TAMIKA: Jurnal Tugas Akhir Manajemen Informatika & Komputerisasi Akuntansi
Vol. 4 No. 2 (Desember 2024) – ***Edisi Khusus SEMNASTIK 2024***
https://doi.org/10.46880/tamika.Vol4No2(SEMNASTIK).pp129-135 e-ISSN: 2828-1276

EVALUATING STUDENTS' CREATIVE THINKING SKILLS THROUGH E-PORTFOLIOS AND PROBLEM BASED LEARNING

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ABSTRACT

According to the 2018 PISA results, Indonesian students' creative thinking skills remain low. This study aims to analyze students' creative thinking in logo design through Problem-Based Learning (PBL) using a web-based e-portfolio. The research followed the ADDIE model. In the Analysis phase, students' creative thinking needs were identified; the Design and Development phases involved constructing the PBL framework and configuring the e-portfolio platform. During the Implementation phase, students worked in groups of 3-4 over three weeks on logo design tasks, documenting their processes and receiving feedback via the e-portfolio. In the Evaluation phase, student progress was monitored, and portfolios were qualitatively assessed for improvements in creative thinking. A sample of 34 high school students was selected through convenient sampling based on class scheduling. Data were collected through questionnaires, interviews, and student portfolios and analyzed qualitatively using creative thinking dimensions of fluency, flexibility, originality, and elaboration. Overall, 50% of students' performances across all dimensions were rated "Very Good," and 47.5% were rated "Good." The use of e-portfolios facilitated self-reflection and iterative feedback, demonstrating a positive impact on creative thinking skills. These findings suggest that e-portfolios can be effectively integrated into broader educational contexts to enhance creative thinking.

Keyword: Creative Thinking Skills, E-Portfolio, Logo Design, Problem Based Learning.

INTRODUCTION

Curriculum revisions in Indonesia are frequently undertaken to achieve higher educational standards. The Independent Curriculum has been introduced to replace the 2013 curriculum, offering students the opportunity to engage in learning that aligns with their interests (Cholilah et al., 2023). This curriculum encourages active student participation and exploration of real-world issues, promoting the development of 21st-century skills.

Supporting this need for skill development, the 2015 PISA results ranked Indonesia 115th out of 139 countries in creative thinking, with an index score of 0.202 (Florida et al., 2015). Furthermore, the 2018 PISA survey ranked Indonesia 74th out of 79 countries, with a score of 379, which is below the international average of 489. This score is lower than that of other Southeast Asian nations, such as Malaysia, Vietnam, Thailand, and Singapore. The PISA results reflect the creative thinking abilities of Indonesian students, as the test items are based on Higher Order Thinking Skills (HOTS), which encompass the 4C skills.

According to the National Education Association, 21st-century skills include the 4Cs: Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation. These skills require students to develop critical and creative thinking through active learning, involving dialogue and discussion (Supena et al., 2021). Education plays a crucial role in nurturing students' potential to compete globally, equipped with technological understanding and application. Consequently, students are expected to possess 4C skills, including creative thinking.

As defined by Moore (2015), creative thinking involves the ability to generate new understanding, concepts, or ideas. Guilford (1950) identifies creative thinking skills through aspects such as fluency, originality, flexibility, and elaboration. Creative thinking enables students to generate new and unique ideas, supporting them in adapting to the challenges of the 21st-century industrial landscape (Aldalalah, 2021). However, creative thinking skills in Indonesia remain relatively low, particularly in graphic design education, where these skills are essential (Alhajri, 2017).

Innovative approaches to learning and assessment are needed, such as using digital platforms. Previous research by Salehudin, et al. (2019) demonstrated the effectiveness of using Instagram in graphic design education, where students can upload their work, including illustrations, packaging designs, and promotional posters. Al Hashimi et al., (2019) also found that digital media enhances student creativity in design education, allowing them to share work and achievements through an e-portfolio.

An e-portfolio is a compilation of work processes, reflections, feedback, assessments, and finished products created by students. E-portfolios encourage the generation of new ideas and creativity in design development (Mudau & Van Wyk, 2022). Research by Alajmi (2019) showed that e-portfolios provide a unique experience, enabling students to collect, upload, and receive feedback on their work. Given these benefits, this research proposes the integration of e-portfolios as an assessment tool in the learning process.

This study aims to integrate e-portfolios into logo design education using Problem-Based Learning (PBL). According to Zarvianti & Sahida (2020), PBL provides students with real-life experiences through tasks that offer new and relevant challenges. The PBL model helps students create tangible outputs such as designs, presentations, and case studies, enhancing their creative thinking skills.

The use of web-based e-portfolios in this research offers easy access, allowing students to upload various forms of work, including images, videos, and documents, anytime and anywhere (Rashid, 2016). Thus, this study explores how web-based Problem-Based Learning combined with e-portfolios can enhance students' creative thinking skills in logo design education.

METHODS

This research employs the R&D (Research & Development) method, which is used to create products and test their effectiveness (Sugiyono, 2016: 407). The media development model utilized in this study is the ADDIE model. The initial phase involves problem analysis through literature reviews and field studies. The literature review provides supporting theories for the research, while field studies include interviews with teachers and questionnaires for students to analyze user needs. This process helps identify the issues faced and the necessary solutions. Based on this analysis, the learning media is then designed, taking into account the identified problems and user needs. Researchers proceed to develop the media by creating a web interface and associated learning content. During the development phase, the researchers begin designing an e-portfolio website. The website is developed using Visual Studio Code, the PHP programming language, and the Code Igniter 4 framework. Once the website is complete, it undergoes a testing phase. In the implementation phase, a trial is conducted using the web-based e-portfolio with students. The e-portfolio serves as a tool for both formative and summative assessments. Students are presented with a case study on logo design and complete pretests and posttests via the web platform. The final phase of the research is evaluation, where the outcomes of the implemented learning activities are assessed.

The research population consists of students from SMKN 2 Garut. The sampling technique employed was purposive sampling, a method where data is collected by elaborating on and examining information using words or images (Sugiyono, 2016). This technique was chosen to ensure that the selected samples had not previously studied logo design material. The sample for this research consisted of 34 students from class XI majoring in Visual Communication Design.

Data collection methods included questionnaires, interviews, and student portfolios. Following the development of the media, the research was conducted. The collected data were analyzed using descriptive qualitative methods, which involve comparing one or more variables across different samples over time (Sugiyono, 2019). In this study, logo design problems were used as a measure of students' creative thinking skills. The development of these skills was then analyzed based on the students' logo design assignments during the learning process. The indicators for assessing creative thinking skills are based on Guilford's (1950) criteria, as listed in Table 1.

Table 1. Indicators of Creative Thinking Skills

Aspect	Very Good	Good	Enough	Low	Very low
Fluency	Ideas are very relevant to the problem and can be done more quickly	Design ideas are relevant to the problem and can be completed on time	The work idea is quite relevant to the problem and is completed in an average time	The work idea is slightly relevant to the problem and the work is done more slowly	The work idea is not relevant to the problem and works very slowly
Flexibility	The ideas presented vary greatly with different concepts from each other	The ideas presented are quite different	The ideas are presented with some variations but seem similar to the others	The ideas presented vary slightly but are very similar to the others	The ideas presented has no variations

Originality	Very original and unique design	The design is quite original with new elements	The design has several common elements	The design is less original and looks like other designs	The design is very unoriginal and exactly the same as other designs
Elaboration	Express the reasons for choosing ideas and design ideas very well and in detail	Provide good reasons for choosing ideas and thoughts, but there are still several things that need to be improved	Provide good reasons for choosing ideas and thoughts, but there are still several things that need to be improved	Design concepts and ideas are poorly understood	There is no explanation of ideas and design ideas

RESULTS

E-portfolios are created by presenting visualizations to create content on the web. The use of this e-portfolio is used to evaluate the extent to which students explore the authenticity of their work. Several interface of e-portfolio web can be found in Figure 1 to Figure 5. The homepage displays initial instructions and introductions regarding the website and a glimpse of student work as illustrated in Figure 1.

Figure 1. E-portfolio homepage

Students can access the Homepage, My Class, Portfolio, My Profile, Change Password, and get notifications. When the My Class menu is displayed, students will immediately be displayed in the Logo Design material list. The interface display of the material features listed in Figure 2.

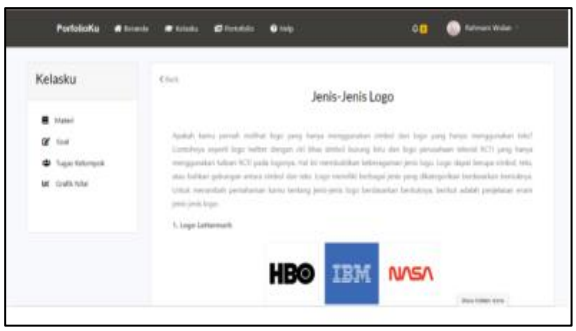

Figure 2. Lessons View

In the students group assignment feature, students can upload their work according to the problems given in groups. The student assignment menu interface is shown in Figure 3.

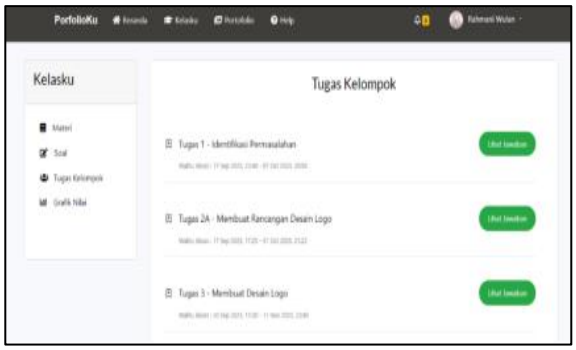

Figure 3. Assignment View

Next is the assignment value graph menu. Students can see a graph of assignment scores to see the comparison of student scores to the average group score. The display of the student grade graph menu interface is depicted in Figure 4.

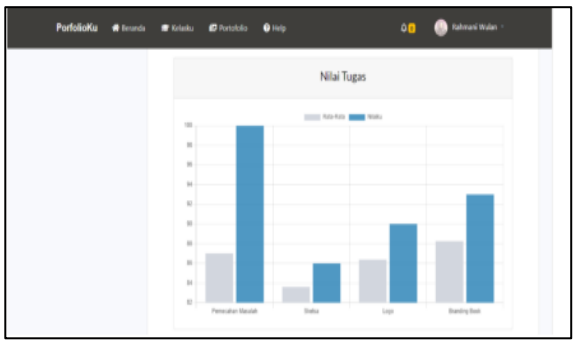

Figure 4. Student Grade View

Students can also access the portfolio menu which contains student works which have been categorized based on logo sketches, logo designs, visual branding books, and student test scores as listed in Figure 5.

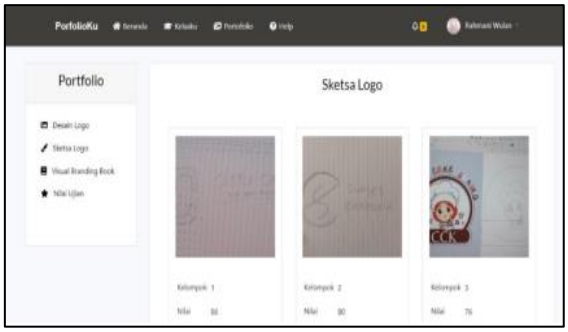

Figure 5. Portfolios View

The e-portfolio web that has been created is then assessed by experts. This stage functions to measure the suitability of the media that has been created. The media assessment uses media assessment according to the Learning Object Review Instrument (Nesbit et al., 2007). The assessment results by material experts were 89%, while the results from media experts were 85%. Based on this value, the media used has a value of "Very Good" and is suitable for use.

From the learning activities that have been carried out, students' creative thinking skills can be observed. Each student's assignment results are assessed using an assessment rubric based on indicators of creative thinking skills. The following are the results of the creative thinking skills of experimental class students listed in Table 2. Overall, 50% of students' performances across all dimensions were rated "Very Good," and 47.5% were rated "Good." This result aligns with previous studies (Simanjuntak et al., 2021, Handayani & Koeswanti, 2021), which have stated that learning through the implementation of problem-based learning can enhance students' creative thinking.

Table 2. Logo Design Results

Groups	Logo Design	Fluency	Flexibility	Originality	Elaboration
1	CASTLE CAKE	Very Good	Very Good	Very Good	Very Good
2	sukses elektronik	Good	Good	Good	Good
3	CCK	Very Good	Enough	Good	Good
4	CAKE	Very Good	Good	Good	Good
5	HG	Very Good	Very Good	Very Good	Very Good
6	HERMOSA GALERRY	Very Good	Good	Good	Very Good
7		Very Good	Very Good	Good	Good
8		Very Good	Good	Good	Very Good
9		Very Good	Good	Very Good	Good
10	TRISNO elektronik	Very Good	Good	Good	Very Good

The fluency component assesses how quickly students can solve problems and the relevance of their concepts to the given situation. Although many designs are relevant to the task, students require extensive practice in generating diverse ideas and solutions to develop the ability to collaboratively tackle problems from multiple perspectives, as demonstrated in the findings of Chang et al. (2022). For example, Group 2 initially created a logo design featuring the letters "S" and "E." They later refined it by adding typographic elements, making the logo's identity clearer. The letters "S" and "E" stand for "Sukses Elektronik," making the logo more relevant by specifying its meaning through typography. The results of Group 2's logo design are shown in Figure 6.

Figure 6. Logo Design Based on Fluency

The flexibility aspect assesses the variety of ideas generated for logo design, which tends to increase over successive sessions. In the initial meeting, the majority of students approached the problem based on the given case study, aligning with the findings of Albar and Southcott (2021). However, there was room for improvement, especially with the initial logo designs. Several groups progressed by refining their sketches. For example, Group 5, working on an art gallery logo, initially included both a type and an image logo. They eventually decided that the image logo alone sufficiently represented the art gallery and removed the typographic elements. This example is shown in Figure 7.

Figure 7. Logo Design Based on Flexibility

There is also a noticeable variety in ideas. Students generally show a good range of styles in their logo designs, with each group producing distinct variations. These variations encompass conservative, progressive, and innovative logos, as highlighted by Halina et al. (2024). Beyond depicting components like cakes, paintings, or technological devices, students also created geometric patterns with unique elements, demonstrating their broad understanding of different logo types. Figure 8 presents a variation of logo designs created by students.

Figure 8. Variation of Logo Designs

Originality is another key aspect of creative thinking. The originality component evaluates the uniqueness and distinctiveness of student designs. Students often exhibit creative thinking, as seen in their logo creations. For example, the "Hermosa Gallery" logo, incorporating the acronym "HG," creatively designs the letter "G" in the shape of a paint palette, effectively reflecting the art gallery theme, as similarly observed in previous studies (Abbey et al., 2022; Yuriy, 2021). This design is shown in Figure 9.

Figure 9. Portopolio View

Most student groups displayed high levels of creativity, designing logos based on their own concepts and observations made in class. However, some students drew inspiration from online images, modifying them slightly to fit their ideas. This practice reflects a blend of visual engagement and cognitive processes in design (Cheng & Do, 2011). The elaboration aspect is analyzed by examining the development of ideas and concepts underlying the logo designs. An example of a well-elaborated student logo is a cake shop logo with the capital letters "CC" shaped like a bitten donut, symbolizing the cakes sold by the shop. Although abstract, this design meaningfully represents the shop's offerings, illustrating the students' elaboration in progressing their logo concepts. This is illustrated in Figure 10.

Figure 10. Logo Design Based on Elaboration

Over three meetings, students had the opportunity to reflect on their designs. With feedback from the teacher, they showed improvement in each session. Most groups were also able to explain the values and philosophy behind their logos in detail.

CONCLUSSION

The research findings indicate that using e-portfolios can enhance students' creative thinking skills. This improvement is evident in the development of their design work throughout the learning process, as students continuously refine their logo designs. They are open to making changes and enhancements to align their logos with the given problems, and they learn to create logos with unique and original characteristics. Teacher feedback provided through e-portfolios aids students in cultivating better creative thinking skills. However, further development of this research is needed, including the addition of features such as a flexible group feature for different materials, a history feature to track student assignment edits after teacher feedback, a feature allowing students to respond to teacher feedback, and an e-portfolio with a more interactive interface.

DISEMINATION

This article has been disseminated at the National Seminar on Information and Communication Technology (SEMNASTIK) APTIKOM Year 2024 held by Universitas Methodist Indonesia on October 24-26, 2024.

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