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The Effect of Using WebQuest for Lower Order Thinking Skills

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Previous research has been widely reported on the use of WebQuest in learning activities. However, no research reported the use of WebQuest for lower-order thinking skills. The purpose of this study was to examine the effect of the use of WebQuest for lower-order thinking skills. The research method was quasi-experimental with two groups of participants were selected by cluster random sampling. The two groups are the experimental group using WebQuest and the control group using traditional methods in learning. Participants' study was the 63 third-year student majoring in Education Technology at the State University of Malang network technology subjects. The instruments used to collect data were pre and post-test scores. The results show that learning using WebQuest is superior to traditional methods for lower-order thinking skills.

Keywords: WebQuest, low order thinking skills

INTRODUCTION

Indonesia is not a new country to utilise the internet. There are 143 million internet users in Indonesia, which consists of 19-34 years olds (49.52%), 35-54 year olds (29.55%), 13-18 year olds (16.68%) and 54 year olds (4.24%) (Bohang, 2018).Aaccording to reports, digital use in 2019 increased by 13% or reached 17.3 million compared to last year (Nistanto, 2019); age population activities in the learning process amounted to 66.2% of the data.

The richness and diversity of information on the internet provide opportunities for educators to use the technology in learning. Our initial research in a small scope shows that students in Indonesia use the internet as basic education. However, the internet is only a tool of information providers to complete their tasks by means of copy and paste. This is reinforced by previous studies with high school teacher respondents (Osman, 2014). Thus, the learning process has not yet happened optimally.

The internet as a source of unlimited information is not only used as a tool to provide information on the study but was actively involved with the learner through learning strategies. WebQuest is a web-based learning strategy (web-based learning) or design web-based learning activitieseffectively. WebQuest is a web-based learning activity with the orientation inquiry or all of the information that interacts with the internet-based learners. Strategies or the learning framework allows educators to integrate the teaching styles, educational objectives, and computer-based technology as a medium for conveying learning. Thus, WebQuest is a strategy that integrates internet media and inquiry learning methods through a link that is provided as a source of learning (Milson, 2001).

WebQuest can help facilitate and provide the skills needed to navigate rather than explore the entire web on the internet. Please note that the internet provides unlimited resources, but is not well structured or is chaos. There are three myths about the internet: 1) that the web is the world's biggest encyclopedia, 2) that the web is an information superhighway, and 3) that the web is full of useless junk. Information on the internet is to be split between the garbage with jewels and it requires the active participation of learners by involving subtle intelligence. When not enough get there, the role of educator must provide a link that can be accounted for. Thus, the link provided in WebQuest needs to be validated and verified properly by the designer.

In 2004, Dodge said that the WebQuest are inquiry-oriented activities with most or all of the information used by learners drawn from the Web. WebQuest is designed to use learners' time well, to focus on using information rather than looking for it, and to support learners in thinking level of analysis, synthesis, and evaluation (Dodge, 2004). It can be defined as the planning of teaching that most of the material presented in this WebQuest is sourced from the internet and is accessed using the internet. The impetus behind such designs is pedagogic. A WebQuest is a scaffolded form of pedagogical sites, where learners set a multi-faceted task to study or a problem to be solved using a specific web link.

Based on the time duration of learning, there are two types of WebQuests: short-term and long-term. Short-term WebQuests are best suited to individual activities, and are completed in one to two class meetings. The purpose of short-term WebQuests is especially focused on the development or use of lower-order thinking skills in the domain of teaching cognition and skills.

Long-term WebQuests could last for a few weeks or a few months and are suitable to work in groups to complete a project. Long-term goals of WebQuest involve the development and use of higher-order thinking skills for teaching cognitive domain, affect, and skills. Problem solving skills and critical thinking are also discussed, as the long-term WebQuest allows students to expand and improve their knowledge base and strengthen their skills to find and integrate new knowledge. At the end of this long-term activity, students must analyse in depth knowledge of the body, turning it in some way, and show understanding of the material by creating something that others can respond to. Often, in the long term WebQuest, students are given roles and ordered to seek information on topics that have been previously studied. The final product or assignment is usually the completion of a special project that can take the form or presentation of a class or paper. WebQuest generally consists of the following pages:

a) Introduction. An introductory section that provides background information and motivates learners to engage in WebQuest. This section also provides an overview of the learning objectives. This page provides the learners to build prior knowledge and experience.
b) Task. The task should be able to reflect the indicators to be achieved learners after completing the task. The first step taken by the learner in preparing tasks is to find the resources or links that are relevant to a specific topic on the web. Then, the learner plans an activity for learners combining information from various sites. Tasks are designed to invoke interesting kinds of thinking inside the learners that go beyond rote comprehension, thus stimulating learners for higher-order thinking.
c) Process. This part is the steps to be followed in completing the task, with associated links in each step. This page contains what should be done by the learners and leads to learning resources such as links to help form a scaffold to another. The internet is the main learning resource provided by WebQuest to maximise time with a well-structured search to minimise the wild-focus in order to complete the task. Thus, most of the process page will contain a link associated with the material to be mastered through a given task.
d) Evaluation. To evaluate the work of learners, WebQuest requires one section. The standard rubric used must be fair, clear, consistent, and specifically to assess the tasks. Clear objectives, a suitable assessment for certain tasks, and involve learners in the evaluation process either as an individual or group in doing the project. In the end, the evaluation should be clearly linked to the objectives stated in the task or introduction.
e) Conclusion. The part that is like closing a different class with learners dropping opening what will be learned. This section is part of the conclusion of all the material that has been taught. This conclusion tells you about what is achieved after going through the learning process with a WebQuest. It also can add some final questions for consideration and additional enrichment links if learners want to explore the topic further.

At the time of the WebQuest, the development process should follow the principle suggested by the creator. This principle is based on the experience gained in the field, during early WebQuest training with teachers. There are five principles that give the term FOCUS by Bernie Dodge. FOCUS stands for: Find great sites, Orchestrate your learners and resources, Challenge your learners to think, Use the medium, Scaffold high expectations. Find great sites is an activity for teachers or learners who will start learning with WebQuest and is looking for sites that are qualified for use. Orchestrate your learners and resources is to manage learning resources and learners that can mean not enough for just a computer and learners but create activities that create interactivity among learners with a computer. Challenge your learners to think is to create an activity that is challenging for learners to interact with a computer, not just copy the information provided but the information is used to answer the problem. Use the medium in question is a medium when the internet is not just a media resource that provides only the information, but the medium that provides the expert, communication and multimedia as well, so not only reiterated but allows for higher-order thinking. Scaffold high expectations means WebQuest is expected to not only ask learners to do something that is common but scaffolding that is used to help the learners to go beyond the skills possessed.

In Bloom's taxonomy of 1956, there are two kinds of differences in human thinking skills that of lower-order thinking skills (LOTS) and higher-order thinking skills (HOTS) (Bloom & Englehart, 1956). Lower-order thinking skills include knowledge, understanding, and application, while analysis, synthesis, and evaluation are included in the higher-order thinking skills. In 2001, Bloom's taxonomy changed with revisions (Anderson et al., 2001). The changes occurred on the dimensions of cognitive processes and cognitive dimensions of knowledge. For the dimension of the taxonomic process initially using a noun, whereas revision uses the verb. Furthermore, there are four categories for the dimension of cognitive knowledge that of factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge. Based on the changes in lower-order thinking skills on the dimensions of cognitive processes include things to remember, understand and apply, while the higher-order thinking skills include analysing, evaluating and creating.

Studies that have been conducted revealed that Bloom's taxonomy was revised to show positive results compared to the beginning of the utilisation in Bloom's taxonomy of learning planning for pre-service teachers in Turkey (Bumen, 2007). Mayer researched other contributions in the use of the revised Bloom's taxonomy as being very helpful towards taxonomy design assessment (Mayer, 2002). This study, therefore, uses the revised Bloom's taxonomy as a reference in learning outcomes.

Lower Order Thinking (LOT) is often marked by the recall of information or the application of the concept or knowledge to familiar situations and contexts. Schmalz noted that the task requires learners LOT to remember the facts, perform simple operations, or the kinds of problems that are common (Schmalz, 1973). Senk, Beckmann, & Thompson (1997) stated that LOT is characterised as the completion of tasks in which the solution requires the application of algorithms that are well known, often without justification, explanation or evidence, and where only one correct answer is possible. In general, LOT marked as complete a task while working in a familiar situation and context; or, applying algorithms that are already familiar to learners (Thompson, 2008). remembering that

capturing relevant knowledge from a long-term memory. Some verbs are included, namely, recognising, identifying or recalling/retrieving.

Understanding that constructs meanings or understandings based on prior knowledge possessed or integrate new knowledge into existing schemes in the thinking of learners. The learner is said to understand at the time that they were able to construct meaning from instructional messages including, oral, written or graphic material delivered learning. Some of the cognitive processes in the category of understanding that is interpreting, examplifying, classifying, summarising, inferring, comparing and explaining.

Applying that implement or use to the procedure in certain circumstances (the given problem), or in other words to solve problems that are closely related to procedural knowledge. There are two types of cognitive processes that execute in the category applying familiar tasks and implement tasks that are not familiar. The learners in executing a familiar task is to use the procedure on the task that is already known or the learner has a particular sequence of steps in completing its tasks. Tasks that are not familiar with using a procedure that is implemented on a task or problem that is not known or learners must choose the technique or method and change their order.

Several previous studies involving the use of WebQuest show inconsistent results on the achievement of learning outcomes at different levels of education. In primary education learning achievement received a positive result using WebQuest strategies (Çığrık & Ergül, 2010; Jamtsho & Apibalsri, 2018; Kurtuluş & Kiliç, 2009; Unal & Karakuş, 2016). While the achievement of learning from other studies indicated that there is no significant difference (Oliver, 2010), even the control group did better (Strickland, 2005). Application of WebQuest strategies on secondary education was not found to be a significant learning achievement even in the control group. But they could have done better Social Sciences and in the science group there was no difference (Şahin & Baturay, 2016; Yenmez, Özpinar, & Gökçe, 2017). At the college level implementation WebQuest strategies yielded positive results on student learning achievement (Abu-Elwan, 2007; Chuo, 2007), but other studies provide insignificant results or no difference to the achievement of learning outcomes (Frazee, 2004). For higher-order thinking skills, research Kanuka, Rourke and Laflamme provide a positive influence for the thirteen-week study by using WebQuest in college (Kanuka, Rourke, & Laflamme, 2007). This was similar for research conducted by Ebadi & Rahimi (2018) for the learning outcomes appearance of critical thinking (Ebadi & Rahimi, 2018). Student Respondents respond positively to the learning utilisation of WebQuest (Soepriyanto, Degeng, Setyosari, & Ulfa, 2018). At the time of WebQuest training to lecturers at the college, they also received a positive response as well (Soepriyanto, Sihkabuden, & Wedi, 2018).

Vidoni and Maddux believe that WebQuest can be a learning strategy for achieving critical thinking skills (Vidoni & Maddux, 2002). This is because WebQuest contains six key elements of critical thinking skills of Weinstein. The results of this study are also obtained through inquiry-oriented activities in the WebQuest. As for the skills of creative thinking on the part of the menu, learners are challenged to develop products that are planned in WebQuest instructional design. Critical and

creative thinking skills are one other form of higher-order thinking skills. The skill is one of the skills needed by learners in the 21st century (Levin-Goldberg, 2014).

Teaching activities that involve the development of higher-order thinking skills move students beyond the acquisition of knowledge (information) to the development of critical thinking skills and problem-solving. It also includes the ability to build knowledge of the facts and data collected through the use of lower-order thinking activities (Gredler, 2009; Merriam & Brockett, 2011), Therefore, the hypothesis is:

Hypothesis 1 : There is a differentce score between lower-order thinking skills using WebQuestWebQuest and traditional methods in network technologies courses.

Hypothesis 2 : There are a differentce scores lower order between lower-order thinking skills between before and after intervention using WebQuestWebQuest in network technologies courses.

Objective

The purpose of this study was to investigate the effect of using WebQuest in learning networking technology for lower-order thinking skills. To the research questions they seek to answer is twofold: (1) there are statistically significant differences scores lower-order thinking skills in computer networks due to the teaching-learning strategy (Web Quests, traditional); and (2) are there difference statistically significant lower-order thinking skills scores before and after intervention? Several previous studies have explored the use of WebQuest influence during the learning process only on academic achievement or higher-order thinking skills. The results of this study provide empirical evidence of the lower-order thinking skills when students are involved in activities WebQuest. Lecturer network technology course builder can use WebQuest in learning to improve lower-order thinking skills. Thus, this study is an attempt to fill a gap in the region in particular WebQuest learning outcomes produced are lower-order thinking skills. In addition, the results of this study proved that WebQuest was able to facilitate the learners to learn the computer network.

METHOD

This study uses a quasi-experimental method by comparing the experimental group using WebQuest with the control group using traditional methods. This study design is quasi-experimental pre-test / post-test nonequivalent groups.

Participants

The total number of participants of this study was sixty-three students of Educational Technology State University of Malang third year. Subjects who used the learning content are a network technology that held in the first semester of 2018/2019. The two classes are selected using random cluster sampling. Total student experiment class is 31 and the number of students in the control class is 32.

Instruments

To measure the achievement of Lower-Order Thinking Skills (LOTS), pre and post-tests were prepared. The test consists of 50 multiple-choice items covering the subject of networking technology. Each question answered correctly awarded two points (total points = 100). The time required to complete the test is 100 minutes. The composition of the question consists of three components in LOTS i.e. remembering, understanding and applying. Items between pre-test and post-test are the same, just different placement numbers.

Before the instrument is used, the expert panel reviews and comments for face validity and appropriateness. The exam was first tested on a group of students who have taken the course for two weeks. This is done to ensure the reliability of the test. A reliability coefficient of about 0.75 that describes the test is acceptable reliability.

Process

Researchers design a learning program to achieve learning objectives. Design learning programs have to follow what is suggested by its creator that surrounds the subject of computer networking technology. Implementation design learning programs are developed to WebQuest pages namely, introduction, task, process, evaluation, and conclusion. WebQuest that have been developed are placed on the free service providers at zunal.com. The test is done repeatedly before the implementation of the research to obtain access to assurance ease and smoothness. The WebQuest address for this study was *http://zunal.com/WebQuest.php?w=387544*. To deal with the validity of the study materials, the panel experts review and provides comments. The panel consists of a linguistic expert, instructional designer, web-based learning expert, and the contents of the course. Validation comes from several departments by the field in the Universitas Negeri Malang. Review and comment on the results of the experts have been revised for two weeks and the WebQuest is ready for use.

In the first week, a pre-test was conducted in both study groups (WebQuest and traditional) before the intervention is given. The pre-test is used to test the equality between the two groups. The indicated resources used Levene's test P = 0.069, which was greater than 0.05, therefore, were assumed equal variances. The results indicated resources for equality of means there was no significant difference at p = 0.051, therefore, the null was retained. The results are displayed in Table 1. Therefore, the two groups are equal, because it has almost the same variant.

After the pre-test was carried out, the experimental class students formed a group, which consists of five people. WebQuest address is given to the group as a preliminary activity and students quickly read the entire menu page that existed. Each team member is chosen and appointed on their own to become a technologist as presented on the pages process. For seven weeks duration the lectures were conducted on both the control and experimental groups. The end product is a print and file presentation proposal on infrastructure planning and design of computer networks in schools. Meanwhile, the control group was taught to use a lecture presentation file to view them. Two groups

at the end of the experiment tested once again to obtain post-test scores. The research findings were analysed and discussed using appropriate statistical analysis.

RESULT

The first research question asks whether there are significant statistical differences at ($\alpha = 0.05$), between the experimental and control groups in the post-test results due to the teaching strategy. To answer the question, the means, and the standard deviation, t-test values were calculated for the sample on the post-test. An independent sample t-test was conducted to analyse the post-test score. The results are presented in Table 2.

As we saw in Table 2 there is a statistical difference between the two means of lower-order thinking skills students score on the post-test due to the teaching strategy. The mean scores of the experimental group (Web Quests) are (51.61), whereas the mean scores are (44.63) for the control group (traditional), $p = 0.016$. It is empirically evident that the instructional program of using WebQuest has enough a positive effect on LOTS in computer technologies courses.

The second research question asks whether there are significant statistical differences at ($\alpha = 0.05$), between the experimental and control groups in the post-test results due to using WebQuest.To answer the second question, a paired sample t-test was calculated for the performance of the study sample in the pre/post-test. According to the low order thinking skills variable. Table 3 presents the results. It can be concluded from the results of Table 3 that there is a statistical difference between the two means of students' LOTS of scores on the pre and post-test diligence teaching intervention strategy. The mean score for lower-order thinking skills before the intervention was 33.29, and the mean score was 51.61 after using WebQuest. The mean difference was 18.32. This means that the lower-order thinking skills score can be increased by using WebQuest as a learning strategy.

DISCUSSION

The purpose of this study was to examine the effects of using WebQuest and traditional methods on lower-order thinking skills. The first research question focused on the difference between the lower-order thinking skills scores, student WebQuest and using traditional methods. The results indicated that in the resources there was a significant difference after the data analysis was performed. These results are consistent with several previous studies tested even though the score is the only academic achievement. This finding is consistent with previous research on WebQuest excellence in English programs as a Foreigner (AL-Khataybeh & AL-Awasa, 2016; Al-Shamisi, 2016; Irzawati & Asiah, 2013),

These findings confirm minimal difference. This could be due to other variables that play a role in the student's self and the environment. Background and psychological conditions of the students either as individuals or groups can affect the outcome. The social environment can also be expected to influence because they are peers in the same department.

WebQuest is an inquiry-oriented learning strategy can develop critical thinking skills/higher-order thinking skills (Aydin, 2016; Chang, Chen, & Hsu, 2011; Ikpeze & Boyd, 2007; Santavenere, 2003; Vidoni & Maddux, 2002). This finding also confirms that teaching involving higher-order thinking skills gives better results at lower level thinking skills (Jones, 2015; McCollister & Sayler, 2010). This is due to having the critical thinking skills or higher-order thinking that the facts and data collected through the use of lower-order thinking is used to build new knowledge.

CONCLUSSION

The results showed that the WebQuest has the greatest potential from the use of teaching strategies in the college network technology. There are a significant differences in the scores between lower-order thinking skills among students who use WebQuest and traditional methods. Although the difference was minimal, WebQuest was still able to improve the learning achievement of lower-order skills. There is evidence that before the intervention and subsequent classes are very significant differences.

Excellence in WebQuest as a learning strategy for lower-order thinking skills due to having an element of critical thinking skills other forms of higher-order thinking skills. If a study involving higher-order thinking skills then lower-order thinking skills can be achieved. Thus WebQuest is superior to traditional methods in achieving lower-order thinking skills.

Table 1. Analysis of Pre-Test Data

Group	N	mean	SD	t-Value	p-Value
Experimental	31	33.29	7.686	-1994	0.051
Control	32	37.69	9667		

Table 2. Analysis of Post-Test Data

Group	N	mean	SD	t-Value	p-Value
Experimental	31	51.61	11.904	2482	0.016
Control	32	44.63	10.416		

Table 3. Data Analysis Pre-Test and Post Test Experimental Group

Condition	Mean	SD	t-Value	p-Value
Pre-Test	33.29	7.686	-8.629	0.000
Post-Test	51.61	11.904		

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