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Students' Perception of Infographics: A Visualization Tool on Strengthening Critical Thinking Skills

I Gusti Ayu Triska Sri Urmila Dewi[1*], Ni Nyoman Padmadewi[2], Ni Putu Era Marsakawati[3], Luh Putu Artini[4], Ni Made Ratminingsih[5], I Gusti Ayu Lokita Purnamika Utami[6]

[1,2,3,4,5,6] English Language Education, Ganesha University of Education, Singaraja, Indonesia

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ABSTRAK

Studi sebelumnya menunjukkan efektivitas infografis, penting untuk mengetahui persepsi siswa penggunaan infografis terutama dalam hubungannya dengan berpikir kritis sebagai keterampilan abad 21 yang dibutuhkan siswa. Oleh karena itu, penelitian ini bertujuan untuk menganalisis persepsi mahasiswa terhadap penggunaan infografis sebagai alat visualisasi untuk memperkuat berpikir kritis. Penelitian ini menggunakan metode penelitian deskriptif kuantitatif dengan menggunakan kuesioner dan wawancara semi terstruktur untuk mengumpulkan data, yang meliputi sepuluh pernyataan untuk kuesioner dan lima pertanyaan untuk wawancara. Partisipan dalam penelitian ini adalah 34 siswa kelas XI. Temuan menunjukkan bahwa mayoritas siswa memiliki pendapat yang baik menggunakan Infografis sebagai alat visualisasi dalam proses pembelajaran. Sebagian besar siswa mengatakan belajar dengan infografis memberi mereka lingkungan belajar yang baru. Selain itu, mereka merasa tertarik ketika belajar dengan infografis karena memberikan informasi yang jelas yang mereka butuhkan. Lebih lanjut, siswa menyatakan bahwa dengan menggunakan infografis dapat meningkatkan kemampuan berpikir kritis mereka dibandingkan dengan tidak menggunakan infografis sebagai alat visualisasi selama proses pembelajaran.

ABSTRACT

As previous studies showed the effectiveness of infographic, it is important to find out students' perception the use of infographic especially on its relation to critical thinking as on of the 21st century skills students require. Therefore, this study purposed to analyze students' perception towards the use of infographics as a visualization tool to strengthen critical thinking. The study employed a descriptive quantitative research method by using questionnaire and semi-structured interview to collect the data, which included ten statements for the questionnaire and five questions for the interview. The participants in this study were 34 students of elevent grade students. The findings showed that the majority of students had a favorable opinion of using Infographics as a visualization tool in the learning process. Most students said learning with infographics provided them with a new learning environment. Moreover, they felt interested when they studied with infographics as it gave clear information they needed. Futhermore, the students stated that by using infographics, they can enhance their critical thinking skills compared to when they were not using infographics as a visualization tool during the learning process.

1. INTRODUCTION

The 21st century has seen significant changes in every aspect of life, including education. In education, the impact of the 21st century is the invention of 21st-century skills consisting of critical thinking, creativity, collaboration, and communication. 21st-century skill is a broad term that refers to the knowledge, skills, and traits that are widely recognized as essential to the success of today's learners in business and life (Dyjur & Li, 2015; Ningsih et al., 2019; Nofrion & Wijayanto, 2018). Schools and universities must also prepare students for different social lives, economic worlds, and more demanding and competent workplaces. For instance, 21st-century students should develop the necessary 21st-century skills.

As one of the 21st-century skills, critical thinking is essential in every aspect of life. Critical thinking can improve an individual's understanding of the world and surrounding events and situations. Critical

*Corresponding author.
E-mail addresses: gustiayutriska1997@gmail.com (I Gusti Ayu Triska Sri Urmila Dewi)

thinking is a technique for analyzing and evaluating thoughts to strengthen them (Habibi et al., 2020; Paul & Elder, 2019). Modern education purposes to educate people who can think, criticize, interpret, and ask questions. Critical thinking is a part of 21st-century skills consisting of critical thinking, collaboration, communication, and creativity. Students nowadays are targeted to be able to think critically. Critical thinking entails effective communication, problem-solving skills, and effort to overcome innate egoism and social centricity (Hendarwati et al., 2021; Muhali, 2019; Rahmatullah et al., 2022). Students must think critically, which means testing ideas, evaluating them for what they already know, and making decisions about their value (Dwee et al., 2016; Insyasiska et al., 2015). Through critical thinking, students can actively seek all sides of the argument, create claims, and search for the evidence used to support their claims. Critical thinking helps students become aware of such unconscious and practical contradictions and allows them to deal with problems consciously and rationally (Anisa, 2017; Muhali, 2019). By possessing a good level of critical thinking, students can assess the evidence in what they are facing and identify spurious or illogical reasoning.

Even though this 21st-century era requires students to think critically, not all students can think critically for specific reasons. The barriers that often impede students from critical thinking are lack of training, lack of information, preconceptions, and time constraints (Hidayatullah et al., 2021; Zwolinski et al., 1970). Moreover, teachers are not training students' critical thinking during the learning process. Lack of critical thinking skills causes the students to have difficulty solving the problem and conveying important information. Lack of critical thinking can be caused by the teaching material provided by the teacher. Some textbooks provide crucial thinking discussion, but the instructional material often lacks additional essential thinking resources (Feng, 2014; Zwolinski et al., 1970). Visualization can be used to encounter the lack of critical thinking and simultaneously enhance students' critical thinking. According to previous study students need to perform a visualization process to think critically (Makina, 2010).

Visualization can be occurred by providing a visualization tool. The visualization tool is a learning analytics tool that analyses log data collected by a learning management system and abstracts a series of an interactive graphical reports of teacher and students activities (Kuosa et al., 2016; Ricketts et al., 2018). Visualization tools enhance students' visualization ability to be more advanced. With advanced visual abilities, students need to use knowledge of the content they have acquired over time in the course and advanced critical thinking skills in integration, thinking and judgment to read more than what is visually shown (Fırat & Laramee, 2018; Krejci et al., 2020). Visualization tools are essential in simplifying and communicating meaningful information.

Providing visualization tools during the learning process can help students deeply determine the problem, environment, and situations around them. Visualization tools help transmit information into a visual context, making data more accessible for the human brain to understand and pull insights (Abdinejad et al., 2020; Kuosa et al., 2016). Visualizing the problem can be occurred by providing certain instructional media. The choice of visualization tool may differ following the intended use and infographics might be an option for teachers to provide visual instructional media to strengthen students' critical thinking. As visual instructional media, infographics clarify abstract information that is difficult to convey verbally and encourage students to get clear ideas for specific details (Akhmad et al., 2018; Delil, 2017).

Infographic might be the best choice to be used as a visualization tool because it provides many user benefits. Infographics are a particular form of visualization that combines words and images to convey a particular message, or at least to be a specific massage (Akhmad et al., 2018; Veszelszki, 2014). Infographic visualization is a more effective than voice or written information (Delil, 2017; Scott et al., 2017; Shafipoor et al., 2016). It is one of the most common visualization tool in real life. According to previous study visualization through infographics is one of the most valuable means of communication in various areas (Otten et al., 2015). The reason infographics are an appropriate visualization tool is because they can simplify extensive information into attractive and simple information without losing the meaning of the information. Infographics have the potential for oversimplification when condensing a comprehensive report of advanced scientific information into a single visualization.

In education, infographics are often used as instructional media to help students during the learning process. According to previous study infographics is one of many instructional media that can aid the teaching and learning process, especially in the EFL context (Lastari & Silvana, 2020). As visual instructional media, the infographic guides the students to clarify abstract information that may be difficult to communicate verbally and gather a clear idea of specific information given by the teacher during the learning process. By providing infographics, students are guided during the learning process and promote their critical thinking. Infographics allow students to work collaboratively while developing their creativity, critical thinking, and communication skills (Dyjur & Li, 2015; Pertiwi et al., 2021). Through infographics as the learning media, students will realize that it is critical to have a thorough understanding of the learning

outcomes. The students' critical thinking and visual literacy are also promoted during the learning process, with infographics as the learning media.

Infographics have been one of several researchers' primary focuses while doing the study. Previous study conducted research exploring infographics to facilitate student learning (Shanks et al., 2017). The result showed that infographics assessment facilitates the learning and translation of the data, and it was suited to be used with diverse college-age students in higher education. The same year, other research utilized as a tool during the learning process (Alrwele, 2017). The result revealed a significant achievement in the group that utilized infographics rather than the other group. Another study was conducted that integrated visualization techniques through infographics (Akhmad et al., 2018). The infographics conveyed the complex material into simple and interesting visual data. The result showed that the students were motivated to learn with infographics visualization (Alqudah et al., 2019; Veszelszki, 2014). There is also study that investigated the effectiveness of infographics in education through data visualization (Bystrova, 2020). The researcher compared the development of infographics to visualizing information from other researchers. The result showed that a cognitive approach must be employed to develop infographics to create an effective educational product

Based on the previous study, a study on students' perception of the use of infographics as a visualization tool in strengthening critical thinking is essential to be investigated since today's learning adopts 21st-century skills, and critical thinking is one of the 21st-century skills. Therefore, this study is conducted to analyze high-school students' perception of utilizing infographics to strengthen their critical thinking. The usage of infographics visualization in this study is comparable. In conclusion, the purpose and focus of this research are the distinctions between the earlier studies mentioned above and this investigation.

2. METHOD

The descriptive qualitative research method was employed in this study. The desirable qualities of the sample that is being examined can be briefly described by using a descriptive qualitative study design (Omair, 2015). The researcher decided to employ descriptive research since it focuses on analyzing students' perceptions while also providing an interpretation of the data. In collecting the data, a questionnaire and semi-structured interview were conducted as the instrument of this research. The questionnaire's alternative answers were based on the Likert scale (5: strongly agree, 4: agree, 3: neither agree or disagree, 2: disagree, and 1: strongly disagree). In order to study the participants' stated thoughts and perspective, which cannot be clearly ascertained by inquiry and questionnaire, interviews are beneficial for the research (Mackey & Gass, 2015). The questionnaire was administered to 34 students and semi-structured interviews with 6 students.

3. RESULT AND DISCUSSION

Result

The results of this study divided into two which derived from the questionnaire as well as the interview. Tables are presented to visualize the result of the questionnaire. The first result is showed on Table 1 which is the result of the questionnaire done by the students.

Table 1. Students' Perception of the use of Infographics

Questionnaire Item	Total Score	Percent	Category
Item 1	116	85.3%	Strongly Agree
Item 2	120	88.2%	Strongly Agree
Item 3	126	92.6%	Strongly Agree
Item 4	117	86%	Strongly Agree
Item 5	130	95.6%	Strongly Agree
Item 6	128	94.1%	Strongly Agree

Based on the Table 1, the questionnaire item 1 scored 116 and was classified as strongly agree with the percentage of 85.3%. Questionnaire item 2 scored 120 and was classified as strongly agree with the percentage of 88.2%. Questionnaire item 3 scored 126 and was classified as strongly agree with the percentage of 92.6%. Questionnaire item 4 scored 117 and was classified as strongly agree with the percentage of 86%. Questionnaire item 5 scored 130 and was classified as strongly agree with the percentage of 95.6%. Questionnaire item 6 scored 128 and was classified as strongly agree with the percentage of 94.1%.

Conclusively, the students' opinions of using infographics are favorable. Furthermore, they understood the advantages of using infographics during the learning process. Students' response of strengthening critical thinking using infographics visualization is show in Table 2.

Table 2. Students' Response of Strengthening Critical Thinking using Infographics Visualization

Questionnaire Item	Total Score	Percent	Category
Item 1	130	95.6%	Strongly Agree
Item 2	121	89%	Strongly Agree
Item 3	119	87.5%	Strongly Agree
Item 4	126	92.6%	Strongly Agree

The presented Table 2 shows that the questionnaire item 1 scored 130. It was classified as strongly agree with the percentage of 95.6%. Questionnaire item 2 scored 121 and was classified as strongly agree with the percentage of 89%. Questionnaire item 3 scored 119 and was classified as strongly agree with the percentage of 87.5%. Lastly, questionnaire item 4 scored 126 and was also classified as strongly agree with the percentage of 92.6%.

Conclusively, the integration of infographics visualization made it easier for students to strengthen their critical thinking skills, with the highest percentage of 95.6% and 89% contained in items 1 and 2. Most students strongly agree that they will use infographics visualization later on in the daily learning process with a percentage of 92.6% contained in item 4.

The Interview Data Collection Description

Based on the statements, students 2,3,5, and 6 mentioned that they feel happy and helped while using infographics during the learning process. It can be seen from their statement, "Glad to know and use infographics during the learning process, it's very simple media to be use and make the learning environment become the next level, I am happy to use this media to support my learning" and "how come I did not know about this kind of media, I am glad to use this during my study."

Respondent 1 said that he was a little bit confused at first when using infographics visualization as the learning media to support his learning but immediately saw the difference once he was able to figure it out. His statement said that, "I little bit confused at first, because it is my first time using infographics but since I understand the flow of infographics I feel helped so much."

Respondent 4 said that her interest in learning increased when she learned through infographics. From her statement she said "Since I study with this infographic, I feel interested because Infographics served the point of the material and supported with interactive drawings to help the reader understand through the visualization." The statement of students 1,3, and 4 stated that the visualization when using infographics slightly improves the way they think critically. One statement said "of course, infographics visualization helps me to think critically, because I can imagine the possible way to solve the problem and find the answer," and also "I never been thinking critically like this before I using infographics". Respondent 2 stated that infographics visualization improved her critical thinking skill compared to her previous experience. Her statement mentioned, "Yes, I feel my critical thinking skill is improved than before."

Discussion

Infographics are being used more and more in recent years for visualization of information. This also comes with the researches that put interest and emphasize this topic on various purposes. The aim of this study is to find out about high-school students' perception of the use of infpographics to strengthen their critical thinking. As previous studies about the infographics laid on the discussion of the effect it shows as visualization aid in the teaching and learning process. This study tries to deep further by putting the highlight on students' perception to the use of infographic during their learning process, particularly with the aim to strengthen their critical thinking (Akhmad et al., 2018; Bystrova, 2020; Shanks et al., 2017).

Students mentioned that using infographics during the learning process makes them interested, happy, and helped. Infographics provide critical information in interactive ways. These outcomes were equivalent to the research which studied infographics as a learning tool to be used in the teaching and learning process (Alyahya, 2019). The findings showed that the students were enthusiastic when given a chance to represent information visually. The similar also found students liked the graphic and presentation of the information on the infographics provided for them (Provvidenza et al., 2019). Those allowed them to comprehend and share information they want. In other study showed high attractiveness towards the use of infographic in the course of theirs study as it help them improve their understanding and learning of educational material which they found complex and challenging (Tarkhova et al., 2020). Also, students' critical thinking abilities and comprehension of scientific topics grew due to their participation in the

classroom activity. These findings were also supported by research on improving education's effectiveness using infographics (Bystrova, 2020). The research showed that infographics facilitate students in perceiving and memorizing the information in the learning process.

Furthermore, students' perception of strengthening critical thinking by the visualization of infographics were stated by the students. They mentioned that infographics visualization can make them think critically and visualizing any other options when facing the learning problems. These findings were similar to previous research found that most students in the study found infographic helped them to think in a way to navigate their critical thinking (Leggette, 2020). For a person to be able to think critically, visualization processes must take place. The overall purpose of visualization education is to assist learners in creating mental representations that correctly or accurately replicate mathematical relationships in instructional representations outside of the mind. On the same account, previous study found that within the theoretical frameworks of critical thinking and habits of the mind, the data visualization process facilitates the logical structure of related pieces of high order thinking that relate to one another (Byrd & Asunda, 2020). The result showed a significant contribution by introducing data visualization to develop critical thinking skills and computing education by introducing data visualization to enhance critical thinking abilities. Previous study also showed on their observation result that infographics helped the students to condense long written information in a concise and visually impactful format (Yuruk et al., 2019).

Along with the discussion above, it is suggested to the upcoming research to discuss further about the topic. First, the teachers are suggested to utilize infographics as visualization tool during the learning process, since the result of utilization infographics as visualization tool has been shown in this study to be beneficial. Second, it is advised that future researchers conduct research on the use of infographics as visualization toon in the other language skills in the light of constraints of the current study.

4. CONCLUSION

Resting on the aim on finding out school students' perception of the use of infpographics to strengthen their critical thinking. The study's findings showed that students feel motivated, engaged, and supported when they use infographics to represent the course material. The students think that visualizing through infographics can improve their critical thinking and the construction of meaning and understanding. In addition, infographics visualization also assists students in clarifying abstract material that may be difficult to explain verbally and gaining a clear understanding of specific information provided by the teacher during the learning process.

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