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The Effectiveness of Using the Edcafe Website in Improving Students' Learning Outcomes in Visual Arts At UPT SMP Negeri 2 Kulo

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Abstrak: Integrasi platform pembelajaran digital dalam proses pembelajaran di kelas menjadi semakin penting untuk meningkatkan keterlibatan dan prestasi akademik siswa. Namun, pendekatan pembelajaran konvensional dan terbatasnya penggunaan media pembelajaran interaktif masih menjadi tantangan dalam pembelajaran Seni Rupa, khususnya dalam membantu siswa memahami konsep-konsep seni. Penelitian ini bertujuan untuk mengetahui efektivitas penggunaan website Edcafe dalam meningkatkan hasil belajar siswa pada mata pelajaran Seni Rupa di UPT SMP Negeri 2 Kulo, Kabupaten Sidenreng Rappang, Indonesia. Penelitian ini menggunakan pendekatan kuantitatif dengan desain One Group Pretest–Posttest. Subjek penelitian terdiri atas 42 siswa kelas VIII.1 dan VIII.2 yang dipilih menggunakan teknik sampling jenuh (total sampling). Pengumpulan data dilakukan melalui tes hasil belajar, observasi, angket, dan dokumentasi. Perlakuan dalam penelitian ini dilakukan dengan mengintegrasikan website Edcafe ke dalam pembelajaran Seni Rupa melalui penyajian materi pembelajaran digital, presentasi visual, kuis interaktif, dan evaluasi pembelajaran. Analisis statistik deskriptif digunakan untuk membandingkan hasil belajar siswa sebelum dan sesudah diberikan perlakuan. Hasil penelitian menunjukkan bahwa nilai rata-rata pretest siswa sebesar 49,64 meningkat menjadi 86,19 pada posttest, dengan peningkatan sebesar 36,55 poin. Nilai posttest tertinggi mencapai 95, sedangkan nilai terendah sebesar 80. Hasil tersebut menunjukkan bahwa seluruh peserta didik telah mencapai Kriteria Ketercapaian Tujuan Pembelajaran (KKTP) yang ditetapkan sebesar 80. Selain itu, siswa memberikan tanggapan positif terhadap penggunaan platform Edcafe, khususnya dalam aspek kemudahan akses, peningkatan motivasi belajar, dan pemahaman terhadap materi pembelajaran. Temuan ini menunjukkan bahwa pembelajaran berbantuan website Edcafe berkaitan dengan peningkatan hasil belajar siswa yang cukup besar pada mata pelajaran Seni Rupa. Meskipun demikian, tidak adanya kelompok kontrol dalam desain penelitian membatasi penarikan kesimpulan mengenai hubungan sebab-akibat secara langsung. Penelitian ini menegaskan potensi lingkungan pembelajaran interaktif berbasis website dalam mendukung pembelajaran Seni Rupa serta merekomendasikan penelitian lanjutan dengan desain eksperimen yang melibatkan kelompok kontrol untuk menguji efektivitasnya secara lebih komprehensif.

Kata kunci: website Edcafe; media pembelajaran digital; hasil belajar; pendidikan seni rupa; pembelajaran interaktif; teknologi pendidikan.

Abstract : The integration of digital learning platforms into classroom instruction has become increasingly important for improving students' engagement and academic achievement. However, conventional teaching approaches and limited use of interactive learning media continue to present challenges in visual arts education, particularly in facilitating students' understanding of artistic concepts. This study aimed to examine the effectiveness of the Edcafe website in improving students' learning outcomes in Visual Arts at UPT SMP Negeri 2 Kulo, Sidenreng Rappang Regency, Indonesia. A quantitative approach employing a one-group pretest–posttest design was implemented. The research participants consisted of 42 eighth-grade students from classes VIII.1 and VIII.2, selected through total sampling. Data were collected through achievement tests, observations, questionnaires, and documentation. The intervention involved integrating Edcafe into visual arts instruction through digital learning materials, visual presentations, interactive quizzes, and learning assessments. Descriptive statistical analysis was conducted to compare students' achievement before and after the intervention. The findings revealed that the mean pretest score was 49.64, increasing to 86.19 in the posttest, representing an improvement of 36.55 points. The highest posttest score was 95, while the lowest was 80, indicating that all participants achieved the minimum learning achievement criterion of 80. Students also reported positive perceptions of the platform, particularly regarding accessibility, motivation, and understanding of learning materials. These findings suggest that Edcafe-supported instruction was associated with substantial improvements in students' visual arts achievement. Nevertheless, the absence of a control group limits causal interpretation. The study highlights the potential of interactive web-based learning environments to support visual arts education and recommends further controlled investigations to establish their comparative effectiveness.

Keywords: Edcafe website; digital learning media; learning outcomes; visual arts education; interactive learning; educational technology.

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INTRODUCTION

Education plays a fundamental role in developing students' intellectual abilities, creativity, practical skills, and personal characteristics. In contemporary educational environments, the integration of digital technology has become increasingly important in supporting effective teaching and learning processes. Educational institutions are expected to provide learning experiences that encourage active participation, critical thinking, creativity, and independent learning. Consequently, teachers must continuously explore innovative instructional approaches that respond to students' needs and the rapid development of digital technologies. The integration of web-based learning platforms represents one approach to transforming conventional classroom instruction into more interactive, accessible, and student-centered learning experiences.

The rapid advancement of information and communication technology has significantly influenced educational practices worldwide. Digital technologies provide opportunities for teachers to present learning materials through various formats, including text, images, audio, videos, animations, and interactive assessments. These resources can support different instructional activities and help students understand concepts that may be difficult to explain through traditional teaching methods. According to Mayer (2021), multimedia learning environments can facilitate meaningful learning when verbal and visual information are organized according to established cognitive principles. Therefore, integrating digital media into classroom instruction may improve students' understanding by providing multiple representations of learning content.

The implementation of technology-enhanced learning has also encouraged a shift from teacher-centered instruction toward more participatory educational practices. Traditional classroom instruction often emphasizes verbal explanations, textbook-based activities, and teacher demonstrations. Although these approaches remain useful in certain contexts, excessive reliance on conventional methods may restrict opportunities for students to interact with learning materials independently. Technology-supported instruction can provide additional opportunities for exploration, immediate feedback, and personalized learning activities. UNESCO (2023) emphasizes that educational technology should be implemented based on pedagogical objectives rather than technological availability alone. Thus, digital learning platforms should be selected and integrated according to their relevance to curriculum requirements, instructional objectives, and students' learning characteristics.

Visual arts education represents an important component of students' holistic development because it encourages creativity, aesthetic appreciation, imagination, visual communication, and artistic expression. Through visual arts instruction, students learn to recognize artistic elements, understand design principles, interpret visual representations, and develop creative products. These learning experiences contribute to cognitive development while supporting students' ability to communicate ideas through visual forms. Eisner (2002) argues that arts education provides distinctive opportunities for developing perception, imagination, and qualitative judgment. Therefore, effective visual arts instruction should encourage students to observe, interpret, experiment, and produce artistic expressions rather than merely memorize theoretical information.

Despite its importance, visual arts instruction frequently encounters challenges related to instructional resources, student motivation, and the availability of visual learning materials. Some teachers continue to rely primarily on verbal explanations and printed textbooks when introducing artistic concepts. Such approaches may limit students' opportunities to observe artistic techniques, explore visual examples, and understand the processes involved in creating artworks. Furthermore, students may experience difficulties interpreting abstract artistic concepts without appropriate visual representations. These challenges indicate the importance of developing instructional strategies that incorporate multimedia resources and interactive learning experiences.

The use of digital learning media offers potential solutions to these challenges. Digital platforms enable teachers to display examples of artworks, demonstrate artistic techniques, provide instructional videos, and organize interactive learning activities. Students can examine visual materials repeatedly and access additional explanations when necessary. These opportunities may improve conceptual understanding and encourage active engagement with learning materials. Clark and Mayer (2016) explain that well-designed digital instruction can support learning through appropriate combinations of visual information, instructional guidance, and meaningful activities. Consequently, digital learning environments may be particularly relevant to subjects requiring strong visual representation, including visual arts.

One emerging platform that can support technology-enhanced instruction is Edcafe, a web-based educational environment that provides tools for developing learning materials, interactive assessments, and classroom activities. Teachers can use the platform to organize instructional content, create quizzes, distribute learning resources, and monitor students' responses. In the context of visual arts instruction, these features may support the presentation of visual examples, explanations of artistic concepts, and formative assessment activities. The platform also provides opportunities for students to engage with digital learning materials using internet-connected devices.

The educational value of Edcafe can be understood through the relationship between interactive learning environments and students' cognitive engagement. Interactive quizzes, visual materials, and immediate feedback may encourage students to participate more actively in learning activities. Feedback is particularly important because it helps students recognize misunderstandings and identify areas requiring improvement. Hattie and Timperley (2007) explain that effective feedback can contribute to learning when it clarifies learning goals, current performance, and subsequent improvement strategies. Therefore, integrating formative assessment features into visual arts instruction may help students monitor their understanding of artistic concepts.

In addition, digital learning platforms may support students' motivation and learning autonomy. Self-determination theory suggests that learning motivation is influenced by students' experiences of competence, autonomy, and relatedness (Ryan & Deci, 2020). When students can access learning materials independently, complete interactive tasks, and receive feedback on their performance, they may develop greater confidence in their learning abilities. Nevertheless, these benefits depend on the quality of instructional design, teacher guidance, technological accessibility, and students' readiness to use digital learning tools.

At UPT SMP Negeri 2 Kulo, Sidenreng Rappang Regency, South Sulawesi, Indonesia, visual arts instruction has faced challenges associated with

limited interactive learning media and students' achievement levels. Preliminary conditions described in the underlying research indicated that conventional instructional practices did not always provide sufficient visual examples and interactive learning opportunities. As a result, some students experienced difficulties understanding visual arts materials and achieving the expected learning objectives. These conditions created a need to explore alternative instructional media capable of supporting more engaging and effective classroom activities.

The Edcafe website was selected because its learning features could be integrated into visual arts instruction through multimedia presentations, learning materials, interactive quizzes, and assessment activities. These features were expected to provide students with more accessible learning resources and opportunities to review instructional content. Furthermore, the platform could assist teachers in organizing learning activities and monitoring students' understanding. However, the availability of digital learning features does not automatically establish their effectiveness. Empirical investigation is necessary to determine whether students demonstrate measurable improvement after participating in Edcafe-supported instruction.

Previous research has demonstrated that technology-supported learning environments can positively influence students' academic performance when appropriately designed and implemented. Tamim et al. (2011), for example, identified generally positive effects of technology integration on learning achievement across educational contexts. Similarly, Sung et al. (2016) found that integrating mobile devices into teaching and learning was associated with improved academic performance. Nevertheless, these findings cannot be directly generalized to every digital platform, subject, or school environment. Differences in instructional design, teacher competence, student characteristics, and technological infrastructure may influence learning outcomes.

Research specifically examining Edcafe-supported visual arts instruction in Indonesian junior secondary schools remains limited in the literature considered for this manuscript. Accordingly, investigating its implementation at UPT SMP Negeri 2 Kulo provides context-specific evidence regarding students' learning achievement following the integration of a web-based educational platform. The study also contributes to discussions concerning the use of interactive digital learning environments in subjects emphasizing visual understanding and creativity.

Based on these considerations, the present study aimed to examine the effectiveness of using the Edcafe website in improving students' learning outcomes in Visual Arts at UPT SMP Negeri 2 Kulo. Specifically, it investigated differences between students' achievement scores before and after Edcafe-supported instruction and described students' responses to the learning experience. The findings are expected to provide practical information for teachers, schools, and educational researchers interested in integrating digital learning media into visual arts education.

LITERATURE REVIEW

2.1. Digital Learning Media in Education

Digital learning media refer to technological resources used to facilitate the delivery, presentation, interaction, and assessment of educational content. These resources include educational websites, multimedia applications, learning management systems, digital simulations,

and interactive assessment platforms. Their integration into classroom instruction has transformed traditional approaches to teaching by expanding the availability of learning materials and creating opportunities for interactive learning experiences.

According to Mayer (2021), multimedia learning is based on the assumption that individuals process information through separate verbal and visual channels, each possessing limited processing capacity. Meaningful learning occurs when students actively select, organize, and integrate information from these channels. Consequently, multimedia instructional materials should be designed to minimize unnecessary cognitive demands while supporting relevant learning processes.

Clark and Mayer (2016) emphasize that effective digital instruction requires more than attractive technological features. Instructional effectiveness depends on the alignment between multimedia elements, learning objectives, student characteristics, and instructional activities. Therefore, digital media should be considered pedagogical tools rather than substitutes for teachers.

Research also demonstrates the potential contribution of technology to academic achievement. Tamim et al. (2011) found positive effects of educational technology on learning performance across various educational settings. However, technological effectiveness depends on instructional design, implementation quality, and the learning environment.

2.2. The Edcafe Website as an Interactive Learning Platform

Edcafe is a web-based educational platform designed to assist teachers in developing and delivering digital instructional resources. The platform provides tools that can support the creation of learning materials, quizzes, assignments, and assessment activities. Its educational functions can be integrated into classroom instruction to encourage interaction between students and learning content.

In the present study, Edcafe was utilized to support visual arts instruction through multimedia learning materials, visual presentations, interactive quizzes, and learning assessments. Teachers could organize instructional resources, distribute activities, and examine students' responses through the platform.

The potential effectiveness of Edcafe can be explained through multimedia learning principles and interactive instructional approaches. Visual presentations can help students understand artistic concepts, while interactive assessments provide opportunities to evaluate their comprehension. Immediate feedback may also support students in recognizing errors and improving their understanding.

Nevertheless, Edcafe's effectiveness should not be assumed solely from its technological capabilities. Its educational contribution depends on how teachers design learning activities, facilitate student participation, and connect digital resources with the intended learning outcomes.

2.3. Students' Learning Outcomes

Learning outcomes represent the knowledge, skills, attitudes, and competencies students acquire through educational experiences. In formal education, learning outcomes are commonly evaluated through assessments designed to determine the extent to which students have achieved specific instructional objectives.

Bloom et al. (1956) classified educational objectives into cognitive, affective, and

psychomotor domains. The cognitive domain emphasizes intellectual development, including remembering, understanding, applying, analyzing, synthesizing, and evaluating information. Anderson and Krathwohl (2001) subsequently revised the cognitive taxonomy to include remembering, understanding, applying, analyzing, evaluating, and creating.

In visual arts education, learning outcomes may involve understanding artistic elements, identifying design principles, interpreting visual information, and applying artistic techniques. These competencies require both conceptual knowledge and practical abilities.

In this study, students' learning outcomes were operationally measured through achievement tests administered before and after Edcafe-supported instruction. The comparison of pretest and posttest scores provided quantitative evidence of changes in students' academic performance.

2.4. Visual Arts Education and Multimedia Learning

Visual arts education encourages students to develop creativity, aesthetic sensitivity, visual literacy, and artistic expression. Students learn to interpret visual representations, recognize artistic techniques, and communicate ideas through creative activities.

Eisner (2002) emphasizes that arts education contributes to the development of perception, imagination, and expressive abilities. These characteristics distinguish visual arts education from instructional approaches focusing primarily on memorization and factual recall.

Multimedia learning resources are particularly relevant to visual arts because artistic concepts often require demonstrations and visual examples. Images, instructional videos, and interactive presentations can illustrate artistic processes more clearly than verbal explanations alone.

However, digital resources should complement rather than replace practical artistic activities. Effective visual arts instruction should combine conceptual understanding with opportunities for experimentation, creative production, and reflection.

2.5. Interactive Learning, Motivation, and Engagement

Student engagement is an important component of successful learning. Fredricks et al. (2004) describe engagement through behavioral, emotional, and cognitive dimensions. Behavioral engagement involves participation in learning activities, emotional engagement concerns students' interest and attitudes, and cognitive engagement refers to their willingness to invest effort in understanding instructional materials.

Interactive digital platforms may support these dimensions by providing accessible resources, engaging activities, and immediate feedback. Students can participate in quizzes, review instructional materials, and monitor their learning progress.

Ryan and Deci (2020) explain that motivation is strengthened when educational environments support autonomy, competence, and relatedness. Digital learning activities that allow students to review content independently and recognize their progress may contribute to these motivational conditions.

Nevertheless, digital engagement does not necessarily guarantee improved achievement. Students must engage in meaningful learning activities aligned with instructional objectives.

2.6. Theoretical Framework and Research Hypothesis

The theoretical foundation of this study combines multimedia learning theory, constructivist learning perspectives, and student engagement theory.

Multimedia learning theory explains how visual and verbal instructional resources can support students' cognitive processing. Constructivist perspectives emphasize the importance of active participation in knowledge development, while engagement theory highlights students' behavioral, emotional, and cognitive involvement.

Based on these perspectives, Edcafe-supported instruction was expected to provide more interactive learning opportunities and facilitate students' understanding of visual arts materials.

The research hypothesis proposed that students' learning outcomes would improve after participating in visual arts instruction supported by the Edcafe website.

RESEARCH METHOD

3.1. Research Approach and Design

This study employed a quantitative research approach using a one-group pretest–posttest design. The design was selected to examine changes in students' learning outcomes before and after the implementation of Edcafe-supported instruction.

A quantitative approach was considered appropriate because the principal research objective involved measuring students' academic achievement through numerical test scores. The study compared students' performance before the intervention with their performance after participating in learning activities supported by the Edcafe website.

The research design consisted of three stages: pretest administration, instructional intervention, and posttest administration.

O_1

Pretest

Before intervention

X

Treatment

Edcafe-supported learning

O_2

Posttest

After intervention

Figure 1. One-group pretest–posttest research design

In this design, O_1 represents the initial measurement of students' learning outcomes, X represents the instructional intervention using Edcafe, and O_2 represents the final measurement.

The design allowed the researcher to identify changes in achievement within the participating group. However, because no control group was included, the design could not fully eliminate alternative explanations such as testing effects, maturation, or other instructional influences. Therefore, the findings were interpreted as evidence of improvement associated with Edcafe-supported instruction rather than definitive proof of causality.

3.2. Research Setting and Participants

The research was conducted at UPT SMP Negeri 2 Kulo, located in Kulo District, Sidenreng Rappang Regency, South Sulawesi, Indonesia.

The research population consisted of all eighth-grade students in classes VIII.1 and VIII.2, totaling 42 students. Each class consisted of 21 students.

Table 1. Distribution of Research Participants

Class	Male	Female	Total
VIII.1	11	10	21
VIII.2	11	10	21
Total	22	20	42

The study employed total sampling, meaning that all members of the identified population were included as research participants. This technique was appropriate because the population was relatively small and accessible.

By involving all 42 students, the research provided a complete description of learning outcomes within the two participating classes. However, the findings should not automatically be generalized to students from other schools or grade levels because instructional conditions and student characteristics may differ.

3.3. Research Variables

The study involved two principal variables.

The independent variable was the use of the Edcafe website as a digital instructional medium. This variable referred to the integration of Edcafe into visual arts learning activities, including the presentation of instructional materials, interactive quizzes, and assessment activities.

The dependent variable was students' learning outcomes in Visual Arts. This variable was operationally measured through students' achievement scores obtained from the pretest and posttest.

The research focused on determining whether the mean achievement score increased following the implementation of Edcafe-supported instruction.

3.4. Research Instruments

Data were collected using achievement tests, observations, questionnaires, and documentation.

Achievement tests. The achievement tests were used to measure students' understanding of visual arts learning materials. A pretest was administered before the intervention to identify students' initial achievement levels. Following Edcafe-supported instruction, a posttest was administered to measure their subsequent achievement. The scores were used as the primary quantitative data for determining changes in learning outcomes.

Observation. Classroom observation was conducted to describe students' participation during the instructional process. Observational attention was directed toward students' involvement in learning activities, their attention to instructional materials, their participation in interactive tasks, and their engagement with the Edcafe website.

Questionnaires. Student questionnaires were used to obtain information regarding their perceptions of Edcafe-supported learning. The questions addressed students' understanding of instructional materials, enjoyment of learning activities, motivation, perceived ease of use, and suitability of the platform for visual arts instruction.

Documentation. Documentation was used to support the research process by recording instructional activities, students' learning experiences, assessment results, and other relevant information.

The thesis identifies these instruments but does not provide sufficient information in the sections reviewed to establish comprehensive psychometric evidence for their validity and reliability. Consequently, no unverified reliability coefficients or instrument-validation results are reported in this article.

3.5. Research Procedures

The research procedures consisted of three main stages.

During the first stage, students completed a pretest designed to measure their initial understanding of visual arts materials. The scores obtained from this assessment served as baseline data.

During the second stage, the teacher implemented visual arts instruction using the Edcafe website. Learning activities incorporated digital instructional materials, visual examples, and interactive assessments. Students accessed

learning content and completed assigned activities through the platform.

The use of Edcafe was intended to provide students with opportunities to explore instructional materials, review artistic concepts, and participate in interactive learning activities. Teachers also used the platform to organize learning resources and examine students' responses.

During the third stage, students completed a posttest following the instructional intervention. The posttest results were compared with the pretest results to determine changes in academic achievement.

Observations, questionnaires, and documentation were used to provide supporting information about students' learning experiences.

The exact number and duration of instructional sessions were not established in the source sections reviewed and therefore are not specified here.

3.6. Data Analysis

The resulting means were compared to determine the magnitude of improvement following Edcafe-supported instruction.

The study also considered the Learning Objective Achievement Criteria (Kriteria Ketercapaian Tujuan Pembelajaran, KKTP), which was set at 80. Students obtaining scores of 80 or higher were considered to have met this criterion.

Questionnaire responses were summarized descriptively using frequencies and percentages.

Although the original thesis describes the increase as significant, the analysis presented does not establish statistical significance through an inferential hypothesis test. Therefore, this article reports the observed improvement without assigning an unsupported p-value.

3.7. Methodological Considerations

Several methodological considerations are relevant to the interpretation of the findings. First, the one-group design enabled within-group comparisons but did not include a conventional-instruction comparison group. Second, the research was limited to 42 students from one junior secondary school. Third, the primary achievement analysis relied on descriptive mean comparisons.

These considerations do not invalidate the observed improvement, but they limit conclusions regarding the independent causal contribution of Edcafe. Future research could strengthen the evidence through controlled designs, standardized assessment procedures, and additional inferential analyses.

RESULTS

The findings revealed an improvement in students' visual arts learning outcomes following Edcafe-supported instruction. The mean pretest score was 49.64, while the mean posttest score increased to 86.19, representing a gain of 36.55 points. Before the intervention, scores ranged from 20 to 75, whereas posttest scores ranged from 80 to 95. All 42 students achieved the minimum learning criterion of 80 in the posttest. Questionnaire responses were also positive: 100% reported understanding the materials, 90% enjoyed Edcafe-supported learning, 92% reported increased motivation, and 97% considered the website easy to use.

Table 2. Comparison of Students' Learning Outcomes

Indicator	Pretest	Posttest
Number of students	42	42
Mean score	49.64	86.19
Total score	2,085	3,620
Minimum score	20	80

Maximum score	75	95
KKTP	80	80

Mean Visual Arts Achievement Scores

Scores out of 100, before and after Edcafe-supported instruction

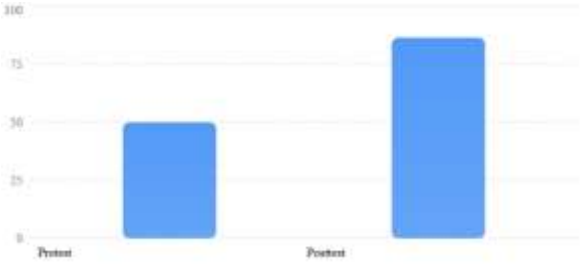


Figure 2. Comparison of mean pretest and posttest scores (N = 42).

DISCUSSION

5.1. Improvement in Students' Learning Outcomes

The findings of this study demonstrated a substantial improvement in students' visual arts learning outcomes following the implementation of Edcafe-supported instruction at UPT SMP Negeri 2 Kulo. The mean achievement score increased from 49.64 in the pretest to 86.19 in the posttest, representing a difference of 36.55 points. This improvement suggests that students demonstrated greater understanding of the assessed visual arts materials after participating in learning activities supported by the Edcafe website.

The initial mean score of 49.64 indicated that students had relatively limited knowledge of the assessed materials before the intervention. This condition was consistent with the instructional challenges identified in the research setting, particularly the limited availability of interactive learning resources and visual instructional materials. Visual arts education requires students to understand concepts that are often communicated through images, artistic examples, demonstrations, and practical activities. When instruction relies primarily on verbal explanations, students may experience difficulties connecting theoretical information with visual representations.

Following the integration of Edcafe, the students' average achievement increased to 86.19. This result exceeded the established Learning Objective Achievement Criteria (KKTP) of 80. Furthermore, the posttest scores ranged from 80 to 95, indicating that all 42 participants achieved the required learning criterion. The observed improvement provides encouraging evidence regarding the potential contribution of Edcafe-supported instruction to students' understanding of visual arts materials.

These findings are consistent with the broader literature on educational technology. Tamim et al. (2011) reported positive effects of technology integration on students' academic achievement across different educational contexts. Similarly, Sung et al. (2016) demonstrated that appropriately implemented digital technologies can support improvements in students' learning performance. The present findings extend this discussion to the specific context of web-based visual arts instruction in an Indonesian junior secondary school.

Nevertheless, the improvement should be interpreted within the limitations of the research design. Because the study did not include a control group, the observed increase cannot be attributed exclusively to Edcafe. Other factors, including repeated exposure to the materials, teacher explanations, classroom activities, and students' growing familiarity with the assessment content, may have contributed to the results.

5.2. The Role of Multimedia Learning in Visual Arts Instruction

One possible explanation for the improvement in learning outcomes concerns the integration of multimedia resources into the instructional process. Visual arts education emphasizes visual observation, conceptual understanding, and artistic interpretation. Consequently, learning materials that combine images, explanations, and interactive activities may help students understand artistic concepts more effectively.

Mayer's (2021) cognitive theory of multimedia learning provides a relevant theoretical explanation. The theory suggests that meaningful learning can occur when students appropriately process and integrate verbal and visual information. In visual arts instruction, visual examples may support students in recognizing artistic elements, interpreting compositions, and understanding relationships between artistic concepts.

Edcafe-supported instruction provided opportunities for learning materials to be presented through digital resources. These materials could support the explanation of artistic concepts and enable students to review instructional information. Such opportunities are particularly relevant when students require additional clarification or repeated exposure to learning materials.

Clark and Mayer (2016) emphasize that multimedia instruction should be designed to support learning rather than simply increase the number of visual elements presented. Therefore, the effectiveness of Edcafe-supported learning may depend on the relevance, organization, and clarity of the materials developed by teachers.

The present study did not independently measure cognitive processing or compare different multimedia design principles. Nevertheless, the improvement in achievement suggests that the instructional approach was compatible with students' learning needs in the observed setting.

5.3. Student Engagement and Motivation

Another important finding concerns students' positive perceptions of Edcafe-supported instruction. The questionnaire results indicated that 100% of participants reported understanding the visual arts materials through the platform, while approximately 90% expressed enjoyment of the learning experience. Furthermore, approximately 92% reported increased motivation, and approximately 97% considered the website easy to use.

These findings suggest that students generally responded positively to the integration of Edcafe into their visual arts lessons. Positive responses are important because students' willingness to participate in instructional activities can influence the quality of their learning experiences.

Fredricks et al. (2004) explain that student engagement includes behavioral, emotional, and cognitive dimensions. Behavioral engagement involves active participation, emotional engagement includes interest and enjoyment, and cognitive engagement concerns students' willingness to invest effort in understanding instructional materials.

In the present study, students' positive questionnaire responses may reflect favorable emotional and motivational experiences during Edcafe-supported learning. Interactive quizzes and digital learning resources provided opportunities for students to participate in activities beyond conventional teacher explanations.

These observations can also be interpreted through self-determination theory. Ryan and Deci (2020) explain that students' motivation can be strengthened when learning environments support competence and autonomy. The

opportunity to complete interactive tasks, review learning materials, and receive feedback may help students develop greater confidence in their learning abilities.

However, questionnaire responses represent students' self-reported perceptions rather than independent evidence of changes in motivation. Consequently, the findings support the conclusion that students perceived the learning experience positively, but they do not establish a causal relationship between Edcafe and increased motivation.

5.4. Interactive Assessment and Learning Feedback

The interactive assessment features of Edcafe represent another potentially valuable component of the instructional process. Traditional classroom assessments often provide feedback after students have completed learning activities. Digital assessment systems, by contrast, can provide more immediate information about student performance.

In the present study, Edcafe was used to support learning activities that included quizzes and assessment tasks. These activities allowed students to engage with instructional content and examine their understanding of the materials.

Hattie and Timperley (2007) emphasize that feedback can contribute significantly to learning when it helps students understand their current performance and identify appropriate strategies for improvement. Similarly, Nicol and Macfarlane-Dick (2006) argue that formative assessment can support self-regulated learning by encouraging students to monitor their progress.

Within visual arts education, interactive assessments may help students recognize artistic elements, identify design principles, and review conceptual misunderstandings. Such assessments can complement practical artistic activities by strengthening the knowledge required for creative production.

The integration of assessment and instruction may also assist teachers in identifying students who require additional support. Teachers can use students' responses to determine whether particular concepts need to be explained again or presented through alternative examples.

Although these instructional mechanisms provide plausible explanations for the observed improvement, the study did not isolate the effects of feedback from other components of Edcafe-supported instruction. Future investigations could examine whether immediate feedback independently contributes to improved visual arts achievement.

5.5. The Contribution of Edcafe to Student-Centered Learning

The findings also have implications for the implementation of student-centered learning. Conventional instruction frequently places teachers at the center of information delivery, whereas digital learning platforms can provide additional opportunities for students to interact with educational resources.

Edcafe-supported instruction may encourage students to become more actively involved in learning by accessing materials, completing quizzes, and reviewing their performance. These activities can support a learning environment in which students participate more directly in the development of their understanding.

Constructivist perspectives emphasize that learning involves active engagement with information and experiences. Vygotsky (1978) also highlights the importance of social interaction and instructional support in cognitive development. From this perspective, digital learning platforms may provide useful resources when their activities are integrated with appropriate teacher guidance.

Nevertheless, student-centered learning does not mean that teachers become unnecessary. Teachers remain responsible for selecting suitable materials, explaining difficult concepts, facilitating discussion, and ensuring that learning activities align with curriculum objectives.

In visual arts education, teacher guidance is particularly important because students must develop not only theoretical knowledge but also creativity, aesthetic judgment, and practical artistic skills.

Therefore, Edcafe should be understood as a supplementary instructional resource that can support, rather than replace, meaningful teacher–student interaction and practical artistic activities.

5.6. Implications for Visual Arts Education

The results of this study provide several practical implications for visual arts teachers and educational institutions.

First, teachers may consider integrating Edcafe into instructional planning to provide more varied learning experiences. Digital resources can be used to introduce artistic concepts, present visual examples, organize learning activities, and conduct formative assessments.

Second, the platform may be particularly useful for reviewing theoretical concepts before students undertake practical artistic activities. For example, teachers can introduce visual elements and design principles through digital materials before asking students to apply those concepts in their own artwork.

Third, the positive student responses suggest that interactive digital learning activities may be acceptable and engaging for junior secondary school students. However, teachers should ensure that technological activities remain purposeful and connected to intended learning outcomes.

Fourth, schools should provide adequate technological infrastructure, including internet connectivity, suitable devices, and professional development opportunities for teachers. UNESCO (2023) emphasizes that educational technology requires appropriate institutional support and equitable access to achieve its intended benefits.

Finally, visual arts assessment should extend beyond knowledge-based tests. Future instructional evaluations should incorporate practical performance, artistic creativity, visual communication, and the quality of students' completed artworks.

5.7. Research Limitations and Future Directions

Despite the encouraging findings, several limitations should be acknowledged. The research involved only 42 students from one school, limiting the generalizability of the results. Furthermore, the one-group pretest–posttest design did not include a comparison group receiving conventional instruction.

The analysis primarily involved descriptive comparisons of achievement scores. No verified inferential statistical results were available to determine whether the observed difference was statistically significant. Additionally, the study did not establish whether the improvement would be maintained over time.

Future research should employ quasi-experimental or randomized controlled designs to compare Edcafe-supported instruction with alternative teaching approaches. Larger samples from different schools would also provide stronger evidence regarding the platform's effectiveness across educational contexts.

Further investigations could examine students' creativity, artistic performance, digital literacy, motivation, and long-term knowledge retention. Such studies would provide a more comprehensive understanding of how web-based learning platforms contribute to visual arts education.

Overall, the present findings indicate that Edcafe-supported instruction was associated with meaningful improvements in students' achievement and positive learning experiences. The results provide a promising foundation for further research and pedagogical development.

CONCLUSION

This study examined the effectiveness of using the Edcafe website in improving students' learning outcomes in Visual Arts at UPT SMP Negeri 2 Kulo, Sidenreng Rappang Regency, Indonesia. The findings revealed that the mean pretest score of 49.64 increased to 86.19 following Edcafe-supported instruction, representing an improvement of 36.55 points. All 42 participating students achieved the minimum learning achievement criterion of 80 in the posttest. Furthermore, questionnaire responses indicated positive perceptions of the platform in terms of understanding, motivation, enjoyment, and ease of use. These findings demonstrate that students experienced substantial improvements in academic achievement during the implementation of Edcafe-supported visual arts instruction.

The study suggests that Edcafe has potential as an interactive digital learning medium for supporting visual arts education, particularly through multimedia resources, interactive assessments, and accessible learning materials. Teachers are encouraged to integrate digital learning platforms thoughtfully while maintaining opportunities for practical artistic activities and meaningful classroom interaction. Nevertheless, the absence of a control group and the reliance on descriptive statistical analysis limit causal conclusions regarding the platform's independent effectiveness. Future research should employ more rigorous experimental designs, involve larger and more diverse samples, and investigate additional learning outcomes, including creativity, artistic skills, student engagement, and long-term knowledge retention.

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