



TRAINING ON THE IMPLEMENTATION OF INFOGRAPHIC MEDIA TO IMPROVE STUDENTS' LEARNING OUTCOMES AT SMK NEGERI 9 SEMARANG

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ABSTRAK

Hasil belajar siswa pada mata pelajaran Bisnis Digital masih belum optimal karena penggunaan media pembelajaran yang kurang bervariasi menyebabkan siswa kurang aktif dan kesulitan memahami materi. Kegiatan pengabdian kepada masyarakat ini bertujuan meningkatkan hasil belajar siswa melalui implementasi media infografis pada materi Search Engine Optimization (SEO) di kelas XI PM 2 SMK Negeri 9 Semarang. Metode kegiatan meliputi sosialisasi, pelatihan, penerapan teknologi, pendampingan, dan evaluasi terhadap 36 siswa mata pelajaran Bisnis Digital sebagai mitra. Hasil kegiatan menunjukkan peningkatan pemahaman siswa dalam memanfaatkan media infografis, meningkatnya keterlibatan siswa selama pembelajaran, serta peningkatan rata-rata nilai dari 62 pada pretest menjadi 82,78 pada posttest. Nilai N-Gain sebesar 0,5560 termasuk kategori sedang. Dengan demikian, implementasi media infografis efektif meningkatkan hasil belajar siswa dan mendukung pembelajaran Bisnis Digital yang lebih inovatif di SMK.

ABSTRACT

Students' learning outcomes in Digital Business subjects remain suboptimal due to the limited use of innovative learning media, resulting in low engagement and difficulties in understanding complex materials. This community service program aimed to improve students' learning outcomes through the implementation of infographic media on the Search Engine Optimization (SEO) topic for Grade XI Marketing students at SMK Negeri 9 Semarang. The activities included socialization, training, technology implementation, mentoring, and evaluation involving 36 students. The results showed increased student understanding of infographic use, improved student participation during learning activities, and higher learning outcomes, as indicated by the increase in mean scores from 62 in the pretest to 82.78 in the posttest. The N-Gain score of 0.5560 was categorized as moderate. Therefore, infographic media effectively enhanced students' learning outcomes and supported more innovative Digital Business instruction in vocational schools.

INTRODUCTION

Education is one of the key factors in improving the quality of human resources capable of responding to the rapid advancement of science and technology. The educational process is implemented through well-planned learning activities designed to help students acquire experiences, knowledge, skills, and attitudes that contribute to their personal development (Yandi et al., 2023). Effective learning is not merely oriented toward delivering instructional content but also toward enabling students to understand and apply the material effectively. In practice, teachers need to utilize instructional media that align with students' characteristics to ensure that learning objectives are achieved optimally (Mulyani et al., 2022). The appropriate use of instructional media can facilitate students' conceptual understanding and increase their engagement throughout the learning process. Therefore, innovation in teaching and learning has become essential for improving students' learning outcomes.

Effective learning can be achieved through the implementation of innovative instructional strategies and learning media that create an enjoyable learning environment (Novela et al., 2024). An engaging learning atmosphere helps students maintain their attention during classroom activities and reduces boredom throughout the learning process. Teachers play a crucial role in creating a conducive learning environment by selecting instructional methods and media that are appropriate for students' needs (Hasriadi, 2022). Enjoyable learning experiences can enhance students' learning motivation, encouraging them to become more active in receiving and processing information. When students possess high learning motivation, they are more likely to understand the learning materials presented by the teacher. Consequently, the quality of the learning process has a direct impact on improving students' learning outcomes.

Learning outcomes serve as indicators for measuring students' achievement after participating in the learning process. According to Alwi Ismail et al. (2025), learning outcomes can be reflected through scores, symbols, or other forms of assessment that represent students' competency attainment. The level of learning outcomes is influenced by various factors, both internal and external to the learning environment. One significant factor is the use of instructional media that facilitate students' understanding of learning materials more effectively (Wardani et al., 2022). Teachers should provide opportunities for students to actively participate in learning activities to enhance their comprehension of the subject matter. Therefore, utilizing engaging instructional media is considered one of the effective approaches to improving students' learning outcomes.

One instructional medium that has the potential to improve the quality of learning is infographic media. According to Wulandari (2019), infographics are visual media that present information through a combination of text, images, symbols, graphs, and colors, making information easier for students to understand. The visual presentation of information enables students to comprehend complex materials more simply and attractively. Infographic media also enhance students' attention because information is presented concisely and systematically (Syarifuddin & Utari, 2022). Furthermore, the use of infographics helps students retain information longer than conventional text-based presentations. Therefore, infographic media have considerable potential to improve students' learning outcomes.

The role of infographic media in education has become increasingly important alongside the advancement of educational technology, which demands more engaging and interactive learning experiences. This medium enables teachers to deliver instructional materials more effectively because students receive information through visually appealing and easily understandable presentations. The use of infographics can also increase students' interest in learning, as the materials appear more

attractive than conventional lecture-based instruction. Mansur and Rafiudin (2020) stated that infographics are effective visual representations for simplifying complex information. Through clear visualization, students can more easily and systematically understand the relationships among concepts. Therefore, infographic media can serve as an alternative instructional medium to support the improvement of students' learning outcomes.

Based on preliminary observations and interviews conducted with Mr. Drs. Umar Said, the Digital Business teacher at SMK Negeri 9 Semarang, on September 29, 2025, it was found that the learning process had not yet been implemented optimally. He explained that students showed limited enthusiasm during classroom activities and tended to remain passive while the teacher delivered the instructional material. Moreover, the instructional media used in the classroom were still dominated by PowerPoint presentations, LCD projectors, student worksheets (LKS), and whiteboards. According to Mr. Drs. Umar Said, these instructional media had not been able to attract the attention of all students effectively. As a result, students experienced difficulties in understanding the learning materials, leading to learning outcomes that had not yet reached the Minimum Learning Achievement Criteria (KKTP) established by the school.

These findings were reinforced by observations of student learning activities in Grade XI at SMK Negeri 9 Semarang, which indicated that students' classroom participation remained relatively low. The observation data revealed that students in Class XI PM 1 achieved an average learning activity score of 44.90%, categorized as less active. This low level of participation indicates that students' engagement in the learning process still requires improvement. According to Mr. Drs. Umar Said during the interview conducted on September 29, 2025, differences in students' characteristics across classes constitute one of the factors influencing their learning participation. These findings highlight the need for instructional innovations capable of increasing students' active involvement throughout the learning process.

In addition to low classroom participation, students' learning outcomes also remained below the expected level. Overall, approximately 50% of the students had not achieved the required level of mastery. This condition indicates that students' understanding of Digital Business subjects had not yet been evenly distributed across all classes. According to Mr. Drs. Umar Said during the interview on September 29, 2025, students encountered difficulties in understanding instructional materials containing numerous technical terms and complex concepts. Consequently, students' learning outcomes had not yet met the performance targets established by the school.

One of the contributing factors to these unsatisfactory learning outcomes is the limited variety of instructional media used in the classroom, which has not been sufficiently effective in capturing students' attention. Based on interviews with Rahmandani Septiansyah and Kesya Gladis Oktavia on September 29, 2025, the PowerPoint presentations used during instruction contained excessive text with relatively simple designs. This condition caused students to become easily bored and lose concentration during classroom activities. Furthermore, students reported difficulties in understanding the learning materials because the information was delivered too quickly and was not supported by attractive visual elements. Therefore, there is a need for instructional media capable of presenting information in a more engaging, concise, and easily understandable manner. Infographic media are considered capable of meeting these needs by effectively integrating visual elements with essential information.

Although numerous studies have demonstrated that infographic media can improve students' learning outcomes, inconsistent findings regarding their effectiveness still exist. Greussing et al. (2021) argued that poorly designed infographics may negatively affect the learning process and students'

memory retention. This finding suggests that the implementation of infographic media in education requires further investigation, particularly in Digital Business courses at vocational high schools. This issue represents a research gap that warrants further exploration through community engagement activities focusing on the implementation of innovative instructional media in schools. Therefore, this community service program aims to implement infographic media to improve the learning outcomes of Grade XI students in the Marketing Study Program in the Digital Business subject at SMK Negeri 9 Semarang. The results of this program are expected to benefit teachers by providing innovative instructional media, support schools in improving the quality of the learning process, and serve as a reference for future community service initiatives related to the utilization of infographic media to enhance students' learning outcomes across different educational levels.

METHOD

This community service program was conducted at SMK Negeri 9 Semarang, Semarang City, Central Java, Indonesia. The participants consisted of 36 eleventh-grade students from the Marketing Study Program (Class XI PM) and two Digital Business teachers who served as community service partners. Overall, the implementation of this community service program comprised five stages: socialization, training, technology implementation (infographic media implementation), mentoring, and evaluation.

a. Socialization

The socialization stage covered four main aspects: (1) introducing infographic media as an innovative instructional medium; (2) explaining the benefits of infographic media in improving students' learning outcomes; (3) presenting the principles of designing effective and engaging infographics; and (4) explaining the procedures for integrating infographic media into Digital Business learning activities. During this stage, the community service team held discussions with the partner teachers regarding the current teaching and learning conditions, the challenges encountered by students in understanding the learning materials, and the potential use of infographic media as a more engaging and interactive instructional alternative.

b. Training

The training stage was conducted through direct demonstrations provided by the community service team for both teachers and students. The training covered: (1) techniques for designing infographic media appropriate to the characteristics of Digital Business learning materials; (2) the use of simple graphic design applications, such as Canva, for creating infographics; (3) strategies for integrating infographic media into classroom instruction; and (4) the development of assessment instruments aligned with learning materials delivered through infographic media. During this stage, teachers and students observed the demonstrations conducted by the community service team and actively participated in discussions on adapting infographic designs to students' learning needs and the school's instructional context.

c. Technology Implementation (Implementation of Infographic Media)

The technology implementation stage involved the direct application of infographic media in Digital Business learning for Class XI PM 2. The activities included: (1) delivering instructional materials using pre-designed infographic media; (2) administering a pre-test before the implementation to assess students' prior knowledge; (3) conducting classroom instruction using infographic media as the primary instructional medium; and (4) administering a post-test after the learning session to evaluate improvements in students' learning outcomes.

Throughout the implementation process, the community service team observed students' learning activities, classroom engagement, and responses to the use of infographic media. In addition, documentation of the activities was collected as supporting evidence for the implementation of the community service program.

d. Mentoring

The mentoring stage was carried out continuously throughout the implementation of the community service program. The community service team assisted the partner teachers in several activities, including: (1) preparing infographic media for each learning session; (2) revising the content and design of the infographics to align with the intended learning outcomes; (3) monitoring students' learning progress based on classroom assessment results; and (4) conducting reflective discussions on the implementation of instruction to identify areas for improvement in subsequent learning sessions.

e. Evaluation

The evaluation stage was conducted to assess the overall effectiveness of the community service program. Students completed a pre-test before the implementation of the infographic media and a post-test after the instructional activities to measure improvements in learning outcomes on the topic of Search Engine Optimization (SEO). The pre-test and post-test data were subsequently analyzed using the normalized gain (N-Gain) score with the assistance of IBM SPSS Statistics version 26 to determine the effectiveness of the implementation of infographic media.

RESULTS AND DISCUSSION

1. Socialization stage

The results of the community service program during the socialization stage demonstrated positive and participatory interactions among the service team, the Digital Business teacher, and the Grade XI Marketing students of SMK Negeri 9 Semarang. The activity began with a presentation delivered by the service team, focusing on introducing infographic media as an innovative learning medium that can improve students' learning outcomes. At this stage, the team comprehensively explained the concept of infographic media, its benefits in the learning process, and the role of visual media in helping students understand complex learning materials by presenting them in a simpler and more comprehensible format. In addition, the team introduced the essential components of infographic design, including title selection, layout arrangement, color composition, and the use of textual and visual elements such as images and symbols (Batubara, 2022). The students showed great enthusiasm by paying close attention to the presentation, taking notes on important information, and sharing their learning experiences. According to Dahlan (2021), this activity was conducted to ensure that students understood the objectives of implementing infographic media and could utilize it effectively during the learning process.



Figure 1. Socialization Activity on the Use of Infographic Media

The activity continued with an explanation of the mechanisms and procedures for utilizing infographic media in Digital Business learning. The service team described the stages of using infographic media, including interpreting the information presented, understanding relationships among concepts through data visualization, and utilizing infographics as an independent learning resource. During this session, the service team acted as facilitators by presenting examples of infographic media specifically designed for Digital Business learning materials. Students were invited to observe the structure, design, color composition, icons, and information presentation contained in the infographics. This demonstration aimed to help participants understand the characteristics of effective and engaging infographic media. Consequently, students were better able to comprehend the Marketing learning materials delivered through the infographic media.

During the discussion session, active two-way interactions occurred between the service team and the students. Students expressed questions, opinions, and learning experiences regarding the need for more diverse and enjoyable learning activities. The service team responded by explaining the advantages of infographic media in facilitating faster and more systematic understanding of learning concepts while providing an overview of how infographic media would be implemented in Digital Business learning throughout the community service program. Overall, the socialization activity successfully enhanced both teachers' and students' understanding of infographic media and prepared them to actively and enthusiastically participate in its implementation during classroom learning.

2. Training Stage

During the training stage, an active collaborative process was established among the community service team, the Digital Business teacher, and Grade XI PM 2 students. The training was conducted using a participatory and demonstration-based approach, in which the service team served as facilitators and technical mentors, the teacher acted as both a partner and learning facilitator, and the students participated actively throughout the activities.

At the beginning of the session, the service team demonstrated techniques for designing infographic media that aligned with the characteristics of Digital Business learning materials, including content organization, selection of visual elements, and the application of effective design principles. Apriani et al. (2024) emphasized that infographic media can transform complex information into a simpler, more systematic, and easily understandable format.

Subsequently, the service team demonstrated the use of Canva as a platform for developing educational infographics. During this stage, the collaborating teacher and students carefully observed each step of the infographic creation process and discussed how the design could be adapted to students' characteristics and the school's instructional needs. Two-way interactions also occurred as teachers and students asked questions regarding design selection, content organization, and the practical implementation of infographic media in classroom instruction. Furthermore, the service team demonstrated strategies for integrating infographic media into classroom activities and designing learning assessment instruments that aligned with the instructional content presented through the infographics. This training was expected to improve teachers' competencies in developing innovative and engaging instructional media while assisting students in understanding Digital Business concepts through visual, systematic, and easily comprehensible information presentation.

3. Technology Implementation (Implementation of Infographic Media)

During the implementation stage, the teacher conducted classroom instruction for Grade XI PM 2 students at SMK Negeri 9 Semarang using infographic media to improve students' learning outcomes on the topic of Search Engine Optimization (SEO). The learning process began with the administration of a pretest to assess students' prior knowledge before the instructional intervention.

The teacher then presented the fundamental concepts of SEO using infographic media displayed through a projector as a visual instructional aid. The use of infographics enabled students to understand SEO concepts more concretely through concise, systematic, and visually engaging information presentation. This activity also helped students connect the learning material with their daily experiences, such as using the Google search engine to obtain information or search for products. In addition, the teacher explained the importance of SEO in digital marketing and introduced career opportunities related to the digital marketing profession, allowing students to gain practical insights into the real-world application of the subject matter.

During the organization stage, students were divided into small groups to discuss SEO case studies presented in the infographic. In the investigation stage, students analyzed the problems, searched for supporting information, and collaboratively developed solutions within their groups. The teacher acted as a facilitator by guiding the discussion process. Subsequently, each group prepared the results of their discussions for classroom presentations. Bela Pathana et al. (2024) stated that the use of infographic media encourages students to become more active and engaged during the learning process, thereby improving learning outcomes.



Figure 2. Training and Demonstration Activities on Developing Infographic Media

During the presentation stage, each group presented the results of their discussions and analyses of the Search Engine Optimization (SEO) topic, while other groups provided comments, questions, and feedback. The evaluation stage concluded with the administration of a posttest to measure students' final understanding after the implementation of infographic media. The interactions among the service team, teachers, and students throughout the instructional process not only strengthened students' conceptual understanding of SEO but also promoted active participation, communication skills, and continuous improvement in learning outcomes.

4. Mentoring Stage

The mentoring stage represented a crucial phase of the community service program, aiming to ensure the sustainable implementation of infographic media in improving students' learning outcomes effectively and continuously. Mentoring was conducted systematically throughout the learning process to assist both teachers and students in utilizing infographic media effectively during classroom instruction. Hayati and Husnidar (2022) explained, based on Jean Piaget's constructivist theory, that knowledge is actively constructed by students through their experiences and interactions with the learning environment. Therefore, mentoring by the service team was essential to support students' knowledge construction and assist teachers in independently integrating infographic media into their instructional practices.

The mentoring process began with assistance provided to teachers in preparing infographic media tailored to students' characteristics and the intended learning outcomes for the SEO (Search

Engine Optimization) subtopic. The service team provided guidance on presenting instructional materials in a more interactive and engaging manner. Throughout the learning process, the teacher served as a facilitator, guiding students in observing, analyzing, and discussing the infographic content collaboratively. This process encouraged students to connect new experiences with their prior knowledge (Budyastuti & Fauziati, 2021). The activity was consistent with the constructivist learning stages of orientation, elicitation, idea restructuring, application of new ideas, and review (Tamba & Panggabean, 2022). Consequently, students became more actively involved in constructing their own understanding.



Figure 3. Mentoring Activities on the Utilization of Infographic Media in Group Discussion

Furthermore, the teacher guided students during the presentation of group discussion results and assisted them in analyzing the relationship between their findings and the concepts of Search Engine Optimization (SEO). The mentoring process continued through evaluation using infographic media, during which the teacher guided students in identifying improvements in their learning outcomes and recognizing concepts that still required further understanding. The results of this mentoring process enabled students to develop a more comprehensive understanding of SEO while simultaneously promoting greater learning engagement, enthusiasm, and active participation throughout the infographic-assisted learning activities.

5. Evaluation Stage

The evaluation stage, conducted through learning outcome measurements, demonstrated students' active participation in completing the pretest before the implementation of infographic media and the posttest after the instructional activities were completed. During this stage, students served not merely as passive respondents but as active participants who demonstrated their understanding of Search Engine Optimization (SEO) through a 20-item multiple-choice test. Anderson and Krathwohl (2001) explained that instructional assessment instruments designed at higher cognitive levels can more accurately measure students' abilities to analyze, evaluate, and apply knowledge.

Students first completed the pretest to measure their initial level of understanding before receiving the instructional intervention. After all infographic-assisted learning activities had been completed, they took the posttest, which consisted of questions with content coverage and difficulty levels equivalent to those of the pretest. Based on the collected data, the average pretest score of Grade XI PM 2 students was 62, which was below the Minimum Learning Achievement Criteria (KKTP) of 80. Following the implementation of infographic media, the average posttest score increased to 82.78, exceeding the established KKTP. Dyah Binti Astuti et al. (2024) also demonstrated that the implementation of infographic media significantly improved students' learning outcomes in Grade XI PM 2.

Throughout the assessment process, the researchers served as supervisors and observers by documenting classroom conditions, ensuring the validity of students' responses, and providing clarification whenever students encountered difficulties in understanding the test instructions. Consequently, the assessment stage not only generated quantitative data on students' learning outcomes but also provided a comprehensive overview of students' cognitive development before and after the implementation of infographic media.

Furthermore, to determine the effectiveness of infographic media in improving students' learning outcomes in the Digital Business course, particularly on the SEO (Search Engine Optimization) subtopic, the researchers conducted statistical data analysis using IBM SPSS Statistics Version 26. The improvement in students' learning outcomes was measured using the Normalized Gain (N-Gain) Score. The N-Gain criteria were classified according to the standards proposed by Hake (1999), as presented in the following table.

Table 1. N-Gain Score Classification Criteria

N-Gain Score Range (GT)	Interpretation
$0,70 < GT \leq 1,00$	High
$0,30 < GT \leq 0,70$	Moderate
$0,00 < GT \leq 0,30$	Low
$GT = 0,00$	Constan
$-1,00 < GT < 0,00$	Decrease

Based on the pretest and posttest results obtained from the 36 students in Grade XI PM 2, the evaluation results indicated a significant improvement in students' critical thinking skills, as presented below:

Table 2. Evaluation Results of the Improvement in Students' Learning Outcomes

Measured Aspect	Mean Pretest Score	Mean Posttest Score	N-Gain Score	N-Gain Category	Interpretation
Learning Outcomes	62	82,78	0,5560	Moderate	Moderately Effective

The evaluation results of students' learning outcomes following the implementation of infographic media in the Digital Business course for Grade XI PM 2 at SMK Negeri 9 Semarang demonstrated significant improvements across all measured aspects. These improvements were reflected in the comparison between the pretest and posttest scores as well as the changes in students' achievement levels based on the Normalized Gain (N-Gain) criteria proposed by Hake (1999).

Grade XI PM 2 students who participated in learning using infographic media achieved an N-Gain score of 0.5560 ($0.30 < 0.5560 \leq 0.70$), which falls within the moderate category. Prior to the intervention, the pretest results indicated that most students were unable to answer the multiple-choice questions correctly, with an average score of 62. Following the implementation of infographic media, students demonstrated substantial improvement in their learning outcomes, as evidenced by the increase in the average posttest score to 82.78. This finding indicates that the integration of infographic media created an active, engaging, and enjoyable learning environment that contributed to improved student learning outcomes. In this regard, Mansur and Rafiudin (2025) reported that

infographic media are easy to implement in classroom instruction and have been shown to significantly enhance students' active engagement and learning outcomes.

Nevertheless, several challenges were encountered during the implementation of infographic media, including the limited time required to design high-quality instructional infographics and the need for adequate design skills to present information effectively. Furthermore, differences in students' abilities to interpret visual information also posed challenges throughout the learning process. To address these issues, the community service team provided continuous mentoring for teachers in designing infographic media that were simple, visually appealing, and aligned with students' characteristics. Consequently, the implementation of infographic media was carried out effectively and produced positive impacts on improving students' learning outcomes at SMK Negeri 9 Semarang.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the implementation of this community service program, which aimed to analyze the application of infographic media in improving students' learning outcomes in the Digital Business course for Grade XI PM 2 at SMK Negeri 9 Semarang, the following conclusions can be drawn:

- a. The infographic media training program successfully enhanced both teachers' and students' understanding and readiness to utilize infographic media as an innovative instructional approach. Teachers gained knowledge of the principles for designing effective infographics, while students learned how to read, interpret, and use infographics as engaging learning resources. This process created a more active, interactive, and student-centered learning environment, thereby supporting more meaningful Digital Business instruction.
- b. The implementation of infographic media, accompanied by assessment instruments, mentoring, and evaluation, demonstrated that infographic media effectively increased students' engagement throughout the learning process. Students became more actively involved in group discussions, problem analysis, expressing opinions, and presenting the outcomes of their collaborative work. Furthermore, systematic mentoring enabled teachers to independently integrate infographic media into classroom instruction while encouraging students to construct knowledge through meaningful learning experiences.
- c. The evaluation results revealed a significant improvement in students' learning outcomes following the implementation of infographic media. The average pretest score of Grade XI PM 2 students increased from 62 to 82.78 on the posttest, exceeding the school's Minimum Learning Achievement Criteria (KKTP) of 80. Based on the N-Gain analysis, the improvement score of 0.5560 was classified as moderate. These findings indicate that the implementation of infographic media positively contributed to improving students' learning outcomes in the Search Engine Optimization (SEO) topic and may serve as an effective alternative instructional medium for supporting Digital Business learning in vocational high schools.

Recommendations

Based on the results and findings of this community service program, the following recommendations are proposed for future program implementation and instructional development:

- a. Teachers are encouraged to implement infographic media consistently across various Digital Business topics as well as other subject areas. The integration of visual instructional media designed according to students' characteristics is expected to become an integral component of

innovative teaching practices that continuously enhance student engagement and learning outcome

- b. Professional development activities, including mentoring and training for teachers, should be continuously strengthened, particularly in improving teachers' competencies in designing infographic media that are simple, attractive, and informative. In addition, institutional support through the provision of technological facilities and the enhancement of teachers' digital competencies is essential to ensure the effective and sustainable implementation of infographic media in classroom instruction.

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