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**Habits of Mind and Concept Mastery of Cell in Multimedia Virtual Class Environment: A Case of Biology Students in Lampung University**

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**Abstract:** The ability of students to use Information and Communication Technology (ICT) is still not optimally integrated with learning. Even though most students already have gadgets, internet connections are available via campus hotspots. Based on this, learning in higher education cannot be separated from the use of computerized and online-based technology. The integration of ICT into vclass-based multimedia learning is a potential thing to develop. This vclass-based multimedia application is expected to improve habits of mind and conceptual understanding of biology cell of students. Improved learning outcomes can be demonstrated through conceptual understanding which are the ability to understand the concepts that exist in the learning material after the learning process takes place.

**Keywords:** habits of mind, mastery of concepts, cells, virtual class.

*Abstrak:* Kemampuan mahasiswa dalam menggunakan Teknologi Informasi dan Komunikasi (TIK) masih belum optimal diintegrasikan dengan pembelajaran. Padahal sebagian besar mahasiswa sudah memiliki gadget, tersedia koneksi internet melalui hotspot kampus. Berdasarkan hal tersebut, pembelajaran di perguruan tinggi tidak bisa terlepas dari pemanfaatan teknologi yang terkomputerisasi dan berbasis online. Integrasi TIK ke dalam pembelajaran melalui multimedia berbasis vclass merupakan hal yang potensial untuk dikembangkan. Penerapan multimedia berbasis vclass ini dapat meningkatkan habits of mind dan penguasaan konsep sel mahasiswa pendidikan biologi. Peningkatan hasil belajar dapat ditunjukkan melalui penguasaan konsep yang merupakan kemampuan memahami konsep-konsep yang ada dalam materi pembelajaran setelah proses pembelajaran berlangsung.

**Kata kunci:** habits of mind, penguasaan konsep, sel, kelas virtual.

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## ▪ INTRODUCTION

Information and Communication Technology (ICT) based learning is still not optimal and the database of lecture material and student assignments is still stored in the conventional way. Even though most students already have computers / laptops / gadgets, lecture rooms are also equipped with one LCD unit, internet connection is available through campus hotspots. Based on this, learning in higher education cannot be separated from the use of computerized and online-based technology. Many universities have extensive access to abundant Information and Communication Technology (ICT) -based teaching and learning resources but these resources have not yet manifested their great potential for education (Dikti, 2010).

Miarso (2009) argues that the development of information and communication technology (ICT) has provided various possibilities for improving the quality of education, namely among others to: (1) increase access to obtain information from anywhere, anyone, anytime and anything, ( 2) increasing the effectiveness of communication with various forms of sensory stimulation, (3) increasing relevance to more and more diverse needs, (4) adjusting to changing environmental conditions, and (5) increasing efficiency by saving time, effort and costs. The use of ICT by students must still be under the guidance of lecturers because according to Rustaman (2011), the use of information technology in addition to providing a number of facilities and alternative solutions in learning, tends to also have an impact on cultural shifts.

For this reason, the integration of ICT into learning through multimedia based on vclass is a potential thing to be developed because basically the teaching and learning process is a reciprocal interaction and communication activity between educators and students that takes place in educational situations to achieve learning goals (Rustaman, 2003 ) The interaction is not just a communication relationship between the teacher and students but also educational interactions that reflect attitudes, values, and habits of mind in students.

Some researchers (Ennis, 1987; Paul, 1990; Costa, 1991; Perkins, 1984; Flavell, 1976; Zimmerman, 1990; Amabile, 1983 in Marzano et al., 1993) put habitual thinking into three categories namely self regulation, critical thinking and creative thinking. The observations show that students' thinking habits are still low and need to be improved. Some of the results of these studies indicate that habits of mind can be explored, trained, developed and shaped for the better. Costa & Kallick (2000) and Campbell (2006) claim habits of mind as characteristics of intelligent thinking behavior that are highest in solving problems and are indicators of success in academics, work and social relations. According to Sriyati (2011), a number of researchers claim that habits of mind can help students to conduct self regulation in their learning and find solutions in their social relationships and workplaces. Risnanosanti's research (2011) shows that learning with habits of mind strategies can improve higher-order thinking skills and better learning outcomes for students. Improved learning outcomes can be demonstrated through mastery of concepts which are the ability to understand the concepts that exist in the learning material after the learning process takes place.

The use of multimedia can be combined with Virtual Class (Vclass) based on Learning Management System (LMS). Vclass is an online class that provides facilities for participants to communicate with each other, view presentations or videos, interact between participants, and share information resources within groups (Ferriman, 2013). Virtual classroom systems can be accessed anytime and anywhere for 24 hours every day so that students have more learning experience (Kumar and Shasi, 2013). LMS is an

application that automates and virtualizes the teaching and learning process electronically (Wahono, 2008). LMS that can be used effectively and efficiently, namely Edmodo, Schoology, and Moodle. Edmodo and Schoology applications implement more on social media while the moodle application has more features that support learning.

#### ▪ **METHOD**

The method used in this study is the weak experiment. Vclass-based interactive multimedia applications are applied to one experimental class. Measurement of habits of mind was carried out through questionnaires given at the beginning and end of the implementation of electronic portfolio assessments. The mastery of concept measurement was carried out through pretest and posttest. Therefore, the research design used is The One-Group Pretest-Posttest Design. Data obtained in the form of quantitative data carried out regression tests with the help of SPSS 17 program.

This research consists of stages of research preparation, research and the final stages of research. The virtual class used in this study is vclass.unila.ac.id and whatsapp as a medium to support online discussion. Multimedia in the form of animation of cell biology concepts, images, and videos published to students through vclass. Online discussions are held regularly once a week to deepen the material given in class during lectures. The data obtained based on the research are field notes during the lecture process, the mahsaiswa response questionnaire which was discussed descriptively, the results of student mastery concept tests, and habits of mind questionnaires. Quantitative data analysis was assisted using Statistical Package For Social Sciences (SPSS) 17 for windows software. Questionnaire data habits of mind (Marzano, 1993) uses the highest four and lowest one. Processing and analysis of habits of mind data is done through the initial and final HoM average test to determine the increase in habits of mind. This test uses the formula N-Gain (Meltzer, 2002) and normalized gain criteria according to Meltzer (2002).

Before the average difference test is carried out, the statistical prerequisite test is done first through the normality test using the Kolmogorov-Smirnov test. In addition to the average difference test, to determine the effect of vclass-based multimedia on students' habits of mind, Paired-sample T Test was conducted with the help of SPSS 17. The measurement was done by comparing students' habits of mind scores between before and after the electronic portfolio assessment. Acceptance or rejection of a hypothesis based on the value of t or its significance value.

#### ▪ **RESULT AND DISCUSSION**

Vclass-based multimedia to improve habits of mind and mastery of concepts was made in vclass.unila as shown in Figure 1. The habits of mind data were obtained from questionnaires with scores from a scale of 1 to 4 adapted from the habits of mind questionnaire Sriyati (2011) developed by Marzano et al (1993). This questionnaire is given before the application of multimedia based on vclass and after the lecture ends which can be accessed online. The results of this questionnaire can describe the binding of habits of mind of students from the three categories, namely self regulation, critical thinking, and creative thinking. The different test results of the average habits of mind at the pretest and posttest prove that multimedia based on vclass can increase the habits of mind of students with the average N-Gain which is included in the medium category, namely 0.50 (Table 1).

**Table 1.** Questionnaire score for habits of mind

No	Factor	Average Initial Score	Average Final Score	Average N-gain
1	Self regulation	45.54	73.51	0.51
2	Critical thinking	50.68	76.08	0.51
3	Creative thinking	48.48	71.62	0.45
Habits of mind		48.23	73.74	0.50

Increased students' habits of mind because of multimedia contributions based on vclass which have components in the form of online discussions, self assessment, and assignments. Increased habits of mind occurred in each category, namely self regulation at 0.51 (medium category), critical thinking at 0.51 (medium category) and creative thinking 0.45 (medium category). This shows that multimedia based vclass is more able to train self regulation and critical thinking of students compared to creative thinking. The equation is because online assignments and discussions provide opportunities for students to realize their thoughts, make effective plans and are sensitive to feedback and sources of information. This is in accordance with the results of the student response recapitulation which states that 73% of students are increasingly diligent in searching for learning resources through the internet and books, 60% of students make assignments, and 65% are aware of their own thoughts through online discussions and assignments. However, students experienced problems in accessing habits of mind questionnaires through vclass (85%) so that filling out questionnaires was given an alternative through googleform.

Increased students' habits of mind were also analyzed through student N-gain grouping (Table 2). The number of students who have a low category is 15.6%, the medium category is 65.6%, and the high category is 18.8%. Besides the N-gain HoM data of students, the Paired-Sample T test was also conducted to determine the significance level. The initial and final habits of mind scores are used in this test and produce  $t$  count = -17.251 ( $\frac{1}{2}\alpha = 0.025$ ). This  $t$ count value proves that there are significant differences in habits of mind between before and after the application of multimedia based on vclass. Increased habits of mind of students can also be from the progress of the learning process of students from the tasks given during learning. Habits of mind in question are one's productive thinking habits when responding to answers to questions or problems whose answers are not immediately known (Costa and Kallick, 2000).

**Table 2.** Category for N-gain habits of mind.

No	Category	Number of students	Percentage
1.	Low	5	15.6 %
2.	Middle	21	65.6 %
3.	High	6	18.8 %

The posttest habits of mind results show that 30% -50% of students get a score of 4 for each category, which is aware of their own thoughts, sensitive to feedback, evaluating the effectiveness of actions, looking for accuracy, being open, being able to place themselves when there are guarantees, are sensitive and know the ability of knowledge of friends, can involve themselves in the task even though the answers and

solutions are not immediately apparent, make efforts to maximize abilities and knowledge, create and improve evaluation standards made by themselves, produce new ways to see situations different from the usual way. However, for one category, which is "clear and seeking clarity", that is, students feel that some part of the task being done is confusing so that it influences the overall results. This is in accordance with the learning process where students often ask questions about the assignments given and some students revise their assignments because there are still many mistakes.

Marzano (1993) and Sriyati (2011) state that it is rare for people to use mental habits like this, therefore habits of mind must be applied to students, because students rarely see habits of mind used by people around them. Thus, habits of mind need to be introduced, explored, trained and developed by students which can be done through multimedia based vclass. In this study two concept mastery tests were carried out which were carried out twice the concept mastery test at the beginning and end of the application of vclass-based multimedia. The pretest and posttest questions consist of 10 social essays with cognitive levels of C2 (comprehending) to C5 (synthesizing). The pretest and posttest are still carried out offline because the types of essay and student questions are still constrained by poor internet access, then the test results are analyzed and the results of the recapitulation can be seen in Table 3.

**Table 3.** Result berdasarkan category of N-gain

Category	Number of students	Percentage
Low	1	3.1 %
Middle	20	62.5 %
High	11	34.3 %

Table 3 shows that students experience increased mastery of different concepts ranging from low to high categories. Most students experienced an increase in mastery of concepts in the medium category, namely 62.5% while the high category was 34.3% and the low category was 3.1%. In addition to N-gain data mastery of student concepts, the Paired-Sample T test is also conducted to determine the significance level. The pretest and posttest scores were used in this test and produced t count = -30.179 ( $\frac{1}{2}\alpha = 0.025$ ). This tcount value proves that there are significant differences in the mastery of concepts between before and after the application of multimedia based on vclass.

The increase in mastery of concepts in students occurs because multimedia animation, images, and videos about cell biology are very helpful for students in understanding cell concepts, organelles, and the processes that occur in them. In addition, the availability of multimedia online helps students to access learning resources that can be accessed anytime and anywhere. Online discussions also help students who do not understand the concept so they can ask questions in the discussion group, then students who are more understanding can help answer. As McCulloch (2006) argues that efforts to build and reconstruct students' knowledge can be done with continuous feedback, students need scaffolding in achieving Zone of Proximal Development (ZPD), scaffolding can be done by lecturers or peers in various ways including instructions (explaining concepts certain), warnings (provide feedback) or encouragement. Feedback through virtual classes can help students construct critical thinking knowledge in identifying errors, sources of information, and analyzing problems.

## ▪ CONCLUSION

Based on the research that has been done, it can be concluded in general that learning with multimedia based on vclass can improve habits of mind or student thinking habits which consist of three categories, namely self regulation, critical thinking, and creative thinking. In addition, the application of multimedia based on vclass also increases the mastery of cell biology concepts because it can help students understand concepts in the cell biology course and facilitate students in obtaining learning resources.

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