

Knowledge Construction for Wiki Education Applied in Moodle 2.3

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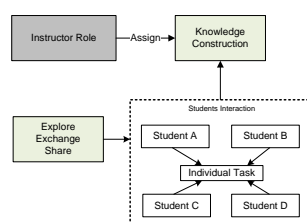
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Graphical abstract



Knowledge Construction Learning Model

Abstract

Wiki is a tool to support collaborative works between learners. Wiki also has proven to provide an efficient, flexible, user friendly and cost effective interface for collaboration, knowledge creation and archive, and learner interaction. Current research finding stated that wiki is an e-learning tool which is very less in terms of use among instructors and learners. Moreover, the learning community is not aware with the capability of wiki to support interactive learning environment as well as effective for their knowledge, skills and attitude. Therefore, this paper highlights the initiative to use wiki in Moodle 2.3 for knowledge construction. The analyses usage of wiki have been done by observing the wiki Moodle data log and survey of learners' usage in Faculty of Computing, Universiti Teknologi Malaysia. The result of analysis is able to determine the active and passive attitude among learners. In addition, to identify the effectiveness of knowledge construction by using wiki towards learners' knowledge, skills and attitude. Finally, this result guides instructors to improve learning strategies on wiki and motivates learners to enhance their knowledge construction learning method.

Keywords: Moodle 2.3; knowledge construction; wiki data log; effectiveness learning

Abstrak

Wiki adalah alat untuk menyokong kerja-kerja kolaboratif antara pelajar. Wiki juga telah terbukti untuk menyediakan alat antara muka yang cekap, fleksibel, mesra pengguna dan kos yang efektif untuk; kolaborasi, penciptaan dan penyimpanan pengetahuan, dan juga interaksi pelajar. Kajian terkini mendapati bahawa wiki adalah alat e-pembelajaran yang sangat kurang dari segi penggunaan di kalangan pengajar dan pelajar. Tambahan pula, pengajar dan pelajar tidak sedar dengan keupayaan wiki untuk menyokong persekitaran pembelajaran yang interaktif serta berkesan kepada tahap pengetahuan, kemahiran dan sikap pelajar. Kertas kerja ini membincangkan inisiatif untuk menggunakan wiki dalam Moodle 2.3 dalam pembinaan pengetahuan pembelajaran. Analisis penggunaan wiki telah dilaksanakan dengan memerhatikan wiki Moodle log data dan kajian penggunaan pelajar di Fakulti Pengkomputeran, Universiti Teknologi Malaysia. Keputusan analisis dapat menentukan sikap pelajar yang aktif dan pasif. Di samping itu, untuk mengenal pasti keberkesanan pembinaan pengetahuan dengan menggunakan wiki ke atas pengetahuan, kemahiran dan sikap pelajar. Akhirnya, keputusan ini panduan pengajar untuk meningkatkan strategi pembelajaran di dalam wiki dan mendorong pelajar untuk meningkatkan kaedah pembelajaran pembinaan pengetahuan mereka.

Kata kunci: Moodle 2.3; pembinaan pengetahuan; wiki data log; keberkesanan dalam pembelajaran

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1.0 INTRODUCTION

Wiki is developed to support author collaboration, and the most widely used for this purpose is Wikipedia. Wiki is one of the tools that assist learners getting involved with social learning.¹ Social learning is very important for learners to get engage with learning throughout the learning process.² Most people chose to get socialized to be active and knowledgeable in both traditional and virtual environments. Social learning can promote an engagement, sharing, exploring and also exposing to the environment.³ In class context, learner is the one community who is working with information and knowledge every day. E-learning is used as main platform that make learner possible to get engaged with friends

every time, anytime and anywhere. Unfortunately, e-learning does not able to provide the encouragement of learners to learn.⁴ Previous research found that learner used e-learning mostly to retrieve their own material such as course not. This learning practice is not good for measurement to the effectiveness of learning.

Embi⁵ has listed Moodle as the most popular e-learning application in Malaysia. Eleven higher institutions have applied Moodle application. However, there are limitations on earlier versions of Moodle. Firstly, the early version of Moodle does not emerged with the social media tool. Second, it is a close system where it is restricted to the particular institution.⁶ The module is also limited to the learners' needs. To cope with the engagement

issue, a learner needs to get socialized and needs to communicate with his friends. Fortunately, current version of Moodle (i.e. Moodle 2.3) has released some web 2.0 features. These features offer learners to keep on with the learning process.⁷

This paper discusses on the wiki capability in Moodle 2.3. Wiki is expected to support social learning in the teaching and learning process. The knowledge construction method is used to engage the learners in the wiki. In result section, the researcher have presented two analyses; learners’ usage of wiki data log and learning effectiveness from the survey.

2.0 WIKI FOR SOCIAL LEARNING

Learning is the action of getting knowledge and information from various angles. Ranson *et al.* stated that learning is the process of discovering and generating new understanding about ourselves and our world.⁸ It can happen in many ways such as conversation, life experiences, social working environment, and also personal thought.⁹ When learning system is introduced in late 1890’s, instructors become the main sources of learners to gain information. Due to the establishment of e-learning technology, the role of instructor becomes less. On the consequence, the learners rely on the technology to seek information.

With rapidly web technology changes, learner becomes a web consumer and demands online instruction in the learning environment. Online instruction is able to support interaction and participation. Learners are also expected to experience the social interaction and to connect with their peers in the learning process.¹⁰

Social learning is born since 1980’s when Albert Bandura discovers it. At that moment, social learning is widely applied in traditional method of learning such as in class. He claimed that social learning is the most influential theory of learning and development.⁸ Social learning becomes important role in learning when it achieved three activities such knowledge sharing, exchanging and also exploration. In order to identify social learning involvement, Reed³ has come out with three changes (Refer to Figure 1).

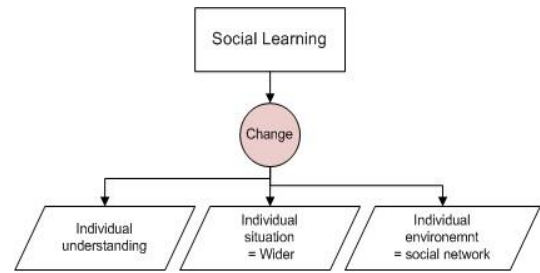


Figure 1 Social learning situation³

One of the changes happened when social learning takes action is the changes from individual interaction in wider interaction. The learning can transform individual work into collaborative group work. Interaction is a vital key in any communication in the world.¹¹ Interaction is needed to achieve a goal. In learning context, interaction is important to be used, when and where it’s beneficial to learning experiences. Schone¹¹ also has listed level of interaction in learning activities (Refer Table 1). Wiki is including in real time interaction which acquire collaborative environment between learners and instructors. Wiki is a tool that capable to assist learners in knowledge construction, collaborative learning, critical thinking and also contextual application. West¹⁰ have listed the activities that can be created by those learning paradigm. For knowledge construction, instructors can create activities such as annotated bibliography, online dialogue, group summary and also class encyclopedia.¹⁰

Knowledge construction is different with traditional classroom where it requires more than reading and rehearsal.¹² It is defined by the action of creating new ideas or concept information by connecting it with experiences through social interaction.¹⁰ In order to promote knowledge construction among learners is by providing them with active learning activities. It includes actively collect, organize and collaborate to transform information into knowledge. According to Knowlton¹³ he have mentioned that knowledge construction is collaborative and active learning, not passive learning.¹³

Table 1 Level of Interaction¹¹

Item	Social learning interaction		
	Level	Interaction	Situation
1	Passive Interaction	Information receiver	Using navigation button.
2	Limited Interaction	Simple responses	Access multiple choice exercise, pop up, follow the process or procedure
3	Complex Interaction	Varied responses	Require text entry boxes and manipulate graphic
4	Real-time Interaction	Training session	Collaborative environment; learners and facilitator.

Active learning can be defined as the environment where learners are actively participated in their learning process.¹⁴ It involves action of higher order thinking skills such as analysis, synthesis and evaluation. Those actions are enabling them to construct personal knowledge through problems solving and experimentation environment. However passive learning is more on passively listening to a lecture, rephrasing, memorizing and observing. There is no feedback on both sides simultaneously in learning process. In order to support learners to be active in learning process,¹⁵ mentioned that it is vital to create learner-centered environment where learners in constant engagement with the content. Collaborative wiki learning environment can be

performed as active learning medium where it allows learners to become main author of work produced.

In order to ensure the learners in active learning environment, the evaluation of learner’s performance have to be measured.¹⁶ Baron also mentioned that one of the successful of e-learning is from monitoring and evaluation.¹⁷ Instead of having access reports in the web system, it is vital to have learners’ evaluation to glean valuable information. One of popular method of gaining information regarding their perception and performance are through survey and questionnaire.¹⁸ The data is processed and to be determined in the next course of action. There are many elements to be taken into account when the effective learning is being measured, but only three elements are selected;

knowledge, skills and attitude.¹⁹ Knowledge, skills and attitude can be defined as learning goal or objective that expected to be achieved in the end of the course.

3.0 METHODOLOGY

In order to measure wiki capability in knowledge construction learning application, some methodologies are used. One class is used to use wiki Moodle 2.3. About 35 samples used from Faculty of Computing in Universiti Teknologi Malaysia. The learners have been enrolled in this class by the lecturer or instructor. Instructors are the main people who are assigned class’s task and also monitor all learners’ participation. In the end of the class, record from the system is generated and process. Survey also is distributed to enrich the result of learning process in wiki Moodle.

3.1 Knowledge Construction Interaction

In this knowledge construction learning method, we focus Wiki Moodle 2.3 e-learning system as the collaboration and interaction tool. Figure 2 illustrates the interaction between instructor and learners in the learning process. In this task, instructor is giving the learners an assignment which is the class encyclopedia activity. In this process, the instructor assigns each learner to list out all unknown terminologies during their learning into wiki. Other learners are encouraged to get the answer and write it in wiki.

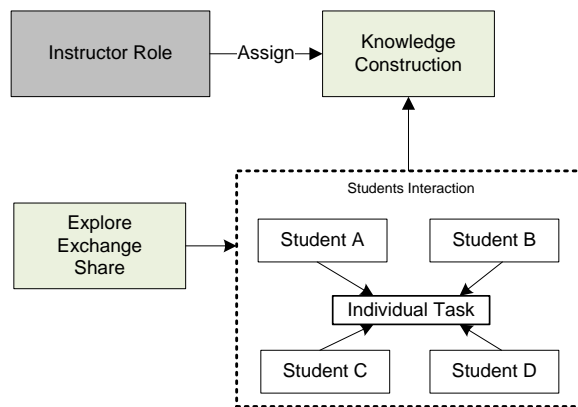


Figure 2 Knowledge construction learning model

In Figure 2, learner A is constructing his/her own information by sharing and collaborating with Learner B, C and D. Each learner involved in wiki is interacted with each other to produce one final project. Throughout the process of creating class encyclopedia, learners become main author to find new word, describe, construct and analyze. Other learners also are able to collaborate to that work in order to produce the exact meaning of the word. Instructor is act as the monitor and guidance for learners.

The learners are given a task that requires them to participate in the activity which is to produce an encyclopedia or terminologies. Time given is in whole semester study. In the end of the semester, unrealizable, with the work of collaboration to constructing the information, they are able produced very long list which listed the terminologies in the course.

In addition, learner can use the terminologies for future reference. In this process of constructing knowledge, each learner is the author of the work. Even though they participate

individually, the final work is actually a group work. Instructor can track the wiki activity data log to know the time when the learners participate.

3.2 Wiki Data Log

Second method to measure learner activeness is by observing log data on wiki activity. The log data on wiki in e-learning is observed to monitor the active and passive attitude of learner performance. In this work, the Computational Intelligence class in Faculty of Computing, UTM was chosen as the sample data. Figure 3 is the list of learner actions in wiki. The wiki log activity provides six tabs with information based on the activity module. The information will be explained in Table 2.

Saved at: 15 October 2012, 9:34 AM

Course	Time	IP address	User full name	Action	Information
SCJ4553-01	2012 October 15 9:33	10.60.100.141	SHAFFIKA BINTI MOHD	wiki history	3
SCJ4553-01	2012 October 15 7:45	161.139.101.81	MOHD SHAHRUL NIZAM	wiki edit	34
SCJ4553-01	2012 October 15 7:45	161.139.101.81	MOHD SHAHRUL NIZAM	wiki view	34
SCJ4553-01	2012 October 15 7:34	161.139.101.81	MOHD SHAHRUL NIZAM	wiki view	34
SCJ4553-01	2012 October 15 7:34	161.139.101.81	MOHD SHAHRUL NIZAM	wiki view	14468
SCJ4553-01	2012 October 15 7:33	161.139.101.81	MOHD SHAHRUL NIZAM	wiki view	34
SCJ4553-01	2012 October 15 7:33	161.139.101.81	MOHD SHAHRUL NIZAM	wiki view	14468
SCJ4553-01	2012 October 11 19:39	161.139.18.154	NG JOO KEING AC0901	wiki view	45
SCJ4553-01	2012 October 11 19:39	161.139.18.154	NG JOO KEING AC0901	wiki edit	45
SCJ4553-01	2012 October 11 19:38	161.139.18.154	NG JOO KEING AC0901	wiki view	45
SCJ4553-01	2012 October 11 19:34	161.139.18.154	NG JOO KEING AC0901	wiki view	14468
SCJ4553-01	2012 October 11 17:22	161.139.18.154	NG PEI SHAN AC09011f	wiki view	36
SCJ4553-01	2012 October 11 17:21	161.139.18.154	NG PEI SHAN AC09011f	wiki view	36
SCJ4553-01	2012 October 11 17:21	161.139.18.154	NG PEI SHAN AC09011f	wiki edit	36
SCJ4553-01	2012 October 11 17:16	161.139.18.154	NG PEI SHAN AC09011f	wiki view	36
SCJ4553-01	2012 October 11 17:16	161.139.18.154	NG PEI SHAN AC09011f	wiki view	14468
SCJ4553-01	2012 October 11 10:59	161.139.18.154	LOKE SUE VOON AC09	wiki view	33
SCJ4553-01	2012 October 11 10:59	161.139.18.154	LOKE SUE VOON AC09	wiki edit	33
SCJ4553-01	2012 October 11 10:32	161.139.18.154	LOKE SUE VOON AC09	wiki view	33
SCJ4553-01	2012 October 11 10:32	161.139.18.154	LOKE SUE VOON AC09	wiki view	14468
SCJ4553-01	2012 October 11 10:32	161.139.18.154	LOKE SUE VOON AC09	wiki view	46
SCJ4553-01	2012 October 11 10:31	161.139.18.154	LOKE SUE VOON AC09	wiki view	14468
SCJ4553-01	2012 October 10 3:50	161.139.101.81	SITI NUR FARHANA BINI	wiki view	40
SCJ4553-01	2012 October 9 22:48	10.60.99.51	LOKE SUE VOON AC09	wiki view	32
SCJ4553-01	2012 October 9 17:01	161.139.101.81	MASHITAH NUR BINTI A	wiki view	48

Figure 3 Wiki in E-learning data log

Table 2 Wiki log information

Moodle Wiki		
Item	Tab	Explanation
1	Course	Course taken by learner. - Course code and class
2	Time	Date: Date learner access wiki Time: Time learner access wiki
3	IP address	IP address of learners’ laptop or computer
4	User full name	Learners’ name
5	Action	Action occur while they access wiki - Add, edit, comment, view, history and map.
6	Information	Version page visited

Based on²⁰, it is important to measure the amount of learner’s action to identify those who are active and those who are passive. In order to determine learners’ participation level, we have to observe access hits from the wiki data log. However, we cannot put the level of learners’ participation on learners’ hits to determine the learning occurred.

Hence, weight is introduced to calculate the learners’ hit. Weight is put as a point stone of score where it is thoughtful meaningful and affects the positive impact towards the learning process. Based on²¹, rank based on score/weight for e-learning activities that contains meaningful learning characteristic such as: active, constructive, cooperative, authentic and intentional. Discussion forum and Wiki are among most of e-learning activities that listed as priority and scored by 5.

For wiki activities, there are six actions that can be categorized into 2 types which are active and passive. Active

learners can be considered as learners who construct the knowledge such as creating new pages, commenting and editing on the existing one. However, passive learners are considered who

do the browsing, accessing maps and review the history (Refer Table 3).

Table 3 Weight for wiki action

Action	Creating something new	Make changes to the existing work for improvement	View and browsing	Does not reflect to learning process
Weight	3	2	1	0
Wiki action	Add Comment	Edit History	View	Map

The steps to determine the learners’ participation level either active or passive is stated below:

First, the data log is sorted according to the wiki actions, namely: add edited, comment, view, history and map. Then, each action is classified according to the hits from each learner. Next, the action score for each learner is calculated for the active and passive action following the Equation (1):

$$Action\ score = \sum_{j=1}^a \frac{h_j \times w_j}{Sum_j} \tag{1}$$

where *j* is an action in Wiki data log
h is the hits of each learners
w is the weight of each action

After we obtain the action score, the active and passive ratio for each learner participations are calculated as shown in Equation (2) and Equation (3).

$$(Active\ Ratio) y_A = \sum_{i=1}^a \left(\frac{x_i \times A}{Sum_x} \right) \times 100\% \tag{2}$$

$$(Passive\ Ratio) y_P = \sum_{i=1}^a \left(\frac{x_i \times P}{Sum_x} \right) \times 100\% \tag{3}$$

where, *i* represents each learner in Moodle Wiki data log.
y is total ratio each learner
x is the numbers of learners’ hit

Ratio calculation is important to measure learners’ participation for whole class.

3.3 Evaluation Instrument

The last method used to measure learner’s effectiveness of the e-learning process is using a questionnaire. In the end of the learning process, the instructor had distributed the questionnaire right after the class session is ended. Time given is about 10-15 minutes of answering. The effectiveness of evaluation questionnaire is build based on the evaluation model.¹⁸

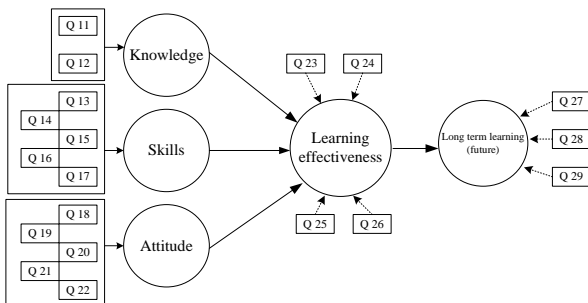


Figure 4 Evaluation the effectiveness of learning model¹⁸

Based on the evaluation model, learning effectiveness is determined by gains in knowledge, skills and also attitude. It is reflect the learning goal set by the instructors. In other scope, which long term learning is affect how learners learned effectively during the learning process using wiki. The definitions of each element are:

- i. Knowledge: The understanding of the Wiki Moodle concept for constructing knowledge application and the understanding about the course content learned.
- ii. Skills: The ability of learners to evaluate, interpret, develop and respond to the learning process in Wiki Moodle
- iii. Attitude: The enjoyment, awareness and encouragement of learners in wiki Moodle environment reflect to the learning application
- iv. Learning Effectiveness: The learning effectiveness towards the tool and learning application
- v. Long term learning: The learning effectiveness towards the future project and other learning application

The result of the effectiveness of e-learning activities is presented in 4.3. Before the actual survey is distributed to the learners in class, the researcher had conducted the pilot study.

4.0 RESULTS

4.1 Wiki Moodle Data Log

Wiki Moodle 2.3 activity produced a complete class encyclopedia listed many words that useful for learners to review it. Figure 5 shows the wiki page that produces a complete class encyclopedia.

- A: The complete alphabetical index. In this tab, learners are able to find the meaning of the index by clicking each alphabetical.
- B: List of word in index C. When learners click on C, new tab is appeared where contains all terms which start with C word.
- C: Work done by learners on index C. In this tab, learners are able to review who edit is and construct the terms given. Learners also are able to restore the originality work if the update is not suitable with the terms.

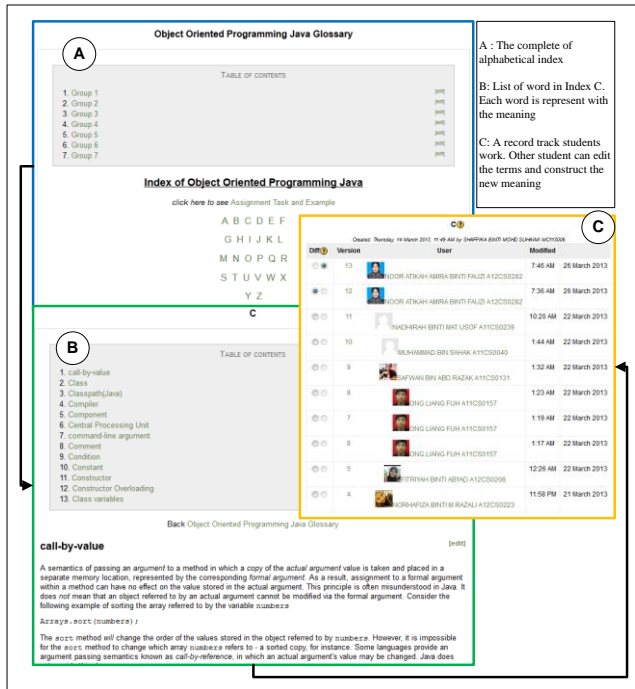


Figure 5 Wiki Moodle E-learning

Log history has been analyzed to identify learners' participation in class. The log data is retrieved to keep track learners' activity in Wiki Moodle. The log has been sort by hits on action. The hits are calculated into score which used to determine the active and passive score. Moreover, graph is produce to determine the active and passive attitude. Learners who are active are expected to understand deeply about the course learned. In addition the learners also are able to collaborate with other learners to discover and construct the knowledge and able to applied in new situation. However, passive learners are expected to be able to record and absorb the knowledge. Figure 6 shows the graph based on learners' participation. There are 4 presumptions used in this study.

- High active action + High passive action = Very good participation
- High active action + Low passive action = Good participation
- Low active action + High passive action = Low participation
- Low active action + Low passive action = Very low participation

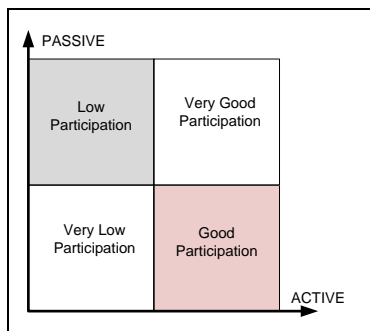


Figure 6 Learners' performance graph on wiki activity

Based on Figure 6, learner participation is considered good participation in the wiki activity, when the learner's active attitude is high and his/her passive action is low. However, learner participation is said to be low participation, when both the learner's active attitude and passive action are low. Figure 7 illustrates the learners' performance (i.e. learners' participations in class) while using wiki activity in Moodle 2.3. Most of learners are fall into very low participation. The instructor is able to recognize the pattern of the learners' participation in learning process.

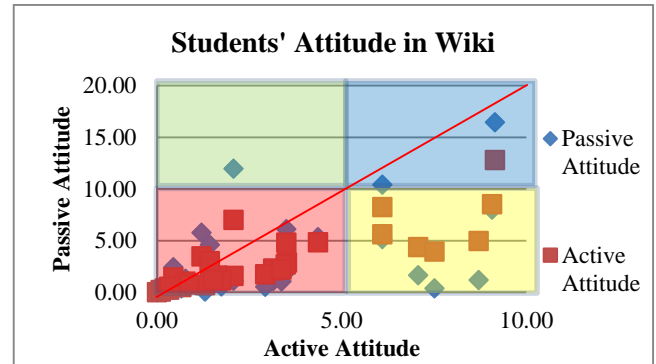


Figure 7 Learners' participation on wiki activity

4.2 Result of Pilot Study

Demographic Characteristic

The characteristic of the respondent is female with 21-25 years old. Most of the respondent is from FPPSM. The respondents have knowledge about e-learning with average 30 minutes usage per day. However they were not being exposed of using wiki in the e-learning.

Table 4 Demographic characteristic

Demographic Items		Frequency	Percentage
Gender	Male	9	30
	Female	21	70
Age	18-20	2	6.7
	21-25	27	90
	26-30	1	3.3
Faculty	Civil Engineering	1	3.3
	FBB	1	3.3
	FE	2	6.7
	FEE	1	3.3
	FKA	1	3.3
	FKE	3	10
	FPPSM	8	26.7
	FSKSM	11	36.6
	Mechanical Engineering	1	3.3
	Science	1	3.3
Year	1	7	23.3
	2	7	23.3
	3	12	40
	4	3	10
Elearning_Course	7	1	3.3
	0-1	9	30
	2-3	10	33.3
Use_Moodle	3-4	3	10
	More than 4	8	26.7
Time_Spent/Day	Yes	25	83.3
	No	5	16.7
Time_Spent/Day	10 Minutes	7	23.3
	120 Minutes	2	6.7

Demographic Items	Frequency	Percentage
15 Minutes	4	13.3
1 Minutes	1	3.3
25 Minutes	1	3.3
30 Minutes	8	26.7
5 Minutes	5	16.7
60 Minutes	2	6.7
Practice_Wiki Yes	10	33.3
No	20	66.7

4.3 The Effectiveness of E-Learning Activity

Factor analysis is used by the researcher for evaluating the item validity. Sample size in this research is 35 learners (small), then inter-item correlation analysis is conducted.¹⁸ Reliability analysis is conducted on the questionnaire item to measure each element (knowledge, skill, attitude, learning effectiveness and long term learning). Acceptable values of alpha are range from 0.70-0.95.^{22,23} All elements that have been tested are shown to be reliable (Refer Table 5).

Correlation analysis also is conducted on the questionnaire item to measure the dependent elements and independents elements. The researcher used regression analysis to evaluate the validity of relationship of the elements. The researcher had concluded two model of survey into one table as shown in Table 6.

- Model 1: Knowledge + skill + attitude → Learning effectiveness

- Model 2: Learning effectiveness → Long term learning

Table 5 Elements reliabilities

Part	Elements	Alpha value α
C	Knowledge	0.931
	Skills	0.870
	Attitude	0.886
	Learning Effective	0.875
	Long term Learning	0.897
Total:		0.892

Table 6 Elements reliabilities

Model Summary			
Model	R	R Square	Adjusted R Square
1	.903 ^a	.815	.797
2	.762 ^b	.581	.568

1. Predictors: (Constant), attitude, knowledge, skill
 2. Predictors: (Constant), effectiveLearning

The independent elements; attitude, knowledge and skill together explain that 81% of the variance (R Square) in the effectiveness of learning, which it is highly significant, as indicated by the F-value of the 45.603 in Table 7. However, for Model 2, the effective learning just stated for 58% of the variance in the long term learning. It is still significant which the F value is 45.717.

Table 7 Anova

ANOVA ^b						
	Model 1			Model 2		
	Sum of Squares	F	Sig.	Sum of Squares	F	Sig.
Regression	304.583	45.603	.000 ^a	138.656	45.717	.000 ^a
Residual	69.017			100.087		
Total	373.600			238.743		

a. Predictors: (Constant), Attitude, knowledge, skill
 b. Dependent Variable: EffectiveLearning

a. Predictors: (Constant), EffectiveLearning
 a. Predictors: (Constant), LongLearning

The regression test (Table 8) also indicates that knowledge has contributed to the learning effectiveness in the wiki Moodle. For the Model 2, effective learning has very highly contribution to the long term learning paradigm t=6.761.

Table 8 Coefficients

Coefficients ^a			
Standardized Coefficients			
Model	Beta	t	Sig.
1 (Constant)		-2.926	.006
knowledge	.443	3.397	.002
skill	.350	1.962	.059
Attitude	.177	1.205	.237
a. Dependent Variable: EffectiveLearning			
2 (Constant)		1.314	.198
effectiveLearning	.762	6.761	.000
b. Dependent Variable: Long Learning			

5.0 DISCUSSION

Data log wiki activity in e-learning application has been analyzed to identify learners' attitude in learning process. Figure 8 shows the log activities of learners while using current e-learning; Wiki Moodle 2.3.

Name	Active				Passive					
	Add	Edit	Comment	Active Score	View	Map	History	Passive Score	Passive Score Ratio	
Student D	2	44	1	20.22	13.04	150	0	11	21.56	7.99
Student G	0	32	0	14.22	8.80	57	0	2	7.22	2.24
Student C	1	21	0	9.44	6.05	86	1	2	11.11	6.10
Student Y	2	18	0	8.22	5.65	78	0	9	12.67	5.34
Student Ad	3	15	1	7.44	5.85	35	0	2	4.78	1.86
Student E	3	13	2	7.00	5.51	45	0	0	5.00	1.20
Student X	1	11	2	5.89	4.17	86	1	1	8.22	5.15
Student Q	0	13	0	5.78	3.49	67	0	3	8.78	2.87
Student R	2	10	0	4.67	3.49	59	0	1	7.00	1.94
Student Ab	0	13	0	5.78	3.49	45	1	1	5.89	4.59
Student W	1	5	4	4.11	3.36	31	3	16	12.78	16.44
Student Ai	2	9	0	4.22	3.23	26	0	1	3.33	1.06
Student L	0	11	0	4.89	2.96	40	0	13	10.22	5.78
Student H	2	7	0	3.33	2.69	27	0	1	3.44	1.08
Student I	2	7	0	3.33	2.69	55	0	0	6.11	1.47
Student J	1	8	0	3.67	2.55	29	0	1	3.67	1.14
Student U	0	5	3	3.56	2.55	22	3	2	4.87	10.40
Student Ab	2	5	0	2.44	2.15	20	0	0	2.22	0.53
Student Ak	0	8	0	3.56	2.15	24	0	0	2.67	0.64
Student V	0	7	0	3.11	1.88	22	0	2	3.33	1.31
Student Aj	0	1	4	2.22	1.88	14	0	0	1.56	0.37
Student T	1	5	0	2.33	1.75	21	0	0	2.33	0.56
Student F	0	6	0	2.67	1.61	14	0	0	1.56	0.37
Student P	1	4	0	1.89	1.48	20	0	3	3.56	1.62
Student Ac	1	3	0	1.44	1.21	29	0	0	3.22	0.77
Student Q	0	4	0	1.78	1.08	9	0	6	3.67	2.41
Student Ae	0	2	1	1.33	0.94	45	2	13	11.67	11.67
Student Af	0	3	0	1.33	0.81	7	0	0	0.78	0.19
Student Ag	0	3	0	1.33	0.81	27	0	0	3.00	0.72
Student Z	1	1	0	0.56	0.67	3	0	0	0.33	0.08

Figure 8 Learners' score hits in Wiki data log

i. Passive and Active Attitude of learners

Wiki Moodle activity is able to identify the participation level for each learner in class. The instructor can identify the learners who collaborate actively in wiki. In addition, the instructor is able to identify learners who are passive. Instructor is also able to give marks for participation in Wiki activity. This will ease the instructor to assess learners' attitude. Moreover, passive learners are given a chance to be more active and participate on wiki activity in future.

ii. Passive and Active Attitude of class(overall of learners)

In addition, instructor also is able to identify classes which are active and passive towards the learning activity given. The top management is able to identify which class is passive on learning process whereby they can take action to the particular learner in improving their participation attitude.

iii. Action taken by instructors in class

Knowledge construction learning paradigm can be expanded into new style of learning. There are many ways to implement wiki activities for knowledge construction. Instructor should be able to identify learners who need attention so that the learners' performances, skill and knowledge can be improved. Implying active action towards passive learners, help to increase critical thinking skills and stimulate learners to be cooperative and collaborative.²⁴ Instructors also find it is so much easier to assess learners learning.

iv. Learners' Performance on Wiki Moodle Learning

Three main elements; knowledge, skill and attitude were used as independent elements towards the learning effectiveness as dependent element. From the result shown, it is proved that all main elements; knowledge, skill and attitude had strong significant effect on learning effectiveness. Moreover, long term learning is affected by learning effectiveness. Learning effectiveness also is defined as short term learning. The instructor shows that wiki e-learning is capable to increase learners' performance in the learning process. The learners also are achieved their learning objective when using wiki in e-learning.

6.0 CONCLUSION

We have presented a model for knowledge construction learning paradigm in Wiki Moodle environment. The advantages of the knowledge construction in wiki Moodle is the learners are able to build rich resources that represent learners' collective intelligence based on course learned. Other than that, learners also are able to control the content and to encourage sharing of their understanding on course learned. The analysis shows that the model can contribute to enhance learning performance by participating in wiki activities. Other wiki learning application using wiki such as; contextual application and critical thinking are possible to apply in e-learning for future. Learners can be identified as active and passive. Based on the log analysis, not all learners fall into highly active participation, but it still brings benefits to the instructors to support and motivate learners. In addition, for survey evaluation which showed that the elements tested had strong relation to be effectiveness in learning application; knowledge construction. However, the questionnaire

is relies on the learners perception towards knowledge construction learning application.

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