Vol 10(1) (2021): 83-96
DOI: http://dx.doi.org/10.24235/sc.educatia.v10i1.7658

SCIENTIAE EDUCATIA: JURNAL PENDIDIKAN SAINS

http://www.syekhnurjati.ac.id/jurnal/index.php/sceducatia

Instagram Assisted Portfolio Assessment to Improve Students' Creative Thinking Skills

Irkhamni Abdillah*, Kartimi, Ria Yulia Gloria

Department of Biology Education,Faculty of Teacher Training and Education, IAIN Syekh Nurjati Cirebon, Indonesia

*Corresponding author: Jl Perjuangan by Pass Sunyaragi Kesambi Kota Cirebon, Jawa Barat, Indonesia. E-mail addresses: irkhamni96@gmail.com

article info

Article history:
Received: 02 January 2021
Received in revised form: 03 March 2021
Accepted: 01 June 2021
Available online: 30 June 2021

Keywords:
Portfolio assessment
Creative thinking skills
Instagram

abstract

The purpose of this study was to find out differences in student activities between those implemented by Instagram-assisted portfolio assessments and those not applied by Instagram-assisted portfolio assessment differences in improving students' creative thinking skills between those implemented by Instagram- assisted portfolio assessment and those not implemented by Instagram-assisted portfolio assessments. They knew students 'responses about applying Instagram-assisted portfolio assessments to improve students' creative thinking skills. The approach in this study uses a quantitative approach with the design pretest-posttest control group. The population in this study were all class X students of SMAN 1 Tanjung, numbering 238 students. Samples taken were two classes, each of which amounted to 34 students. Data collection techniques used are observation sheets, tests, and questionnaires. The study results show that students' activities applied portfolio assessment assisted Instagram with an average of 73% with good criteria while those not applied Instagram-assisted portfolio assessment 58% with sufficient measures. Instagram-assisted portfolio assessment showed an increase in creative thinking skills at experimental class the average N-Gain by 0.60 medium categories. Instagram-assisted portfolio assessment can improve students' creative thinking skills.

1. Introduction

Knowledge and skills are needed in the world of education because they are the key to the advancement of a nation. One of the goals of education is to create creative learners. However, creativity development has received less attention than informal education. Schools demand the ability of students to find the correct answers and results based on the information provided by the teacher because generally, they are only trained to think logically. The government has been trying to advance education in Indonesia by changing the curriculum, which is considered more appropriate. Changes in the current curriculum, namely the change from the 2006 KTSP curriculum to the 2013 curriculum.

In the 4.0 era, information technology is a tool that can be utilized in learning, especially learning the Indonesian language and literature. Era 4.0 requires that the teachers develop their skills in technology that can be associated with learning. Information and communication technology can be a forum for easy use as learning media. This internet-based learning media can also make it easier for teachers to work more creatively. Plants of creative thinking, one of which

can be achieved through the school environment. This is following the objectives of education in general, namely to provide an environment that allows students to develop talents (intelligence, creativity, and motivation) and abilities optimally so that they can manifest themselves and function fully, according to their personal needs and the needs of society (Amtiningsih et al., 2013; Panjaitan, & Surya, 2017; Munandar, 2012).

Putra and Iqbal (2016) explained that the ability of critical thinking is a processability thinking that allows one to evaluate or investigate, assumptions, logic, and evidence, that underlies other people's ideas. Critical thinking skills are essential in learning because these skills provide opportunities for students to learn through discovery (Simbolon & Tapilouw, 2015). Jufri (2013) states that critical thinking is a way of reflective thinking whose primary goal is pattern decision making. Another thing that teachers need to pay attention to in teaching science is building mastery of students' concepts of the material being taught. Mastery of concepts is essential for learning success. Therefore, mastery of concepts students is expected to manage cognitive skills to improve the next lesson (Lestari et al., 2019; Sulistyowati et al., 2012; Ihsan et al., 2019). The importance of developing skills, critical thinking, and mastery of concepts is not yet in line with the current state of science learning. In Indonesia, one of the biggest problems is the inability to learn. The learning process is less encouraging for students to develop thinking skills. Students learn in classes to memorize information, but are not required to comprehend what they have learned (Amijaya et al., 2018)

Tafonao (2018) stated that learning media are everything that the sender and receiver can convey to stimulate the mind, ideas, and student's interest in learning. This opinion is in line with Falahuddin's (2014) that learning media are everything that can provide information from the source of information to the recipient of the information. So it can be concluded that Learning media is a tool used by teachers to deliver lesson material to stimulate students' thoughts, feelings, and interests. Portfolio assessment is an alternative assessment that can embrace student abilities and reveal student creativity. Ipriadi and Muhfahroyin (2013) stated that a portfolio is a collection of all student activity files during and after learning, for example, files on test results, presentation assignments, work results, observations, questionnaires, or journals. One way to control this condition is by conducting an assessment through electronic media or e-assessment.

Tafonao (2018) learning media has the following characteristics: namely (1) learning media can be touched, seen, and heard, and which can be observed by students the five senses, (2) objects or things that can be seen and heard, (3) learning media used for communication between teachers and students, (4) learning media as an aids in the teaching and learning process, (5) learning media is an intermediary used in the learning process, (6) learning media as tools and techniques related to learning methods.

Falahudin (2014) there are several benefits of learning media, namely the delivery of learning materials can be uninformed, the learning process is more straightforward and exciting, the learning process becomes more interactive, efficient in time and effort, improve the quality of learning outcomes, media can be done anywhere and anytime, media can foster a positive attitude of learners towards the material and the learning process, change the role of the learner in a more positive direction, the media can make learning materials that abstract becomes more concrete. Media can overcome the limitations of human senses.

Instagram is a media platform that includes three components: information infrastructure, tools to create and distribute media content, and tools. Individual messages, news, and cultural products can all be media content. Then, individuals, companies, and industries are responsible for creating and consuming digital media content (Howard & Park, 2021; Zulfikar & Asnawi, 2019). Instagram is easy to use in everyday life and does not recognize gender (Al-Kandari et al., 2016). Instagram has become a fun learning tool for teachers and students (Salomon, 2013). Previous research by

Apriani (2017) with level result creativity by using the Facebook network is good, and this can be seen from the two tasks carried out, the average percentage level of creativity in the task learning poster making by 67.43% with good category and report practicum of 59.46% with sufficient category.

Electronic portfolios (e-portfolios, ePortfolios, e-folios, digital portfolios) are a relatively new term but are rapidly developing in educational programs. Since electronic portfolios (e-portfolios) have been commonly used in teacher education as a means of (1) showing strong evidence of growth and competence, (2) focused thinking, and (3) serving as a medium for translating theory into practice, it is hoped that is that the e-portfolio helps link professional growth to the learning process for teaching. (Giandari, 2015). The general purpose of this research is to improve students' creative thinking skills on the use of Instagram social media in portfolio assessment on environmental pollution concepts.

2. Method

Methods should contain relevant information about the materials, experimental design, and methods to be repeated. If there are no other sources, names of manufacturers and products should be listed. You should describe any novel experimental methods in detail. Please describe briefly the method used by the previous researcher and explain any modifications.

The research was conducted at SMAN 1 Tanjung in April-May 2019. The population in this study were all class X IPA, totaling 238 students. The sample consisted of 34 students of class X IPA 4 (Control Class) and class X IPA 7 (Experiment Class), totaling 34 students. The design of this study used a pretest-postest control group design model (Sukmadinata, 2012).

The research method used in this research is a Quasi-experimental design with a pretest-posttest control group design. Data collection methods observation, tests, questionnaires, and portfolios. Data analysis techniques for instrument test; written test instrument analysis, validity test, reliability test, difficulty level, and discriminatory power. Data analysis techniques of research results: N-gain test, data normality test, homogeneity test, differential test (hypothesis test)

The data collection technique used an instrument in a tiered multiple-choice test conducted before learning (pretest) and after learning (posttest), then observation sheets, questionnaires, and portfolio sheets. This observation sheet aims to observe student activities in learning the concept of environmental pollution by examining students' creative thinking skills. This test is multiple-choice with creative thinking skills with a total of 30 questions with developing several indicators of creative thinking skills with different levels of cognitive in this test is analysis, evaluation, and creating. A questionnaire or questionnaire is a form of data collection instrument obtained through questionnaires is. The data we collect categorize as factual data.

Portfolio assignments of tasks performed during learning and outside of class hours. Each task will show results, increasing the ability of each student. Portfolio result data was analyzed using the analytical assessment rubric with predefined categories by researchers based on a value range of 1 to 4.

This study used statistical methods to analyze the data. The following stages and formula were used for analysis: 1. Analysis of test instruments. This included the validity test of test questions, reliability test, difficulty index and distinguishing power. 2. Anates description software was used. 2) N-Gain test is used to obtain a neutral gain value. 3) the statistical research test using SPSS version 21.0 software, namely in the form of prerequisite tests (normality and homogeneity tests) and hypothesis testing. Equation N-gain means introduced by Hake (1998). The results of the normalized gain mean value <g> are then interpreted using the criteria by Hake (1998); <g>> 0,70 is high, 0,30 <<g> < 0,70 medium criteria, <g> < 0,30 low criteria.

$$< g >= \frac{< s_{pos} > - < s_{pre} >}{100 - < s_{pre} >}$$

Description: $< g >$ = average N-Gain; s_{pos}= average posttest score; s_{pre}= mean pretest score.

3. Result and Discussion

The results of this study indicate a difference between the experimental class and the control class on student activities in learning, and there is an increase in students' creative thinking skills regarding the concept of the material being taught. The experimental class that implements the Instagram-assisted Portfolio Assessment in student learning activities is superior to the control class that does not apply it and the increase in creative thinking skills of the experimental class students, which has a significant increase compared to the control class. According to Celeste, the electronic portfolio can allow the creative process to express oneself concerning others and portray identity through narrative. In a more applied sense, an e-portfolio serves as a "life portal" where students can continually re-articulate their ideas to others to bring about new insights.

Student learning activities by implementing Instagram-assisted portfolio assessment

The Instagram Assisted portfolio assessment allowed for observations to be made about biology learning. These observations led to data collection on student learning activities. Students learn in both the experimental and control classes, in general, can be seen in the picture below.

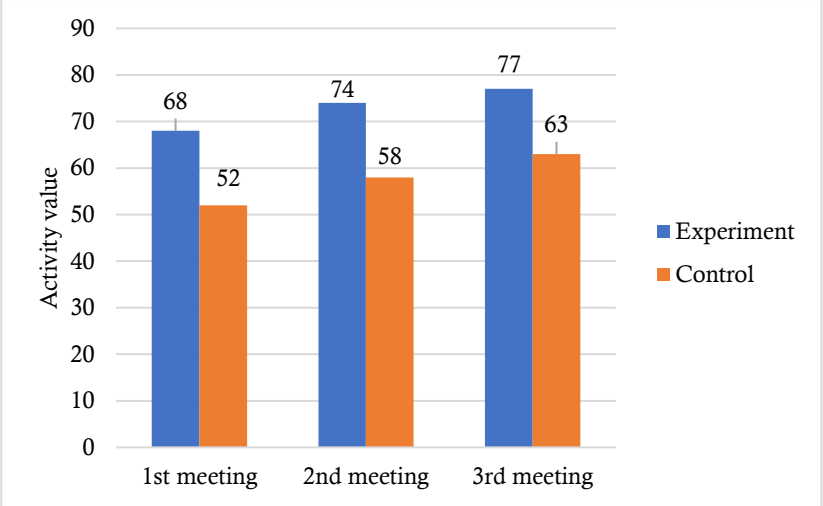

Figure 1. Diagram of the difference in student activities between the experiment class and the control class

Figure 1 addressing student learning activities in general in the experimental and control class. Based on this graph, it can be seen that there is an increase in student learning activities at each meeting, both in the experimental class and in the control class. The average value of student learning activities in the experimental class was more excellent by obtaining an average of 73 with good criteria than the average value of student learning activities in the control class by obtaining 58 with fewer criteria. The increase in student learning activities in the experimental class tended to be greater from one meeting to the next, whereas in the control class, there was an increase in each meeting, but it was smaller than the increase in the experimental class, which lasted three meetings by applying an Instagram-assisted portfolio assessment.

Portfolios can help students develop skills to self-assess and offer students the opportunity to reflect on their student development (Stefani Mason & Pegler 2007, 2007). Portfolios can help students understand how they think, reason, organize and communicate (Lorenzo, & Ittelson, 2005; Yang, Tai, & Lim, 2016).

Students' ability to think creatively refers to their ability to solve problems using different strategies or methods (divergent). Students can improve their creative thinking skills by increasing their scores in understanding problems, fluency, flexibility, and novelty in problem-solving. Students are said to understand the problem if they show what is known and stated. Students have fluency in solving problems if they can solve problems with various logically correct answers (Herman & Dahlan, 2016).

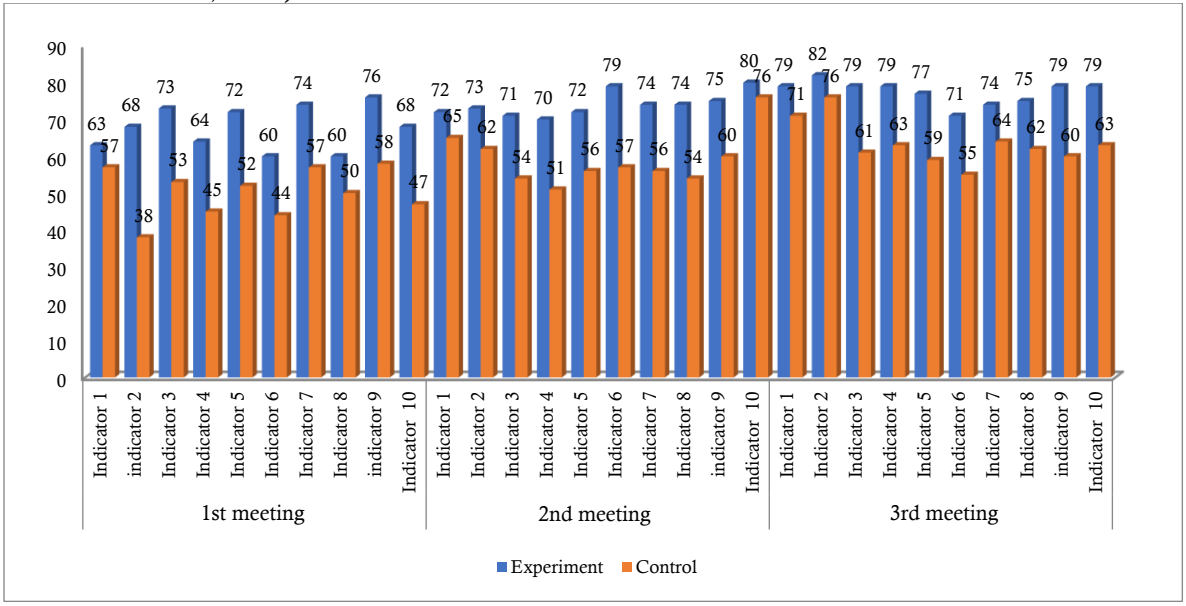

Figure 2. Recapitulation of student activity indicators for experiment and control class

Figure 2 shows the difference in the varying values of each indicator. The highest value observed from the first to a fourth meeting in the control class is the indicator shows the results of observations of student learning activities at the first meeting based on graphs on the graph, it can be seen that the highest average student activity in both the experimental class and the control class is indicator 9 (Practicing the process of creative problem solving according to systematic discipline in dealing with problems and information). Meanwhile, the average learning activity of the student learning activity is the lowest by the indicator graph 6 (describing carefully and systematically the material that occurs) both in the experimental class and in the control class. The first meeting in the experimental class is at most indicator nine is 76% with reasonable criteria, and the lowest is on indicator six at 60% with sufficient criteria. In the control class, the highest on indicator nine was 58% with sufficient criteria, and the lowest was on indicator two at 38% with poor criteria. The highest increment in the first meeting in control and experimental classes occurred on the same indicator, namely indicator 9, and the lowest activity value on different indicators, namely the experimental class indicator 6, while the control class on indicator 2 with fewer criteria indicated that the experimental class was better.

Student activities for each meeting are different. The following explains student activities for each meeting: at the first meeting, namely making a video learning about changes to the environment around the school. The results of observations from student activities at the second meeting have good criteria, which means that students are enthusiastic about learning. From the results of observations, student activities can be analyzed and presented if the activity conveys opinions from each video about environmental pollution. This activity is higher because implementing an Instagram-assisted portfolio assessment can make students more active because students are encouraged to dare express their opinions actively. Student activeness is assessed through the assessment of learning videos made by students and the assessment of Instagram-assisted portfolio assessments to make assessing student assignments easy and getting to know students about technological developments. In the first meeting, it can be seen that the highest average student learning activity in both the experimental class and the control class is indicator 9

(practicing the creative problem-solving process according to disciplinary systematic in dealing with problems and information) because at the first meeting students make learning videos of environmental changes, where students compile or edit videos, images and materials systematically and creatively. Students edit videos of environmental changes.

Table 2 shows that the value of the experimental class is included in the same criteria good, while the control class is included in the good criteria. So that it can be concluded that the experimental class got a better score than with the control class, this is in line with the research conducted Apriani's research (2017) with level results creativity by using the Facebook Network is good, so the assessment of this portfolio must be applied in every lesson to create quality results and a more efficient learning process. Potential social media platforms and online videos stimulate proactive, participatory engagement, communication of science, and interest in environmental contexts (Pavelle & Wilkinson, 2020).

Factors that can affect the value experimental class students in the task of environmental pollution due to power capture and thinking patterns of the experimental class students are higher, they can make learning videos and collect them online well, with social media Instagram students can see the assessment directly also shows best skills and make videos to everyone.

Results of student assignments in the application of Google Classroom-based e-Portfolios

The average value of student e-portfolio assignments can be seen in the following Figure 3.

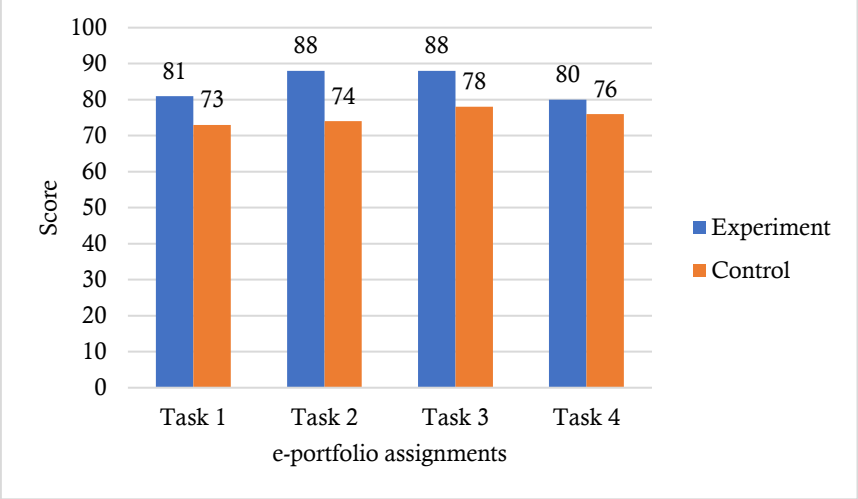

Figure 3. Diagram of a score of e-portfolio task for experiment class and control class

Figure 3 shows the average value of the portfolio assignments done by the experimental class and control class students. In the experimental class, the highest score was 88, which was in the task of reviewing articles on maintaining the health of the human excretory system organs. This achievement is influenced by the student activeness in the class and because of assistance in finding reference sources from the internet and even journals so that students' insights are broader and it is not new to the review task so that students can get excellent grades. The lowest score is shown in the fourth assignment, which is making a paper on the organs of the excretory system in humans with a value of 80. The effect of decreasing grades from the first to fourth assignments is because students are still less compact in working on paper assignments.

The control class shows the highest score in the fourth assignment, which is making a paper on the excretory system organs with a score of 76 and a difference of 6. It can be concluded that the experimental class gets better scores than the control class. This aligns with Auliyana's (2015) research, which states that learning using google classroom media helps the learning process.

According to students, the advantages of google classroom are that students can repeat material and open material at any time, the material is easy to download, and there are several students. Argued that the operation was easy so that students were interested in these innovations.

The score of the e-portfolio task for the experimental and control class

The average value can be e-Portfolio assignments for the experimental class and class are shown in the Figure 4 below.

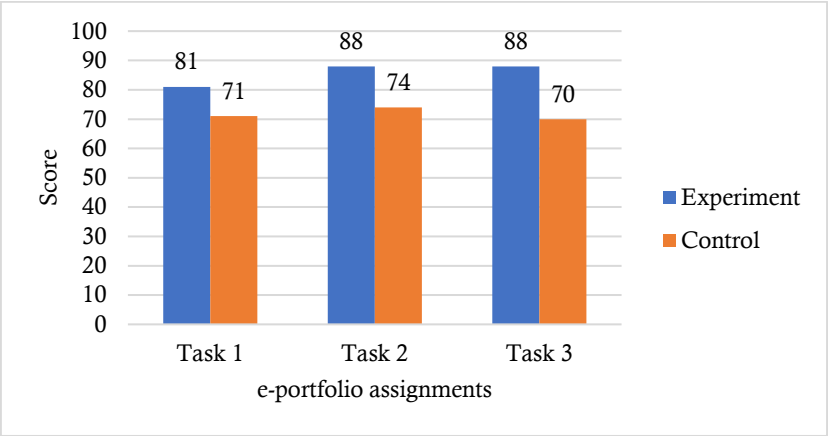

Figure 4. Diagram of Score of e-Portfolio Assignments at making environmental pollution videos

Figure 4 shows the average value of the portfolio assignment done by the experimental class students, with the highest score of 88, which is found in the second assignment, which is to make environmental pollution videos. This achievement is influenced by the factor of material made into video material easily found in the school environment so that students' insights are broader and students can get excellent grades. The lowest score is shown in the environmental change video assignment, with a value of 81. the effect of this value is due to the first experience for students in making instructional videos, and they are still not serious about making videos so that the value they get is the maximum.

The highest score in the control class in making environmental pollution videos was 74. This achievement is influenced by the factor of material used as video material that is easy to find in the school environment. The lowest score is shown in the video assignment on tackling environmental pollution, with a value of 70. The effect of this value is because the students' insight in finding sources of coping methods is lacking, resulting in less than the maximum value obtained.

At the third meeting, the lowest score was making a video on environmental countermeasures. This is because students are getting bored due to the video being made carelessly. Figure 4 shows that the value of the experimental class is included in the excellent criteria, while the control class is included in the good criteria. It can be concluded that the experimental class gets better scores than the control class. Instagram can be used as a promotional broadcasting tool, focusing on final collection and curation work through the communication of discovery and science as a process (Brown Jarreau et al., 2019). The effective use of online video in social media requires a balance between composing informative yet entertaining narratives without compromising scientific accuracy (Pavelle & Wilkinson, 2020).

Learning using the E-Portfolio assessment method shows promising results with an increase in each student's score in each meeting. Factors that can affect the increase in the value of experimental class students in environmental pollution assignments are due to the higher comprehension and thinking patterns of experimental class students, they are able to make learning videos and are collected online well, with social media programs, students can see direct assessment

also show skills best and make videos to everyone. That way, the enthusiastic attitude of students in responding to the assignments given by the researcher can be done thoughtfully and responsibly.

Differences in increasing creative thinking skills of students in experiment and control class

Indicators of creative thinking skills observed in this study are: 1) building the depth of knowledge that students have; 2) raising awareness about the problem; 3) strengthening awareness of problems and difficulties; 4) deepening creative and constructive excavation; 5) encouraging creative personal traits or tendencies; 6) describes carefully and systematically the material that occurs; 7) proactive questions to make learning to think about information; 8) raise awareness about the problem; 9) practicing the process of solving creative problems according to disciplined systematic in dealing with problems and information; 10) see a clear relationship between new information (Lawson, 2001).

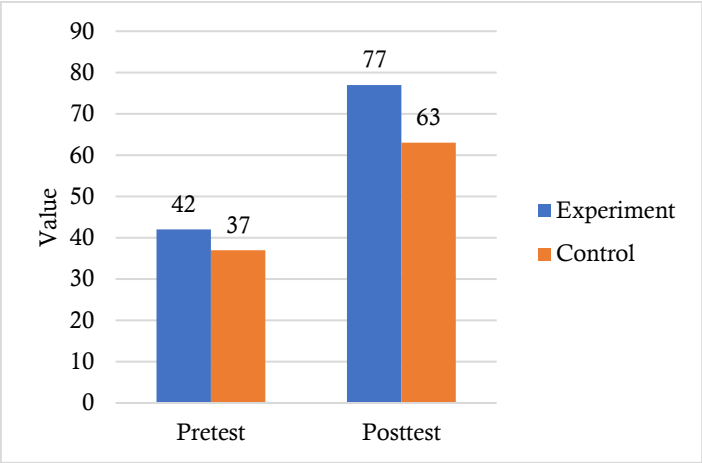

Figure 6. The pretest-posttest values of creative thinking skills between the experiment and the control class

Figure 6 shows the average acquisition of students' pretest and posttest scores between the experimental and control classes. The average pretest score of the experimental class and control class showed a slight difference. The average value of the experimental class pretests is 42, whereas the average pretest value of the control class was 37. Based on these data, it can be said that the pretest means the value of the experimental class was more significant than the average pretest value of the control class. The difference between the pretest value of the experimental class and the control class is 4.

The average posttest score of the experimental and control class students increased. The average posttest score of the experimental class is 77, while the average posttest score of the control class is 63. These data show that the average posttest score of the experimental class is greater than the average posttest score of the control class. The enhancement of CTS in the experimental class was higher than the increase in the creativity of the control class students. And the average CTS N-gain value of the experimental and control class students.

Students' initial knowledge of a material concept is essential because students often have difficulty understanding specific knowledge, especially new knowledge. Newly accepted knowledge can occur because it has no connection with previous knowledge, or it could be that students have not had previous knowledge, so students have difficulty understanding a material concept. Therefore, initial knowledge is the main requirement and becomes very important for students. In teaching material, a learning model must be selected following the objectives. In addition, other considerations in choosing a learning model are subject matter, students' level of

cognitive development, and the means or facilities available so that learning that has been applied can occur (Trianto, 2010).

Students' initial knowledge of a material concept is essential because students often have difficulty understanding specific knowledge, especially new knowledge. Therefore, initial knowledge is the main requirement and becomes very important for students. A learning model must be selected following the objectives (Sanwasi, 2018). The average N-Gain value for the experimental and control classes can be seen in the Figure 7 below.

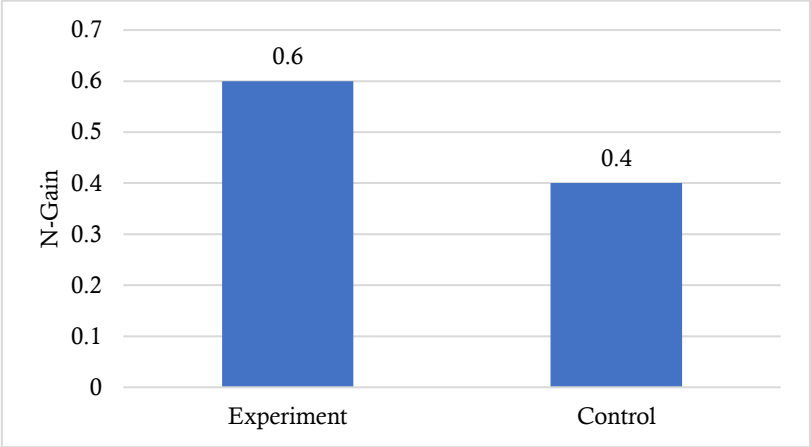

Figure 7. The N-gain value of critical thinking skills (CTS) experimental and control class

Figure 7 illustrates the average CTS N–Gain value for students in experimental and control classes. The moderate category included both the experimental and control classes' average N-Gain values. The experimental class had a higher average N-Gain than the control class's average N-Gain. The experimental class had a 0.60 N-Gain score for the moderate category and 0.40 for the poor category. Table 1 below shows the comparison of the pre- and posttest CTS indicators in the experimental class and the control class.

Table 1. The results of the general N-Gain pretest and posttest of CTS

Data	Class	Normality test		Homogeneity	
		Sig.	Information	Sig	Description
Gain	Experiment	0.002	Abnormal	0.014	Inhomogeneous
	Control	0.000	Abnormal		

Table 1. Overall, the N–Gain value of the experimental class is greater than that for the control class. Purwanto (2017) says that learning success or failure depends on many factors. There are two types of factors that can influence learning success or failure: individual and social. Individual factors include intelligence, maturity/growth, training, motivation, as well as personal factors. Family factors are social factors.

Table 2. General difference test results of N-gain

Data	Different test	Sig.	Description
N-Gain	Mann Whitney	0.000	Significantly different

Table 2 lists the results of the N-Gain data. Based on the Mann Whitney test results, the significance value N-Gain is 0.000. This means that Ho is rejected while Ha is accepted. These data show that there is a significant difference between the experimental and control classes in students' creativity. Figure 6 shows this difference. Figure 7 shows that the N-Gain average of the experimental classes is higher than that of the control.

The ten indicators were obtained after the conditions test, and the data difference test was carried out. After being examined, the statistics have significantly different data, which means that there are differences. Significant creative thinking skills between the experimental class with control class Factor the cause of the difference in creative thinking skills between the experimental class and the class control, namely the experimental class applying Instagram-assisted portfolio assessment, which can help students to process information factually so that In addition to students repeating the understanding of the information, students are also invited to seek and process information into conceptual, factual knowledge (Rohmad, 2017). Creative thinking skills are related to the correct brain function, which tasks related to the nature of the whole, intuitive, synthesis, integration, emotion, interpersonal, feeling, kinesthetic. (Raven. 1996).

Table 3. The results of the N-Gain data difference test for each CTS indicator

Data	Different test	Sig.	Description
CTS 1	Mann-Whitney Test	0.000	Significantly different
CTS 2	Mann-Whitney Test	0.000	Significantly different
CTS 3	Mann-Whitney Test	0.000	Significantly different
CTS 4	Mann-Whitney Test	0.001	Significantly different
CTS 5	Mann-Whitney Test	0.000	Significantly different
CTS 6	Mann-Whitney Test	0.000	Significantly different
CTS 7	Mann-Whitney Test	0.000	Significantly different
CTS 8	Mann-Whitney Test	0.000	Significantly different
CTS 9	Mann-Whitney Test	0.000	Significantly different
CTS 9	Mann-Whitney Test	0.000	Significantly different
CTS 10	Mann-Whitney Test	0.000	Significantly different

Based on these data of Table 3, there is a significant difference in the improvement of creative thinking skills on each indicator between the experimental class and the control class in all CTS. Meanwhile, based on the average gain of the experimental and control classes, it shows that the experimental class in all CTS has better creative thinking skills scores than the control class.

Improvement of creative thinking skills from the difference in posttest and pretest scores between the control class and the experimental class is relatively low, and this is because the value between the pretest and posttest is only slightly or in other words, during the posttest, the students' grades increased only slightly. Results interpretation of the data in Figure 4.5 shows that the experimental class has a high value of creative thinking skills. The experimental class in learning to apply Instagram-assisted portfolio assessment help students to learn the fundamental lessons being taught. Trianto (2010) stated in a statement that proper learning is based on students being able to learn. It should not be focused on getting as much information at the end.

Overall data show that N-Gain for the experimental class is greater than N-Gain for the control. The success or failure of learning depends on various factors. Factors that influence the success or failure of whether or not learning can be divided into two factors, namely individual and social (Lim, & Johnson, 2002; Vonderwell & Zachariah, 2005). Individual factors include maturity/growth, motivation, training, intelligence, and personal factors. Social factors include family factors, teachers' way of teaching, learning media, environment, and opportunities available and socially motivated.

Student response to the implementation of Instagram-assisted portfolio assessment to improve creative thinking skills

Student responses to the Instagram Assisted Portfolio Assessment application to Improve Creative Thinking Skills can be seen in the following Figure 8.

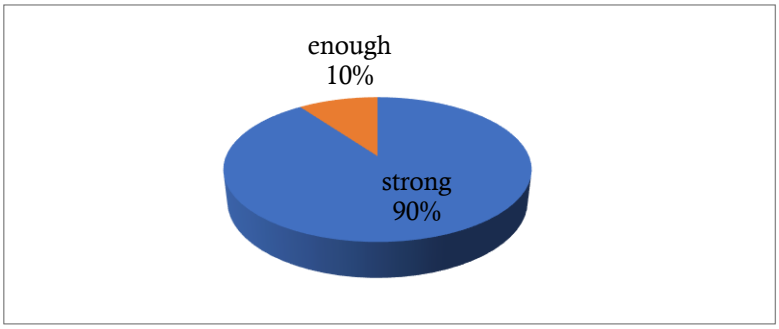

Figure 8. Questionnaire diagram of student responses to the e-portfolio assessment based on google classroom

Figure 8 shows a diagram of the percentage of student responses to the biology learning with the E-Portfolio assessment based on the Google Classroom application on the excretion system sub-concept. The diagram shows that students' responses to Biology learning with e-portfolio assessments based on the Google Classroom application are integrated into the excretion system sub-concept, namely 90% of students gave a strong response and 10% of students responded sufficiently. Based on these data, it can be concluded that biology learning with e-portfolio assessment based on the Google Classroom application on the excretion system sub-concept received a good or positive response from students. As is the case according to Slamet's research (2015) that in the use of electronic learning, three things must be fulfilled in designing it, namely simple, personal, and fast. A simple system will make it easier for students to use technology to learn more efficiently.

Munandar (2012) the behavioral characteristics of creative children are always curious, have broad interests and enjoy creative hobbies and activities. Child and creative youth are usually entirely independent and self-confident. They are more daring to take risks (but with calculations) than children in general. It means in doing something significant to them, crucial and liked, they are less affected by the criticism or ridicule of others—person innovative way to highlight and surprise or offend tradition. Confidence, tenacity, and perseverance make them not break up quickly hope to achieve their goals. This can be seen from the students' responses about implementing the assessment that showed excellent results; they tried hard from the first meeting to the third meeting, creating masterpieces, maximum learning videos, and pursuing grades and pride when displayed on Instagram.

Using portfolios increases students' activeness in the teaching and learning process, encourages students to seek knowledge, and enables active construction (Montrezor et al., 2016). The use of a web-based portfolio can reflect student achievement, which is valid and reliable (Chang et al., 2016). Assessment using e-portfolios can increase the effectiveness and efficiency of learning (Maulani et al., 2016). The use of e-portfolios can increase metacognitive awareness and understanding of biological concepts (Lukitasari et al., 2014). E-portfolios can increase student engagement, help students reflect on learning outcomes and enhance student learning experiences (Haave, 2016).

4. Conclusion

There is a difference in activities between students who apply portfolio assessment with the help of Instagram to improve students' creative thinking skills the concept of environmental pollution. Obtained a percentage of 77% for the experimental class and 63% for the control class. There is a

significant difference in the improvement of creative thinking skills between students who apply Instagram-assisted portfolio assessment with students who do not apply Instagram-assisted portfolio assessment to the concept of environmental pollution. The difference in increase can be seen from the average value of N-Gain in the experimental class, which reaches 0.60 with moderate criteria, and the control class, which reached 0.40 with low criteria. Students positively respond to applying biology learning Instagram-assisted portfolio assessment is included in the strong category with an average percentage value of 94%, which means the criteria are excellent. So it can be said that students are interested in the learning provided by the researcher. Instagram-assisted portfolio assessment can improve students' creative thinking skills.

References

Al-Kandari, A. J., Al-Hunaiyyan, A. A., & Al-Hajri, R. (2016). The influence of culture on Instagram use. *Journal of Advances in Information Technology, 7 (1), 54*, *57*.

Amijaya, L. S., Ramdani, A., & Merta, I. W. (2018). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar dan kemampuan berpikir kritis peserta didik. *Jurnal Pijar Mipa*, *13*(2), 94-99.

Amtiningsih, S., Dwiastuti, S., & Sari, D. P. (2016). Peningkatan kemampuan berpikir kreatif melalui penerapan guided inquiry dipadu brainstorming pada materi pencemaran air. In *Proceeding Biology Education Conference: Biology, Science, Enviromental, and Learning*,*13*(1), 868-872.

Apriani, W. (2017). *Penilaian kreativitas siswa SMA menggunakan tugas portofolio online melalui jejaring facebook pada konsep sistem gerak manusia* (Bachelor's thesis, Fakultas: Ilmu Tarbiyah dan Keguruan UIN Syarif Hidayatullah Jakarta).

Auliyana, S. (2015). Penerapan Google Classroom Sebagai Media Pembelejaran pada Pelajaran Kimia SMK Negeri 2 Temanggung. *Skripsi, Fakultas Teknologi Informasi, Universitas Kristen Satya Wacana, Salatiga*.

Brown Jarreau, P., Dahmen, N. S., & Jones, E. (2019). Instagram and the science museum: a missed opportunity for public engagement. *Journal of Science Communication*, *18*(2), A06.

Chang, C. C., Liang, C., & Chen, Y. H. (2013). Is learner self-assessment reliable and valid in a Web-based portfolio environment for high school students?. *Computers & Education*, *60*(1), 325-334.

Falahudin, I. (2014). Pemanfaatan media dalam pembelajaran. *Jurnal Lingkar Widyaiswara*, *1*(4), 104-117.

Haave, N. (2016). E-Portfolios Rescue Biology Students from a Poorer Final Exam Result: Promoting Student Metacognition. *Bioscience: Journal of College Biology Teaching*, *42*(1), 8-15.

Hake, R. R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, *66*(1), 64-74.

Herman, T., & Dahlan, J. A. (2016). The enhancement of students' creative thinking skills in mathematics through The 5E learning cycle with metacognitive technique. *International Journal of Education and Research*, *4*(7), 14.

Howard, P. N., & Parks, M. R. (2012). Social media and political change: Capacity, constraint, and consequence. *Journal of communication*, *62*(2), 359-362.

Ihsan, M. S., Ramdani, A., & Hadisaputra, S. (2019). Pengembangan E-Learning pada pembelajaran kimia untuk meningkatkan kemampuan berpikir kritis peserta didik. *Jurnal Pijar Mipa*, *14*(2), 84-87.

Ipriadi, I., & Muhfahroyin, M. (2013). Pembelajaran berbasis portofolio untuk meningkatkan aktivitas dan hasil belajar biologi siswa kelas X MA Negeri 2 Metro semester genap tahun pelajaran 2011/2012. *Bioedukasi (Jurnal Pendidikan Biologi)*, *4*(1), 1-10.

Lawson, A. E. (2001). Promoting creative and critical thinking skills in college biology. *Bioscience*, *27*(1), 13-24.

Lestari, P., Ristanto, R. H., & Miarsyah, M. (2019). Analysis of conceptual understanding of botany and metacognitive skill in pre-service biology teacher in Indonesia. *Journal for the Education of Gifted Young Scientists*, *7*(2), 199-214.

Lim, D. H., & Johnson, S. D. (2002). Trainee perceptions of factors that influence learning transfer. *International Journal of Training and Development*, *6*(1), 36-48.

Lorenzo, G., & Ittelson, J. (2005). An overview of e-portfolios. *Educause learning initiative*, *1*(1), 1-27.

Lukitasari, M., Susilo, H., Ibrohim, I., & Corebima, A. D. (2014). Lesson study in improving the role of e-portfolio on the metacognitive skill and concept comprehension: a study on cell biology subject in IKIP PGRI Madiun, Indonesia. *American Journal of Educational Research*, *2*(10), 919-924.

Mason, R., Pegler, C., & Weller, M. (2004). E-portfolios: an assessment tool for online courses. *British journal of educational technology*, *35*(6), 717-727.

Maulani, G., Rahardja, U., & Adila, L. T. (2016). Video sebagai E-portfolio Mahasiswauntuk Meningkatkan Keterampilan Mahasiswa. *Creative Communication and Innovative Technology Journal*, *9*(2), 225-239.

Montrezor, L. H., Brancaglião, L. F., Gonçalves, V. M., Lemos, J. E. S., Rocha, N. F., & Marcondes, F. K. (2016). Portfolio as an active learning methodology for the study of the endocrine system. *Intern Educ Res J*, *2*, 42-46.

Munandar, U. (2012). *Pengembangan kreativitas anak berbakat*. PT Rineka Cipta.

Panjaitan, A. H., & Surya, E. (2017). Creative Thinking (Berpikir Kreatif) Dalam Pembelajaran Matematika. *ABA Journal*, *102*(4).

Pavelle, S., & Wilkinson, C. (2020). Into the digital wild: utilizing Twitter, Instagram, youtube, and Facebook for effective science and environmental communication. *Frontiers in Communication*, *5*(575122).

Putra, P. D. A., & Iqbal, M. (2016). Implementation of Serious Games Inspired by Baluran National Park to Improve Students' Critical Thinking Ability. *Jurnal Pendidikan IPA Indonesia*, *5*(1), 101-108.

Salomon, D. (2013). Moving on from Facebook: Using Instagram to connect with undergraduates and engage in teaching and learning. *College & Research Libraries News*, *74*(8), 408-412.

Simbolon, E. R., & Tapilouw, F. S. (2015). Pengaruh pembelajaran berbasis masalah dan pembelajaran kontekstual terhadap berpikir kritis siswa SMP. *Edusains*, *7*(1), 97-104.

Stefani, L., Mason, R., & Pegler, C. (2007). *The educational potential of e-portfolios: Supporting personal development and reflective learning*. Routledge.

Sukmadinata, S. N. (2012). Metode penelitian. Bandung: PT Remaja Rosdakarya.

Sulistyowati, N., Widodo, A. T. W. T., & Sumarni, W. (2012). Efektivitas model pembelajaran guided discovery learning terhadap kemampuan pemecahan masalah kimia. *Chemistry in education*, *1*(2).

Tafonao, T. (2018). Peranan media pembelajaran dalam meningkatkan minat belajar mahasiswa. *Jurnal Komunikasi Pendidikan*, *2*(2), 103-114.

Trianto, T. (2010). Model pembelajaran terpadu. *Jakarta: Bumi Aksara*.

Vonderwell, S., & Zachariah, S. (2005). Factors that influence participation in online learning. *Journal of Research on Technology in Education*, *38*(2), 213-230.

Yang, M., Tai, M., & Lim, C. P. (2016). The role of e-portfolios in supporting productive learning. *British Journal of Educational Technology*, *47*(6), 1276-1286.

Yaniawati, R. P. (2013). E-learning to improve higher-order thinking skills (HOTS) of students. *Journal of Education and Learning (EduLearn)*, *7*(2), 109-120.

Zulfikar, R., & Asnawi, A. (2019, November). Social Media Opportunities as a Culinary Business. In *IOP Conference Series: Materials Science and Engineering* (Vol. 662, No. 3, p. 032035). IOP Publishing.