

The Effect of Instructor Metacognitive Scaffolding on Students' Learning Performance in Facebook Learning Environment

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ABSTRACT

Learning in online environment without the presence of an instructor to provide assistance and guidance may challenge the students to keep engage and stay focus on their learning goals especially in a social media learning environment such as Facebook. Although learning in Facebook is students-centred, the presence of instructor to provide metacognitive scaffolding to encourage them to involve in learning regulation is important for better academic performance. The present study sought to address the effect of instructor metacognitive scaffolding on students learning performance in Facebook learning environment by adopting pre-experimental research design. A Facebook group was introduced to thirteen undergraduate students in their Instructional and Learning Technology course. Data were collected through online observation and by conducting pre-and post-learning performance tests. It was found that instructor's metacognitive scaffolding that focuses on the process of learning had a significant relationship with students' learning performance and that instructor metacognitive scaffolding has an effect on students' learning performances. Students were able to focus on learning with the guidance of instructor and through focusing in learning and thus they were able to perform better in their academic achievement

Keywords

Metacognitive scaffolding, Facebook, Learning Performance

Introduction

Social media plays an important role in today's society encompassing learners as one of its users' population. Learners are heavy users of various popular social media platforms that include Instagram, Facebook, Twitter, and many others. There are only a few studies conducted so far which have indicated that the integration of social media can increase learners' participation in education which can lead to a better academic performance (Junco, Heiberger, & Loken, 2011). According to McLoughlin and Lee (2010), if social networking tools are used correctly, these tools can transfer control of learning to learners and encourage learners-centred activity while increasing learners' learning engagement through social network. Facebook is one of the most popular social media sites that is commonly used by learners with a large proportion of the time spent on Facebook is used for social interaction (Bicen and Cavus, 2011). Nowadays, instructors have begun to utilize Facebook as an educational tool for teaching and learning process. Instructors who use Facebook as an educational tool foster a positive relationship with their learners (Mazer, Murphy & Simonds, 2007). Social media platforms allow instructors to indirectly step into learners' world and encourage learning. However, instructors who use Facebook as an educational tool are equipped with insufficient guidance on how to provide metacognitive scaffolding for learners to enhance their learning performance.

Problem Background

Student in the current generation are more interested and attracted to social media which is one of the most popular tools for social interaction and communication. The emergence of social media brings lots of changes in communication method and the daily life routines of people. Most of the face to face interaction is replaced with online

interaction via technology gadgets and tools (Tiryakioglu, 2011). Facebook are one of the most popular social media sites that been widely used by students across globe. Facebook is not only popular among learners but also among instructors where they use social media as teaching tools. Facebook was designed mainly to create an interaction among the user, where the Facebook provides platform for people to share information, have a social interaction and create a bond with other people who work, study and live around them (Wang, Lin, Yu, & Wu, 2013).

In Facebook, users can express themselves through creating an online profile where their friends can view the profile and leave a comment on one another pages, the user also able to join in in specific group tat share same interest, share information, get updated news and engage on other online activities. Not only for social interaction, Facebook also been used for teaching and learning process by students and instructor for communication and share resources. According to Alexander (2006) social media such as Facebook is able to create a personalized and social learning experience which supports knowledge development through social knowledge environment and learning environment. As we can see social media are being used for personal use and also for educational used where schools are using to stay connected with students and student using the online environment for learning. Social media cannot be a replace for the traditional teaching method (Kalasi, 2014) but it should be adapting and incorporate with the technologies such as Facebook, You Tube, Twitter, Blog in learning environment so that the access to the information will be wider and global. Social networking apps and tools have some features that support social interaction in many ways such as creating awareness of the presences of other; establish relationship in group or individual and sharing experience publicly or privately into closed groups (Dabbagh & Reo, 2011).

Even though there is a lot of positive impact that social networking sites such as Facebook offer but there is undeniable negative impact about using social networking in education such as confidentiality, misuse of information and leading students to non-educational activities. Other than this some research shows that the social media such as Facebook have its negative effect on academic performance (Kirschner & Karpinski, 2010) while other study indicate that the integration can increase student motivation and involvement in education (Junco, 2012) and (Junco et al., 2011).

Even in self-centered environment such as Facebook environment, instructors involvement are needed for provides guidelines, but some studies indicate that instructor are using social media for just communicating with student and lack of guidance to provide student scaffolding to enhance their learning performance and promotes self-regulated learning learners (Mazer et al., 2007). According to Berent and Bugbee (1993), learners that did not obtain any kind of feedback or assistance from instructors regarding their progression are unable to pledge metacognitive processes and their mission to complete a task are not motivated. This is because learning in social media can cause distraction to students and the over freedom learning environment can lead to student poor performance.

However the potential of Facebook for teaching and learning remains because schools and educators can use the social network advantages through a proper guidance and positive uses (Tiryakioglu, 2011). Hence, this study is conducted to find the effect of instructor metacognitive scaffolding on students learning performance while learning in Facebook to better understand the importance of instructor roles in social media learning and guidance on how to utilize instructor metacognitive scaffolding mechanism to help students build their learning performance.

Research Objectives

This research aims at the following:

- To identify the relationship between instructor metacognitive scaffolding and learning performance in Facebook learning environment
- To determine the effect of instructor metacognitive scaffolding on learning performance in Facebook learning environment

Research Methodology

Research Design

The aim of this study is to investigate the effect of the instructor metacognitive scaffolding on students learning performances in Facebook learning environment. This study applied one group pre-experimental research design where participants took part in pre-tests, intervention and post-test measures.

Participants

Participants in this study were selected based on convenience sampling, which is a non-probability sampling method that depends on the data collection from the population member that is available to participate in study. Participants were thirteen undergraduate students who enrolled in Instructional and Learning Technology course. Ten out of thirteen participants have a Facebook account but they have no experience in using Facebook for formal education purposes.

Instructional and Learning Technology course is a course that presents the principle and concept of educational technology as well as teaching the students on how to utilize the instructional media from convention to up-to-date digital media in teaching and learning. It was a 14-week face-to-face course offered to first year student teachers in a university.

Instrumentation

To measure students' learning performance learning performance tests set was used in the study.

Learning Performance Test

Learning performance test set consists of pre-performance test and post-performance test. The tests set were used to measure students' learning performance upon learning with Facebook. The tests set were designed to cover the topics in Instructional and Learning Technology course. Validation of the tests set was carried out by the course experts and the reliability of the tests were found to be reliable with $r = 0.78$.

Intervention

Metacognitive Scaffolding Script

There are seven instructors metacognitive scaffolding mechanism for online discussion in introduced by Reingold, Rimor, & Kalay (2008) suggested to the course instructors as shown in Table 1. These scripts were presented to the instructor of the course to assist them in giving scaffolding during students' learning in Facebook.

Table 2. Metacognitive Scaffolding Mechanisms script for learning in Facebook

Code	Instructor's Metacognitive Scaffolding Mechanism	Example
MC1	Presenting rationale for task and activities	<i>This task will help you to design graphic by using a suitable graphic design principle. By doing this task, you will have a better understanding on how this principle has been used in the real world.</i>
MC2	Presenting the relationship between reading items, course objectives, and tasks	<i>Please share about the topic that has been discussed by the lecturer in class.</i>
MC3	Supporting reflective writing	<i>Thank you for your feedback. and please continue on sharing your information</i>
MC4	Discriminating between conclusion/fact/ opinion/hypothesis	<i>Mind to share with us the advantages and disadvantages of...</i>
MC5	Focusing on the process of learning	<i>Can you elaborate more on the content of the video that has been shared</i>

MC6	Encourage relationships among participants	<i>Please give your opinion about your friends' work</i>
MC7	Supervising text comprehension	<i>Can you state what are the strategies that have been shared in this video and why do you think that it is the best one?</i>

Facebook Learning Task

There were four tasks designed for students to learn with Facebook learning environment throughout the experimental period. Each task is created based on each topics in Instructional and Learning Technology. The students had to solve or discuss the tasks individually using Facebook learning environment. They had to complete all the given tasks before they could participate in the post-performance test session. The Facebook learning tasks are the followings:

- Task 1: Students have to snap a picture of any kind of graphics (analogy, arbitrary, representation) it can be poster/banner/menu card/ or any other graphic design that student come across anywhere and share it in the Facebook page wall. Then student have to elaborate on what type of graphic design principle that been used and justification how they used it and what the improvement that can be done on the shared design. Other member in group has to give opinion or any addition information about the design principle used.
- Task 2: In a group of 3 to 4 students, students have to create a slide presentation (Max 5 slide) for a small topic from selected subject. Then a poll will be created in Facebook, the student will be given 2 days after the presentation to vote for best slide presentation depend on the given rubric. Then the group has to share the slide in Facebook page so that other group member will give opinion how to improve the slide. Student can tag other group member when they giving suggestion to that specific group.
- Task 3: Students have to share teaching and learning materials in video format and it will be shared in Facebook page by the instructor. The video is about how the teachers apply 21st century learning media in teaching and learning method. The video must contain the media or learning strategic that can be applied in 21st century learning.
- Task 4: A poll was created on Facebook page containing a list of available Instructional Material and the students have to vote for Instruction material that they think is most suitable for teaching and learning process in 21st century learning. The poll was available for 2 days. Next, polling result was published and students have to give justification why a certain instruction material gets higher vote compared to the others. Students can discuss about the pros and cons of the Instructional material and give opinion if the instructional materials are still relevant for 21st century learning.

Data Collection

Starting from the first week till tenth week, the instructor and participants participating in the study interacted with each other using Facebook Group page outside the classroom. Before participants started the first task, they were given the pre-performance test to identify their knowledge about the course. Then, the participants carried out four Facebook tasks and all the discussions, information and guidance regarding activity were given by the instructor which took place in Instructional and Learning Technology Facebook Group. During the experimental period, all the discussion, comment and information is periodically observed to analyze the whether the interaction is based on the metacognitive scaffolding mechanism that prompt by instructor in Facebook Group.

After the instructor and students completed ten weeks of experimental period using Instructional and Learning Technology Facebook Group, the post-performance test is conducted to identify their learning performance upon receiving instructors' metacognitive scaffolding that took place in Facebook learning environment.

Results and Findings

The Relationship between Instructor's Metacognitive Scaffolding and Students' Learning Performance

The frequencies of metacognitive scaffolding as well as the students' performance test scores were collected, and correlation analysis was carried out to determine the relationship between instructor's metacognitive scaffolding and learning performance.

Table 1 presents the distribution of mean scores for pre-performance test and post-performance test. The finding indicated that there is a huge difference between pre-and post-performance tests' mean scores indicating that the students performed better after learning in Facebook learning environment.

Table 1. Descriptive Statistic for Performance Scores and Frequency of Metacognitive Scaffolding ($n=13$)

Students	Pre-Performance Test Score	Post-Performance Test Score	# of Metacognitive Scaffolding
S1	6.00	21.50	9
S2	10.00	20.50	11
S3	13.00	27.00	10
S4	5.00	18.00	11
S5	11.00	13.50	10
S6	3.00	18.00	11
S7	6.00	16.00	9
S8	9.00	19.00	10
S9	8.00	21.00	10
S10	5.00	16.00	9
S11	3.00	10.00	9
S12	15.00	22.00	9
S13	5.00	14.00	10
Mean	7.66	18.19	
Std. Deviation	3.78	4.41	

Correlational analysis on students' post performance test scores and frequency of instructors' metacognitive scaffolding received is shown in Table 2. Findings show that only one instructor's metacognitive scaffolding mechanism has a correlation with learning performance which is MC 5, apart from MC 2 and MC 4 which were inter-correlated. All the other metacognitive scaffolding types were not related to learning performance. There was a strong and positive correlation between MC 5 (Focusing on the process of learning) and students' learning performance, which was statistically significant ($r=0.63, p=0.02$).

Table 2. Correlation between Metacognitive Scaffolding and Students' Post-Performance Test Score

	MC1	MC2	MC3	MC4	MC5	MC6	MC7
Performance Test Scores	0.286	-0.060	0.217	-0.089	0.625*	0.225	0.434
MC1	1	0.267	0.147	-0.433	0.312	0.083	0.123
MC2		1	0.294	-0.617*	-0.071	-0.267	.033
MC3			1	-0.339	-0.039	-0.147	-0.217
MC4				1	-0.386	-0.192	0.178
MC5					1	0.267	-0.033
MC6						1	-0.123
MC7							1

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

There is a strong relationship between MC 2 and MC 4, which was statistically significant ($r=0.617, p=0.025$). MC 2 presented the relationship between reading items, course objectives, and tasks while MC 4 involved discriminating between conclusion/fact/opinion and hypotheses. Both of these mechanisms focus on helping students to differentiate learning between facts, opinion, conclusion, reading item, course objective, and also tasks. These scaffolding mechanisms helped the students to recall their learning in class and elaborate more on topic learned.

Generally, these findings show that instructor’s metacognitive scaffolding that focuses on the process of learning plays a role in students’ learning performance. Students were able to focus on learning with the guidance of instructor and through focusing in learning; they were able to perform better in their academic achievement.

The Effect of Instructor’s Metacognitive Scaffolding on Students’ Learning Performance in Facebook Learning Environment

To determine the effect of instructor’s metacognitive scaffolding on students’ learning performance in Facebook learning environment, Wilcoxon sign rank test was conducted. The result indicated that there was a significant difference between pre-and post-performance test scores ($p < 0.05$, $z = -3.18$) suggesting that instructor’s metacognitive scaffolding had an effect on students’ learning performance in Facebook learning environment. Cohen’s effect size value of 0.624 suggested a moderate practical significance that the intervention had on students’ performance test (Becker, 2000).

Generally, the frequencies of metacognitive scaffolding that students received vary according to tasks. The pattern of metacognitive scaffolding that the students received in each task is illustrated in Figure 1.

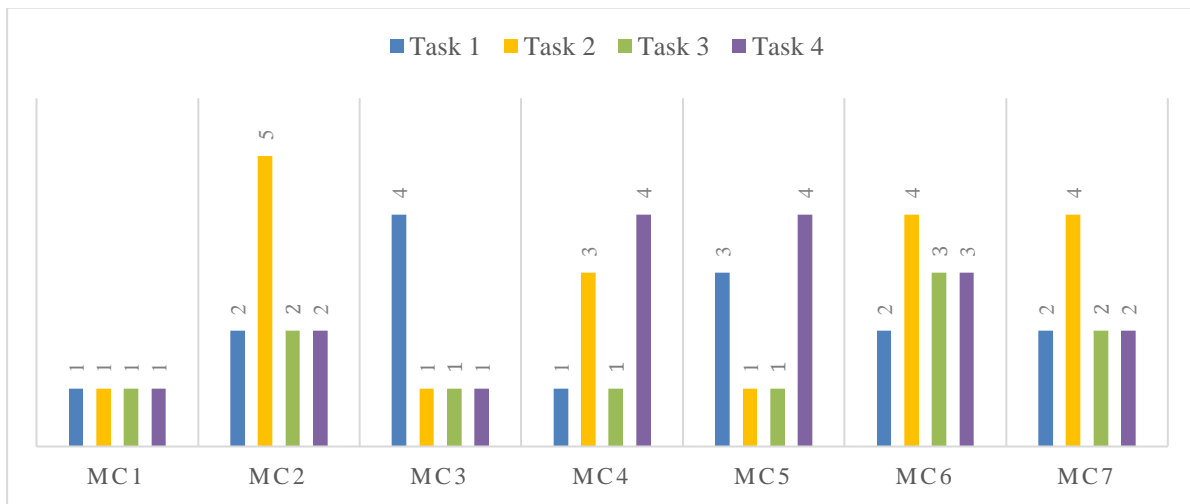


Figure 1. Frequencies of metacognitive scaffolding received in Task 1 – Task 4

The pattern shows that in each task, students received all seven types of metacognitive mechanisms. In Figure 1, it shows that the frequency of MC 3 is higher in Task 1 compared to other tasks. More scaffolding were provided during Task 1 where the students were still new to the Facebook page and had hesitation in participating and giving reflection.

The pattern also shows that the frequency of MC6 is continuously high in all four tasks. MC6 was the highest metacognitive scaffolding provoked by instructor throughout the study which is responsible for encouraging the relationship among the students, subsequently allowing students to evaluate their friends’ work and give opinion and feedbacks. In relationship with performance test, the second question in the performance test asked the students to evaluate three given slides and choose the best and the worst slides in terms of design followed by their justification.

The frequency of MC1 (presenting rationale for the task and activity) is constantly low in all four tasks which was only utilized once in each task. This indicated that the students were able to rationalize on why they must carry out this task by their own, which did not contribute much in performance test. Instructor provided the rationale once as to why the students must carry out the task, which took place when the instructor posted the task in a designated Facebook page.

Further analysis on students' learning in Facebook found that S3 obtained the highest score in post-performance test compared to other students with the largest score difference in comparison to its respective pre-performance test score. Figure 2 shows that S3 was actively involved in discussion on the given task and was consistently aware of instructor's instruction and guidance. The total metacognitive scaffolding received by student S3 amounted to 10.



Figure 2. Student S3 interaction in Task 1

Other than that, student S6 has the highest improvement difference between its pre and post-performance test among all other participants. The frequency of metacognitive scaffolding received by student S6 amounted to 11 is also the highest suggesting that instructor's metacognitive scaffolding may have an influence on student S6's learning performance. Figure 3 shows some of the interaction of student S6 in Facebook group where the student reacted to instructor's question.



Figure 3. Student S3 interaction in Task 3

The following is an example of a script from Task 4 where the students were required to upload a video regarding 21st century learning. Student S4 uploaded a video without elaborating its content. The instructor provoked the student by using questions in Facebook comment section so that the student will be more focused on the content of the video. Then, student S4 replied by describing about the content of the video. Student S4 and instructor’s interaction in Facebook is shown in Figure 4.

“Can you elaborate more about the content of the video?”

Instructor (MC 5: Focusing on the process of learning)

“This video discusses the need for 21st Century Learning and proposes the use of Inquiry-Based Learning as a suitable pedagogy...”

Student S4

“Good Job”

Instructor (MC3: Supporting reflective writing)

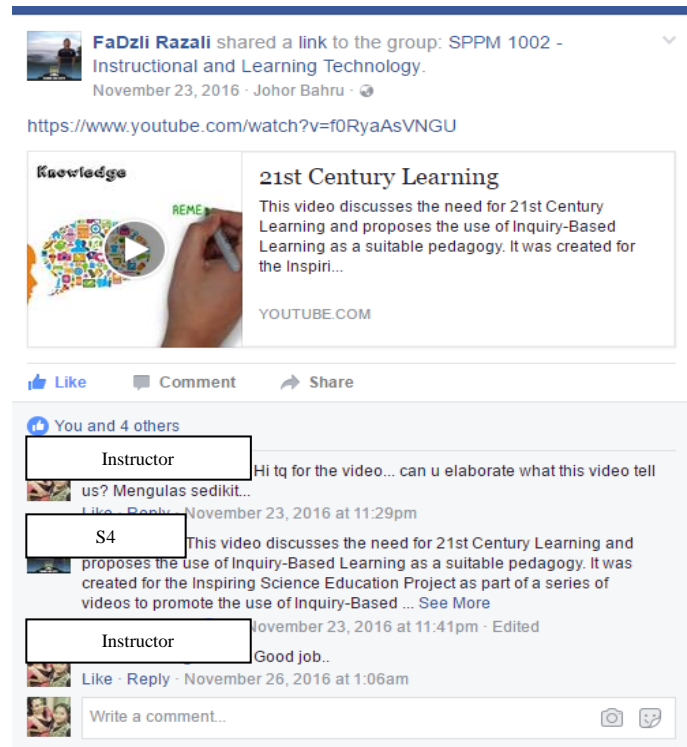


Figure 4. Screenshot of Instructor and Student Interaction in Task 4 from Facebook

By asking questions, the instructor actually used the MC5 mechanism which is ‘*focusing on the process of learning*’. By answering the question, the student was able to focus on the content of the video. Instructor also gave a positive feedback to the student S4 utilizing the third metacognitive scaffolding mechanism which is ‘*supporting reflective writing*’. By giving such feedback, student was encouraged to reflect their learning and share more ideas and thought.

Another example was taken from Task 2, where students as a group were required to upload presentation slides, with other students required to provide feedback regarding the design of the presentation slides. When there was a lack of feedbacks from the students related to the post, the instructor ‘tagged’ all of the students using Facebook’s ‘tag’ feature and reminded them to give feedbacks on their friends’ slides. Upon receiving this reminder, students started to comment such as student S4, S8, and S5. The interactions between the instructor and the students in Facebook learning environment are as follows:

“Every student needs to give opinion on how to improve the other group’s presentation slide in terms of arrangement of materials and design by commenting on their shared slide, and tag that group members in the comments.”

Instructor (MC6: Encouraging relationships among participants)

“There is a lot of wording and the slides look very dull...”

Student (S4)

“It is quite easy to use but bleak color may reduce the span of attention...”

Student (S8)

“The use of color is not interesting. Use of relatively long sentences make readers lazy to read it...”

Student (S5)

Instructor used the sixth metacognitive scaffolding mechanism which is ‘*encouraging relationships among participants to get them involved in the discussion and give their feedbacks*’. After giving encouragement, student

began to participate more, provided feedback, and shared suggestion to their fellow friends to improve slides presentation.

Discussions

In investigating the relationship between instructor's metacognitive scaffolding mechanisms and students' learning performance, the result indicated that focusing on the process of learning is a mechanism that is related to learning performance. Instructor used MC5 to scaffold students to be more focused on their process of learning such as asking them to elaborate more on a video's content or information that has been shared to trigger them to learn more beyond what they already know. Encouraging students to elaborate information promotes deep learning, whereby in this learning students are able to think critically and work collaboratively with others effectively across a subject. While students engage in deep learning, they are anticipated to be able to apply on what has been learned throughout Facebook learning environment in a different situation such as when answering examination question. This practice will help students to apply the knowledge learned in learning performance test and expand their academic achievement. This claim is supported in a study conducted by Subasinghe and Wanniachchi (2003) which discovered that there is a positive relationship between deep learning and students' learning performance; where students with deep learning approach scored better compared to students that used other approaches.

Findings of the study also indicated that students' learning performance improved after their learning through Facebook. There are several factors driving this improvement, such as Facebook environment which gives space for students to interact freely in gaining knowledge (Sánchez, Cortijo & Javed, 2014) where students can overcome shyness or fear to ask questions (Bosch, 2009), and share information with instructor and fellow students (Buzzetto-More, 2012). This is in line with the study conducted by Selwyn (2009) which found that Facebook helps students to overcome the struggle that they encounter in association with instructor, assessment, and academic expectation through an offstage platform such as Facebook compared to convention learning.

Tools provided in Facebook help students to have an informal conversation with peer students and instructor, which at the same time enable them to share information and knowledge inclusively. Madge et al. (2009) indicated that Facebook can enhance students' social interaction while learning. Further, sharing and gaining information collaboratively help students to improve their learning performance (Kabilan et al., 2010). In addition, learning in Facebook provides a relaxed unstructured learning which can raise students' interest in learning and promote their active involvement in Facebook activities. Students' active participation generates critical thinking among students. This skill is required to achieve conventional objective of learning (Bugeja, 2006). Another study by Wang et al. (2013) is in consistency with the finding that the use of the Facebook in teaching and learning process is able to support students to obtain better scores and boost students' engagement and satisfaction toward learning experience.

Other than that, provided tasks to students throughout experimental period have helped students to explore their learning. The tasks were designed in a way that each task reflects students' learning in class. This was followed by further discussion in Facebook which have helped students to gain a better understanding. This claim is supported by Reyes (2010) in his study which revealed that social media such as Facebook has a prospective in providing a student-based learning and task oriented environment that subsequently enables theory dialogue and course content discussion. Students are able to reflect their thoughts and make significant comments through further discussion with instructor in a Facebook group. This is also supported from a study conducted by Yang (2009) which indicated that students and instructor are able to use features such as wall posting and commenting as tools to provide and promote critical reflection.

However, instructors' metacognitive scaffolding throughout learning in Facebook plays an important role to improve students' learning performances. In this study, instructors used seven metacognitive scaffolding mechanisms introduced by Reingold et al. (2008) in order to provide guidance to students throughout their learning in Facebook. Findings indicated that instructor's metacognitive scaffolding has helped students to organize their knowledge while learning in Facebook group similar to findings by Lampe et al. (2011). Organization of knowledge is important as it can help the students to understand how conceptual components of knowledge are grouped together and by possessing more information on how knowledge is constructed, it may help students to justify the knowledge (Majidi, 2013). This is in line with the study conducted by Way and Rowe (2007) who indicated that metacognitive scaffolding can assist students concerning how they can access and organize knowledge and questions from instructor, which subsequently

can help them to summarize learning quickly. When a student has an organized knowledge from learning, it helped them to perform better in learning performance test (Way & Rowe, 2007). When a student has an organized knowledge from the learning, it helped them to perform better in learning performance (Pintrich, 1999).

Instructor's metacognitive scaffolding helps students to stay focused while learning in Facebook environment. This is because social media such as Facebook has a high possibility to cause students to lose their focus on learning and become uninterested in gaining knowledge (Holmes et al. 2010). Instructor's scaffolding provides students with guidance in a student-centered learning environment which keeps the students' focused on their learning to achieve learning objectives and improve their learning outcome. Students tend to lose focus on their learning in Facebook environment when they are involved in multitasking activities comprising managing social and learning activities through the same platform (Rouis et al., 2011). Students need instructor's scaffolding to overcome these distractions and establish a balance between learning and social interaction in Facebook. This is in harmony with a study conducted by Wang et al. (2012) which indicated that even though Facebook is a practicable learning environment, a successful collaborative learning would require an instructor's scaffolding in order to gauge students' motivation and focus. According to Wilson and Conyers (2011), focusing on learning is also a skill that student required, because through having a good attention student able to remember the knowledge that their learned and able to finds new information and ways to use it. Other than that Wilson and Conyers also argues students who are focused have higher the metacognitive and higher order thinking skill.

Instructor prompts questions that can trigger students learning while they complete each task in Facebook. Instructor's scaffolding helps the students to be more knowledgeable about the content of the information, picture or video that have been shared in a Facebook group. Such scaffolding improves their understanding on the subject learned. Result of this study indicated that after getting an instructor's metacognitive scaffolding, students are able to obtain a better result in a post-performance test. The guidance provided by instructor throughout students' learning in Facebook group has given the opportunity to students to get an expert feedback and opinion concerning their work in order to develop their skills and knowledge while completing tasks given.

Conclusion

The availability of technology at more affordable prices has allowed current students to stay connected all the time with various kinds of social interaction. Thus, instructional approaches and learning environment deliberated by instructor should also leverage on the current technology to draw students' attention and engagement throughout learning to achieve better learning outcome (Jiang & Tang, 2010). As for this study, Facebook was used as a platform to investigate the influence of instructor's scaffolding on students' learning outcome. The finding revealed that there was an improvement in students' learning performance. This indicates that instructor should put more emphasis in using social media such as Facebook as an educational tool to stay connected with students. By emphasizing on social media's role an educational tool, instructors would be able to engage the students inclusively in the sphere of student-centered learning environment. This study emphasized on Facebook features that were used by instructor to improve students' participation and motivation toward learning.

This study shows that instructor's scaffolding was able to enhance students' focus in learning, which implies a necessity for instructors to provide scaffolding in order to retain students' attention toward the learning process. Instructor's feedback in Facebook learning environment should be precise as it plays an important role in improving students' motivation (Butler and Winne, 1995) and is capable of creating self-awareness. Facebook can be an excellent educational tool for student-centered learning if it is combined with a proper instructor's metacognitive scaffolding.

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