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Digital Based Guided Note Taking Toward Preservice Elementary Teacher Retention on Science

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Abstract. The potential of making digital notes has been reported by number of study. However the quantity of digital based notes cannot guarantee its quality. Therefore further testing is needed to determine quality of digital notes taking on student retention. The study was carried out to investigate of the digital based guided note taking preservice elementary teacher retention on basic concept of science class. This study employs quasy-experiment method by using pretest-posttest control group design. Two classes of students participated in this study – control class was taught by power point and take notes by traditional notes taking; the experiment class was taught by power point and take notes by digital based guided note taking. Retention was measured three weeks after final examination. The result suggest that digital based guided note taking improve student retention with the categories. The graphical data with standard statistical analyses (t-test) show that retention between control and experiment class was not different.

Keywords: Retention, digital based guided note taking, science

INTRODUCTION ~ Education research has shown various type of cognitive strategies that can be used to facilitate student learning, one of that is note taking strategy.The note strategy has been successfully implemented in various disciplines and in students of various ages (Duhon, 2015). Traditionally, note taking is defined as "...*as the process of capturing key ideasand concepts*" (Duhon, 2015). Note taking is a valuable skill for individuals both in academic and non-academic. In the academic, taking notes is a critical aspect for the learning process. Learning can occur as long as students produce and review the notes they make to link ideas and engage deeply with the processing of lesson content (van Blankenstein, 2018). In the non-academic, notes can be used as evidence of documentation of activities.

Good note taking can lead to efficient learning practices, improve learning outcomes and can increase retention of the content being studied (Friedman). Retention refers to the amount of information that can be stored and reused when needed in different situations (Hikmawati, 2016).

A number of research reports the function of notes as storage of information for students. In fact, there are still many students who are not aware of the benefits of effective note taking (McLeskey, 2010).

A note is considered effective if recording information systematically and comprehensively (Quintus et al, 2012). Effective note taking is often a problem for many students because this activity requires application and coordination of a variety of complex skills including listening, short-term memory, prioritizing and copying information for future use (Haydon et al, 2011).

Basically there are many ways to take notes, for example in the form of textual

outlines, guided notes, concept maps or the web. The form of the note is made depending on the purpose or interest of the note itself. Each person has a number of diverse interests when taking notes, for example to study, increase long-term retention and for the benefit of documentation of activities (Friedman).

One of the solution to solve the students' problems in taking notes is through the implementation of a digital-based guided note-taking strategy (White, 2017). "*Guided notes are strategy that has been developed to support for studentsduring note taking*"(Friedman).

Noting activities involve many mental processes that occur, such as focusing on the teacher, understanding the information conveyed, identifying important concepts that need to be written down and coordinating a number of members of the body to take notes or delete notes. The series of mental processes that occur during recording occur continuously at the same time (Friedman, 2014).The more mental activity involved when taking notes, the more likely that information will be stored in long-term memory.The review process or review the note that have been created is a critical aspect in enabling the transfer of information from their holdings of short-term memory into long-term memory. Storage of information on long-term memory has an impact on the ease of the process of recalling that information in different situations (Hikmawati, 2014). Duhon (2015) also said that the review of notes made by students during learning or when faced with teaching material is a mechanism for storing information that facilitates the retention of students' knowledge.

Some students involved in van Blankenstein's research mentioned that writing activities are more fun when they know the resultsvan Blankenstein (2018).The feedback from teacher becomes a very crucial part for the formation of students' self-efficacy in writing.

Utilization of cellular computing devices in the classroom brings new trends in taking techniques.Speed, legibility and traceability are three positive attributes provided by digital note taking techniques.These strengths are the basis for triggering students' preferences to prefer digital notes over handwritten notes.Oppenheimer and Mueller's (2012) research results show that traditional notes (paper-based and pencil-based) have the same effect as computer-based notes when students are tested with this type of factual knowledge(Gallego, J.C. & Torres, 2013).The results of the research also revealed that students who took digital-based notes encoded more concepts than students who took notes traditionally.

The results of previous studies indicate that the guided note strategy positively influences student learning outcomes and has been practically proven to improve the accuracy of note taking and student test scores (Haydon, 2011).A similar opinion was also conveyed by Gallego & Torres "*...learners couldpromote their cognitive,*

behavioral and motivational engagement through the development ofwriting skills and also foster their self-efficacy to ensure lifelong learning goals" (Hikmawati, 2014).

Technological advancements such as tablet computers, mobile applications and lecture recordings have changed the dynamics of the classroom and influenced the way students take notes from the pen switch on the keyboard.As a multiplatform application, Google Classroom provides an "assignment" feature that facilitates teachers to check student notes during learning, thus teachers can evaluate the effectiveness of learning and provide feedback on students' note-taking abilities.Limited research on the implications of a variety of digitally recorded experiences (such as writing, reviewing and correcting) digital based on self efficacy (Mashhady, 2015) is one of the factors underlying this research.

Considering the potential of guided note-taking strategies, this study was specifically designed to achieve the goal of measuring the effectiveness of digital-based guided note-taking on the retention of knowledge of primary teacher education students in learning the Basic Concepts of Natural Sciences. Practical information obtained from the results of this study is expected to be a contribution of thought in an effort to optimize the use of information technology in learning science in the 21st era.

METHOD

This study focuses on testing the effectiveness of guided note taking strategies on the retention of knowledge and writing self-efficacy of primary teacher education students in learning Basic Concepts of Science through the experimental method with Pretest-Posttest-Retest Design (an extension of Pretest-Posttest Design) (Creswell, 2012).In this research design, the control group and the experimental group are used. The selection of research data was collected before and after the treatment, before the pretest treatment, after the pre-test and retest treatment after four weeks of learning.The two sample classes are differentiated based on the type of treatment given, the control class is given treatment in the form of a traditional note-taking strategy (paper based text) while the experimental class is given treatment in the form of a digital-based guided note taking strategy.During the learning activities, students in the experimental class are directed to connect to the internet and open the Google Classroom application. Through the Google Classroom application, students record important information conveyed by lecturers during the learning process.The format of the notes has been provided by the lecturer in the Google Classroom application in the form of a few paragraphs that are left blank in several sections, students need to fill in the blanks with definitions of terms, key facts or other important concepts. The number of paragraphs provided by the lecturer is

adjusted to the content discussed during the lesson. After completing learning, the lecturer will examine and provide feedback on the results of student notes when learning is done.

The sampling technique in this study was through purposive sampling. The technique of selecting data is done through tests and non-tests. The test is used to capture data on mastery of concepts and retention of students' knowledge about the Basic Concepts of Natural Sciences. Non-test techniques are used to describe data writing self-efficacy and student responses to the use of digital-based guided note taking strategies in learning the Basic Concepts of Natural Sciences. Data mastery of concepts and knowledge retention are netted using the same problems that were developed by considering the cognitive level. Problem development refers to the cognitive level version of Bloom's Revised Taxonomy, the cognitive level that is emphasized namely the C1 and C2 levels to measure retention rates.

Data processing techniques in this study use the help of Microsoft Office Excel 2010 software for descriptive data testing and SPSS version 20 is used for hypothesis testing using independent-samples T-test. Retest data is tested through several steps including scoring and converting the scores of each question bureau so that a total score is obtained. Total scores are converted into percentages for retention testing using Recognition Methods.

RESULTS

In this study preservice teacher were asked to take notes while listening to lecturers' explanations during the lectures of Basic Science Concepts. Digital base is a distinguishing aspect between the two sample groups. In the experimental group, students are asked to connect to internet and access Google Classroom. Through the 'assignment' feature provided by the lecturer in the Google Classroom application, students in the experimental group take notes and fill in the blanks. The blanks are the main concepts or ideas of content that are important for students to master. In the control group, students take notes traditionally based on *paper and pencil* in the handout that has been provided.

Table 1. Exam Scores for students in conventional guided-note taking and digital based guided notetaking. First value in pair is score on first exam. Second value is the same students score on the second (retention) exam

Conventional guided note-taking (n= 28 students)		Digital based guided note taking (n= 28 students)	
(100,76)	(76,56)	(64,72)	(76,56)
(92,56)	(84,72)	(80,84)	(84,72)
(92,68)	(76,72)	(72,80)	(76,72)
(80,68)	(72,60)	(68,80)	(72,60)
(88,76)	(68,72)	(72,80)	(68,72)
(84,64)	(80,68)	(92,68)	(80,68)
(84,68)	(64,68)	(84,68)	(64,68)
(80,76)	(80,64)	(80,76)	(80,64)
(76,56)	(60,80)	(76,56)	(60,80)
(80,76)	(60,52)	(80,76)	(60,52)
(80,48)	(62,80)	(80,72)	(80,68)
(80,76)	(72,80)	(80,76)	(88,76)
(68,64)		(68,64)	
(64,72)		(100,76)	
(80,84)		(92,72)	
(72,80)		(84,64)	

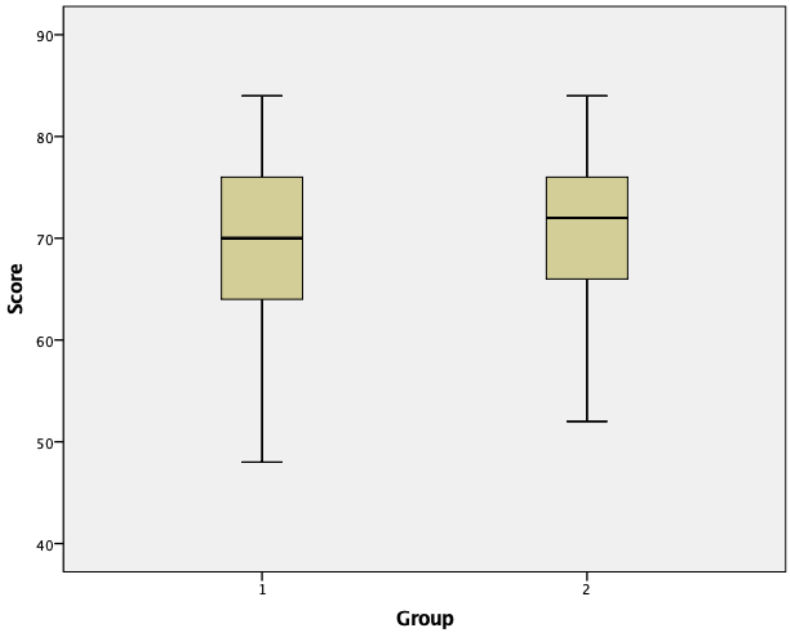

Figure 1. Student Score for retention (1) Control group; (2) Experimental group

DISCUSSION

The results of this study indicate that the GNT strategy in the form of digital handouts assisted by Google Classroom has a positive effect on students' academic performance. Note taking activities involve many mental processes that occur, such as focusing on the teacher, understanding the information conveyed, identifying important concepts that need to be written down and coordinating multiple sense to take notes or delete notes. The mental processes that occur during continuous record occurred at the same time (Friedman, 2014). The more mental activity involved when taking notes, the more likely that information will be stored in long-term memory. In line with these opinions, Duhon (2015) confirms the positive impact of the use of GNT strategies related to the *encoding* functions and *storage* function.

The coding function involves recording content process, which in this study the process is realized in the form of guided notes. The storage function of the recording activity is the process of reviewing records as a mechanism to facilitate retention. The reviewing process that have been made is a critical aspect to enable the transfer of information from short-term memory storage to long-term memory. Storage of information on long-term memory has an impact on the ease of the process of *recalling* information in different situations (Hikmawati,2014).These two functions of applying the guided notes taking (GNT) strategyare the logical reasons for the high retention criteria on the basic concepts of science which are examined 3 weeks after lecture. More than 50% of students in both groups of subjects received a retest score in the range of 70-79% which means, the ability of students to remember the basic concepts of science is in the excellence category. The retention categorization of the two groups was different. Retention predicates in the control group are more scattered among the excellence, the good, and the sufficient.Majority of students are in the excellence category. Student retention in the experimental group show on excellence, and good category.

Although the measured average retention is greater for the digital based note-taking, t-test show there are not significantly different between digital based and conventional note taking. With equal variances assumed show p value 0.543. In this case, p value > 0.05 which means there was not different retention between digital based note taking and conventional note-taking.

Note taking techniques *fill in the blanks* that are applied in this study was shown to reduce ambiguitas concepts because students simply specify the critical information needed to fill in the handouts. The blank on the handout is critical information of key facts, definitions or important concepts from the basic concepts of natural science. With the

technique of filling in the blanks, students are more focused on the part that is emptied so can take notes effectively and provide opportunities for students to be actively involved in classroom discussion.

Unlike the case with note-taking strategies developed in conventional classroom, several studies have tested that note-taking strategies require student involvement in two different tasks (listening and writing) at the same time. To do different tasks at the same time is not easy work. Haydon (2011) explains that if students focus on one task then the other, inaccuracies in other task is very large. For example, when students focus on listening to lecturers' explanations during course then it can reduce accuracy and completeness of the information he notes. In addition, he can also lose the opportunity to be actively involved in the classroom.

This study has several limitations. First, the limited number of sample make it is difficult to generalize the finding. Second, the limited of time and researcher ability to control various factors that might affect student performance. Based on findings of this study, it can be suggested several points for other researchers who are interested in conducting similar research. Further research needs to be developed the role of taking notes which is used to help students apply information on tasks and assesments outside the lecturer setting. Future studies can determine the effetiveness guided note taking to help elemantary preservice teacher prepare teaching material.

CONCLUSION

Digital-based guided note taking strategy can help preservice elementary teacher to store information about the basic concept of science. The fill in the blank technique used to guide students to take notes can reduce ambiguity and time efficiency. Digital or non-digital basis used in taking notes is not a differentiating factor when both are compared as a learning strategy.

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