

The Effect of Gender and Online Collaborative Learning Strategy to Student Learning Motivation

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Accepted: July 24, 2012 Published: November 13, 2012

Doi:10.5296/ijld.v2i6.1989

URL: <http://dx.doi.org/10.5296/ijld.v2i6.1989>

Abstract

The purpose of this paper is to focus on the effectiveness of online collaborative learning especially using the wiki to improve student learning motivation. This paper also seeks the possibility gender will affected to the learning motivation in this environment. The article explores for the possibility to design the collaborative learning on the Jig Saw technique framework using wiki.

The paper reports the findings from a quantitative research which had two independent variable i.e. gender and learning strategy. The control group was classroom based collaborative learning and the experimental group was online collaborative learning. The dependent variable was student motivation learning which measured by questionnaire. The proposed hypotheses were tested using two way ANOVA that to find the main effect of gender and learning strategy, and the interaction of both variables.

The findings of this research are that gender did not give significant effect to student learning motivation. But, learning strategy gave the significant effect to student learning strategy which the online collaborative learning had better affect to the motivation than classroom based collaborative learning. Both independent variable had slight interaction but statistically not significant. The results presented here will assist researchers, teachers or lecturers, and higher-education administrators to take the beneficial of the wiki to improve student learning motivation that would increase the learning performance as well.

Keywords: Collaborative, Online Learning, Wiki, Gender

1. Introduction

During the last two decades the learning environment has experienced a rapid changing driven the information and communication technology. The information and communication technology including the web technology is changing rapidly in this decade compare to the previous era. The mobile device and Web 2.0 technology are adopted in many areas and aspects of learning (Crampton *et al.* 2012; Chelliah and Clarke 2011; Sangrà and Sanmamed 2010; Siritongthaworn and Krairit 2006). The student will need new skill in the new technology environment when they enroll to the higher education. Learning and refining on such skills as critical thinking and problem solving, communication, creative thinking, collaboration, leadership, adaptability, and self-direction is very important for students in this era (Chelliah and Clarke 2011; Chu and Kennedy 2011). Collaboration has become one of an

essential skill necessary for effective functioning in society. The higher education should pay the attention of this shifting on their learning strategy.

Nowadays, internet is used more intensive on learning. Consequently, there is a shift in how students learn and communicate and how the increasing functionality of technologies are raising the bar in learning, employability skills, communication, collaboration, creativity, leadership and information literacy (Chelliah and Clarke 2011; Chen *et al.* 2006). Internet becomes more effective to be used as learning media especially after the emergence of Web 2.0 as a tool for facilitating collaboration on learning. One of the most popular Web 2.0 technologies is wiki, which have shown much promise in promoting communication, collaborative authoring, and information sharing (Chu and Kennedy 2011, Zywica *et al.* 2011; Hossain and Aydin 2011). Wiki is characterized by simplicity, accessibility, and interoperability. In recent year's education has been undergoing a shift from teacher-centered and instruction-based curriculum implementation to student-centered and inquiry-based learning. Students are routinely required to engage in collaborative learning activities such as group projects, presentations, group discussions, and peer evaluations. These activities require significant collaboration and communication with classmates (Norberg *et al.* 2011; Hossain and Aydin 2011).

The student skill especially on such skill as critical thinking and problem solving, communication, creative thinking, collaboration, as mention before can be facilitated using the new learning system like wiki (Chu and Kennedy 2011; Greenhow 2011; Chelliah and Clarke 2011; Menkhoff *et al.* 2011) that generally used as a homepage format. The problem of this paper is how to bring the traditional learning activity based on the classroom to the online learning using the wiki facilities. The new learning design from this paper will give more opportunity to learning access in the new learning skill in the new technology era.

2. Literature Review

2.1 Web 2.0 and Wiki characteristics

Hossain and Aydin (2011) describe Web 2.0 technology is a new trend in communication technology that has become a basis of the new generation internet to make it a more mature and distinctive medium of communication by facilitating user to develop web applications interactively and interoperable. Web 2.0 technologies refers to the new generation of web development and design concepts that are more organized than its predecessor, Web 1.0 technology. This technology enables the user dynamically to use and develop web application. Based on the easier access to the internet through computers with CD-ROM, cellular, and handheld devices, Web 2.0 tools enable users to develop a collaborative virtual society to share information interactively and interoperable (Hossain and Aydin 2011; Zyl 2009).

Desilets *et al.* on Laughton (2011) defines wiki as simple to use asynchronous, web based collaborative hypertext authoring systems. Wiki is web pages or a website that people can directly edit, update, modify or delete (Wang and Wei 2011; Laughton 2011; Menkhoff *et al.* 2011; Frumkin 2005). Wiki can be linked to a collaborative word processing document allowing multiple users from different locations to collaborate in real-time (Liu *et al.* 2010; Frumkin 2005). Wiki allow us to create collaborative knowledge spaces that harbor learning practices that extend beyond the boundaries of traditional formal education (Chu and Kennedy 2011; Menkhoff *et al.* 2011; Sangrà and Sanmamed 2010).

Wiki applications are web-based hypertext applications that facilitate collaborative editing and are supported by a mechanism for monitoring the changes and contributions made to the

sections edited. Many virtual communities in various academic and practical areas have adopted wiki applications because of their advantages with regard to knowledge creation, sharing, dissemination, and accumulation (Crampton *et al.* 2012; Norberg *et al.* 2011; Persico and Pozzi 2011; Liu *et al.*, 2010 Laughton 2011). Systems that adopt wiki applications have three essential characteristics which individually and jointly create a robust collaborative environment. These are collectively referred to as wiki characteristics, and are described as follows (Mason 2008; Laughton 2011, Zyl 2009; Wang and Wey 2011; Keser *et al.* 2011):

- Open collaborative authoring (open editing), which refers to the ability for anyone to easily edit the content on a wiki.
- Controlling changes (edit preservation) and security, which refers to the ability to retain and trace all the edits to and versions of content contained on a wiki, and the ability of wiki administrators to set user's authority to ensure the quality of the activity.
- Linking and creating pages (knowledge structuring), which refers to the ability to group web pages on a wiki that contain different kinds of content into various categories based on their similarity, and the ability to enable users to establish links between pages within a wiki or to external web pages.

ICT is a key on virtual community formation; and consequently the characteristics of such technologies such as ease of use, flexibility, reliability, and usefulness may affect the intentions of the users to participate in virtual communities, as well as the quality of interaction between the communities. The use of wiki applications in a learning activity can enable the monitoring and improvement of the interactions between teacher and student. This can lead to a higher intensity of student participation with teacher and with other student in a collaborative knowledge sharing process (Hossain and Aydin 2011, Chu *et al.* 2011).

2.2 Collaboration

Collaboration is sometimes distinguished from cooperative learning in that cooperation is typically accomplished through the division of activity, with each person responsible for some portion of the problem solving (Lai 2011; Sahin 2010; Wasonga 2007). Collaboration, on the other hand, involves participants working together on the same task, rather than in parallel on separate portions of the task. Collaboration is the “mutual engagement of participants in a coordinated effort to solve a problem together”. Collaboration can be seen as “coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem”. Collaborative interactions are characterized by shared goals, symmetry of structure, and a high degree of negotiation, interactivity, and interdependence. Interactions producing elaborated explanations are particularly valuable for improving student learning. Nonresponsive feedback, on the other hand, can be detrimental to student learning in collaborative situations. Collaboration can have powerful effects on student learning, particularly for low-achieving students. However, a number of factors may moderate the impact of collaboration on student learning, including student characteristics, group composition, and task characteristics.

Collaborative learning refers to tasks that require joint intellectual efforts among students or between students and teachers (Chu and Kennedy 2011). In most instances this involves students working in groups to co-construct an artifact (e.g. a report or presentation) for assessment. More specifically, it also involves social interactions as small groups of students solve an academic problem together (Chu and Kennedy 2011). As a learning strategy it emphasizes social and intellectual interaction in the learning process such that the differences

in knowledge, skills, and attitudes among collaborators become strengths rather than weaknesses. Knowledge is shared and acquired during communication, negotiation, and production of materials (Chu and Kennedy 2011). Through collaborative learning, learners have the opportunity to equip themselves with stronger analytical skills for interpreting information and acquiring further knowledge (Farajollahi and Moenikia 2011; Hossain and Aydin 2011; Cebeci *et al.* 2009; Wasonga 2007; Dabbagh 2007). In return they contribute by co-constructing and sharing knowledge within their learning community.

The challenge on the online collaborative learning is the wide variation in the meaning of words like “online” and “computer supported collaborative learning”. In some studies online groups occasionally gather in face-to-face settings and in other studies the groups are framed as geographically distributed subgroups. Examination of the completely online case is rare (Goggins *et al.* 2011). Variations in socio-technical context are widely understood to have a material effect on group experience, but consideration of these effects is glossed over in much work that examines these different constructions of “online group” (Persico and Pozzi 2011; Goggins *et al.* 2011). This challenge should be considered when group activity used to improve new student skill.

3. Methodology

3.1 Subject

One of the lessons of Primary School Teacher Training is the used ICT for Learning. This lesson is a capstone design subject that need many student skill for instant how to understand the primary school subject, how to arrange a learning strategy, how to conduct the learning assessment and evaluation, and how to share and publish learning program to others. Considering these characteristics, the collaborative learning will fit for student activity.

One of the consequences of the credit semester in the higher education is that the learning duration is 14 weeks in one semester. The learning monitoring should be conducted by teacher each week to ensure student run their activity. Encouraging and motivating student are very important in this learning environment.

3.2 Wikispaces as a Tool

Wikispaces (the URL is <http://wikispaces.com>) is one of a freeware wiki facilities that operated in the web based. The feature of this wiki is simple but can be used for collaborative learning effectively. This is the reason why in this design using this wiki. Student are able to literate their skill using this wiki in the short time. The main features in this wiki that used to support collaborative learning are homepage, discussion using member e-mail, project, and uploading and downloading the document (pdf, docx, rtf, etc.). The posting information can be in HTML format or formatted text. The screenshot of this wiki is shown below.

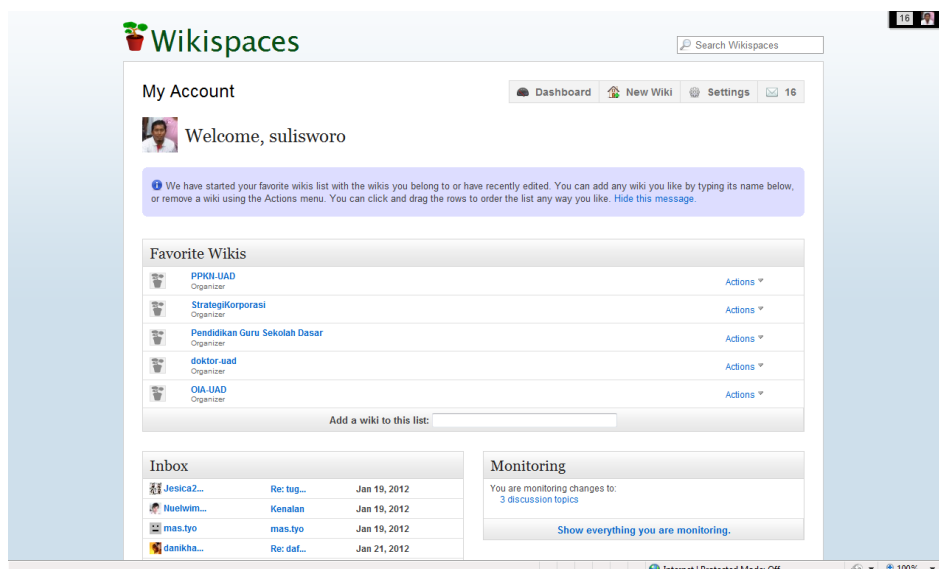


Figure 1 The screenshot of Wikispaces account

Project is the most important feature in this learning scenario. With Projects, teacher can put student who been wiki members into groups so they can work independently. Each Project on wiki is made up of a unique set of teams of members, pages, files, and settings. There's no limit to the number of teams within a Project, or to the number of pages within a team, but here are a few things to keep in mind as you get started:

- Only members of the wiki can be members of a team on that wiki.
- Every team should have at least one member.
- Every team starts out with one page, called "home." Teacher and team members can create more pages as the teamwork continues.

As mention at the project feature, an individual user can only be a member of certain team of some project. The administrator or teacher does not need all wiki members to every project.

3.3 Sample and Variables

The sample consisted of 117 undergraduates from the primary school teacher training which 57 students assigned as control group and 60 students as experimental group; shown by table 1. The independent variables are Gender and Learning Strategy. The control group is classroom based collaborative learning, and the treatment group is online collaborative learning. Then the group used in this research is shown below.

Table 1: Number of student for each group

Control Group: Classroom based collaborative learning			Treatment Group: Online Collaborative Learning		
Male	Female	Total	Male	Female	Total
25	32	57	26	34	60

Total of subjects: 117 students

3.4 Instrumentations

In order to pursue the main aim for this research study which is to evaluate the students motivation on the learning, further measurements were applied. Each student as a respondent needs to state his/ her level of disagreement or agreement on the factors that influence their learning motivation. The type of response format used in this section is 5- point category that used as follows: 5= strongly agree, 4= agree, 3= normal, 2= disagree, and 1= strongly disagree. To measure the student learning motivation, the questionnaire that had been validated with confidence level is 95%. The learning motivation is influenced by four factors i.e. attention, confidence, satisfaction, and relevance. The questionnaire structure is shown by table 2.

Table 2 Questionnaire Structure

Factors	Positive Statements	Negative Statements	Total items
Attention	1,7,16,20	9,12,18	7
Confidence	10,26	2,6,15	5
Satisfaction	8,11,17,19,23,27	25	7
Relevance	3,5,13,14,21,24	22	8
Total			27

3.5 The Statistical Data Analysis

The statistical analysis used in this research is Two-way ANOVA using SPSS. The two-way ANOVA compares the mean differences between groups that have been split on two independent categorical variables i.e. Gender and Learning Strategy as factors. The dependent variable of this experiment is student motivation. To analyze the data, several test are implemented to fulfill the assumptions that the dependent variable is approximately normally distributed for each combination of levels of the two independent variables, homogeneity of groups variances that formed by the different combination of two independent variables level.

3.6 Collaborative Learning Strategy

For the control group, the learning scenario is pure Jig Saw approach. All of the materials are divided to several topics which consist of 4 to 5 expertise. Then, for each week the Jig Saw strategy was conducted in the classroom to deliver those materials to the whole students. But, student had breaking time to review their project on small seminar to present the progress at 10th and 13th weeks as draft and final review respectively.

Based on the previous research, the learning scenario for online collaborative learning is Jig Saw approach modified to fit in the online collaborative learning environment as mention before. Jigsaw, one of the cooperative learning techniques, is based on group dynamics and social interactions. It is one of the cooperative learning techniques that including two different treatments in order to improve the cooperation between students. Using this structure, students

are responsible for share their skill or knowledge each other material (Sulisworo 2012). The activities are divided to 4 time blocks. The activity and the time duration for each block are shown by table 3 as follows.

Table 3 Learning Scenario for Online Collaborative Learning

Block	Duration	Activity	Output/ Outcome
I: Introduction	2 weeks	Sign up to wiki Create page Student upload a document Posting and Reply discussion	Account One student page At least 3 document uploaded At least 2 posting and 3 replies
	4 weeks	Teacher assigns student to expert group Reading the expert materials Reply the discussion moderated by teacher Teacher asks student to post some question and reply some answer for each other Students upload their product to each expert page	5 expert groups, i.e. i.e. Learning Strategy Group, Learning Material Group, Learning Media Production, Learning Assessment and Evaluation Group, Product Socialization to internet Group At least 3 replies, 5 discussion topics 2 question each, and answer for each question Uploaded document as a student product (.doc, .ppt, etc.)
II: Expert Group Activity	5 weeks	Teacher assigns student to the new group as a project group. Each group involve 5 student from different expert Each group decides their topic from primary school subject. Teacher can guide the topic for each group Accomplishing the project result draft Review the product by upload it to the general page that can be accessed by other group Refining the draft and publish the result	The topic should be continued from one group to other group so all student will get the comprehensive project result. Comment and response from other group Complete primary school subject
III: Project Group Activity	2 week	Each group gives some comment to other group to improve their product draft. Once after draft published and once after final product	
IV: Project Review			

3.7 Hypotheses

Using the variables mentioned before, there are three sets of hypothesis with the two-way ANOVA. The null hypotheses for this research are below,

- 1) The means of the gender between male and female are equal.
- 2) The means of the learning strategy between classroom based collaborative learning and online collaborative learning are equal.
- 3) There is no interaction between the two variables i.e. gender and learning strategy.

4. Result

4.1 Descriptive Statistic

The descriptive statistic figured out the mean and standard deviation for each factor i.e. learning strategy and gender as shown by table 3. From that table, the assumption that the variances of the populations must be equal and the groups must have the same sample size was not fulfilled. Otherwise, the two ways ANOVA could be applied in this case as proportional design experiments.

Table 4 Descriptive Statistics

Dependent Variable: Total of Motivation Scores

Learning Strategy	Gender	Mean	Std. Deviation	N
Classroom based collaborative learning	Male	99.6400	3.97786	25
	Female	100.9688	5.86672	32
	Total	100.3860	5.12610	57
Online collaborative learning	Male	112.1538	5.04137	26
	Female	111.3824	5.08721	34
	Total	111.7167	5.03914	60
Total	Male	106.0196	7.76013	51
	Female	106.3333	7.55357	66
	Total	106.1966	7.61265	117

Table 4 indicates that the total mean of the classroom based (100.3860) was lower than the online collaborative learning (111.7167). The male student (99.640) had lower score on learning motivation than female student (100.9688) for classroom based collaborative learning. But, for the online collaborative learning there was an opposite situation, which the male student (112.1538) got higher score than female student (111.3824). The same table illustrate also that in a whole the female student (106.333) got the higher means than the male student (106.0196). This descriptive statistic result should be checked the effect of each independent variable through the two way ANOVA.

Table 5 Tests of Between-Subjects Effects

Dependent Variable: Total of Motivation Scores

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3786.336 ^(a)	3	1262.112	48.573	.000
Intercept	1293089.898	1	1293089.898	49765.686	.000
JPEM	3778.432	1	3778.432	145.416	.000
JKEL	2.232	1	2.232	.086	.770
JPEM * JKEL	31.706	1	31.706	1.220	.272
Error	2936.143	113	25.984		
Total	1326215.000	117			
Corrected Total	6722.479	116			

a R Squared = .563 (Adjusted R Squared = .552)

4.2 The Effect of the factors

Two Way ANOVA test was applied to find the effect of the learning strategy and gender effect. The calculation of this technique was shown by table 5. From table 5, the main effect of each independent variable could be analyzed. There is statistically significant difference on the main effect of learning strategy ($F=145.416$ and $Sig. =0.000$). On the other word, the online collaborative learning gave higher effect than classroom based to student learning motivation as well as indicated on the descriptive statistic. Even though, there was some differences learning motivation affected by gender as mention before, but statistically there was not significant ($F= 2.232$ and $Sig.= 0.770$) as shown by table 5. From table 4, there was interaction between both independent variable, but statistically not significant ($F= 1.220$ and $Sig. = 0.272$). The more clearly this interaction would be shown by figure 2 as a result of profile plot for each independent variable.

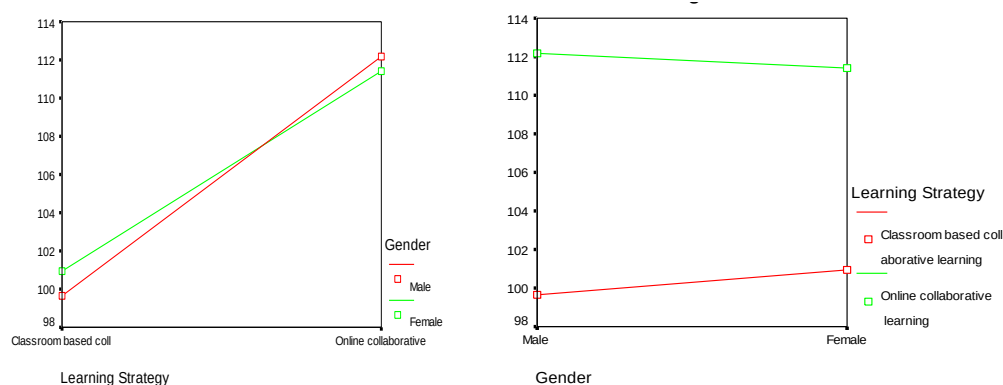


Figure 2 Profile Plots

4.3 Interaction between factors

The interaction between the effect of gender and learning strategy on student learning motivation is shown by figure 1. From that figure could be conclude that there was slight interaction between the effects of gender and learning strategy on learning motivation but statistically not significant (Sig.=0.272). The estimated marginal mean of male student (99.6400) was lower than female student (100.9688) for classroom based collaborative learning. On the contrary, the estimated marginal mean of male student (112.1538) was higher than female student (111.3824) for online collaborative learning.

5. Discussion

5.1 Gender on learning motivation

Based on the findings as mention on the statistical analysis, this result revealed that gender does not affect the learning motivation; but learning strategy. There was no interaction between gender and learning strategy.

The importance of technology including learning technology anxiety on the intention to use technology is evident from the findings of several previous studies. However, lately studies have found that gender gaps are lessening (Kim et al. 2011; Letchumanan and Tarmizi 2011; Cebeci *et al.* 2009). For instance, Letchumanan and Tarmizi (2011) found that there is no significant difference between genders towards assessing the intention to use e-book. Kim et al. (2011) found that gender seems to have no significant effect on both the perceived usefulness and perceived ease of use on training soft skills via e-learning. The research finding shows the same parallel meaning that gender has no significant effect to the learning motivation.

5.2 Wiki as a tool for online collaborative learning

Learning is a very complicated system that orchestrating many elements interaction and correlation. These elements include students' own factors like individual intelligence, learning ability, learning style, motivation and characters, as well as the environmental factors like learning tasks, materials, place, time, instructors and classmates (Shen and Liu 2011; Cebeci *et al.* 2009). Motivation for learning stems from students' beliefs about learning. The finding of this research revealed that wiki used as a main tool on collaborative learning had significant role to the successful of learning strategy. This wiki gave the possibility and forced students into a learning experience, rapidly increasing their involvements, and producing activities that dramatically allow students to examine and analyze information while building their knowledge. The same result also had found by Abbad and Albarghhouth (2011) using the e-learning method.

The other finding was that Jigsaw model can be applied on online mode in wiki environment and gave significant improvement on student learning motivation. Sahin (2010) found in his research that use of Jigsaw II, one of the cooperative learning techniques, in writing expression classes has positive effects on students' academic achievement and attitudes to these classes. In the Jig Saw II groups, it should be consider the high academic achievement levels, positive attitudes to writing expression classes, and students' views. The Wiki's facilities gave many interaction channels that enable students more confidence and satisfy to share and to adopt the idea to others. Experts and novices student could learn each other to be better knowledge and skill. This reason had found also on the research by Wilkesmann and Wilkesmann (2011). The learning strategy used on the knowledge transfer as interaction between experts and novices

supported by technology had significant effect to student performance Wilkesmann and Wilkesmann (2011). Technologies can create opportunities for individuals to provide and obtain knowledge. In this case, wiki only create opportunities, students eagerness to involve the learning activities would affect their learning performance. This is the reason why learning strategy which using wiki effected the student learning motivation significantly.

6. Conclusion

In conclusion, the learning strategy is one of the important aspects to enhance learning motivation that will affect the learning performance. The more possibilities to suitable, freedom feeling and confidence interaction are given by wiki. The learning strategy using Jigsaw on the collaborative online learning gave the significant effect to student learning motivation higher than classroom based collaborative learning. As the other results finding, there were significant effect of gender to student learning motivation. It also means that male and female has the same response to take the benefit of the learning technology. In further research, more attention should be paid to deeper understanding on how wiki can be used as an alternative tool to other subject in the higher education. The characteristic of each subject can be predicted, will affect the learning result.

Acknowledgments

This research was partially funded by research grant from Ahmad Dahlan University. Thank very much especially for Prof. Achmad Mursyidi and Prof. Sarbiran for helpful discussions.

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