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Improving Virus Lesson Mastery by Using Web-Based Learning Media

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***Abstract*— This research aims to find out the improvement of the students' virus lesson mastery by using web-based learning media. This research is a type of classroom action research with the subjects of class X students in MA Nur Iman Mlangi, Sleman, Yogyakarta. The action taken in this research in this research is to use web-based learning media on the virus lesson. Data collection techniques in this research are test and non-test. Student learning results take through multiple choice test questions, and the other hands non-tests taken from interviews and questionnaires that used to identify those problems that exist in the school. All of the data were analyzed descriptively using percentages. The results of this research showed that the application of web-based learning media was able to improve the student learning results in class X about the virus lesson at MA Nur Iman Mlangi. The average score of student learning results in the pre-cycle reached 51.67 and the percentage of completeness 13.33%. After applying web-based learning media in the first cycle, the average learning result reached 70.67 and a percentage of completeness 53.33%, while in the second cycle, the average learning result improved to 84.69 and the percentage of completeness 93.33%.**

Keywords: web-based learning media, virus lesson mastery, SMA class X

I. INTRODUCTION

The development of Information and Communication Technology (ICT) rapidly, has caused the necessity of a concept and mechanism of learning activities that utilize information technology. The development and use of information technology in this learning activity have an impact on the teaching and learning systems at various levels. This change not only in terms of content but also changes the education system itself. Web-based learning tools are continuously being redesigned by developers to increase their effectiveness [14]. Indeed the ease of technology will bring advantage if it used wisely. The internet possible to minimize limitations (distance, space, and time) in the delivery of information throughout the world [4]. Learning by utilizing the internet in the world of education has many benefits, especially as a learning medium.

One key point and challenge in deciding the design of teaching is to determine the media or media that can use to deliver instruction [7]. Learning media have a vital role in achieving learning objectives, which are the means and delivery of information or primary learning to students [6]. The existence of media in the teaching and learning process expected to assist teachers in conveying learning material to students that have an impact on increasing student learning achievement. Therefore, teachers should present the media in every learning process for the performance of learning objectives, and students become more active in the learning process [8]. Media is a learning device used to more effectively communicate and interact between teachers and students in the process of education and teaching in schools [20].

Technology in learning needs to get the attention of teachers who have implications for the use of varies learning media to create conducive learning, the subject matter can be delivered correctly, and learning objectives can be obtained [13]. The use of media is the systematic use of learning resources. The purpose of the discussion is relevant because of the conversation between students with learning materials or learning systems [3]. Therefore the teacher's professional ability must extend because when it needed, it will give positive results on improving the quality of the process and learning outcomes [25]. Presence of the educational media, this is expected that learning material will be more distinct and not verbalizes. The existence of the attractive examples that contain facts, data, images, graphics, photos, or videos with or without sound makes learning projects more attractive. Materials that presented with a series of events that are simplified or enriched so that learning activities do not constitute descriptions that spend students [22].

The results of observations at MA Nur Iman Mlangi on August 21, 2019, showed that biological laboratory facilities are limited, schools already have facilities for holding learning, however, the learning process not yet utilizing the information technology media, the learning process is more dominated by the teacher than the student. Based on students' pre-test results data on the lesson of virus structure characteristics, virus replication, and the role of the virus through the pre-test results of class X science students, some students have not reached the minimum criteria, which is 75. The average score of students is 52, 67, and a percentage score above the KKM is 13.33%, and a percentage of scores below the KKM is 86.67%. The low pre-test results in class X 3 shows that the students still have under the mastery of the virus lesson.

Learning biology is one of the subjects that include difficult material. It is because there is some material about a process that is difficult to be observed directly by students [19, 23]. Besides, the results of the preliminary questionnaire with the students about the biology subject of virus lessons problem include difficulties in understanding the abstract concepts, such as the shape of the virus, and replication of the virus, although the distinguishing features between diseases caused by viruses or bacteria. Besides, the learning resources used are package books provided by schools so that the information obtained by students is also only sourced from the availability of biology books in schools. The available books have not been able to improve the interest of students in teaching and learning activities because in terms of monotonous appearance, so they feel bored and lazy to learn. Based on a questionnaire given to students, 87% of students an enjoyable learning resource that they asked to learn.

Based on the survey results, 98% of children and adolescents aged 10 - 19 years know about the internet, and 79.5% are internet users [16]. Based on the survey outcome, the conclusion that class X students whose age is around 16-18 years are no longer taboo with the use of electronic devices and the internet. The results of studies show that the use of the internet for study purposes and academic achievement is directly proportional to each other. The amount of enthusiasm in the users of computers and the internet by students, as well as positive results for student academic achievement, the use of computers and the internet, can be taken as a consideration in chosen learning media [11].

The selection of appropriate learning media types will increase student interest and learning results towards the subjects taught, one of which is digital learning media (17). Web-based learning media can be an alternative in the learning process. Web-based learning media is a place on the internet that consists of a collection of images, videos, and other files placed on a web server so that it can be accessed online by anyone through the internet network [9]. Web-based learning media has several benefits, including, (1) increasing levels of learning interactions, (2) enabling learning interactions wherever and whenever, (3) reach students in a broad scope, (4) facilitate the development and accommodation of learning materials, (5) independent learning and (6) cost savings in several aspects [12].

Web-based learning media are assumed very appropriately when used as a medium for delivering virus lessons because the characteristics of the virus are invisible, only can be presented through pictures or videos or animations. Besides, the process of virus replication can not explain through textbooks that can display via video or animation. The use and ease of access to web-based learning media expected to improve student understanding of virus lessons. So that student learning results improve. In connection with the description above, the researchers felt the need to research the application of web-based learning media on virus lessons. This study was determined to test whether the use of web-based learning media can improve student learning results.

II. RESEARCH METHODS

The research used is classroom action research (CAR) to overcome the problems contained in the classroom [15]. This action class research aims to improve student motivation and learning results on virus material. The research design used in this study refers to the classroom action research model proposed by Kemmis & Taggart. Each cycle in Classroom Action Research must go through the following stages: planning, action and observation, reflection. States that the cycle will repeat if the research results have not been reached [2]. This research implemented at MA Nur Iman Mlangi, Sleman, Yogyakarta. Data collection was carried out on August 21, 2019, until September 4, 2019. The subjects of this study were students of class X in MA Nur Iman Mlangi in the 2019/2020 school year.

Data collection techniques used in this study are two ways, that is through tests and non-tests. A test used to find out or measure something in an atmosphere in a way and rules that predetermined. A test used to measure students' mastery of concepts towards concepts taught in the form of multiple choice. To measure students' mastery concepts, before they learn with web learning applications, a pre-test cycle consists of 20 multiple choice questions about virus material. Afterward, the post-test was carried out at the end of the first cycle with the same problem. In Cycle 2, a final test of mastery of concepts is carried out after learning using the learning web. The non-test data collection in the form of interviews and observation questionnaires is a data collection technique that is done by giving a set of questions or written statements to respondents to be answered [26].

This study uses descriptive-analytical methods using a list of cognitive scores of students. Furthermore, the data obtained in each cycle are analyzed descriptively by calculating percentages correction. Analytical descriptive is a statistic used to analyze data by describing or describing data that are collected as it is without intending to make conclusions that apply to the public or generalizations [26]. Descriptive analysis is very informative when it is relevant to all types that do not yet have a basic understanding of a phenomenon, one of which is to assess its effect on teaching and research projects [24].

III. RESEARCH RESULT

This class action research was carried out for three weeks starting from 21 August 2019 - 4 September 2019 with three meetings with a total time allocation of 9 x 40 minutes. Data obtained from each factor investigated, analyzed descriptively analytically in the form of a percentage, the average score in each cycle to be then discussed accord to the research objectives formulated.

The students' concept mastery test results obtained from the pre-test score of the first cycle, post-test cycle I, and final test cycle II. The pre-test used to determine the students' initial ability before they treat using the learning web media. These pre-test questions are in the form of multiple-choice totaling 20 questions with five answer choices. The result data of the pre-test shown in TABLE 1 below:

TABLE I. STUDENT TEST RESULT DATA (PRE-TEST) CYCLE I

No	Information	Pre-test
1	The highest score	25
2	Lowest Score	75
3	Average	51.67
4	% Completeness	13,33%
5	Category	Bad

Based on TABLE I above, the average score of students at the time before the holding of learning using the learning

web was 51.67% with the deficient category. The highest score obtained by students is 75, while the lowest score is 25, and the ordinary score obtained is below the Minimum Mastery Criteria (KKM) that has been determined by the school that is equal to 75. So the minimum completeness percentage at the time of this pre-test is still low 13.33% with the number of students who complete there are two people. After the pre-test, learning used a learning web for two cycles. Post-test is held at the end of the first cycle to find out whether there is an improvement in learning results after learning using the learning web. Data from the end of the first cycle, as well as the post-test, can be shown in TABLE II below:

TABLE II. STUDENT TEST RESULT DATA (POST-TEST) CYCLE I

No	Information	Post-test
1	The highest score	85
2	Lowest Score	50
3	Average	70.67
4	% Completeness	53.33%
5	Category	Pretty good

Based on TABLE II above, the average score of students at the post-test was 70.67 as quite a good category. The highest score obtained by students is 85, while the lowest score is 50. The percentage of mastery learning is 53.33%. Furthermore, the final test of the second cycle is to determine whether there is an increase in students' ability to know the concepts by applying this learning web. Data description of the results the second cycle shown in TABLE III.

TABLE III. DATA ON STUDENT TEST RESULTS (POST-TEST) CYCLE II

No	Information	Post-test
1	The highest score	100
2	Lowest Score	70
3	Average	84.69
4	% Completeness	93.33%
5	Category	Very good

Based on TABLE II and TABLE III above, determined that the average score of students has improved. It shows from the data student test results an average, score of 70.67 in the first cycle, and 84.69 in the second cycle. The percentage of students' mastery learning also improved from 53.33% in Cycle I to 93.33% in Cycle II. Minimum completeness criteria are a criterion imposed by the school to state whether the student passed or not on one subject. KKM in Biology topic at MA Nur Iman Mlangi is 75. The number of students who are the object of research is 15. Some students have finished learning using this learning website, such as shown in TABLE IV below:

TABLE IV. PERCENTAGE OF COMPLETENESS OF STUDENTS BEFORE AND AFTER IMPLEMENTED A WEB-BASED LEARNING MEDIA

Data	Information	Not complete	Complete
Pre-test	Number of Students	13	2
	Percentage	86.67%	13.33%
Cycle I	Number of Students	7	8
(Post-test)	Percentage	46.67%	53.33%
Cycle II	Number of Students	1	14
(Post-test)	Percentage	6.67%	93.33%
	Average	46.67%	53.33%

Based on TABLE IV above, it discovered that the average learning completeness of students after the implementation of learning web on virus lesson is 53.33%. The number of students was complete always improves every cycle. Cycle I, Students who completed was 8, while those who had not completed were 7. Whereas in Cycle II, the number of students who completed was 14, while those who had not yet completed is 1. It shows that the application of web-based learning media can improve students' mastery of the concept of biology in virus lessons.

IV. DISCUSSION

Based on the research data above, the comparison of the average score of the test results in mastering the lesson of virus students before and after applied learning using the learning web always improves. Pre-test who transferred before learning should be purposed to find out students' initial knowledge about the topic presented. Based on the results of the study, the average score of the pre-test before the implementation of learning using the learning web is 51.67, with the highest score of 75 and the lowest score of 25. It shows that the average score of the pre-test still below the minimum criteria score of 75. Many factors can cause low student pre-test scores. The low score of the student's pre-test caused by students' unpreparedness in learning, and an advance of the learning process never gets a pre-test from the teacher concerned, so students never learn before the material is delivered. Another factor that influences is the difficulty of students in working on the test questions given because the topic contained in the pre-test questions has never obtained before. So the pre-test score obtained is below the predetermined KKM score.

A low pre-test score of the student cannot avoid because the material is not covered. It is also possible that because the pre-test was not rated, students would not take it seriously and only fill it in to complete it [27]. The average results of the pre-test that tend to be low and below the KKM scores are not the final goal of the study, because the pre-test implements to find out to what extent the material or learning topic to be taught has managed by students [1]. The results of the pre-tests that was obtained by student will help integrate students 'prior knowledge with new information so that the material or learning topic to be taught can be adjusted to the ability of students themselves, or the occurrence of students' cognitive adjustments into new material if the material has not been mastered at all by students [10].

The application of web-based learning media consists of two cycles, where each cycle consists of four main stages that are the stages of planning, action, observation, and reflection that repeated cyclically. It Cycle I and Cycle II are divided into three meetings with a total time allocation of 9 x 40 minutes. This research refers to learning to use web-based media to improve student learning results in the virus lesson. Learning activities used the learning web is carried out using a scientific approach of observing, asking questions, gathering information, associating, and communicating.

At the observation stage, the students are assigned to observed and examined the summary of the content presented on the learning web that displayed online. Students also observe the presence summary of material by the teacher in front of the class. Students also record important information obtained as initial information received by students. Besides, to observe the summary of the content, students also make observations on the video contained in the learning website. The observed video is used as a source to formulate problems related to the material. The formulation of the posed problem

always leads to efforts in achieving learning objectives. The questioning activity aims to train students to develop creativity, curiosity, and the ability to form questions to form the critical mind that is necessary for intelligent living.

In the data collection stage, students collect as much data as possible through literature studies and group discussions to be able to answer the formulated problems. Furthermore, in the association phase, the learning web presented in the observation phase also contains questions that must discuss in groups. Students in each group must play an active role and work together to solve the problems in the quest. After that, the question already discussed is then presented in front of the class by each group. Here, the teacher plays as a facilitator who facilitates group questions and answers. Teachers also play a role in reinforcing so that students do not experience misconceptions about what they have learned. Communicating training to acquire an honest, conscientious attitude, tolerance, ability to think systematically, express ideas briefly and clearly, improve language skills.

Last, of the first cycle, students are given multiple-choice tests of 20 questions, such as mastery of the concept of the virus. A description of the results of the virus concept mastery test in cycle 1 presented in Table 2 above. Based on Table 2 is known that the average score of the students' concept mastery test is 70.67 and the highest score of 85 and the lowest score of 50. The percentage of completeness in this cycle is 53.33% and a respectable category. The end of the first cycle test is also a post-test to determine students' mastery of the concepts related to the learning material that has taught through learning web applications.

According to the obtained data, there is a difference in the average score of pre-test and post-test 19. The pre-test and post-test scores are used as a comparison material to determine the effect of the learning web used during learning. The difference or the difference between the pre-test and post-test scores is a real achievement as an effect of the learning process of students. Therefore, learning activities through the application of this learning web has a pretty good influence on the mastery of the concept of students' virus material because the average post-test score is higher than the average pre-test score. A comparison of the average of score students' concepts mastery, before and after learning is applied using web-based learning media is presented in Fig.1 below:

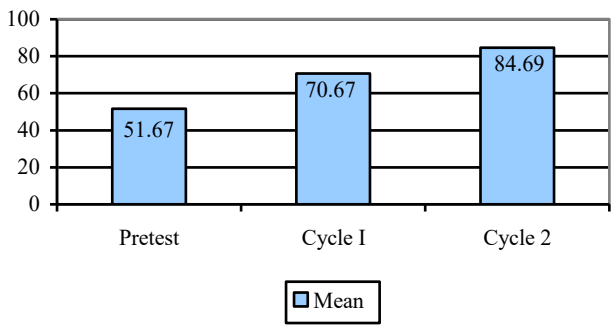

Fig 1. Comparison of Mastery Results for Pre-test, Cycle I and Cycle II

Based on Fig. 1 above shows that there are significant differences in the mastery of the concept of virus material that is achieved by students. Based on Figure 1, shows the average pre-test score of 51.67, the average score of the first cycle of 70.67, and the average score of the second cycle of 84.69. Improved mastery of concepts achieved by students illustrates an improve in the understanding of each student that has learned. At the end of this second cycle, students get a mastery test of the concept of the virus. A description of the results cycles 2 of the virus concept mastery test, as shown in TABLE 4 above.

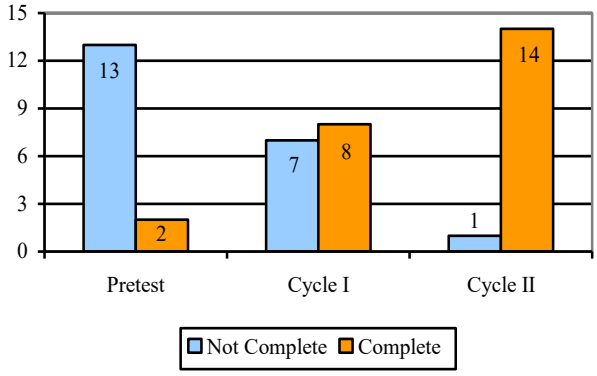

Fig 2. Comparison of Students' Completeness in Pre-test, Cycle I, Cycle II

Based on Fig. 2 above, the number of students who passed the criteria completeness minimum always improves every cycle. In the pre-test, students who complete was 2, while those who had not completed were 13 students. Besides, Cycle 1 students who completed were 8, while those who had not completed were 7. Cycle Two, students who completed were 14, while those who had not complete were 1. Based on the graph in the picture above, learning using the learning web has a significant effect on the number of students who have finished learning the virus lesson using web-based learning media.

Pre-test and post-test were designs are widely used in research. It is because the pre-test and post-test design provide a means to assess the impact of the research treatment [5]. Based on this, the use of pre-test and post-test can support the achievement of learning objectives with better understanding, and this helps students focus on the main topics to be discussed [21].

V. CONCLUSION

Based on the results of classroom action research that has been carried out, it concluded that the improvement in learning results known from the results of the tests of each cycle. The average score of student learning results in the pre-cycle reached 51.67 and the percentage of completeness 13.33%. After applying web-based learning media in the first cycle, the average learning result reached 70.67 and a percentage of completeness 53.33%, while in the second cycle, the average learning result improved to 84.69 and the percentage of completeness 93.33%. Based on the research results obtained, it concludes that the implementation of web-based learning media on virus lessons can improve student mastery concept.

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