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The Use of 3D Pageflip Professional Electronic Student Worksheets on the Protist Concept on the Learning Outcomes of Grade X Senior High School Students

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Abstract

Currently, the success rate of students in schools is still lacking in learning the subject matter. Therefore, the authors conducted research on the use of 3D Pageflip Professional electronic student worksheets on the concept of protists on the learning outcomes of students in grade X high school. The purpose of this study is to describe the effect of using the 3D Pageflip Professional electronic student worksheet on the Protists concept on (1) product cognitive learning outcomes (2) cognitive learning outcomes of students in grade X high school. The design of this research is quasi-experimental and the design is The Nonequivalent control group design. The research sample is grade X-PMIA 1 and X-PMIA 2 as the experimental group, grade X-PMIA 3 as the control group. The research instrument uses multiple choice tests to measure product cognitive learning outcomes and process cognitive. The hypothesis data analysis technique is the Independent Samples Test from the pre-posttest. From the research, the results showed that there was an effect on the use of 3D Pageflip Professional electronic student worksheets on (1) cognitive learning outcomes of students' products with sig. (2-tailed) 0.017 (2) cognitive learning outcomes of students with sig. (2-tailed) 0.041. From the results of the study, it is suggested that the evaluation tool needs to be improved to make it look more effective in improving product cognitive and student learning outcomes.

Abstrak

Sekarang ini tingkat keberhasilan dari peserta didik di sekolah masih dinyatakan kurang dalam mempelajari materi pelajaran. Maka dari itu penulis melakukan penelitian penggunaan *e*-LKPD 3D *Pageflip Professional* pada konsep protista terhadap hasil belajar peserta didik kelas X SMA. Tujuan dari penelitian ini yaitu untuk mendeskripsikan pengaruh penggunaan *e*-LKPD 3D *Pageflip Professional* pada konsep Protista terhadap (1) hasil belajar kognitif produk (2) hasil belajar kognitif proses peserta didik kelas X SMA. Rancangan penelitian ini yaitu *quasi experiment* dan desainnya yaitu *The Nonequivalent control group design*. Sampel penelitian yaitu kelas X PMIA 1 dan X PMIA 2 sebagai kelompok eksperimen, kelas X PMIA 3 sebagai kelompok kontrol. Instrumen penelitiannya menggunakan tes pilihan ganda untuk mengukur hasil belajar kognitif produk dan kognitif proses. Teknik analisis data hipotesisnya dengan uji *Independent Samples Test* dari *pre-posttest*. Dari penelitian didapatkan hasil yaitu terdapat pengaruh penggunaan *e*-LKPD 3D *Pageflip Professional* terhadap (1) hasil belajar kognitif produk peserta didik dengan sig. (2-tailed) 0.017 (2) hasil belajar kognitif proses peserta didik dengan sig. (2-tailed) 0.041. Dari hasil penelitian, disarankan perlu penyempurnaan terhadap alat evaluasi agar terlihat lebih efektif pengaruhnya dalam meningkatkan kognitif produk dan kognitif produk hasil belajar peserta didik.

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A. Introduction

The 21st century is referred to as the "Biology" century because of the many advances in human understanding of the basic processes and components of life (Putra, 2019). The 21st century skills identified by the National Education Association are “The 4Cs” skills which include Creativity, Critical Thinking, Communication and Collaboration. Basically, these 21st century competencies have been adapted in the education system in Indonesia through the 2013 Curriculum.

Curriculum development that is directed and competency-based is achieved by the formulation of Graduate Competency Standards which is the meaning of the 2013 curriculum. Graduate qualifications in accordance with the Graduate Competency Standards produced by Indonesian National Education are obtained through learning activities (Ripani *et al*., 2018).

Science education in general, and biology-focused education in particular, at the school level must be linked to "real world" situations to be relevant to social problems (Putra, 2019). Learning competencies that are really demanding in the field of understanding are Biology (Lesman *et al*., 2018). The wealth of knowledge about the environment and knowledge is the meaning of Biology (Afifah and Putra, 2015). It can be concluded that the notion of biology is a learning competence or wealth of knowledge about the environment and knowledge at school and in the real world that are relevant to social problems.

Learning biology is not enough if you only memorize the material, but you must also be able to understand the concepts in it. This can be achieved if the learning is meaningful. According to Ausubel (Dahar, 2001) "Meaningful learning is a process of linking new information to relevant concepts in one's cognitive structure". Cognitive knowledge can be measured, one of which is by looking at student learning outcomes (Sariningsih *et al*., 2020).

The pre-research that was carried out on October 14, 2020 at State Senior High School 3 Banjarmasin can be seen from filling out questionnaires by X-PMIA class students that 85.9% of students still have difficulty understanding Biology material through previously applied learning and 67.6% of students agree that the material and explanations provided are still incomplete and lacking in depth. Judging from the percentage of the results of the questionnaire there is a relationship with the learning outcomes of students, it is stated that the success rate of the students themselves is still stated to be lacking in learning the subject matter. Students who have difficulty in learning can be shown by the presence of obstacles to learning, as well as the influence of physiological, sociological, and psychological characteristics that affect learning achievement which results in a decline (Daryanto, 2010).

Students are more comfortable to interact with the material provided and are very important and indispensable in planning an effective learning process with the aim of presenting teaching materials, one of which is by using student worksheets (Putra and Olfia, 2018). Student worksheets are sheets in the form of tasks that follow the indicators to be achieved (Rahimah *et al*., 2020). In the modern era when technological developments are very high, people's reading interest in printed reading materials has decreased (Hani *et al*., 2020). Active learning in the era of globalization and the rapid development of technology that cannot be avoided has an impact on the world of education, so teachers use electronic student worksheets in conducting the online learning process for their students. The domain of education has grown rapidly with the help of information and communication technology (Putra *et al*., 2020). Electronic student worksheets can be presented through the 3D Pageflip Professional application.

The electronic student worksheets presented in this application are different from the student worksheets that have been circulating in schools where the student worksheets only contain a summary of the subject matter and contain practice questions or questions (Hariati *et al*., 2020). 3D Pageflip Professional is an application in an electronic format in which it is able to display video, text, images, animation, and audio, so that students are more interested in participating in biology learning, and learning can take place more fun and interestingly.

There are still obstacles when teaching Biology in online learning today, namely that many students are still unable to meet virtually. In addition, the learning media still uses student worksheets and powerpoint. As for the obstacle in the application of electronic student worksheet teaching materials in today's online conditions, there is still a lack of innovation in making electronic student worksheets. Based on the description above, the title of this research is "The use of 3D Pageflip Professional electronic student worksheets on the Protist Concept on the Learning Outcomes of Grade X High School Students".

B. Materials and Method

Research on the effect of the use of 3D Pageflip Professional electronic student worksheets on the Protists concept on product cognitive learning outcomes and cognitive learning outcomes for

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grade X senior high school students uses a quasi-experimental research design with the design of the nonequivalent control group design According to Sugiyono (2019) in Figure 1 below.

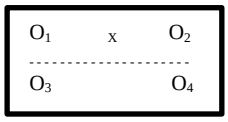

Figure 1 Research Design The Nonequivalent control group design

Information:
O_1 = experiment group (*pretest*)
O_2 = experiment group (*posttest*)
X = treatment using 3D Pageflip Professional electronic student worksheet
O_3 = control group (*pretest)*
O4 = control group (*posttest*)
- - - = *nonequivalent*

This research took place at the State High School 3 Banjarmasin on Veteran Street, Sungai Bilu No. 381, Banjarmasin City, South Kalimantan. The implementation is in the odd semester, namely September-December 2020.

The research samples were students from grade X-PMIA 1, X-PMIA 2, and X-PMIA 3, which amounted to 22 people each. The sample is taken based on a purpose (purposive sampling).

The research instrument used to describe the effect of using 3D Pageflip Professional electronic student worksheets on product cognitive learning outcomes and process cognitive learning outcomes is a multiple choice test instrument. The aspects assessed are cognitive aspects (C1-C5). The data analysis technique that will be carried out is the test data analysis technique, namely calculating the normality test, homogeneity test, and hypothesis testing. The test is with SPSS version 25.0. Then calculate the N-Gain Score of each group to see the improvement.

C. Results and Discussions

1. Product Cognitive Learning Outcomes

The results of the average pre-posttest cognitive products of students in the control and experimental groups are presented in Figure 2 below. In Figure 2, the average pretest results on the cognitive products of students in the control group are 47.73 and the experimental group is 46.14. While the average results of the cognitive product posttest of students in the control group is 57.95 and the experimental group is 64.09. After the data has been declared normal and homogeneous using normality and homogeneity testing, then the hypothesis testing of the cognitive data of students' products is carried out using the SPSS 25.0 program which is presented in Table 1 below.

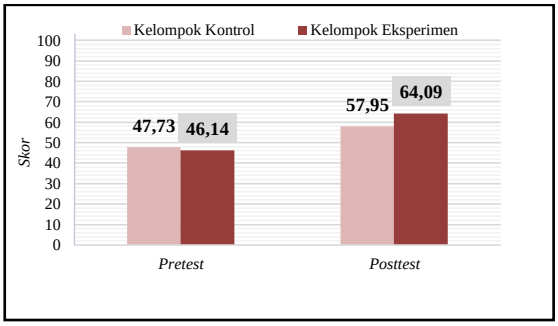

Figure 2
Mean Results of Pretest and Posttest Results of Product Cognitive Learning

Table 1 Hypothesis Test Results for Product Cognitive Learning Outcomes

Group	Data	Sig. (2-tailed)	Conclusion
Control Experiment	*Pretest*	0.503	Not significantly different
Control Experiment	*Posttest*	0.017	Significantly different

Pretest test obtained sig value. (2-tailed) is 0.503, then H_0 is accepted, it can be concluded that the control and experimental groups have initial abilities that are not different/same. Then proceed with the Independent Samples T Test for the posttest which shows the value of sig. (2-tailed) is 0.017, then H_1 is accepted, which means that the posttest results in the control and experimental groups have different/different average final abilities. So it can be concluded that there is an effect of using the 3D Pageflip Professional electronic student worksheet on the Protists concept on the cognitive learning outcomes of students in grade X of high school. Yulianci *et al*. (2017) stated that learning with interactive multimedia, learning outcomes from students who use it are better than not using it. The process that students experience during the learning process can affect the success of students on product cognitive tests. Nur *et al*. (2008) states that students must work to find something, grapple with ideas, and solve problems so that students can really understand and apply knowledge.

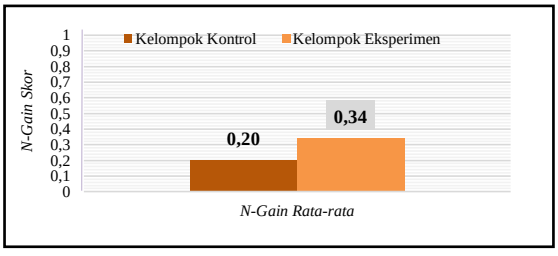

Figure 3
The Mean Results of N-Gain Scores for Product Cognitive Learning Results

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N-Gain Data Cognitive scores of students in the control and experimental groups can be presented in Figure 3 above. Figure 3 shows the N-Gain value. The class average score for the control group is 0.20 including the low category and the experimental group is 0.34 including the medium category. Thus, it can be concluded that there are different improvements in terms of product cognitive learning outcomes of students in the control and experimental groups. Khairunnisa *et al*. (2019) reported that the control class's N-Gain score was lower than that of the experimental class which resulted in a significant effect of using thematic student worksheets on student learning outcomes.

2. Process Cognitive Learning Outcomes

The results of the average pre-posttest cognitive process of students in the experimental and control groups can be presented in Figure 4 below.

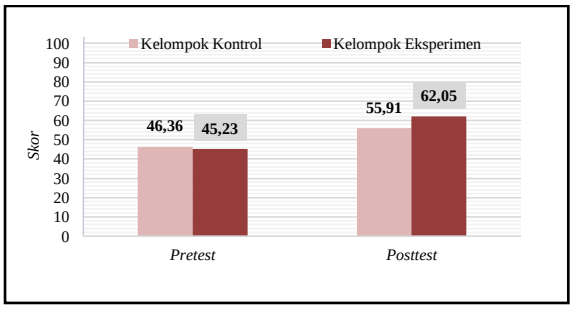

Figure 4
Mean Results of Pretest and Posttest Results of Cognitive Learning Process

In Figure 4 it is known that the average result of the cognitive process pretest of students in the control group is 46.36 and the experimental group is 45.23. While the average result of the posttest cognitive process of students in the control group is 55.91 and the experimental group is 62.05. After the data has been declared normal and homogeneous using normality and homogeneity testing, then hypothesis testing is carried out on the cognitive process data of students using the SPSS 25.0 program which is presented in Table 2 below.

Table 2 Hypothesis Test Results for Process Cognitive Learning Outcomes

Group	Data	Sig. (2-tailed)	Conclusion
Control Experiment	*Pretest*	0.619	Not significantly different
Control Experiment	*Posttest*	0.041	Significantly different

Pretest test obtained sig value. (2-tailed) is 0.619, then H_0 is accepted, it can be concluded that the control and experimental groups have initial abilities that are not different/same. Then proceed with the Independent Samples T Test for the posttest which shows the value of sig. (2-tailed) is 0.041, then H_1 is accepted, which means that the posttest results in the control and experimental groups have different/different average final abilities. So it can be concluded that there is an effect of using the 3D Pageflip Professional electronic student worksheet on the Protists concept on the cognitive learning outcomes of students in grade X high school. It is suspected that in the experimental group the students were more trained in cognitive processing skills when working on the 3D Pageflip Professional electronic student worksheets. By observing the many interesting pictures and videos on the 3D Pageflip Professional electronic student worksheets, it is possible for students in the experimental group to measure their cognitive process superiority compared to the control group, which only uses conventional student worksheets without pictures.

Figure 5
3D Pageflip Professional electronic student worksheet display

Conventional learning models more often use the provision of information, compared to demonstrating and providing opportunities to display performance directly. The teacher assumes that the success of the learning program is seen from its completeness in conveying all the material in the curriculum. The emphasis on learning activities is more on textbooks and the ability to re-express the contents of the textbook. So, conventional learning does not emphasize the provision of process skills (Fitrianti, 2021). Semiawan (1992) states that to better understand the abstraction and complexity of a concept, process skills can be applied to students. Biology learning emphasizes the process skills approach, so that students find facts, build concepts, theories, and scientific attitudes on the part of students that can have a positive effect on the quality and educational products (Pardiyana, 2020). Learning outcomes by students will be obtained better if they can understand more complicated concepts. Nurliawati (2016) stated that class VIII students at MTsS Insan Qur'ani obtained their learning outcomes on light material which had an effect on the use of comic-based student worksheets.

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N-Gain Data Cognitive process scores of control and experimental group students can be presented in Figure 6 below.

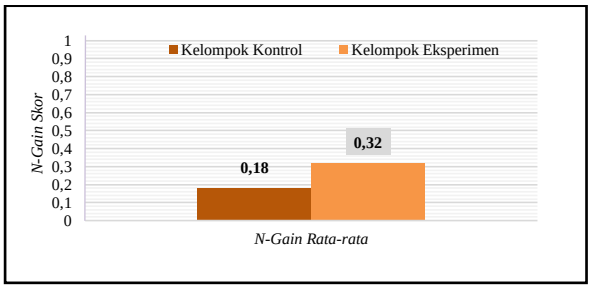

Figure 6
Mean N-Gain Results Score Process Cognitive Learning Results

In Figure 6 it is stated that the average N-Gain score for the control group is 0.18 including the low category and the experimental group is 0.32 including the medium category. Thus, it can be concluded that there are different improvements in terms of cognitive learning outcomes of control and experimental group students. Piaget in Cahyo (2013) states that children's abilities in constructing knowledge vary based on their intellectual maturity at the stage of the child's cognitive development.

D. Conclusion

Based on the results of research and discussion that have been obtained, it can be concluded that there is an effect of using the 3D Pageflip Professional electronic student worksheet on the Protists concept on cognitive learning outcomes for students of grade X High School students with sig. (2-tailed) 0.503 and there is an effect of using the 3D Pageflip Professional electronic student worksheet on the Protists concept on the cognitive learning outcomes of students in grade X High School with sig. (2-tailed) 0.619.

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