning educators, instructional material, and other academic information.

Moreover, if it is well managed, Facebook encourages collaboration among learners. Regrettably, the internet that has been prepared for many years in the campus has not been utilized for educational aims optimally by combining traditional learning models by online as one of the current obstacles [7] as recommended by as a university that makes the next professional educator for teaching science has to meet the requirements including facilities that support technology-based learning [8] gives reasons to be a success today and next, learning from well-prepared lecturer should accept ongoing learning, adjust, and transform, and solve complex problems with colleagues collaboratively.

Lecturers are demanded to enhance the art of collaboration, pay attention to learners, use formative and summative evaluation, and encourage supervision of learners' self-learning. Currently, the role of educators is as a facilitator, leader of students to build, produce, analyze, evaluate, synthesize, and share knowledge. Technology is the center of the study of students. Their expectations are high in learning, choosing instruments, and conditions that suit their needs with up-to-date views on how to move them for learning [9].

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Literature Review

Instructional Model for Teaching Science

Models of Instruction are based on learning theory, long term learning aim, context, content, classroom management, dealing with the strategy for teaching, process verification, and the student learning evaluation [10] define a model of instructional as "a plan or pattern that can be used to shape curriculums (long-term courses of studies), to design instructional materials, and to guide instruction in the classroom and other settings". An instructional model should be used for an all instructional unit and covers all of the planning, design, implementation, and evaluation functions for that unit.

Instructional models have strong theoretical foundations and have undergone much research in their development and implementation. Most teaching models have been initially developed for use in classrooms, for outcomes primarily in the cognitive and affective domains. Several models have also dealt with the effectiveness of guided discovery-based learning materials on biology subjects in class XI IPA and Model Blended Learning for biology program [11], experiential learning with moodle [12], and so on.

Instructional Models as Coherent Plans for Teaching and Learning

To get a variety of outcomes of all domains and to overcome the various abilities of students, biological education lecturers need to know and use different instructional models by training activities to meet the needs of the lecturer in developing learning innovations [13]. The most effective lecturer should be familiar with each appropriate instructional unit which is developed with embedding employability skills into competency-based learning modules [14]. A lecturer can select and use specific content such as books with exciting text, graphics or images, video, audio, and animation for a plan each model of instruction and a suitable time to assist students in learning most effectively [15].

Blended learning (BL) has been a transformation in education in the 21st century. The Flipped classroom is originated from blended learning rotation model. The flipped classroom design principles as proposed [16] are (i) giving time for students to get exposure before class; (ii) providing a stimulant for students to get ready for the class; (iii) giving a mechanism to assess student understanding; and (iv) giving higher-level cognitive activities in-class activities.

In the contemporary study, these foundations were particularly picked up to prepare the lesson plans; videos contained sample biological lessons and additional instructional materials are conveyed to the students via Facebook one week before each face to face class, so that they had adequate time to study and practice before class-meeting. Facebook serves for posting announcements and the lecturer's feedback on the questions of students if they had any trouble connected to the lessons.

Research on the Flipped Model and Facebook

Review of some of the research on some subjects has concluded that flipped classroom has indicated to encourage the motivation of students, supports active learning, and learning performance in many disciplines [17]. However, factual researches about the perceptions of students and the flipped classroom effectiveness have been under examination until the present. In an attempt to pick up the outcome of the flipped learning on strategies of students' learning, a study noticed that major learners appreciated accessible recorded lectures and a feeling of raised activities when engaging in face to face activities [18]. There have also been several studies on the Facebook platform found recently. A study was conducted on the use of Facebook impact at the UIN SMH Banten, Indonesia public university students [19]. The result pointed a strong positive association between intensity of using Facebook and academic achievement.

Mostly, flipped learning is an ingenious and attractive instructional method that has been studied and executed in science teaching and learning globally. Nevertheless, in the circumstances of Indonesia mostly and specifically in the UIN SMH Banten, flipped learning is understudied and entirely new. By the opposite conclusion of prior research on Facebook effectiveness as a medium for educational mark, contemporary research shows significant.

Objectives of the Study

The main objectives of the study was to determine whether students' perceptions of flipped learning changes after experiencing FLoF model for a series of learning activities.

METHOD

This study employed a One-group pretest-posttest design following existing rules of R & D approach of the Borg and Gall model which involves: research and collecting information, planning, developing a precursory form of product, early field trials, revising the main product, main field experiment, reviewing an operational product, operational field testing, last product revision, and dissemination and implementation.

The research sample consisted of 30 students who did not have the flipped learning experience of the science faculty of UIN Sultan Maulana Hasanuddin Banten. Respondents were given treatment for eight classes using the FloF model as the prototype of this research product.

Pre-test and post-test were administered before and after treatment using the questionnaire adopted from Hsieh et al. to poll students' perceptions of the FloF model in terms of four constructs [20]. This questionnaire consists of 14 items on a five-point Likert scale addressing four constructs of perception towards flipped learning experience namely, motivation, effectiveness, engagement, and overall satisfaction. The response scores are ranged within 14 to 70, carrying *strongly disagree=1, disagree=2, neutral=3, agree=4, strongly agree=5*.

RESULT AND DISCUSSION

Results

This research resulted in The FLoF learning model as shown in Figure. FLoF learning model is implemented inside and outside the classroom and consists of six stages. Three stages are carried out in the class and the other three out of the class.

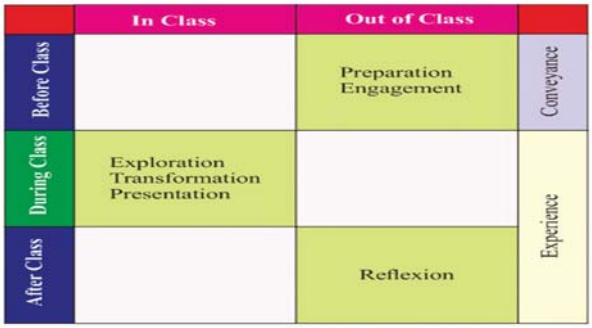

FIGURE 1. The FLoF Model

Phase 1. Preparation: The lecturer creates a class group on Facebook and ensures that all students join the group. Next, the lecturer assigns the students into small discussion groups. Phase 2. Engagement: Lecturer provides materials to groups on Facebook in various formats. Lecturers use the event features provided on Facebook to upload content for each meeting (weekly). The lecturer also gave the topic in each session and gave students access without having to make requests. In this step, the lecturer also participates in the student group, which is posted automatically by Facebook every time they visit the group. Phase 3. Exploration: The lecturer answers every question asked by students, explaining to them the problem discussed. Phase 4. Transformation: Students conducted group discussions. This way, students who originally have low achievements will eventually be able to increase their performances because of the transformation process from students who have high achievements. Phase 5. Presentation: Each group presented the results of the discussion. When one group makes a presentation, the other group observes, examines, compares the results of the presentation, and responds. Phase 6. Reflection: Each group discussion provided answers to questions that were equipped with links/sources of references that can be learned by friends. Via Facebook. Each student makes a self-assessment of the discussion they have done. The result of the pre-test and post-test indicates the effectiveness of the FloF model are as presented in Table 1.

TABLE 1. The averages of students' learning outcome on pre-test and post-test

	Pre-test	**Post-test**
Mean	59.92	72.50
N	30	30
Std. Deviation	5.06	5.34
Std. Error Mean	0.92	0.97

Table 1 shows the descriptive statistics of the group involved in the study. The results indicated a sharp increase (mean difference=12.58) in the perception of flipped learning after exposure to FLoF based learning instruction during eight classes. A t-test was carried out to find any statistical significance in the mean difference.

TABLE 2. The one-sample t-test

	Test Value = 30					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Posttest	4.122	29	0.000	1.73333	0.8732	2.5934

Table 2 shows based on the results of the paired-sample t-test. It is evident that the mean difference of pre-test and post-test is statistically significant at $p < 0.05$ level {t-value=4.122, df=28}. Therefore, it can be ascertained that the FLoF model is significantly effective in improving students' perception of flipped learning.

Students' perception towards flipped learning through analyzing the response of each statement of the questionnaire given to students after the intervention with The FLoF Model is shown in Table 3.

TABLE 3. Descriptive statistics of the item responses in the perception of a flipped learning experience

	N	Minimum	Maximum	Mean	Std. Deviation
MeanFLoF	30	4.56	3.63	4.13	.22
Valid N (listwise)	30				

Based on the data in Table 3. The average score of perceptions of students in the questionnaire is M = 4.13. This result shows that students have a positive bend with the flipped learning, both in the motivation, effectiveness, involvement and overall satisfaction categories. Descriptive statistics of the item responses in each of the four constructs is figured in Table 4.

TABLE 4. The students' perceptions on the flipped learning (post-test data)

	N	Minimum	Maximum	Mean	Std. Deviation
Motivation	30	3.43	4.67	4.1543	0.28043
Effectiveness	30	3.67	4.90	4.2200	0.34452
Engagement	30	3.50	4.27	3.9927	0.17677
Satisfaction	30	3.67	4.87	4.1447	0.27154
Valid N (listwise)	30				

Table 4 shows that most participants felt motivated to learn with the FloF model with an average score of 4.154 out of 5. The highest value (M = 4.22) indicated that the perceived effectiveness of flipped instruction was most prominent among the students.

This shows that students consider the material provided before learning in the form of video, audio, and other electronic files to provide knowledge for the readiness of learning that will be carried out face to face in class. In addition, learning activities can be more focused on activities that deepen their understanding of learning material, both through discussion, transformation, and presentation. Although getting the smallest value is 3.99, students showed positive responses to their involvement in learning, especially in discussion and collaboration activities and reflection where both lecturers and students evaluate the whole process and the results they have gained during learning. Overall, students showed their satisfaction with the FLoF model which they found very useful and helped them understand the lesson better.

Discussion

Recently, the development of ICT has been dramatically used to increase the effectiveness of learning by enriching the learning experience of students through online, one of which is flipped learning. Flipped learning combines the power of face-to-face teaching where the role of lectures in class is enriched by the power of the internet which can provide easy and fast access to information. Through the combination of the two learning methods, the limitations of traditional learning have been transformed into advantages where simultaneously, the offline-online model approach provides learning experiences everywhere, both in terms of sharing information, discussing, and collaborating so that the classroom is transformed into a dynamic and interactive learning environment.

The FLoF model is found to be effective in improving student perception of flipped learning. Also, the students showed a very positive perception towards the FLoF model, in all four constructs, i.e. motivation, effectiveness, involvement, and satisfaction. The results of this study are compatible with most other researchers who experimented

with this method who found a positive effect of flip learning on science academic achievement and attitude, individualized learning and increased teacher availability, self-paced, more self-directed, and motivation and engagement.

The present researcher observed that most participants appreciated the elegance of the FLoF model, which enables them to access material simply and vigorously on the Facebook platform anytime and anywhere, even as much as they wanted. With the FLoF model, students got lessons via videos that were interesting, lively, and authentic at home. As a result, they became more enthusiastic and motivated to learn. The FLoF model helped prepare and understand lessons more effectively so that they are more satisfied and involved in-class activities.

Facebook is an environment where social interaction is free, straightforward, and user-initiated; thus, Facebook can serve educational purposes. Salameh conducted the survey reports and found a positive attitude of students on Facebook as a potent learning platform [21]. This study found that students have a positive perception of the use of Facebook in learning. The results of this study are compatible with other studies that show that the use of Facebook in learning can enhance learning, encourage collaboration, actively involve students in learning, facilitate learning in the form of the ability to share, connect, participate, increase student involvement and performance, provide expertise in multitasking facilitating teaching and learning processes become more flexible and cost-effective [1–6].

Generally, students have a very positive perception of the FLoF model in learning science lessons that emphasizes integrating the potential of information and communication technology into learning, especially the potential for speed, ease of access, cost-efficiency, and the ability to provide space for interaction for discussion, collaboration, and reflection. Prospects for using Facebook and other social media need of research confirmations, and the possibility of Facebook use to enhance science teaching and learning.

There are a few limitations of this study's lack of internal validity related to testing using the same questionnaire in pre-test and post-test. The study could have covered more students, including creating a control group to more precisely explore the effectiveness of the FLoF model in enriching perception towards flipped learning.

CONCLUSION

Flipped classroom combines the power of traditional learning (face-to-face instruction) and the power of online learning through internet technologies. The effectual amalgamation of these two modes reduces the limitations existing in the traditional learning setup.

The results of the current study have shown that introduction of the FLoF model resulted in students' science learning experiences in a better way and enriched their perception towards flipped learning. This also holds prospects for further investigations on using FloF model to enhance science teaching and learning in other institutions as well as other academic disciplines including language, humanities, and social sciences.

REFERENCES

1. I. T. Awidi, M. Paynter, and T. Vujosevic, *Comput Educ* **129**, pp. 106–121 (2019).
2. P. F. D. Ractham, *44th Hawaii International Conference on System Sciences*, pp. 1–10 (2011).
3. J. Lam, *Int J Innov Learn* **21**, pp. 449–466 (2017).
4. R. Ventura and M. J. Quero, *Procedia - Soc Behav Sci* **83**, pp. 1032–1038 (2013).
5. K. Shraim, *Int J Emerg Technol Learn* **9,** pp. 25–31 (2014).
6. S. Roodt, C. de Villiers, and Joubert, *Int J Innov Digit Econ* **3**, pp. 10–24 (2012).
7. P. I. W. B. Wuisan, *IJRTE*; 8: 673–8 (2019).
8. Zurweni, B. Wibawa, T. N. Erwin, *AIP Conf Proc* (2017).
9. J. Rahmi and B. K. Wibawa, *Int J Psychosoc Rehabil* **24**, pp. 2958–68 (2020).
10. B. Joyce and M. C. E. Weil, *Models of Teaching*. 9th ed. (Pearson, 2015).
11. M. Sari, *Ta'dib* **17**, pp. 126–136 (2014).
12. A. Asip, B. Wibawa, and A. Idris, *International Conference Primary Education Research Pivotal Literature and Research* **303**, pp. 277–285 (2019).
13. W. B. Leonard, *Univers J Educ Res* **8**, pp. 2064–70 (2020).
14. Surono and Z. W. B. Syahrial, *Int J Adv Sci Technol* **29**, pp. 3745–60 (2020).
15. Awaludin, B. Wibawa, and M. Winarsih, *Int J online Biomed Eng* **16**, pp. 109–127 (2020).
16. C. J. Bonk, *International Journal of Emerging Technologies in Learning* **10**, (2015).
17. B. R. Stockwell, M. S. Stockwell, M. Cennamo, *et al., Cell* **162**, pp. 933–936 (2015).
18. S. Kardipah and B. Wibawa B, *TechTrends* **64,** pp. 507–513 (2020).
19. Jamridafrizal, B. Wibawa, and N. Ibrahim, *Int J Recent Technol Eng* **8**, pp. 151–158 (2019).
20. J. S. C. Hsieh, W. C. V. Wu, and M. W. Marek, *Comput Assist Lang Learn* **30**, pp. 1–21 (2017).
21. Z. Salameh, *J Educ Pract* **8**, pp. 1–6 (2017).