



The Impact of Implementing the VAK Model in Practical Learning with Case Method to Improving Students' 21st Century Skills

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Article Info

Article History:

Received: 19 December 2025

Revised: 8 March 2026

Accepted: 23 April 2026

Keywords:

21st Century Skills, Case Method, Practical Learning, VAK Model.

Abstract

The advancement of the Industrial Revolution 4.0 era requires university graduates to master 21st-century skills in order to actively contribute and play a role in the workforce. This necessity has become a key factor influencing graduates' employability. However, challenges arise during the learning process, such as low student participation, limited conceptual understanding, and difficulties in developing critical thinking and problem-solving skills, particularly in practicum activities. A solution to address these issues is to implement a combination of student-centered learning models, namely the VAK (Visualization, Auditory, Kinesthetic) model, in practical learning based on the Case Method. The purpose of this study is to analyze the effect of applying the VAK model in case method-based practical learning on the improvement of students' 21st-century skills. This research employed a Pre-Experimental Design with a One-Shot Case Study approach. The sample consisted of 94 regular class students of the PTIK Study Program at UNNES in the even semester of 2024/2025, enrolled in the Computer Networks course. The data collection instruments were based on 21st-century skill indicators, including communication, collaboration, critical thinking and problem solving, as well as creativity and innovation. Data analysis was conducted using descriptive and inferential statistics. The findings revealed that the application of the VAK model in case method-based practical learning positively influenced the enhancement of students' 21st-century skills with a significance value of 0.001. The most significant improvements were observed in Collaboration at 87%, Critical Thinking and Problem Solving at 86.2% with a very strong category. Further research is needed to explore the ideal combination of learning models and approaches to achieve greater improvements in 21st-century skills.

INTRODUCTION

21st-century skills are crucial for students to master in order to adapt to the demands of the workforce in the Industrial Revolution 4.0 era (Jufriadi et al., 2022; Mantau et al., 2023). The World Economic Forum (WEF, 2020) released a list of the 15 most in-demand cross-functional skills required by global industries for 2025. Skills such as critical thinking, communication, creativity, and collaboration must be nurtured to meet workplace needs and contribute to community well-being (Mardhiyah et al., 2021; Karaca-Atik et al., 2023).

The demand for 21st-century skills has become a major factor influencing graduates' employability (Prasetyo et al., 2023; Pramesti et al., 2024). University graduates must therefore be equipped with these skills through both classroom and field-based learning activities (Arsanti et al., 2021; Al-Fikri, 2021). Innovation in higher education learning is urgently needed to train students' 21st-century competencies. One approach universities adopt to address these challenges is implementing the Case Method as a primary learning strategy focused on student-centered learning (Wulandari et al., 2022). With this method, graduates should possess strong 21st-century skills. However, in practice, learning often faces several obstacles, including limited student participation, low conceptual understanding, and constraints in developing critical thinking and problem-solving skills, especially during practicum sessions. This highlights the need for more effective learning approaches that can accommodate diverse student learning styles (Damayanti et al., 2020).

The VAK (Visualization, Auditory, Kinesthetic) model is a learning approach oriented toward students' learning styles, providing balanced visual, auditory, and kinesthetic stimulation (Kusumawarti et al., 2020; Ningtyas et al., 2023). This model has the potential to enhance conceptual understanding, analytical and critical thinking skills, as well as active student engagement (Setiawan et al., 2019; Salsabila et al., 2023; Rahmah et al., 2024). Therefore, the VAK model approach should be applied to case method-based practical learning so that it can strengthen the experiential learning aspect and optimally support the development of 21st-century skills.

Various perspectives on the factors influencing 21st-century skill development across different educational levels remain a topic of ongoing discussion. Analytical studies have been conducted in previous years, focusing on aspects such as curriculum (Fakhri, 2023), teacher readiness (Makhrus et al., 2018), learning models

(Nashiroh et al., 2024), learning platforms (Trisnawati et al., 2019), and learning evaluation (Ramdhani et al., 2019).

This study focuses on analyzing factors that influence the enhancement of students' 21st-century skills within the learning process. Several approaches are adopted to address these issues, such as optimizing the implementation of the VAK model in practical learning to accommodate diverse student learning styles (Astuti, 2022). Learning delivery is conducted through blended learning, combining online and offline formats to improve flexibility and accessibility of materials (Puspitarini, 2022). Additionally, relevant case scenarios are designed to reflect real-world industry conditions and enhance students' problem-solving abilities (Fauzi et al., 2023; Ririen & Irawati, 2023; Rahmadi et al., 2022). The completion of case studies is supported through collaborative learning techniques, allowing students to share insights and reinforce concepts through teamwork (Munfiatik, 2023). The discussion outcomes are then presented and reflected upon to further develop students' communication and collaboration skills (Nuzalifa, 2021).

The research question of this study is: How does the application of the VAK model in case method-based practical learning influence the enhancement of students' 21st-century skills? Based on this research question, the study aims to analyze the effect of implementing the VAK model in case method-based practical learning on students' 21st-century skill development. Other factors that influence the effectiveness of this approach are also examined to strengthen the research findings. The results of this study are expected to contribute to the development of innovative and effective learning methods applicable to higher education.

RESEARCH METHODS

This study employed an experimental method with a Pre-Experimental Design, aiming to analyze the effect of implementing the VAK model in case-method-based practical learning on the enhancement of students' 21st-century skills (Sugiyono, 2017). The research design was a One-Shot Case Study, in which students received treatment, followed by observations to assess their 21st-century skills, as illustrated in Figure 1.

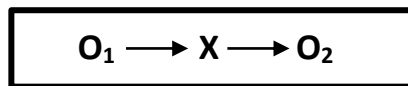


Figure 1. One-shot case study experimental design

Figure Description:

O₁ : Initial skills observation

X : VAK Model in case-based practical learning

O₂ : Final skills observation

A. Population and Sample

The population in this study consists of all students in the PTIK UNNES study program during the even semester of 2024/2025, totaling 113 students. The sample was selected using a purposive sampling technique, comprising 94 regular-class PTIK UNNES students enrolled in the Computer Networks course in the even semester of 2024/2025.

B. Data Collection Technique

This study involved a single experimental group as the research subjects. The implementation was divided into two stages. The first stage was carried out over two meetings to identify the students' initial skills before the treatment. The second stage took place over three meetings in the Computer Networks course, aiming to evaluate students' 21st-century skills after applying the VAK model in case-method-based practical learning.

The data collection instruments were based on 21st-century skills, including communication, collaboration, critical thinking, problem-solving, creativity, and innovation (Table 1). Skills assessment is carried out through observation of student activities and assignments during learning using an assessment rubric with a scale of four. To strengthen the data, interviews were conducted with several students after the learning sessions.

Table 1. Instrument of 21st Century Skills

No	Indicator	Number of Questions
1	Communication	7
2	Collaboration	8
3	Critical Thinking and Problem Solving	11
4	Creativity and Innovation	9
	Total	35

The research was conducted by assessing students' 21st-century skills in accordance with the stages of the Case Method Learning Model as outlined in Table 2.

Table 2. Stages of the Case Method Learning Model with VAK

Case Method Phase	Student Activities
Introduction	1. Create a study group
Case Method lesson plan and guidelines	2. Prepare tools and materials for the computer network lab.
Active Learning	1. Understand the basic concepts and materials for computer network practicals.
Deepening concepts and materials with the VAK model	2. Use the online learning platform (<i>Elena</i>) with the VAK feature as a learning resource for practicals.
Directed Case	Understand the given computer network case study
Focused case presentation	
Problem Solving	1. Develop a lab scenario to complete the case study.
Comprehensive case analysis and solution search	2. Conduct lab activities with study groups according to the lab scenario.
	3. Discuss lab results.
	4. Formulate a solution through lab troubleshooting.
	5. Compile lab work results.
Classroom Discussion	1. Presenting the results of the practical work in solving the case.
Discussion and validation of problem solving solutions	2. Class discussion and validation of the problem-solving results.
Evaluation and Reflection	1. Assessment and feedback
Evaluation and reflection	2. Completing the self-assessment

C. Instrument Validity and Reliability

The instrument's content and construct validity were assessed by three expert lecturers in learning evaluation, covering lesson plans, rubrics, and 21st-century skills questionnaires. Validity testing used Pearson Product-Moment correlation.

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}} \quad (1)$$

The instrument was considered valid if $r_{count} > r_{table}$ value with a significance of 0.05. Reliability was measured based on a Cronbach's Alpha coefficient > 0.50 .

$$\alpha = \frac{k}{k-1} \left(1 - \frac{\sum \sigma_i^2}{\sigma^2} \right) \quad (2)$$

The instrument's validity and reliability were assessed using IBM SPSS Statistics version 27.0.1.

D. Data Analysis Techniques

The data were analyzed using descriptive and inferential statistics. After the data were collected and integrated, a comprehensive analysis was conducted to draw conclusions about the effect of applying the VAK model in case-method-based practical learning on the improvement of students' 21st-century skills.

1. Questionnaire Analysis (Self-assessment)

The 21st-century skills questionnaire uses a four-point scale. The questionnaire analysis was carried out using the following percentage formula 3.

$$\text{Total Score (x)} = \frac{\text{Acquired Score}}{\text{Maximum Score}} \times 100\% \quad (3)$$

The questionnaire responses were interpreted according to the assessment criteria in Table 3.

Table 3. Student 21st-Century Skills Score Categories

Percentage (%)	Category
$25 \leq x < 40$	Very Weak
$40 \leq x < 55$	Weak
$55 \leq x < 70$	Moderate
$70 \leq x < 85$	Strong
$85 \leq x \leq 100$	Very Strong

2. Analysis of the 21st-Century Skills Rubric

The assessment rubric used refers to a four-point scale, the results of which are then categorized into four levels, namely basic, intermediate, trained, and proficient, as shown in Table 4.

Table 4. Student 21st-Century Skills Rubric Score Category

Score	Category
$1.0 \leq \text{score} < 2.8$	Level 1: Entry Level
$2.8 \leq \text{score} < 3.2$	Level 2: Basic Level
$3.2 \leq \text{score} < 3.6$	Level 3: Intermediate Level
$3.6 \leq \text{score} \leq 4.0$	Level 4: Advanced Level

Inferential statistical analysis techniques were used to test the research hypothesis. The hypothesis test used a T-test, preceded by a normality test. The data analysis process was assisted by IBM SPSS Statistics software version 27.0.1.

RESULT AND DISCUSSION

A. Validity and Reliability Results

The results of the instrument validity test, consisting of the indicators Communication, Collaboration, Critical Thinking and Problem Solving, Creativity, and Innovation, are shown in Table 5.

Table 5. Instrument Validity Test Results

Indicator	Number of Questions	Invalid Item	Valid Item
Communication	7	0	7
Collaboration	8	0	8
Critical Thinking and Problem Solving	11	0	11
Creativity and Innovation	9	0	9
Total	35	0	35

Reliability testing was conducted to determine the instrument's consistency in measuring students' 21st-century skills. The results of the reliability testing are shown in Table 6.

Table 6. Instrument Reliability Test Results

Indicator	Cronbach's Alpha	Status
Communication	0.925	Reliable
Collaboration	0.866	Reliable
Critical Thinking and Problem Solving	0.892	Reliable
Creativity and Innovation	0.873	Reliable

The results of validity and reliability testing show that the 21st-century skills instrument is said to be valid and reliable and can be used in research.

B. 21st-Century Skills Rubric Score Results

From the results of the observation assessment of initial skills and student skills after learning using the Case Method with the VAK model, data were obtained on the assessment of 21st-century skills, which are described in Table 7.

Table 7. Average Score of Students' 21st-Century Skills Assessment Rubric

21st-Century Skills Rubric Score	Initial Observations	Final Observation
Maximum Score	2.91	3.68
Minimum Score	1.12	1.86
Average	1.90	3.09
Category	Level 1	Level 2

The average results of the assessment rubric score in Table 5 show an increase in students' 21st-century skills when participating in practical lectures with the Case Method and VAK Model of 1.19. The distribution of students' 21st-century skills rubric scores is explained in Figure 2.

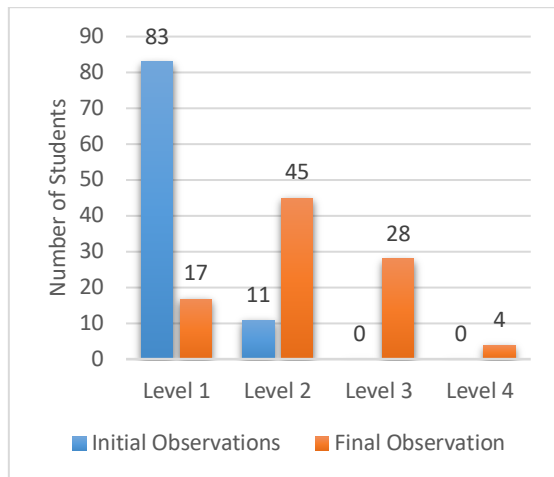


Figure 2. Distribution chart of students' 21st-century skills rubric scores

The distribution of skill scores in Figure 2 shows an increase in students' 21st-century skills after participating in practical learning with the Case Method and VAK Model, with 81% of students successfully achieving scores above Level 1.

C. Results of the 21st-Century Skills Questionnaire Scores for Students

The results of the average percentage of students' 21st-century skills questionnaire scores, which are described in each skill aspect, can be seen in Table 8.

Table 8. Average Percentage of Students' 21st-Century Skills Questionnaire Scores

No	Skills Aspect	Percentage (%)	Category
1	Communication	82.1	Strong
2	Collaboration	87.0	Very Strong
3	Critical Thinking and Problem Solving	86.2	Very Strong
4	Creativity and Innovation	76.5	Strong
Total		82,9	Strong

The percentage of 21st-century skills questionnaire scores in the "Very Strong" category, based on Table 8, was obtained for the

aspects of Collaboration, Critical Thinking, and Problem-Solving. Meanwhile, the "Strong" category was found in the aspects of Communication skills, Creativity, and Innovation skills. The overall average score of students' 21st-century skills questionnaire results fell into the "Strong" category, with a percentage of 82.9%. The distribution of the percentage of students' 21st-century skills questionnaire scores is illustrated in Figure 3.

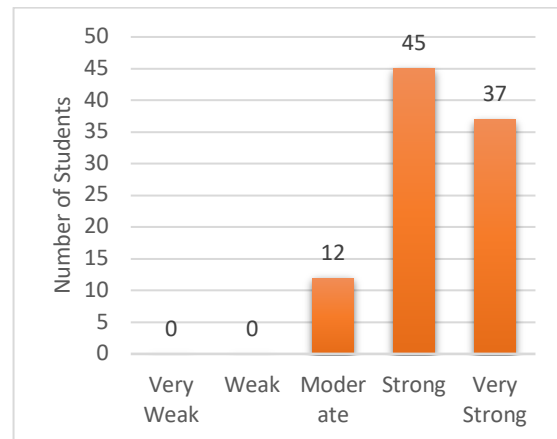


Figure 3. Distribution chart of student 21st-century skills questionnaire scores

The distribution of skill scores in Figure 3 shows that students' 21st-century skills improved after participating in practical learning with the Case Method and VAK Model, with all students achieving scores above the "Weak" category.

D. Results of Inferential Analysis

1. Normality Test

The normality test was conducted using the Statistical Package for Social Sciences (SPSS) version 27.0.1. The normality test refers to the Kolmogorov-Smirnov test with a significance level of $\alpha = 0.05$. The results of the normality test can be seen in Table 9.

Table 9. Results of Normality Test of Observation Data of 21st-Century Skills

Types of Skills	Data	Sample (N)	Significance	Conclusion
Student's 21st-century skills	Initial Observations	94	0.06	Normal
	Final Observations	94	0.05	Normal

Data testing using the Kolmogorov-Smirnov test shows that the data is normally distributed if the significance value is $> \alpha$, and

vice versa if the significance value is $\leq \alpha$, the sample is not normally distributed. Based on the data in Table 9, it shows that all data in the sample is normally distributed.

2. Hypothesis Testing

Hypothesis testing was conducted using the *Paired Sample T-Test* assisted by the SPSS version 27.0.1 application. Hypothesis testing was determined by the criteria of $p\text{-value} > \alpha$ (0.05), then H_0 is accepted, and H_1 is rejected. If $p\text{-value} < \alpha$ (0.05) then H_0 is rejected and H_1 is accepted. The results of the hypothesis test on students' 21st-century skills can be seen in Table 10.

Table 10. Results of the Hypothesis Test of Students' 21st Century Skills

Data	Sample (N)	t	Df	P-value
Student s' 21st-century skills	94	17.311	93	0.001

Table 10 shows the T_{count} value of students' 21st century skills of 17,311, while the T_{table} value with degrees of freedom (Df) = 93 at a two-tailed significance level is $T_{\text{table}} = 1,989$. Therefore, $T_{\text{count}} > T_{\text{table}}$ ($p\text{-value} < 0.05$), and the significance value obtained is Sig. (2-tailed) $0.001 < \alpha$ (0.05) then H_0 is rejected and H_1 is accepted. These results indicate that implementing the VAK (*Visualization, Auditory, Kinesthetic*) model in case-method-based practical learning improves students' 21st-century skills.

The results of the descriptive analysis of the 21st-century skills rubric indicate a significant improvement in students' performance when taught using the Case Method and the VAK Model in practical learning. Based on the average scores in the students' 21st-century skills rubric, the improvement was quite substantial, with the overall category of students' 21st-century skills reaching level 2. In terms of score distribution, more than 50% of students achieved scores above level 1, with some reaching levels 3 and 4. These findings are further supported by the distribution of scores on the 21st-century skills questionnaire, which showed that most students fell into the "strong" and "very strong" categories. Thus, it can be concluded that the application of the VAK (*Visualization, Auditory, Kinesthetic*) model in case-method-based practical learning enhances students' 21st-century skills.

Based on the average questionnaire scores for each aspect of 21st-century skills, the range was above 80%, categorized as "Strong." The

most influential aspects of students' 21st-century skills, both from the average questionnaire and rubric scores, were Collaboration, Critical Thinking, and Problem-Solving. This indicates that most students were able to collaborate and think critically to solve problems and achieve the objectives of the practical sessions.

The implementation of the VAK (*Visualization, Auditory, Kinesthetic*) model in Case Method-based practical learning requires students to perform pattern recognition and evidence evaluation. Case studies in learning provide contradictory data, demanding the brain to perform logical inference and deduction. These conditions cause Critical Thinking and Problem Solving skills to become dominant aspects of 21st-century skills. This finding is reinforced by research conducted by Fauzi, which states that the Case Method learning model is effective in improving students' critical thinking abilities (Fauzi et al., 2023). In addition to these aspects, the cooperation aspect has a significant influence on enhancing 21st-century skills. This occurs because Case Method-based practical learning creates an environment where students must test each other's arguments to reach a consensus on a case solution. Thus, collaboration plays a vital role in developing solutions to case studies. In her research, Widiastuti also noted that the Case Method learning model can increase students' active participation in lectures (Widiastuti et al., 2022). On the other hand, Dewi's research found that implementing the Case Method significantly improves students' collaboration skills (Dewi et al., 2024).

Creativity and innovation require unlimited freedom, whereas in the Case Method learning, they are constrained by real-case parameters. The focus is not on creating something "new," but rather on finding the "most appropriate solution clinically or logically". Meanwhile, in the communication aspect, students can communicate well without collaborating. This Case Method learning emphasizes aligning ideas to solve problems, rather than just fluency in delivering presentations. Therefore, these two aspects have a significant influence but do not dominate in enhancing 21st-century skills.

The empirical findings of this study confirm that the Case Method, supported by the VAK learning model, enhances students' 21st-century skills, particularly in Collaboration, Critical Thinking, and Problem-Solving. These results are also supported by studies conducted by Syawalina and Alania, which reported that the VAK model improved critical thinking and problem-solving abilities (Syawalina et al., 2024;

Alania & Afandi, 2025). This may be due to the structured stages of the Case Method, which heavily involve student collaboration from case presentation, problem-solving, and discussions to the final stage of presenting results. These stages require students to take responsibility and actively engage in solving case studies, thereby fostering critical thinking and problem-solving processes.

Based on the results of the inferential analysis, it shows that the significance value of students' 21st century skills obtained through the parametric statistical test *Paired Sample T-Test* obtained a $T_{\text{count}} > T_{\text{table}}$ ($p\text{-value} < 0.05$), where the T_{count} value of students' 21st-century skills = 17,311, while the T_{table} value with degrees of freedom (Df) = 93 and the significance value obtained is *Sig. (2-tailed)* $0.001 < \alpha$ (0.05). From the acquisition of these significance values, it can be interpreted that H_0 is rejected and H_1 is accepted. This supports the results of the descriptive analysis, which indicate that applying

the VAK (*Visualization, Auditory, Kinesthetic*) model in case-method-based practical learning improves students' 21st-century skills.

CONCLUSION

Based on the research findings, it can be concluded that the application of the VAK (*Visualization, Auditory, Kinesthetic*) model in case-method-based practical learning has a significant effect on improving students' 21st-century skills, with a significance value of 0.001. The most influential aspects of 21st-century skills are Collaboration at 87%, Critical Thinking and Problem Solving at 86.2%, with a very strong category. On the other hand, Communication at 82.1%, Creativity and Innovation at 76.5%, with a strong category. Further research is needed to examine the ideal combination of models and learning approaches in order to achieve better outcomes in enhancing 21st-century skills.

REFERENCES

- Al-Fikri, H.M. (2021). Peluang dan Tantangan Perguruan Tinggi Menghadapi Revolusi Digital di Era Society 5.0. 3(3), 350–355. Retrieved from <https://prosiding.unma.ac.id/index.php/semnasfkip/article/view/621>
- Alania, Z., Afandi, M. (2025). Pengaruh Model Pembelajaran VAK (*Visualization, Auditory, Kinesthetic*) Terhadap Kemampuan Berpikir Kritis Pada Mata Pelajaran IPAS Kelas IV SDN Pamongan 1. IJE. 2(1):342-347. doi:10.71417/ije.v2i1.457
- Arsanti, M., Zulaeha, I., Subiyantoro, S., S, N. H. (2021). Tuntutan Kompetensi 4C Abad 21 dalam Pendidikan di Perguruan Tinggi untuk Menghadapi Era Society 5.0. Prosiding Seminar Nasional Pascasarjana. 319-324. Retrieved from <https://proceeding.unnes.ac.id/index.php/snpasca/article/view/895>
- Astuti, B. (2022). Optimalisasi Model Pembelajaran VAK (*Visual, Auditory, Kinesthetic*) Sebagai Upaya Meningkatkan Kemampuan Mengidentifikasi Unsur Cerpen pada Siswa Kelas XI SMA Negeri Terawas. Jurnal Language Education Literature. 2(2), 1-16. doi:10.55526/-v2i2.520
- Damayanti, E., Santosa, A.B., Zuhrie, M.S., Rusimamto, P.W. (2020). Pengaruh Penggunaan Media Pembelajaran Berbasis Multimedia Interaktif Terhadap Hasil Belajar Siswa Berdasarkan Gaya Belajar. Jurnal Pendidikan Teknik Elektro. 9(3):639-645. doi: 10.26740/jpte.v9n03.p639-645
- Dewi, I., Siregar, H., Agustina, A., Dewantara, K.H. (2024). Implementasi Case Method Berbasis Pembelajaran Proyek Kolaboratif terhadap Kemampuan Kolaborasi Mahasiswa Pendidikan Matematika. Teorema: Teori dan Riset Matematika. 9(2), 261-276. doi: 10.25157/teorema.v9i2.16341
- Fakhri, A. (2023). Kurikulum merdeka dan pengembangan perangkat pembelajaran: menjawab tantangan sosial dalam meningkatkan keterampilan abad 21. Proceeding Umsurabaya. Retrieved from <https://journal.um-surabaya.ac.id/Pro/article/view/19711>
- Fauzi, A., Ermiana, I., Rosyidah, A.N.K., Sobri, M. (2023). The Effectiveness of Case Method Learning in View of Students' Critical Thinking Ability. Pedagogia: Jurnal Pendidikan. 12(1), 15-33. doi: 10.21070/pedagogia.v11i1.1544
- Jufriadi, A., Huda, C., Aji, S.D., Pratiwi, H.Y., Ayu, H.D. (2022). Analisis Keterampilan Abad 21 Melalui Implementasi Kurikulum Merdeka Belajar Kampus Merdeka. JPNK: Jurnal Pendidikan dan Kebudayaan. 7(1):39 -53. doi:10.24832/jpnk.v7i1.2482
- Karaca-Atik, A., Meeuwisse, M., Gorgievski, M., Smeets, G. (2023). Uncovering important

- 21st-Century skills for sustainable career development of social sciences graduates: A systematic review. *Educational Research Review*. 100528. doi: 10.1016/j.edurev.2023.100528
- Kusumawarti, E., Subiyantoro, S., Rukayah. (2020). The Effectiveness of Visualization, Auditory, Kinesthetic (VAK) Model toward Writing Narrative: Linguistic Intelligence Perspective. *International Journal of Instruction*. 13(4), 677-694. doi:10.29333/iji.2020.13442a
- Makhrus, M., Harjono, A., Syukur, A., Bahri, S., Muntari, M. (2018). Identifikasi kesiapan LKPD guru terhadap keterampilan abad 21 pada pembelajaran IPA SMP. *Jurnal ilmiah profesi pendidikan*. 3(2). doi: 10.29303/jipp.v3i2.20
- Mantau, B.A.K., Talango, S.R. (2023). Pengintegrasian Keterampilan Abad 21 dalam Proses Pembelajaran (Literature Review). *Irfani (e-Journal)*. 19(1):86-107. doi:10.30603/ir.v19i1.3897
- Mardhiyah, R.H., Aldriani, S.N.F., Chitta, F., & Zulfikar, M.R. (2021). Pentingnya Keterampilan Belajar di Abad 21 sebagai Tuntutan dalam Pengembangan Sumber Daya Manusia. *Lectura: Jurnal Pendidikan*. 12(1), 29-40. doi: 10.31849/lectura.v12i1.5813
- Munfiatik, S. (2023). Collaborative Learning Sebagai Model Inovasi Pendidikan Dalam Pembelajaran. *SINOVA: Jurnal Ilmu Pendidikan & Sosial*. 1(2), 83-94. doi: 10.71382/sinova.v1i2.37
- Nashiroh, P. K., Ristanto, R. D., Ekarini, F., Widianingtyas, W. Y., Khoerunnisa, A. K., Hasanah, N. K. (2024). Implementasi Case Method Pada Pengembangan Modul Digital Simulasi Jaringan Komputer untuk Mendukung Kecakapan Abad 21 Mahasiswa. *Jurnal Ilmiah Wahana Pendidikan*. 10(24.2):818-32. Retrieved from <https://jurnal.peneliti.net/index.php/JIWP/article/view/11326>
- Ningtyas, B.P., Rukhayah, R.R., Triyanto, T. (2023). VAK (Visual, Auditory, Kinesthetic): Pedagogical Implications of Model Learning. *Proceeding of International Conference on Education*. 2, 46-51. Retrieved from <https://icon.ftk.uinjambi.ac.id/index.php/icon/article/view/66>
- Nuzalifa, Y. U. (2021). Penerapan Model Pembelajaran Think-Pair-Share (TPS) Berbasis Lesson Study sebagai Upaya untuk Meningkatkan Keterampilan Kolaborasi Mahasiswa. *Jurnal Pendidikan dan Pembelajaran Sains (JPPSI)*. 4(1), 48-57. doi:10.23887/jppsi.v4i1.31774
- Pramesti, K.D., Meisya, N.I., Amrillah, R. (2024). Relevansi Lulusan Perguruan Tinggi dengan Dunia Kerja. 3(4), 236-243. Retrieved from <https://journal.nabest.id/index.php/annajah/article/view/304>
- Prasetyo, A., Prastyana, B.R., Putra, V.F.E., Adytya, D.P. (2023). Pengelolaan Lembaga Sertifikasi Profesi (LSP-P1) dalam Menyiapkan Lulusan Perguruan Tinggi di Dunia Kerja. *SAJIEM: Southeast Asian Journal of Islamic Education Management*. 4(1), 59-72. doi:10.21154/sajiem.v4i1.177
- Puspitarini, D. (2022). Blended Learning as a 21st Century Learning Model. *Ideguru: Jurnal Karya Ilmiah Guru*. 7(1), 1-6. doi:10.51169/ideguru.v7i1.307
- Rahmadi, M.T., Nurman, A., Yuniastuti, E., Pinem, M., Berutu, N., Rahmadi, M. T., Maulia, T., Ginting, M. R. P., Saqina, D. (2022). Analisis Penerapan Case Method dan Team Based Project Dalam Kebijakan Jurusan di Universitas Negeri Medan. *PUBLIKA: Jurnal Administrasi Publik Universitas Medan Area*. 10(2), 137-143. doi:10.31289/publika.v10i2.8348
- Rahmah, A., Disman, Supriadi, A. (2024). Implementasi Pembelajaran Visual Auditory Kinesthetic (VAK) Sebagai Upaya Meningkatkan Berpikir Kreatif Siswa pada Pembelajaran IPS. *Didaktika: Jurnal Kependidikan*. 13(4), 4903-4914. doi:10.58230/27454312.1181
- Ramdani, A., Jufri, A. W., Gunawan, G., Hadisaputra, S., Zulkifli, L. (2019). Pengembangan alat evaluasi pembelajaran IPA yang mendukung keterampilan abad 21. *Jurnal Penelitian Pendidikan IPA*. 5(1). doi:10.29303/jppipa.v5i1.221
- Ririen, D., & Irawati. (2023). Implementasi Pembelajaran Berbasis Case Method dalam Meningkatkan Kemampuan Berkomunikasi dan Critical Thinking Mahasiswa. *Jurnal Dedikasi Pendidikan*. 7(1), 27-38. doi:10.30601/dedikasi.v7i1.3443
- Salsabila, G., Septian, A., Inayah, S., Hanifah, N., & Komala, E. (2023). Penerapan Model Pembelajaran Visualization, Auditory, Kinesthetic (VAK) terhadap Kemampuan Pemahaman Konsep Matematika Siswa. *Intellectual Mathematics Education (IME)*. 1(1), 33-39. doi:10.59108/ime.v1i1.16
- Setiawan, A.S., Alimah, S. (2019). Pengaruh model pembelajaran visual auditory

- kinesthetic (VAK) terhadap keaktifan siswa. *Profesi Pendidikan Dasar*. 6(1):81-90. Retrieved from <https://journals.ums.ac.id/ppd/article/view/7284>
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.
- Syawalina, S., Rustamana, A., Maryuni, Y. (2024). Pengaruh Gaya Belajar VAK (Visual, Auditorial dan Kinestetik) Terhadap Kemampuan Berpikir Kritis Pada Mata Pelajaran Sejarah Indonesia Siswa Kelas XI IPA 2 SMA Negeri 7 Kota Serang. *J-CEKI*. 4(1):342-352. doi:10.56799/jceki.v4i1.6252
- Trisnawati, W. W., Sari, A. K. (2019). Integrasi keterampilan abad 21 dalam modul sociolinguistics: Keterampilan 4c (collaboration, communication, critical thinking, dan creativity). *Jurnal Muara Pendidikan*. 4(2), 455-66. doi:10.52060/mp.v4i2.179
- Widiastuti, F., Amin, S., Hasbullah, H. (2022). Efektivitas Metode Pembelajaran Case Method Dalam Upaya Peningkatan Partisipasi dan Hasil Belajar Mahasiswa pada Mata Kuliah Manajemen Perubahan. *Edumaspul: Jurnal Pendidikan*. 6(1), 728-731. doi:10.33487/edumaspul.v6i1.3034
- World Economic Forum. (2020). *The Future of Jobs Report 2020*.
- Wulandari, A., Wibowo, D.E., Arifin, M. (2022). Pergeseran pembelajaran berbasis student centered learning. *PEGAS (Jurnal Pendidikan Guru Sekolah Dasar)*. 1(1):1-5. doi:10.56721/PEGAS.V1I1.78