

The Influence of Blended Learning Station-Rotation (Cooperative Vs Competitive) and Cognitive Style Towards Intellectual Skill in Management Construction

Gde Agus Yudha Prawira Adistana¹, Wasis Djoko Dwiyo²

¹Faculty of Engineering, State University of Surabaya, Indonesia

²Faculty of Sport Science, State University of Malang, Indonesia

wasisdjokod@gmail.com

Abstract:

The purpose of this study was to test the effectiveness of blended learning station-rotation model, and to examine the cognitive style influence and interaction between blended learning station-rotation model and cognitive style on intellectual skills learning acquisition. The findings showed there are differences in the acquisition learning of intellectual skills of construction management between students who use the cooperative model of blended learning station-rotation and the competitive model of blended learning station-rotation. There is no difference between students who have field dependence cognitive style and those with field independence one. In addition, there is no interaction effect between blended learning station-rotation models and cognitive style.

Keywords: *blended learning, cooperative, competitive, cognitive style, intellectual skill*

1. INTRODUCTION

The growth of blended learning as a learning method goes hand in hand with the rapid development of internet network and increasing number of internet users. In general, blended learning is the combination between face-to-face learning method (traditional) and online learning method. In line with the development of blended learning, several models of blended learning emerge, more particularly those focusing on how online learning is implemented in real classroom situation.

Blended learning station-rotation is one type of blended learning model that has been developed vastly. Based on the blended learning station-rotation model, learners take turn to have at least one online learning station besides other stations that have been designed previously; the process is called rotation. Through the model, it is expected that learners are exposed to more learning source or in this case two different learning environments. The first environment is guided, face-to-face environment, and the other is online learning environment. Each learning environment has its own benefits and shortcomings. Thus, when these two learning environment are combined into one learning environment, it is expected that both can complement each other. Taking care of learner's need with different characteristics is a fundamental issue in learning, especially one related to the use of ICT (Information and Communication Technology).

Duncan (2008:545) states that: *"To make the best use of current and future technology opportunities it would be helpful to perform further research on cognitive and affective traits to identify which students benefit most from the different delivery method"*. The statement means that in order to get optimum result of the implementation of blended learning, teachers should have some information about learner's cognition and attitude so that teachers are able to identify which learners obtain the most advantage from a delivery system. Specifically, it is expected that teachers or course designers have knowledge or adequate consideration to design an optimum blended learning model. In line with Duncan's theory, Graff (2003), Magoulas et al. (2003), and Snow (1997) state that in order to optimize an online delivery system, further studies on learner's need should be conducted. Some information about learner's need can be obtained through seeking information about strength and weakness of each characteristic of learners.

According to Morrison (2003), other current issue and challenge in the implementation of blended learning is tendency that face-to-face is the only learning method that is able to transfer complex knowledge and skills, while online learning is merely suitable for transferring lower-level of knowledge and skills.

Related with the issue, findings of some studies have proven the previous statement untrue. Complex knowledge and skills can be taught using online learning method as long as learning environment is carefully designed based on knowledge about learner, learning process and content of learning (Hofmann, 2001; Morrison, 2003).

Similar statement is conveyed by Degeng (2013) who argues that learning quality has always been related to the use of optimum learning model in order to achieve learning purpose under particular learning condition.

The purposes of the study are to find out effectiveness of blended learning station-rotation model of learning, influence of cognitive style as well as interaction between blended learning station-rotation model of learning and cognitive style towards learning acquisition in management construction intellectual skills

Learning acquisition in management construction intellectual skills is pivotal since understanding of some abstract concepts in management construction and related procedures or application of some rules are of necessities to solve some problems in the field of management construction; these skills are the requirements to learn management construction. In other words, to overcome a problem correctly, learners have to be able to apply two types of knowledge, conceptual and procedural one. Surif et al (2012) also put some emphasis on the importance of the two types of knowledge claiming that procedural knowledge is one's understanding of how to apply concepts s/he has learned previously in a problem-solving situation.

Gagne (1985) gives a definition of intellectual skill towards learning capacity, that is the use of symbols to discriminate, form a concept and rule as well as solve a problem. According to Degeng, Gagne's learning capability taking intellectual skills as its form is continuum in nature from simple to more sophisticated level. Besides that, intellectual skills (discrimination, concept, rules and sophisticated rules) have hierarchical correlation which means lower-order intellectual skill is the pre-requisite to higher-order ones.

2. RESEARCH METHODOLOGY

Research Method

Variable of the study consists of (1) independent variable that is the blended learning station-rotation model, both competitive and cooperative one; (2) moderator variable that is cognitive style consist of field dependence and field independence; (3) dependent variable namely intellectual skill in management construction. Based on the independent and moderator variables configuration used in the study, it is carried out using factorial design (2x2) more specifically the non equivalent control design version.

Subject of the Study

The subjects of the study are the fourth semester students of Civil Engineering Department, State Polytechnic of Malang, Indonesia, year 2014-2015. The subjects consist of 4 classes divided into two classes of 49 students as the experimental group and the other two classes of 48 students as the control group. The total number of participants are 97 (ninety-seven) participants. The experimental group is the group being given treatment of the cooperative blended learning station-rotation model. On the other hand, the control group is the one being given treatment of the competitive blended learning station-rotation model.

Data Analysis

The technique of data analysis used for hypothesis testing is the Analysis of Variance (ANOVA).

3. FINDINGS

The findings of the study show three things. First, there is a discrepancy in management construction intellectual skills learning acquisition between students using cooperative blended learning station-rotation model and those using competitive blended learning station-rotation. In terms of statistics, the use of cooperative blended learning station-rotation is significantly better than the use of the competitive blended learning station-rotation. ($F = 11,481$; $p=0,001$). The second is there is no discrepancy in management construction intellectual skills learning acquisition between students who have field dependence cognitive style and those with field independence one ($F = 0,199$; $p=0,658$). The third is there is no effect of interaction between the blended learning station-rotation model (cooperative and competitive) and cognitive style (field dependence and field independence). No effect of interaction means the cognitive style does not alter correlation of blended learning station-rotation model towards learning acquisition in management construction intellectual skill ($F = 0,795$; $p=0,377$).

4. DISCUSSION

Based on the hypothesis testing, it is found out that there is discrepancy in management construction intellectual skills acquisition between learners taught using cooperative blended learning station-rotation and those taught using competitive blended learning station-rotation. The finding is supported using descriptive testing that shows students who are given cooperative blended learning station-rotation as the treatment have higher scores in management construction intellectual skills compared to those given competitive blended learning station-rotation as the treatment.

The findings of the study show that the implementation of the cooperative blended learning station-rotation gives better influence towards the acquisition of management construction intellectual skills compared to the implementation of the competitive blended learning station-rotation. The finding becomes empirical evidence that learning process emphasizing on cooperative learning method through group formation is better than that emphasizing on competitive or individual group. The findings of the study matches Escurado et al. (2013)'s that reveal the learning process in virtual environment where students work in groups to finish an assignment enables the students to give better learning performance compared to assigning individual work to the students. Escurado et al. (2013) also state that distant learning (online) without adequate interaction among learners gives very few opportunity for learners to overcome complex problems.

Similarly, the findings of Yaman & Graf (2010)'s study reveal that blended learning consisting of group activities is more effective than the blended learning emphasizing on learner's individual ability. Azis (2013)'s study describes the benefit of group work in blended learning environment; the blended learning with group work enables students to have better comprehension on linear function compared to students being taught with individual blended learning. Azis (2013) explains learners have better acquisition when

they work in groups because group work allows discussions where slow learners or learners who have yet understood the concept being learned obtain information from other learners in their group with different background.

Related to Vygotsky's learning theory (Tudge, 1990), learning in group facilitates learners to construct concept and their knowledge based on information or knowledge they obtain from cooperative learning environment, and therefore the learners became active participants in the learning process. When they learn in a team or group, learners can learn how to discuss and achieve their learning goals through knowledge they obtain from other learners (social context). Besides that, group work gives some opportunity for learners to increase their abilities to work in team as well as develop their leadership, communication and interpersonal skills through presentation and social interaction with their fellow group members.

Johnson & Johnson (2003) state that even though they learn in groups, learners have certain awareness to take responsibility and are motivated to become cooperative to other members of their groups. In the situation, learners tend to play the role of giving information rather than accepting information, while teachers will act as facilitators who gives direction and guidance for the learners. Johnson & Johnson (2003)'s statement support the process taking place in the cooperative blended learning station-rotation learning conducted in the study; the model of learning, the cooperative blended learning station-rotation, gives significant effect towards learner's social need in working as a team and communicating effectively among other members of his/her group.

The finding of the study is in accordance to and consistent to the findings of the study conducted by Vanicharoenchai and Toskulkaew (2010) claiming that blended learning model is an effective learning model. In terms of the management construction intellectual skills acquisition scores, the learners taught using the cooperative blended learning station-rotation model where the learners work in groups are significantly higher than those taught using the competitive blended learning station-rotation model; it means cooperative learning process in small groups motivates learners to become the active participants in the learning process.

The active learning process takes place since the learning environment in the cooperative provides a room for learners to construct their knowledge individually through the analysis of the problems they encounter with. Furthermore, the learners are stimulated to find solutions using online media and given some time for sharing the solutions to other learners. In the stage, the process of information exchange occurs where learners gives their opinion to one another; it results in information assimilation process that generates new and more accurate information to overcome the learners' problems or obstacles.

The findings of the study can also be explained using Kerres & de Witt (2003)'s didactic models. Kerres & de Witt (2003)'s didactic model has 3 components, namely (1) content, (2) communication and (3) construction. The first component, component, provides some explanation how learners get learning materials. As the example in the study the content is available through the use of online media and interactive CD (offline) as the learning objects. As an addition, communication explains how learners can construct knowledge through social interaction with other learners or teachers through communication. Construction, the final element, discusses the components that discuss and guide both individual and group activities in completing the task. For example, in the study, the classroom activities are constructed or facilitated using worksheets (*Lembar Kerja Mahasiswa*).

All of the components of the didactic model of Kerres & de Witt are included in the blended learning station-rotation model implemented in the study. The didactic component that has the highest influence in the discrepancy between the experimental and control group is communication. In the control group (competitive blended learning station-rotation), communication occurs only between learners and teachers komunikasi, whereas communication between learners in the form of sharing knowledge and discussion is hardly accommodated in the control group. The condition is totally different from the condition of the experimental group (cooperative blended learning station-rotation) where communication also occurs among learners. Communication among learners becomes the advantage that explains why the experimental group has better learning acquisition than the control group.

Constructivism can also justify the findings of the study. Based on Vygotsky, act of learning also takes place through social interaction with other learners through discussion, dialogue, cooperative work, sharing information, and interaction with other learners. Vygotsky's theory is supported by Bruner (1996) who has the perspective that act of learning has to consider social and cultural aspects through group activities. Social

interactions between learners are in the form of discussion, dialogue, cooperative work, sharing information, and interaction with others.

Slavin (2005)'s statement is also in accordance to the findings of the study. Slavin explains that it is easier for learners to construct their abilities to understand concepts and apply procedures when learning activity is in the form of discussion. Besides that, it is also explained that learning through group formation help increasing thoughts and comprehension towards the change of concepts. When related to the finding, it means that the model of learning implemented in the experimental group namely the cooperative blended learning station-rotation kelompok facilitates learners to have skills to elaborate a concept so that the learners obtain deeper understanding concept of a concept and have capabilities to apply more sophisticated procedures.

5. CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the description of the findings, the hypothesis testing and discussions, some conclusions drawn for the study are as follow:

1. There is different learning acquisition in management construction intellectual style between the learners taught with the competitive blended learning station-rotation model and the learners taught with the cooperative blended learning station-rotation model. The latter group of learners is significantly better than the former one in management construction intellectual style learning acquisition.
2. In terms of the learning acquisition in management construction intellectual skills, there is no difference between the learners with field dependence (FD) cognitive style and those with field independence (FI) cognitive style.
3. There is no effect of interaction between the blended learning station-rotation model with cognitive style towards the project management construction intellectual skills. The absence of interactional effect can be inferred that the involvement of cognitive style does not change the correlation between the blended learning station-rotation model towards the learning acquisition in management construction intellectual skills.

Suggestions

Suggestions Related to the Findings of the Study

1. Taking the first conclusion of the study into account, lecturer whose responsibility is to teach management construction should consider cooperative blended learning model as the method of learning in order to develop learner's intellectual skills. Therefore, it is vital for the lecturers to have sufficient knowledge and capability to design and manage model of blended learning that combines effective and efficient face-to-face and online learning and at the same time pays attention to cooperative learning process.
2. The blended learning station-rotation model of learning can be the answer to solve some problems related to the learning system in the university which consists of face-to-face meeting, structured activities, and independent study when lecturers for some reasons are unable to attend the classes. Rotation between face-to-face meeting and online activities can be done once in every meeting. It means when the first meeting is a face-to-face meeting, the second meeting can be conducted in the form of an independent study (online/ offline).
3. Technically, in order to carry out the implementation of the blended learning station-rotation model, an interactive CD is a requirement. The interactive CD is the solution to overcome the need of such huge bandwidth for data transfer if the content of learning is delivered through online video.
4. The competitive blended learning station-rotation can be selected by learners whenever time efficiency in completing the content of the materials becomes the only consideration.
5. Related to the findings of the study on the cognitive style, where there is no discrepancy in learning acquisition between learners with field dependence (FD) cognitive style and those with field independence (FI) cognitive style, learners who have tendency to learn in competitive manner (individually) should be given some freedom to select the blended learning station-rotation models that they think suitable the most. The same thing should also work for learners with the tendency to learn in cooperative manner.

6. Taking the third conclusion into account, which states there is no interaction between the model of blended learning station-rotation and cognitive style, teachers should take learner's cognitive style aside when they plan to apply one of the blended learning station-rotation model.

Suggestions for Further Studies

1. In the study, the composition of face-to-face meeting and online/offline learning are 50:50 or both shares an equal 50% of the total learning process. There should be further studies emphasizing on composition of face-to-face meeting and online/offline learning so that eventually it is found out the most optimum composition for both face-to-face meeting and online/offline learning for blended learning.
2. Considering limited facilities and resources, the study does not use video conference in the implementation of blended learning station-rotation models. Therefore, further studies should involve virtual component as an element to study in order to have more reference for blended learning model.
3. The study is limited to compare learning acquisition between two groups of learners using blended learning model. Further studies should involve other aspects for instance learning effectiveness and reasons why learners are interested in the blended learning model.
4. The model of blended learning selected for the study is the station-rotation. Further studies on the implementation of other models of blended learning such as the flipped classroom and flex model needs to be conducted.
5. The findings of the study show there is no interaction between the model of blended learning and cognitive style. As the consequence, further studies on the implementation of blended learning model should focus on other characteristics of learners, for example locus of control, learning motivation, self efficacy and so forth.
6. The study also reveals the presence of nurturant effect in the form of responsibility, motivation and appreciation on information from the fellow learners when a learner becomes a part of a group in the cooperative learning. Taking the finding into account, further studies should involve conducting assessment on the presence of the nurturant effect namely responsibility, motivation and appreciation on information from the fellow learners when a learner acts as a group member in the cooperative blended learning station-rotation model.

REFERENCES

- [1]. Azis, Y.M. 2013. The Effectiveness of Blended Learning, Prior Knowledge to The Understanding Concept In Economics. *Educational Research International*. ISSN-L: 2307-3713 Vol 2. No.2.
- [2]. Bruner, J. 1966. *Toward a Theory of Instruction*. Cambridge, MA: Harvard University Press.
- [3]. Degeng, I.N.S. 2013. *Ilmu Pembelajaran:Klasifikasi Variabel untuk Pengembangan Teori dan Penelitian*. Bandung: Arasmedia.
- [4]. Duncan, J. 2008. Learning and Study Strategies for Online Teaching. Editor Kidd, T. T. & Song , H. 2008. *Handbook of Research on: Instructional System and Technology volume II*. New York: information Science Reference.
- [5]. Escurado, I. Leon, J. A., Perry, D., Olmos, R. & Jorge-Botana, G. 2013. Collaborative Versus Individual Learning Experiences In Virtual Education: The Effects of A Time Variable. *Procedia - Social and Behavioral Sciences* 83. 367 – 370.
- [6]. Gagné, R.M. 1985. *The Conditions of Learning and Theory of Instruction (4th Edition)*. New York: CBS College Publishing.
- [7]. Gagne, E.D. 1985. *The condition psychology of school learning*. Toronto: Little Brown & Company Limited.
- [8]. Graff, M. 2003. Individual Differences in Sense of Classroom Community in a Blended Learning Environment. *Journal of Educational Media*, 28(4) 203-210.
- [9]. Magoulas, G.D., Papanikolaou, K. & Grigoriadou, M. 2003. Adaptive Web-Based Learning: Accomodating Individual Differences Through System's Adaption. *British Journal of Educational Technology*, 34(4), 511-527.
- [10].Morrison, D. 2003. *The Search for the Holy Recipe*. Retrieved on October 25, 2013 from http://www.morisonco.com/downloads/blended_learning_holy_recipe.pdf
- [11].Slavin, R.E. 2005. *Educational psychology: theory and practice*. Needham Heights, MA: Allyn and Bacon.
- [12].Snow, R.E. 1997. *Aptitude-Treatment Interactions and Individualized Alternatives in Higher Educations*. In A. S. Messick (Ed.), *Individuality in Learning* (pp. 268-293). San Fransisco: Jossey-Bass.
- [13].Surif, J., Ibrahim, H. N., & Mokhtar, M. 2012. Conceptual and Procedural Knowledge in Problem Solving. *Procedia - Social and Behavioral Sciences* 56. 416 – 425.
- [14].Tudge, J. 1990. *Vygotsky, The Zone Of Proximal Development, And Peer Collaboration: Implications For Classroom Practice*. Editor: Moll, L. C. *Vygotsky and Education: Instructional Implications and Applications Of Socio historical Psychology*. New York: Cambridge University Press.
- [15].Vanicharoenchai, V. & Toskulkaew, T. 2010. Effects of Blended Learning, Using Online Data Searches and Action Learning, Upon Academic Achievement and Searching Skills of Nursing Students. *J Nurs Sci*,Vol.28 No.2.
- [16]. Yaman, M. & Graf, D. 2010. Evaluation of An International Blended Learning Cooperation Project in Biology Teacher Education. *TOJET: The Turkish Online Journal of Educational Technology*, 9 (2).