JURNAL OF APPLIED MULTIDISCIPLINARY STUDIES
Volume 2 (1), 2025: 29 - 38
ISSN: 3089-5707

Utilization of a Web-Based Diagram Application as an Alternative to Visio in Computer Application Practicum

Syafran Nurrahman 1[1*]
[1]Sekolah Tinggi Ilmu Ekonomi Ganesha, Indonesia
Email: [1]**syafran@stieganesha.ac.id***
[*)] **Corresponding Author**

Received: 09 Agustus 2025

Revised: 10 Oktorber 2025

Accepted: 10 November 2025

Published online:

Abstract

This study is motivated by the need for students to develop competencies in creating process diagrams and system models in the Computer Applications course as part of their professional skills in the field of information technology, as well as the challenges associated with the use of licensed, paid diagram software in practical learning activities. The purpose of this study is to analyze the utilization of a web-based diagram application (Draw.io) as an alternative to Microsoft Visio in supporting the implementation of computer application practicums in higher education. The research subjects consisted of eight selected students enrolled in a single Computer Applications class at a higher education institution. This study employed a quasi-experimental approach, with data collection techniques including observation of practicum outcomes, distribution of questionnaires to students, and semi-structured interviews with selected students to obtain supporting data related to their experiences in using the web-based diagram application. The results indicate that the utilization of the web-based diagram application (Draw.io) improved students' ability to create process diagrams and system models, as evidenced by an increase in the average score from 69.2% in the pretest to 82.6% in the posttest, representing an improvement of 13.4 percentage points. In addition, students' perceptions revealed that the web-based diagram application is easy to use, flexible in terms of access, and feasible to be used as a supporting medium for practicum activities. This study is expected to provide a practical alternative solution for educational institutions in supporting computer application practicums and to contribute to the development of efficient and sustainable technology-based learning.

Keywords:
Web-Based Diagram Application, Draw.io, Microsoft Visio, Computer Application Practicum, Information Technology Learning

INTRODUCTION

Computer application learning in higher education plays an important role in equipping students with fundamental skills in information processing and system modeling. One of the essential competencies that students must master is the ability to construct process diagrams and system models, such as flowcharts and structure diagrams, which are used to visually represent workflows and relationships among system components. This competency is an integral part of information technology and information systems education. The visualization of processes and systems through diagrams constitutes a core competency in the Computer Applications course, as diagrams assist students in understanding workflows, information structures, and inter-component relationships within a system.

Diagrams play a crucial role in information technology learning as effective tools for conceptual thinking and communication among students. Previous studies have shown that the use of digital diagramming tools can enhance creativity and conceptual understanding in formal educational settings, particularly in flowcharts and structural representations of specific subject matter, such as human impacts on ecosystems, where Draw.io has been utilized as a digital mind map to improve students' conceptual comprehension (Aldiana Mahendra, 2021). In practical learning activities, professional diagramming software such as Microsoft Visio is often used as a reference due to its comprehensive features and systematic diagram presentation. However, in practice, the use of licensed, paid software presents challenges, particularly related to license availability and flexible access for students.

Previous research has indicated that the use of Microsoft Visio can positively influence learning outcomes in diagram drawing techniques within the context of electrical installation studies; nevertheless, its implementation is frequently constrained by licensing requirements and associated costs, which may impose financial burdens on educational institutions (Inge Yellia Adinda, 2024). These conditions highlight the need for alternative software solutions that are capable of supporting learning objectives without compromising the quality of practicum outcomes. In response to these limitations, several studies and implementations have advocated the use of web-based diagramming tools such as Draw.io, which can be accessed free of charge by both students and educators.

Other studies in educational contexts have demonstrated that the utilization of Draw.io can assist in introducing software design concepts to vocational high school students and can be implemented for visualizing workflow diagrams and data structures, thereby potentially improving the quality of learning in the field of information technology (Oktafiandi et al., 2024). Numerous previous studies have also shown that the appropriate use of information technology can enhance learning effectiveness and improve work process efficiency. Research published in the SISTEK Trilogi Journal indicates that the utilization of computer-based and web-based applications can serve as practical solutions for improving administrative process efficiency and data management within organizational environments (Nurrahman & Rusmanto, 2025). In addition, web-based information systems and digital applications have been widely implemented across various domains, such as the application of Odoo-based ERP systems to support business processes (Rusmanto et al., 2024) and the development of technology-based systems to support decision-making and data management (Sitti Aliyah Azzahra et al., 2024).

The findings of these studies suggest that technology-based applications have substantial potential as solutions to the limitations of manual processes and certain proprietary software. In the context of learning and digital competency development, the use of digital platforms and technology-based applications has also been proven to yield positive impacts. Research published in the Creative Research and Economics Journal of STIE Ganesha shows that the use of digital platforms can enhance learning effectiveness and technology-based activities (Nurrahman et al., 2024). Overall, the literature indicates a trend in which web-based diagramming media and

technology-based learning tools contribute positively to the development of students' conceptual understanding and technical skills.

Nevertheless, most existing studies primarily focus on general applications of educational technology or the use of Draw.io at non-higher-education levels. Research that specifically analyzes the effectiveness of web-based diagram applications as direct alternatives to Microsoft Visio in the context of Computer Applications practicum courses in higher education remains limited. Furthermore, few studies have evaluated the use of Draw.io through a quasi-experimental approach by comparing student learning outcomes before and after the implementation of the application, as well as examining students' perceptions regarding ease of use and feasibility as a practicum medium. Based on this research gap, the present study focuses on analyzing the utilization of a web-based diagram application (Draw.io) as an alternative to Microsoft Visio in Computer Applications practicum activities in higher education. This study is expected to provide practical contributions for educators and educational institutions in selecting practicum media that are efficient, cost-effective, and easily accessible, as well as to enrich scholarly discussions on the application of web-based technology in computer application learning.

METHODS

Research Approach

This study employed a quasi-experimental approach, which aims to examine the effect of a treatment on participants without involving randomization of groups (Abraham & Supriyati, 2022). The research design used was a one-group pretest–posttest design, involving a single group of participants without a control group (Capili & Anastasi, 2024). The research subjects were students enrolled in the Computer Applications course in one class at a higher education institution. Measurements were conducted twice: a pretest to identify students' initial ability in creating diagrams, and a posttest to determine changes in ability after the treatment in the form of using a web-based diagram application (Draw.io). The one-group pretest–posttest design applied in this study has limitations in terms of internal validity, particularly the potential testing effect, in which participants may demonstrate improved performance due to familiarity with the test format during the posttest, as well as the history effect, referring to the possibility of external factors outside the treatment influencing the research outcomes. Therefore, the findings of this study are interpreted cautiously and are focused on an initial evaluation of the learning media rather than broad causal generalization.

Participants and Research Scope

The participants in this study consisted of eight students selected purposively from a total of 28 students enrolled in the Management Study Program who participated in the Computer Applications practicum during the second semester of the 2024/2025 academic year. Participant selection was based on their availability to complete the entire research process, including the pretest, practicum activities using the web-based diagram application (Draw.io), and the posttest.

All participants were drawn from the same class and had relatively homogeneous basic computer knowledge backgrounds, as indicated by the curriculum of previous semesters. Prior to the study, most students were familiar with basic concepts of process diagrams and flowcharts but had not had intensive experience using professional diagramming software such as Microsoft Visio or web-based diagram applications. The practicum activities were conducted in a computer laboratory equipped with internet-connected computers. The scope of the study was limited to the use of the web-based diagram application (Draw.io) as a practicum support tool for creating process diagrams and system models, without direct comparison to other diagramming software.

Data Collection Techniques

Data were collected using the following instruments:

1. **Observation of Practicum Outcomes**
   Observation (Chand, 2025) was conducted to assess the quality of diagrams produced by students after using the web-based diagram application (Draw.io). The assessment employed an observation rubric consisting of the following indicators:
   a. Structural accuracy: the appropriateness of process sequences and relationships among diagram elements.
   b. Completeness of symbols: the use of diagram symbols according to standards (terminator, process, decision, flowline).
   c. Diagram neatness and readability: layout arrangement, spacing between symbols, and text readability.
   d. Clarity of process flow: the clarity of logic and directional flow presented in the diagram.
   The assessment was conducted by two independent raters, and inter-rater reliability was maintained through shared understanding of the assessment rubric. The level of agreement between raters was analyzed using an inter-rater reliability approach based on percentage agreement.

2. **Student Questionnaire**
   The questionnaire (Ardiansyah et al., 2023) consisted of closed-ended questions arranged using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) (Koo & Yang, 2025) to measure students' perceptions of the use of the web-based diagram application. The measured aspects included:
   a. Ease of use
   b. Learning effectiveness
   c. Accessibility
   d. Feasibility as an alternative to Microsoft Visio

3. **Semi-Structured Interviews**
   Semi-structured interviews were conducted with the eight selected students to obtain supporting qualitative data regarding their experiences using the web-based diagram application (Draw.io) (Masilela, 2024). The interviews focused on perceptions of ease of use, encountered challenges, and comparisons of experiences before and after using the application. The interview data were analyzed thematically to identify patterns in students' perceptions.

Research Procedure

The research procedures were conducted as follows:

1. Development of observation instruments, questionnaires, and interview guidelines through indicator review and limited discussions with fellow lecturers to ensure clarity and alignment with learning objectives prior to implementation.
2. Administration of the pretest to assess students' initial ability in creating diagrams using available tools.
3. Implementation of practicum activities using the web-based diagram application (Draw.io).
4. Administration of the posttest to assess students' abilities after the practicum.
5. Collection of questionnaire and interview data.
6. Data processing, analysis, and preparation of research findings.

Data Analysis Techniques

Comparative analysis of pretest and posttest scores was conducted using a paired sample t-test to determine the significance of differences in mean scores before and after the treatment (Ismail et al., 2025). This test was selected because the data were obtained from the same group with two measurements. In addition, descriptive analysis was used to present mean scores, percentage improvements, and questionnaire results related to students' perceptions. Qualitative data from interviews were analyzed thematically to support and enrich the quantitative findings. Given the limited number of participants, the analysis focused on within-group changes and was not intended for generalization to a wider population.

Instrument Validity and Reliability

The questionnaire instrument underwent content validity testing through expert judgment by lecturers in the field of information technology. Questionnaire reliability was referenced using the Cronbach's Alpha coefficient, as commonly applied in previous studies (Niskarlina et al., 2025), with a criterion value of $\alpha \geq 0.70$ indicating acceptable reliability. The use of Cronbach's Alpha in this study served as a reliability criterion reference, considering that the research emphasized an initial evaluation of learning media with a limited number of participants. The observation rubric was developed based on standard process diagram assessment criteria and validated through discussions among raters to ensure consistency in scoring.

Research Ethics

This study was conducted with due consideration of research ethics. All participants were provided with explanations regarding the objectives and procedures of the study and voluntarily agreed to participate through informed consent. Participant confidentiality was maintained by using anonymous codes for all research data, which were used solely for academic purposes. As the study constituted a learning evaluation and did not involve high-risk interventions, ethical approval was obtained through official permission from the study program where the research was conducted.

RESULTS AND DISCUSSION

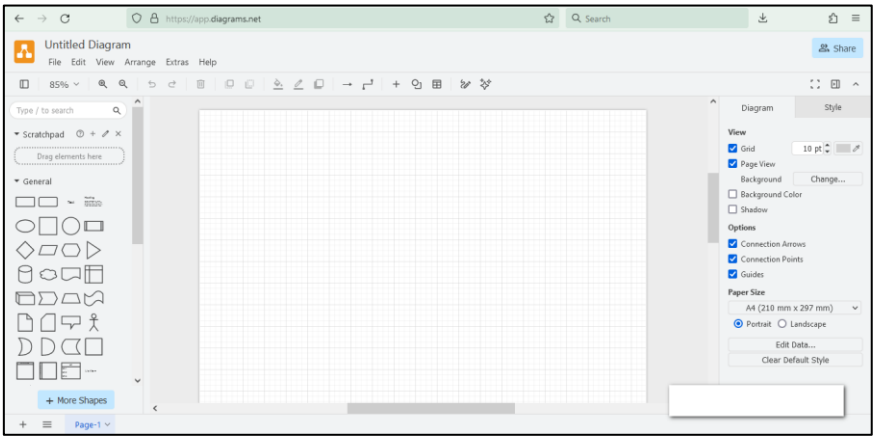

Figure 1. User interface of the Draw.io application (https://app.diagrams.net/)

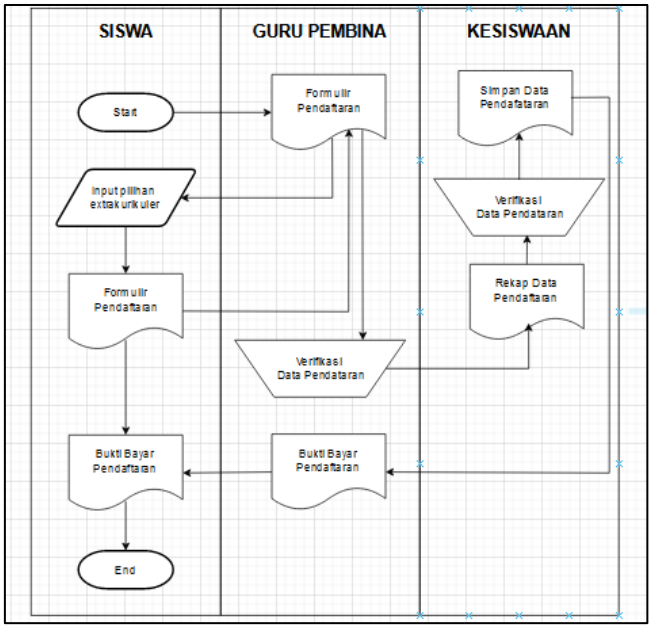

Figure 2. Flowchart design produced by students in the Computer Applications course – As-Is system for extracurricular registration (https://app.diagrams.net/)

Comparison of Pretest and Posttest Results in the Computer Applications Practicum

Table 1. Comparison of Pretest and Posttest Results in the Computer Applications Practicum

Assessment Indicator	Pretest	Posttest
Mean score	69,2%	82,6%
Highest score	80%	95%
Lowest score	55%	70%
Mastery percentage (%)	60%	87%

Based on Table 1, there is a clear improvement in students' average scores after the implementation of the web-based diagram application (Draw.io) in practicum activities. Increases in the highest score, lowest score, and mastery percentage indicate that the web-based media (Draw.io) effectively supports the improvement of students' practicum performance.

Table 2. Results of the Paired Sample *t*-Test

Statistic	Value
Mean Pretest	69,2
Mean Posttest	82,6
Mean Difference	13,4
t-value	6,21
df	7
Sig. (p-value)	0,000 (< 0,05)

The results of the statistical analysis using the Paired Sample *t*-test indicate a significant difference between students' pretest and posttest scores. The mean score increased from 69.2 to 82.6, with a mean difference of 13.4 points. The test results show $t(7) = 6.21$ with $p < 0.05$, indicating that the improvement in students' abilities after using the web-based diagram application (Draw.io) is statistically significant and did not occur by chance.

Observation Results of Practicum Outcomes

Table 3. Summary of Diagram Quality Observation Results

Assessment Aspect	Mean Score	Category
Structural accuracy	3,4	Good
Symbol completeness	3,3	Good
Diagram neatness	3,5	Very Good
Process flow clarity	3,4	Good

Score Description:
1 = Very Poor
2 = Poor
3 = Good
4 = Very Good

The observation results indicate that the quality of the diagrams produced by students falls within the good to very good categories. The neatness of the visual presentation obtained the highest score, suggesting that the web-based diagram application (Draw.io) assists students in organizing diagrams in a more systematic and readable manner.

Questionnaire Data Analysis

Table 4. Summary of Student Perceptions of the Web-Based Diagram Application (Draw.io)

Assessment Aspect	Mean Score	Interpretation
Ease of use	4,3	Strongly Agree
Learning effectiveness	4,2	Agree
Accessibility	4,5	Strongly Agree
Feasibility as an alternative to Visio	4,4	Strongly Agree

Rating Scale:
1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Based on the questionnaire results, students expressed very positive responses toward the use of the web-based diagram application (Draw.io). The accessibility aspect received the highest score, indicating that ease of access through a web browser is the main advantage of the application in supporting practicum activities.

Interview Data

Table 5. Summary of Student Interview Findings

Main Theme	Key Findings
Ease of use	The application is easy to understand and use
Access flexibility	Can be used anytime via a web browser
Usage constraints	Initial adaptation and internet connectivity
Student acceptance	Most students support continued use

The interview findings reinforce the quantitative results, as students stated that the web-based diagram application is easy to use and flexible. Although there were initial adaptation challenges and dependency on internet connectivity, the majority of students supported the continued use of this application. One student stated that *"Draw.io is easier to use because it does not require application installation, so it can be used directly during practicum sessions or from home."* Another student mentioned that *"Browser-based access is very helpful, especially when there is no time to visit the computer laboratory."* However, some students also reported initial difficulties, such as *"At first, it required adaptation to the tool interface, and slow internet connections could be disruptive."* Overall, the interview results indicate positive student acceptance of the web-based diagram application (Draw.io). Most students stated that the application is feasible for continued use in practicum activities due to its ease of use, access flexibility, and ability to support systematic and efficient diagram development.

Thematic Analysis Process of Interview Data

The analysis of interview data in this study employed a manual thematic analysis approach. The analysis process was conducted through several stages, as follows:

a. Transcription and initial reading, in which all interview recordings were transcribed and read repeatedly to gain a comprehensive understanding of the context of students' responses.
b. Open coding, which involved identifying frequently occurring keywords or significant statements, such as *easy to use*, *flexible*, *browser-based access*, and *suitable for future use*.
c. Code categorization, where codes with similar meanings were grouped into provisional categories.
d. Theme identification, in which these categories were synthesized into main themes, including *ease of use*, *accessibility flexibility*, *usage constraints*, and *student acceptance*.

The analysis was conducted manually without the assistance of qualitative data analysis software, as the number of interview respondents was limited and the research focus was exploratory in nature. This approach was considered adequate for capturing students' in-depth perceptions of the use of a web-based diagram application (Draw.io) in practicum activities.

Discussion

The results indicate that the utilization of a web-based diagram application (Draw.io) had a positive impact on improving students' practicum performance. The statistically significant increase in scores from pretest to posttest suggests that web-based diagram applications can function effectively as instructional support media in computer application courses. The high student perception scores on ease of use and feasibility as an alternative to Microsoft Visio can be explained through the Technology Acceptance Model (TAM). According to TAM, technology acceptance is influenced by two main factors: *perceived ease of use* and *perceived usefulness*. Draw.io was perceived as easy to use due to its intuitive interface and the absence of installation requirements, which reduced technical barriers for students. Furthermore, the application's usefulness in supporting systematic diagram construction enhanced perceived usefulness, leading to positive student acceptance.

Accessibility received the highest score in the questionnaire results, indicating that browser-based access was a key factor supporting practicum activities. This finding aligns with the concept of flexible learning, where learning is not constrained by time and location, and supports the principle of digital equity, namely equal access to digital learning resources without reliance on licensed software. Thus, web-based diagram applications not only support instructional effectiveness but also enhance inclusivity in higher education.

This study has several limitations. First, the one-group pretest–posttest design did not involve a control group, meaning that improvements in learning outcomes may have been influenced by other factors such as prior learning experiences, practice effects, or student

maturation. Second, the limited number of participants means that the findings are focused on within-group changes and are not intended for broad generalization. Therefore, future research is recommended to employ experimental designs with control groups and larger sample sizes to obtain more comprehensive results.

The integration of quantitative and qualitative findings demonstrates consistency across data sources. Quantitatively, the increase in average pretest and posttest scores and the significant results of the paired sample *t*-test indicate that the use of a web-based diagram application (Draw.io) positively affected student learning outcomes. These findings are consistent with questionnaire results showing very high levels of agreement regarding ease of use, accessibility, and feasibility as an alternative to Visio. Qualitatively, interview data further explain these positive responses by revealing the underlying reasons for student acceptance.

Students perceived Draw.io as easy to use, flexible due to its web-based nature, and supportive of systematic diagram development without software installation barriers. Moreover, the majority of students expressed support for the continued use of this application in future practicum activities. Thus, qualitative data functioned as explanatory evidence for the quantitative findings, strengthening the interpretation that improvements in learning outcomes were not merely numerical but were also supported by positive student experiences and perceptions throughout the learning process.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, the utilization of a web-based diagram application as an alternative to Microsoft Visio in Computer Applications practicum activities has been shown to effectively support the learning process. The pretest and posttest results indicate an improvement in students' ability to construct process diagrams and system models, which is reinforced by observations of diagram quality, positive student perceptions obtained through questionnaires, and interview findings highlighting ease of use, accessibility flexibility, and the feasibility of the application as a practicum support tool. From a practical perspective, these findings suggest that instructors of Computer Applications courses are encouraged to integrate Draw.io into practicum modules as the primary tool for developing process diagrams and system models. To address initial adaptation challenges and dependence on internet connectivity, instructors are also advised to provide written guidelines or short video tutorials, as well as standard diagram examples, prior to practicum implementation. Educational institutions may consider adopting web-based diagram applications as legal, accessible, and cost-efficient software alternatives that do not require additional licensing fees. Academically, this study contributes as an initial empirical investigation demonstrating the effectiveness of web-based diagram applications in the context of computer application practicums in higher education. The findings enrich the literature on web-based learning media utilization and may serve as a foundation for future studies employing more rigorous research designs. Further research is recommended to use quasi-experimental designs involving a control group using licensed diagram software (e.g., Microsoft Visio) and an experimental group using a web-based diagram application (Draw.io), with random participant allocation. Such designs would enable more valid and objective comparisons of application effectiveness. Additionally, future studies should involve larger sample sizes to strengthen the generalizability of the findings.

REFERENCES

Abraham, I., & Supriyati, Y. (2022). DESAIN KUASI EKSPERIMEN DALAM PENDIDIKAN: LITERATUR REVIEW. *Jurnal Ilmiah Mandala Education*, *8*(3). https://doi.org/10.58258/jime.v8i3.3800

Aldiana Mahendra, M. Y. (2021). *THE USE OF DRAW IO AS DIGITAL MIND MAP TO IMPROVE STUDENTS' CREATIVITY AND STUDENTS' CONCEPT MASTERY IN LEARNING HUMAN INFLUENCE ON ECOSYSTEM*. https://repository.upi.edu/60864/

Capili, B., & Anastasi, J. K. (2024). An Introduction to Types of Quasi-Experimental Designs. *AJN, American Journal of Nursing*, *124*(11), 50–52. https://doi.org/10.1097/01.NAJ.0001081740.74815.20

Inge Yellia Adinda, A. H. (2024). The Effect of Using Microsoft Visio Application on Drawing Learning Outcomes of TIT XI Class Students. *Jurnal Pembangunan Pendidikan: Fondasi Dan Aplikasi*, *12*. https://doi.org/10.21831/jppfa.v12i1.73970

Ismail, M., Al – Badri, A., & Al – Senaidi, S. (2025). Evaluating the effectiveness of a computerized achievement test using learn smart for psychometric assessment under item response theory. *Journal of Education and E-Learning Research*, *12*(1), 115–123. https://doi.org/10.20448/jeelr.v12i1.6676

Masilela, L. N. (2024). *MENTAL HEALTH AS A HUMAN RIGHT IN ESWATINI*. *9*(1).

Niskarlina, Usman, & Bahnar, S. H. (2025). VOA Learning English: Enhancing Listening Proficiency in the Vocational Classroom. *Jurnal Edukasi Saintifik*, *5*, 109–118.

Nurrahman, S., & Rusmanto, D. E. (2025). PENERAPAN FUNGSI INDEX MATCH MICROSOFT EXCEL PADA SISTEM PENGELOLAAN ARSIP INVOICE DI PT. XXX. *Jurnal Sistem Informasi dan Sains Teknologi*, *7*, 33–50. https://doi.org/10.31326/sistek.v7i1.2122

Nurrahman, S., Saefullah, A., Ar, R., Sitohang, R. M., Syaputra, R., & Hakim, M. P. (2024). *Pemanfaatan Platform Digital E-commerce Tiktok & Shopee Affiliate dalam Manajemen Resiko dan Ketahanan UMKM Budidaya Jangkrik dan Usaha Dimsum*.

Oktafiandi, R., Zakaria, H., Zailani, A. U., Ilyasah, R., Syahrul, D., Asrizal, M., Haidar, M. F., Reynaldi, P., Palah, S., & Gibran, Y. (2024). PENGENALAN KONSEP PERANCANGAN PERANGKAT LUNAK MENGGUNAKAN DRAW.IO BAGI SISWA SMK SEBAGAI PERSIAPAN KARIR MENJADI PROGRAMMER. *Jurnal Pengabdian kepada Masyarakat*, *1*(6).

Rusmanto, D. E., Zakariyya, A. Y., & Nurrahman, S. (2024). Implementasi Sistem Informasi Dengan Menggunakan Enterprise Resource Planning (ERP) Odoo di PT. XYZ Purwodadi. *TeknoIS : Jurnal Ilmiah Teknologi Informasi dan Sains*, *14*(2), 261–269. https://doi.org/10.36350/jbs.v14i2.263

Sitti Aliyah Azzahra, Syafran Nurrahman, & Aep Saefullah. (2024). Integrasi Kecerdasan Buatan Dalam Sistem Rekomendasi Produk Untuk E-Commerce. *Jurnal Sains dan Teknologi*, *3*(1), 21–28. https://doi.org/10.58169/saintek.v3i1.394