AN ANALYSIS OF TECHNOLOGICAL CONTENT KNOWLEDGE OF STUDENTS OF MATHEMATICS EDUCATION DEPARTMENT STKIP BINA BANGSA GETSEMPENA BANDA ACEH

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ABSTRACT

Students as prospective teachers are required to have technological content knowledge because the current learning process will become meaningful if combined with technology. This study aims to determine the technological content knowledge of students of Mathematics Education Studies Program STKIP Bina Bangsa Getsempena Banda Aceh. The approach in this research uses qualitative approach and descriptive research type. Subjects in this study are students of Mathematics Education Studies Program STKIP Bina Bangsa Getsempena Banda Aceh force 2015 who are taking media and mathematics learning technology courses as many as five students. The research instrument used is questionnaire and interview guide. Based on the results of research can be concluded that 1) Research subjects can describe the use of technology in learning mathematics. They describes examples of the use of technology in learning mathematics for example the use of Matlab and Just Basic software for linear equations and matrix materials. 2) The use of learning technology is very helpful for the subject of research in understanding mathematics material even though they have difficulty in making mathematical formula into software program 3) Technological learning in college is very helpful for research subjects to gain knowledge about the use of learning technology and hopes that the lectures will get better for the coming year.

Keywords: Technological content knowledge.

INTRODUCTION

The development of ICT has enriched resources and learning media in various forms such as power point slide, animated picture / photo, movie
video, web page, computer-assisted learning program, and learning support software application. Students in teacher education programs as prospective teachers are expected to have the necessary knowledge to apply effective models in learning as well as have readiness to teach their students with ongoing technological changes (Sancar, 2013). To prepare mathematics teacher candidate who has knowledge about learning technology, mathematics education department in STKIP Bina Bangsa Getsempena apply technology-based learning process in lecturing process. This can be seen from the preparation of lecturers and students in providing a presentation during the learning process. Obviously this can be done because facilities and technology-based learning tools are available with good and adequate.

For students of mathematics education department in STKIP Bina Bangsa Getsempena who sit in the third year is required to take courses in technology and learning mathematics media. This course aims to equip students with knowledge of technology in learning mathematics. In addition, students are also expected to apply technology-based learning media to their students who will teach them in school.

Based on the results of interviews with some students of Mathematics Education Studies Department in STKIP Bina Bangsa Getsempena who is carrying out field experience practice shows that students are very interested in using technology-based learning media in the classroom, especially for mathematical materials in the form of geometry. Utilization of media technology can help them in explaining the geometry to be more concrete so that students feel motivated in learning mathematics. Media that they often use is a power point slide that contains geometry images obtained from the internet. However, most of the students have difficulty in preparing teaching materials using technology.

Today's technology has become an important tool in learning mathematics. Technology can be used in various ways to improve and improve mathematics learning. NCTM (Niess, 2006) argues that technology serves as a facility in solving mathematical problems, communication, reasoning and evidence. In addition, technology can provide an opportunity for students to explore mathematical ideas and support them in making connections both inside and outside mathematics.

The use of technology has a long history in mathematics education. Many societies introduce arithmetic with the abacus because it can support
calculations. In addition, the abacus can present real images of mathematics and can help students understand difficult concepts. Technology used in mathematics learning eg OHP, whiteboard, books, and digital technology such as calculators, cell phones, computers, and the internet. For computers it is usually equipped with software used in a mathematical context, such as Geogebra, Microsoft Excell, Cabri, GSP, SPSS, Matlab, SketchUp and others (Stols, 2008).

In the TPACK scheme, there is a relationship between the constituent components that intercepts between the subject matter (content), pedagogical, and technological that affect the learning process. Technological Content Knowledge is a slice of Technological Knowledge and Content Knowledge. Technological Knowledge is an in-depth knowledge of technology that can be utilized to support learning. According to Mishra (2008) technological knowledge emphasizes the basic knowledge of technology as well as skilled in using it to support the understanding of the material being taught.

Content knowledge is knowledge of subject matter that must be learned or taught. This knowledge includes the concepts, theories, ideas, knowledge of evidence as well as the practices and approaches to developing that knowledge. The subject matter includes knowledge of concepts and ideas and their application in everyday life. So it can be concluded that Technological Content Knowledge is knowledge of the use of technology that can help the process and affect the component of the subject matter.

In this research the authors want to examine about one of the TPACK indicator that is technological content knowledge. Technological content knowledge is knowledge of the use of technology that can help and affect the component of the subject matter (Stoilecu, 2011). In relation to this the authors want to examine the technological content knowledge of the students of Mathematics Education Studies Program STKIP Bina Bangsa Getsempena. This is considered necessary as an implementation of the objectives of the technology course and the mathematics learning medium they have or are currently studying. In addition, students as prospective teachers are required to have technological content knowledge because the current learning process will become meaningful when combined with technology.
METHODS

The approach in this research uses qualitative approach and descriptive research type. The reason used qualitative approach is to reveal and understand something behind the phenomenon to be studied (Strauss and Juliet, 2007). In addition qualitative approaches are used so that researchers gain insight into something newly known by observing directly the object of research. This type of descriptive research is a research method that tries to describe and interpret the object as it is (Sudijono, 2006).

In taking the subject of research using purposive technique. Bungin (2007) purposive technique is the technique of taking informants in qualitative research by determining the group of participants in accordance with the selected criteria relevant to the research problem. The size of the number of informants depends on the available resources and time as well as the research objectives.

Accurate selection of subjects will affect the success and smooth collection of information that will ultimately determine the efficiency and effectiveness of the study. Based on the above, the subjects in this study are students of Mathematics Education Department in STKIP Bina Bangsa Getsempena Banda Aceh generation 2013 who have or are taking media courses and mathematics learning technology.

In this research data collection techniques used are interview and questionnaire techniques. Interviews are data collection techniques used to obtain oral information through dialogue and face-to-face with people who can provide information to researchers. Questionnaire is a technique of collecting data indirectly. The instrument or data collection tool is also called a questionnaire that contains a number of questions that must be answered or responded by the respondent. Respondents have the freedom to provide answers or responses according to their preseptions. The questionnaire used in this research is a structured questionnaire.

The data analysis techniques used in qualitative research according to Creswell (2010) through the steps as follows.

1. Processing and preparing data for analysis.
2. Read the entire data.
3. Analyze more details by coding data.
4. Apply the coding process to describe the settings, the people, the categories to be analyzed.
5. Show how the description of the information obtained will be restated in the narrative / qualitative report.
6. Interpret the data.

Based on the above, the data analysis in this study includes the stage of collecting information obtained from interviews and questionnaires.

RESULTS AND DISCUSSION

Technological Content Knowledge student of Mathematics Education Study Department in STKIP Bina Bangsa Getsempena Banda Aceh based on questionnaire answer and interview result presented in the description below. The author presents the results of interviews and questionnaires of five students who are considered to have the appropriate response and answers to the research objectives. The research results are as follows.The result of questionnaire answers given by the students are:

<table>
<thead>
<tr>
<th>No.</th>
<th>Statement Indicators</th>
<th>Answer Questionnaire</th>
<th>SUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I know about media and learning technology in mathematics</td>
<td>SD D N A SA</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Use of mathematical software is one form of technology utilization in learning</td>
<td>1 4 5</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Learning technology provides little benefit in the learning process</td>
<td>1 4 5</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Learning technology facilities available on campus are inadequate</td>
<td>4 1 5</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>I use learning technology during technology learning process</td>
<td>2 3 5</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>The process of learning subject of Technology and Media of Mathematics Learning is very pleasant</td>
<td>1 4 5</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>I find it difficult to use learning technology</td>
<td>3 2 5</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>I get a lot of knowledge about the use of mathematics learning technology through lectures</td>
<td>4 1 5</td>
<td></td>
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Note:
SD : Strongly Disagree
D  : Disagree
N  : Neutral
A  : Agree
SA : Strongly Agree
From the results of the above questionnaire answers, more students choose the answer agree and strongly agree to a statement that is positive. Agreed answers were selected 19 times and the answer was strongly agreed to be selected 7 times for 8 indicator statements. Answer strongly disagree elected by a student for statement number 3. There are 4 student choose answer not agree to statement “Learning technology facilities available on campus are inadequate”. Neutral answer selected by a student for statement no 1 and number 6. Besides, there is three students who chose a neutral answer to the statement “I find it difficult to use learning technology”.

The results of the questionnaire above are reinforced by the results of interviews that researchers do to students. The following presented one of the interview quotes with the student.

Researchers: What do you know about mathematics learning technology?
Student: Mathematics learning technology is a learning system that makes it easy to learn math.

Researchers: Give examples of the use of mathematical learning technology! Examples may be more than one answer
Student: Just basic and mathlab

Researchers: How do you think about the use of technology in learning mathematics?
Student: In my opinion, the use of technology is very useful to facilitate students in solving math problems

Researchers: What learning technology is available on your campus?
Student: Computer, infocus, mathlab and just basic

Researchers: How do you think about the learning process of mathematics technology course?
Student: The learning process has been very helpful to me and useful for me to solve math problems especially for mathematical formulas

Researchers: Do you have difficulty in using learning technology? If so, explain!
Student: I have difficulty when using math apps that use certain codes and create program formulas

Researchers: How knowledge do you get about learning technology on campus?
Student: So far it has been good, but it would be great if more addition material about other mathematics software

Based on the interview above, it can be seen that the knowledge of students about mathematics learning technology is good. It is shown in their interview answers that they use learning technology during the course. Students used the basic and matlab applications to help them in solving math problems. This is in accordance with the opinion of NCTM (Niess,
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2006) that suggests about the technology serves as a facility in providing opportunities for students to explore mathematical ideas. The available of technological facilities on campus are sufficient. Students carry out the learning process using technology. The learning process experienced by the students felt very pleasant although still need to be held up to be more effective

TPACK is a framework of teacher knowledge that includes the interaction between matter, pedagogy, and technology (Mishra, 2008). Knowledge content alone is not enough for effective learning. The teacher's knowledge should include pedagogic skills as well as supported by technology usage. This is in accordance with the opinion of NCTM (Margaret et al., 2009) that the use of technology is very important in learning mathematics because it can affect students in learning and improve their achievement. In addition, the demand for 21st century learning requires that the mastery of educators in technology is not something that can be negotiable.

CONCLUSION

Based on the results of research, it is concluded:

1. Research subjects can describe the use of technology in learning mathematics. They describes examples of the use of technology in mathematics for example the use of Matlab and Just Basic software for linear equations and matrix materials.

2. The use of learning technology is very helpful for the subject of research in understanding mathematics material even though they have difficulty in making mathematical formula into software program

3. Technological learning in college is very helpful for research subjects to gain knowledge about the use of learning technology and hopes that the lectures will get better for the coming year.

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