The influence of problem reality-based Web Course Learning (WCL) on students' Higher-Order Thinking Skills (HOTS) on human reproductive system material

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Article information	ABSTRACT
	Penelitian ini bertujuan untuk 1) mengetahui penerapan Web Course Learning berbasis problem reality pada materi sistem reproduksi kelas XI MIPA SMA 1 Bae Kudus, 2) mengetahui High Order Thinking Skills (HOTS) siswa pada Materi Sistem Reproduksi Kelas XI MIPA SMA 1 Bae Kudus, dan 3) mengetahui pengaruh Web Course Learning (WCL) berbasis problem reality terhadap Higher Order Thinking Skills (HOTS) siswa pada Materi Sistem Reproduksi Kelas XI MIPA SMA 1 Bae Kudus. Penelitian ini merupakan jenis penelitian eksperimen dengan pendekatan kuantitatif. Penelitian ini mengambil data dari
	SMA 1 Bae Kudus dengan sampel yang digunakan sebanyak 70 siswa. Pengambilan sampel dilakukan dengan teknik Cluster Random Sampling. Teknik analisis data menggunakan uji Independent sample t-test. Hasil uji hipotesis menunjukkan bahwa nilai sig-2 Tailed 0,000 < 0,05, maka kesimpulannya H1 diterima artinya Terdapat Pengaruh Web Course Learning (WCL) Berbasis Problem Reality terhadap Higher Order Thinking Skills (HOTS) siswa kelas XI MIPA pada materi Sistem Reproduksi. Hasil penelitian ini diharapkan mampu memberikan pengetahuan baru bahwa pembelajaran tanpa tatap muka juga mampu meningkatkan Higher Order Thinking Skills (HOTS) siswa.
	ABSTRACT
	The influence of Problem Reality Based Web Course Learning (WCL) on students' Higher-Order Thinking Skills (HOTS) on human reproductive system material. The purpose of this study was to describe 1) the application of Problem Reality Based Web Course Learning in the Reproductive System Material for Class XI MIPA SMA 1 Bae Kudus. 2) the students' High Order Thinking Skills on Reproductive System Material for Class XI MIPA SMA 1 Bae Kudus. 3) the effect of Web Course Learning Based on Problem Reality for Higher Order Thinking Skills of students XI MIPA on Reproductive System material SMA 1 Bae Kudus. This is experimental research with a quantitative approach. The sample of this study used 70 students from SMA 1 Bae Kudus. Sampling by using the Cluster Random Sampling technique. The data analysis by using the independent sample t-test. Hypothesis test results show that the value of sig-2 Tailed 0.000 <0.05, the conclusion is that H 1 is accepted, meaning that there is an effect of implementation Web Course Learning Based on Problem Reality for Higher Order Thinking Skills of students XI MIPA on Reproductive System material. This research is expected to be able to provide new results that online learning is able to increase Higher Order Thinking Skills of student.

INTRODUCTION

In today's advanced era, quality human resources are needed. Human qualities including insights and skills can be developed through education. National Education still faces a variety of problems. Various problems arise because the education and learning process is under the pressure of societal progress, knowledge, and technology. Science is experiencing very fierce competition in the international world (Malik Fajar, 2015). Therefore, education in Indonesia is expected to compete globally and be able to contribute globally. This is because education is able to lead humans to continue to exist and compete in the era of the industrial revolution 4.0. One of the focuses in improving the quality of education is human resources. Human resources are closely related to human potential that can be developed in the production process. These qualities can be monitored from the development of thinking skills developed during educational programs (Wahyu, et al, 2018).

Thinking is a mental ability that includes several aspects of thinking including analytical, systematic, logical, critical, and creative thinking. Thinking is a person's mental process through the process of remembering and understanding even beyond these two things. There are three main things in the thinking process including work, contents, and results. Thinking learning prioritizes the process of seeking and finding insights that occurs through the relationship between the individual and the environment, so learning to think also prioritizes ways in students to find their own knowledge. Thinking learning views that students can build their knowledge through a thinking process facilitated by the teacher as a guide in learning (Hamidah, 2019).

Based on the explanation above, learning is not just what is available in the book and students understand the material, but one part of building knowledge and insight accompanied by attitudes and values that can be applied in various community environments. One of the efforts in improving thinking skills is by implementing Higher Order Thingking Skills (HOTS). HOTS is the ability to think at a high level. Handayani (2013) states that HOTS can be experienced by a person if he relates new information with information that is in his memory to be linked and developed according to the objectives to be achieved. HOTS are thinking activities that prioritize experience as a center in student thinking so that students are able to construct knowledge accompanied by more critical and creative thinking. Students must be able to explain, relate to each other, classify, manipulate, create new ways innovatively and apply them to obtain solutions to various problems of life .

The results of field research state that Indonesia's science literacy ability is ranked lower out of 65 countries. The research is based on results from TIMSS (Trends in International mathematics and Science Study) in 2011 and PISA (Program for International Student Assessment) in 2009. The results showed that the assessment was based on a lack of understanding of information, theory of analysis and problem solving, use of tools and instructions for use, and carrying out investigations. Based on the results of the assessment obtained that weaknesses in the theory of analysis, problem solving, the use of tools and procedures are included in the HOTS section.

Based on the results of research from the Australian Council for Educational Research (ACER) in 2015 through a discussion with the theme "Teaching and Assessing High-Level Thinking Ability" it was produced that Indonesia is ranked 10th lowest in the evaluation of education systems in 72 countries. Based on the results of this research, HOTS is needed to improve educational performance so that Indonesia does not lag behind other countries in the world because HOTS encourages individuals to be able to form a mindset with a higher level in facing situations in people's lives.

HOT s can be developed through learning, but not all learning is suitable as a means of improving HOTS. This is related to problems in the world of education about the lack of application of types of learning models as well as integrating learning models in carrying out learning activities. Teachers must be active in updating information along with the times and students need to develop ways of learning in accordance with the times. This is done because the education curriculum in Indonesia has undergone changes, namely called the existence of a revised edition of K-13.

The revised edition of K-13 has almost the same principle as K-13 that this curriculum encourages teachers to innovate in developing various types of learning models to give rise to new

types of learning in accordance with the times. So that learning activities are more lively with activeness, innovation and being able to create interactions between components in learning. However, the learning model that is usually carried out in the classroom has changed due to the pandemic (Adit, 2020).

HOTS can be developed through learning, but not all learning is suitable as a means of improving HOTS. One type of learning that is suitable for pandemic conditions is Web Course Learning (WCL). WCL is a form of learning that utilizes the internet as a means of learning so that students and teachers do not need face-to-face meetings (Aji Kurniawan, 2017). WCL learning will be more constructive with the existence of a Problem Reality base. Problem Reality-Based Web Course Learning (WCL) is a learning system that utilizes the existence of the internet so that all learning is carried out online using an additional Problem Reality based as a spur for students to learn by presenting various problems in real life that will later be connected to existing theories.

The material used in this learning is the material of the reproductive system. This material is applied because the complexity of the problems in studying the reproductive system fits perfectly with the author's goal of improving HOTS. The complexity of the problems that the author refers to are human reproductive devices, human reproductive processes, differences in female and male reproductive devices and diseases and disorders of the human reproductive system. some of these problems are quite telling that reproductive system material is suitable to be applied in conjunction with Problem Reality-Based Web Course Learning (WCL).

Efforts to improve HOTS in students can be done by providing treatment in learning, but not every treatment has the same success rate. Based on the results of research conducted by Ambarita, et al (2020) regarding the Application of E-learning to Improve Higher Order Thinking Skills (HOTS) Students stated that E-learning in order to achieve learning goals is certainly able to train students to have high-level thinking skills. The results of the research above are considered relevant to the title of the study because WCL is part of E-Learning learning which is also overall internet-based learning. Therefore, the author uses Problem Reality-Based Web Course Learning (WCL). This type of learning is believed to be able to increase student HOTS because learning with online media where unlimited information is accompanied by the presentation of problems that occur in real life.

Learning with Problem Reality-based Web Course Learning (WCL) is expected to be able to make students more careful and precise in thinking, especially in improving student HOTS. Although learning in a pandemic situation that is only limited to online learning, it is hoped that HOTS can increase which is able to encourage and construct the knowledge that has been obtained by students so that they can be applied and understood in everyday life. The objectives in the implementation of this study are 1) to find out the application of Reality-Based Web Course Learning (WCL) to the material of the reproductive system of class XI MIPA SMA 1 Bae Kudus, 2) To find out the High Order Thinking of students on the Reproductive System Material of class XI MIPA SMA 1 Bae Kudus, and 3) To find out the influence Web Course Learning (WCL) based on Problem Reality To Higher Order Thinking Skills (HOTS) students in the reproductive system material of class XI MIPA SMA 1 Bae Kudus.

METODE

This research is an experimental study. The experimental research design used is quasi experimental design (Sugiyono, 2019). The Quasi Experiment form used is a non-equivalent control group design. Non-equivalent control group design is a form of design that is designed in such a way as to provide pretests to the experimental and control groups so that students know the initial state of the students (Sugiyono, 2019). Then after the pretest is carried out, it will be given treatment according to the researcher's plan, namely the experimental group is given treatment in the form of the application of WCL based on Problem Reality while the group control performs conventional learning as usual.

Providing treatment in experimental classes, namely the presentation of material through videos, images and text based on Problem Reality. The previous material has been available on social media such as Youtube. The treatment is given at each meeting in accordance with the

subject matter to be studied. The sampling technique in this study is a cluster random sampling technique. The samples used are class XI MIPA 1 and XI MIPA 2 with the number of students in each class of 35 students if the total total number is 70 students.

The instruments in this study are in the form of HOTS questions and student response questionnaires to WCL based on Problem Reality. The questions used to measure student HOTS are multiple-choice questions totaling 30 items and essay questions totaling 5 items. The question indicators used are in accordance with the indicators of high-level thinking ability according to Anderson and Krathwohl (2002), namely the levels of C4 (analysis), C5 (evaluation) and C6 (creative). As for knowing the increase in HOT s students in the reproductive system material of class XI MIPA SMA 1 Bae Kudus using the N-gain score. Hypothesis test analysis was used to test the effect of WCL on Student HOTS on the reproductive system material of class XI MIPA SMA 1 Bae Kudus. The data analysis technique used in this study was an independent sample t-test.

RESULTS AND DISCUSSION

Problem Reality-based Web Course Learning (WCL) in its application is responded well by students as evidenced by the results of the student response questionnaire to WCL based on Problem Reality. The questionnaire was distributed to the experimental class with a sample of 35 students with the highest score of 140 and the lowest score of 35 so that, it can be determined the score of the student response questionnaire criteria to the Problem Reality-Based WCL by taking the average on the highest and lowest scores for the experimental class. The results of the questionnaire calculation showed an average score of 93.34, the result was included in the "good" criteria. The criteria score can show good criteria can be seen in Table 1 below.

Table 1. Criteria for student response questionnaire scores to Web Course Learning (WCL) based on Problem Reality-

Scale Value	Scale
106 – 140	Excellent
71 – 105	Good
36 – 70	Good Enough
10 – 35	Not Good Enough

Furthermore, with regard to students' higher-order thinking skills can be seen from the average results of pretests and posttest averages of both control classes and experimental classes. The average calculation result of the experimental class pretest was 42.51, while the experimental class posttest average was 80.82. Based on the results of the average pretest and posttest of the experimental class, it can be seen that the increase in the value of the experimental class using the WCL treatment is 38.01.

The average posttest and average pretest results of the control class did not increase significantly. This is evidenced by the pretest results of the control class of 42.98. While the posttest result was 60.37. Based on the average results of the pretest and posttest control classes, it can be seen that the increase in value was only 17.39 not as much as the experimental class that used the WCL based on Problem Reality treatment. The large comparison of the results of the experimental and control class HOT s test was seen from the increase in the average pretest and posttest results of 20.62. The results of the experimental and control class pretest and posttest data can be seen in table 2 below.

Table 2. Experimental and Control Class Pretest-Posttest Results

Experimental Class		Control Class	
Pretest	Postest	Pretest	Postest
42, 51	80, 82	42, 98	60, 37

Hasil test HOTS students of the experimental class is higher than the control class. The *N-Gain Score* result is 0.66 when interpreted as being in the high category. The average pretest and posttest results when observed have shown an improvement seen from the *N-gain* score results in the criteria score table. Therefore, it was found that HOTS in students increased after the provision of Problem Reality-Based WCL treatment. The *N-Gain Score* criteria can be seen in table 3 below.

Table 3. *N-Gain Score* Criteria

Scale Value	Scale
$g \leq 20$	Very Low
0,21 – 0,40	Low
0,41- 0, 60	Keep
0,61 – 0, 80	Tall
0, 81 – 1,00	Very high

Based on the results of data analysis using an independent sample t test, it is known that WCL based on problem reality against HOTS produces a sig value of 0.000 < 0.05, then H_0 is rejected and H_1 is accepted, meaning that there is influence of the application of Problem Reality-based Web Course Learning (WCL) to students' HOTS competencies on the material of the reproductive system of class XI MIPA SMA 1 Bae Kudus. WCL based on problem reality is significantly able to improve students' HOTS on the reproductive system on the learning material of class XI MIPA SMA 1 Bae Kudus. The results of the hypothesis test can be seen in Table 4.

Table 4. Hypothesis Test Results

Student HOTS results	T	Df	g (2-tailed)
Equal variances assumsed	733	69	0,000
Equal variances not assumsed	805	', 809	0,000

Learning in schools is carried out online during the pandemic situation. This was done on the basis of the government's decision that during the pandemic, learning activities were carried out on the condition that learning from home and still with the direction and guidance of teachers who taught subjects online. Learning at home has different effects for each student. There are students who understand by studying at home through an online system, there are also students who prefer conventional learning. If it is associated with the development of increasingly advanced technology, then learning in Indonesia should also need to be developed along with increasingly modern technology.

The online learning model is learning that utilizes internet-based facilities and infrastructure and digital media. Online learning is considered very close to millennials. Indonesia has entered the industrial era 4.0, so that all activities and activities take advantage of modern technological trends such as free access via the internet. Therefore, learning in schools is also aligned with technological developments and in accordance with the pandemic situation, one of which is the Web-based learning model (E-Learning).

Web-based learning model (E-Learning) is a teaching and learning activity that uses internet sites as a means of learning. There are three internet-based learning that can be applied in schools, namely web courses, web centric courses and web enhanced courses. One type of learning that is suitable for pandemic conditions is Web Course Learning (WCL). WCL is a form of learning that utilizes the internet as a means of learning so that students and teachers do not need face-to-face meetings. All teaching and learning activities are fully delivered via the internet. This type of learning can be applied by teachers who have a desire in the development of student learning, especially in spurring student curiosity and increasing the activeness of thinking, so there is a need for learning based on problem-reality (Milya Sari and Asmendri, 2020).

The results of this study are in line with the theory that explains that online learning is able to increase learning interactions at unlimited times and places (Nur Hadi, 2006). This indicates that

online learning, including one of them, is a Problem Reality-Based WCL that is also able to increase teaching and learning interactions between students and teachers and allow interaction in any situation and condition related to HOTS. This can be seen during teaching and learning activities in the experimental class in the implementation of research that students showed enthusiasm when the teacher started playing learning videos which were then followed by a series of questions from students about various things in the video which were responded well by the teacher. Meanwhile, in the control class, students do not show in-depth interaction during teaching and learning activities with the teacher. It proves that there is an increase in interaction during learning in any situation and condition.

Students in thinking HOTS need teaching and learning interactions with teachers so that each learning process students take the right stages because HOTS in their thinking process apply complex situations linking theory with the situation at hand in the form of problem reality. Reality of problems in life applications require careful thinking before overcoming life problems. Therefore, HOTS are needed so that each individual human being is able to place himself in the face of life's problems and is able to solve problems properly. Other research studies have revealed that various applications of thought processes to complex circumstances such as critical thinking activities, sensible thinking, metacognitive that control the cognitive realm, and creative thinking activities have been involved in HOTS. If Reality-Based WCL is able to increase teaching and learning interactions between students and teachers and allows interaction in any situation and condition, then indirectly Problem Reality-Based WCL is also able to increase student HOTS (King, Goodson and Spiritual, 2020).

This is also supported by the results of research by Ambarita, et al of the Department of Postgraduate Educational Technology, Medan State University regarding the application of e-learning to improve student HOTS which states that E-learning in order to achieve learning objectives is certainly able to train students to have high-level thinking skills (Ambarita, et al, 2019). It can be seen that E-Learning is a type of internet-based learning model that requires students to be able to find the information they need. In addition, students are also trained in a problem in life that is being faced by students

The results of another study entitled "The Effect of Web-Based Learning on Motivation and Learning Outcomes of Paguyangan State High School Students in Physics Subjects of Temperature and Heat Subjects". The results showed an increase in learning motivation in the experimental class by 24.58 and the control class by 15.34. Thus, it can be concluded that Web-based learning can increase student motivation and learning outcomes. The results of the research can be said to be in line with theory because Web-based learning is able to increase student motivation and learning outcomes (Fatwa Aji, 2017). We can use this as a reference that it is possible that Web-based learning can also improve HOTS.

WCL learning will be more constructive with the existence of a problem reality base. Problem reality is a term that leads to problems or problems based on reality. A person will tend to increase their curiosity when it comes to something like problem reality. The application of Problem Reality-Based WCL can increase student HOTS because at the learning stage students are faced with material that contains life problems. So that indirectly students learn as well as study the situation at hand. In the study process, students will automatically use deeper thinking power including the ability to analyze, evaluate and also the ability to think creatively, this is because something they face is not just theory but also practice or application in real life. This is the advantage of Problem Reality-Based WCL being able to increase student HOTS.

CONCLUSION

The application of Problem Reality-Based WCL was responded well by students as evidenced by the results of the questionnaire calculation showing an average of 93.34 included in the "good" criteria. The increase in student HOTS can be seen from the N-gain score of 0.66 if interpreted as falling into the "moderate" category. So, it can be said that student HOTS increased after the implementation of Problem Reality-Based WCL. Based on the results of the hypothesis test showing that the value of sig-2 tailed $0.000 < 0.05$, then the conclusion is that H_0 is rejected and

H_1 is accepted, meaning that there is an influence of Problem Reality-based Web Course Learning (WCL) on Higher Order Thinking Skills (HOTS) students of class XI MIPA SMA 1 Bae on the Reproductive System material. This is in accordance with pre-existing theories and research studies. The results of this study are expected to be able to provide new knowledge that learning without face-to-face is also able to improve students' Higher Order Thinking Skills (HOTS).

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