Jurnal Pendidikan Ekonomi
DOI 10.17977/UM014v19i1p015

Research Article

Does the Group Investigation Learning Model Promote Student Outcomes?

Cahya Rizki A'lifiah*, Durinda Puspasari
Faculty of Economics and Business, Universitas Negeri Surabaya, Surabaya, Indonesia
*Corresponding email: cahya.21054@mhs.unesa.ac.id

Abstract
This research aims to determine the impact of the group investigation learning model on student learning outcomes in the archival management element of the office management subject. A quasi-experimental design was applied involving two classes: the first class (experimental group, group investigation model) and the second class (control group, direct instruction), with a total of 70 students selected through saturated sampling. Data were collected through tests, observations, interviews, and documentation. In addition, validity and reliability tests were conducted before data analysis using SPSS version 22. Comparative analysis through independent sample t-test revealed that t-count (3.268) > t-table (2.002) with a significance value of 0.002 < 0.05, indicating a significant positive influence of the group investigation model on student learning outcomes. Students in the experimental group showed higher gain scores compared to those in the control group. These findings indicate that the group investigation model is effective in enhancing mastery of procedural and conceptual competencies in archives management, demonstrating its suitability for vocational learning contexts that require inquiry, collaboration, and problem-solving.

Keywords: archives management, group investigation, learning outcomes

INTRODUCTION

The improvement of student outcomes remains an important issue in vocational education (SMK), primarily in students who are expected to master knowledge, skills, and professional attitudes (Inderanata & Sukardi, 2023). In the context of 21st-century learning, students are required to understand subject content and demonstrate critical thinking, collaboration, communication, and problem-solving abilities (Thornhill-Miller et al., 2023). These competencies are relevant for vocational high schools because students are prepared to enter the workplace, continue higher education, or develop entrepreneurial capacities (Jumhur et al., 2024). However, conventional instruction that relies heavily on lectures results in passive students who struggle to develop critical thinking and collaboration skills, while active learning approaches have been shown to enhance student conceptual understanding and overall learning outcomes (Amirova, 2025). The Indonesian Merdeka Curriculum reinforces this by emphasizing student centered learning, requiring teachers to create learning activities that foster collaboration, communication, analysis, and critical thinking (Hunaepi & Suharta, 2024). The success of the curriculum depends on the use of innovative learning models that can stimulate active participation.

Received: 24 December 2025; Revised: 16 February 2026; Accepted: 27 February 2026
This is an open access article under the CC BY-NC-SA 4.0 license

One model that aligns with these characteristics is the group investigation model. As a form of cooperative learning, group investigation engages students in investigating problems, analyzing information, and presenting findings collaboratively (Silva et al., 2023). Students work in heterogeneous groups, develop investigation plans, explore learning resources, and communicate their results (Ainiyah et al., 2022). The model emphasizes higher order thinking, teamwork, and communication skills, enabling deeper involvement in the learning process (Syam & Murdiono, 2025). The group investigation model is considered suitable for addressing these challenges, as it allows students to explore archival problems, analyze information collaboratively, and present their findings (Devi et al., 2020; Utamaningsih et al., 2023).

Archival management was chosen as the focus of this study due to its central role in the office management competency. The topic requires procedural accuracy, analytical skills, and mastery of filing systems competencies essential for vocational students preparing for administrative work environments (Rahayuningsih & Martono 2020). In addition, archival management provides an appropriate context for implementing the group investigation learning model because students can investigate real problems related to records management, collaborate in organizing information, and present practical solutions (Bajwa & Rafiq, 2025). The activities are consistent with the orientation of vocational education, which emphasizes practice-based learning, workplace relevance, and the development of job-related skills (Adelia et al., 2025).

Previous research has demonstrated that group investigation can improve learning outcomes, motivation, and student activity. For instance, a study by Hia et al. (2022) found that group investigation can develop students' analytical skills in understanding learning concepts. In addition, Zuhdi et al. (2021) remarked that group investigation significantly improves learning outcomes compared to conventional instructional approaches. Similar findings by Palupi and Rahayu (2021) revealed that group investigation can improve students' communication and social skills. However, studies on the implementation of the group investigation model within vocational education settings in Indonesia remain limited, particularly in subjects that require procedural competence such as archival management. Therefore, this study seeks to fill this gap by empirically examining the impact of group investigation on archival competencies in a vocational context. To guide this study, the research question (RQ) is formulated: RQ. Does the group investigation influence student learning outcomes?

The structure of this article is organized as follows. The subsequent section provides a theoretical foundation encompassing cooperative learning principles and the group investigation model. The methodology section then outlines the research design, participant characteristic, instruments, and procedures for data collection and analysis. The following section presents the study findings along with a detailed discussion. Finally, the concluding section summarizes the main results, highlight the implications, and offers recommendations for future research.

METHOD

Research Design

This research employed a quantitative approach using a quasi-experimental design with a pretest and posttest control group model. This design was selected because random assignment of participants was not possible, as class groupings had already been determined by the school. Thus, the quasi-experimental design was the most suitable for

maintaining natural classroom conditions while still allowing comparison between the group investigation model and direct instruction. This study involved two classes XI MP2 as the experimental group and XI MP1 as the control group in SMKS PGRI 2 Sidoarjo, with a total of 70 students. A saturated sampling technique was used, meaning that the entire population was included as the research sample.

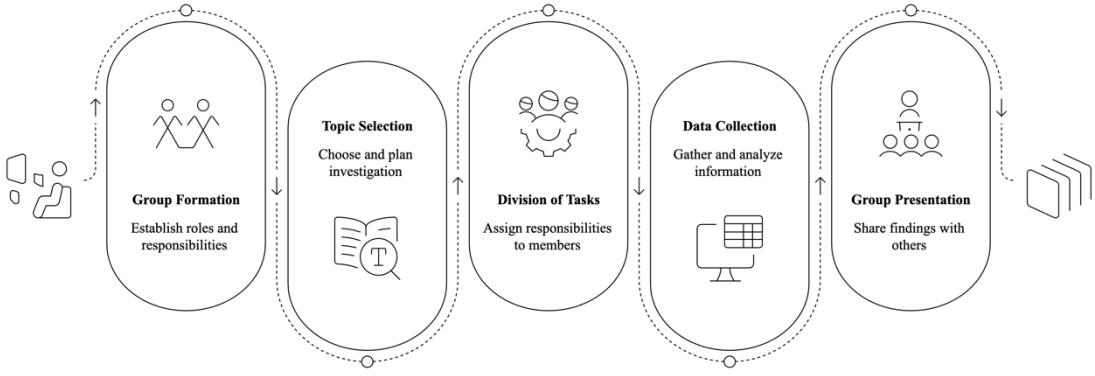
Instruments

The instruments used in this study consisted of tests, observation sheets, and documentation. The test instrument was developed based on the competency indicators of the archival management element and was validated through item validity tests, reliability tests, difficulty index, and discrimination index using SPSS version 22. Observation sheets were employed to assess student activity and engagement during the learning process, particularly in group work and investigation stages. Meanwhile, documentation included school records such as summative scores, student data, and learning materials that supported the research process.

Procedures

The procedures of this research consisted of several stages. As shown in Figure 1, the process begins with group formation, where students are organized into small groups and each member is given clear roles and responsibilities. After that, students move to topic selection, in which they choose and plan the problem or issue they want to investigate. The next stage is the division of tasks. At this point, responsibilities are distributed fairly among group members so that everyone contributes to the investigation. Students then conduct data collection by gathering, analyzing, and interpreting relevant information from various sources. This stage encourages inquiry, cooperation, and critical thinking. Finally, the groups present their findings to the class through a group presentation. They share the results of their investigation, explain their ideas, and respond to questions from others.

Figure 1
Steps of the group investigation model



Data Analysis

Data were analyzed using both descriptive and inferential statistics. Descriptive analysis was used to present the mean scores, distribution, and mastery learning percentages for the pretest and posttest results. Inferential analysis included normality testing, homogeneity testing, independent t-tests, and gain score calculations to determine

the improvement in learning outcomes. All statistical analyses were conducted using SPSS version 22.

RESULT

Pretest Results of the Experimental Class and Control Class

Before the learning treatment was implemented, both classes were given a pretest to measure their initial ability in the Archival Management material. Based on the pretest scores, the experimental class (XI MP2) obtained scores ranging from 20 to 90 with an average of 55.33, while the control class (XI MP1) obtained scores ranging from 40 to 90 with an average of 60.00. Both mean scores were below the minimum passing criteria, indicating that the initial competence of students in both classes was relatively comparable and required improvement (see Table 1). The results show that although the control class had a slightly higher mean score, the overall initial ability of both groups was still relatively similar to ensuring balanced starting conditions before the learning intervention.

Table 1
Pre-test results of the experimental class and control class

Class	Lowest Score	Highest Score	Average	Number of Students
Control Class (MP2)	40	90	60.00	30
Experimental Class (MP1)	20	90	55.33	30

Source: processed by researchers (2025)

Posttest Results for the Experimental Class and Control Class

After the instructional treatment was completed, both classes were given a posttest to evaluate changes in learning outcomes. The experimental class obtained scores ranging from 40 to 100 with an average of 72.00, with most students achieving scores above the minimum passing criteria. Meanwhile, the control class obtained scores ranging from 20 to 90 with an average of 55.33. these results indicate that the group investigation model supported greater improvement compared to direct instruction (see Table 2).

Table 2
Posttest results of experimental class and control class

Class	Lowest Score	Highest Score	Average	Number of Students
Control Class (MP2)	20	90	55.33	30
Experimental Class (MP1)	40	100	72.00	30

Source: processed by researchers (2025)

The results of the study showed that the experimental class experienced a more substantial increase after learning, indicating that the group investigation model is more effective in improving students understanding of archives management. The increase in the experimental group posttest scores further demonstrates that the group investigation model contributed to a greater improvement in student understanding of archival concepts compared to conventional instruction. Although both groups experienced improvement, the gain in the experimental group was substantially.

Validity

A validity test was conducted to determine whether each item in the learning outcome test accurately measured students understanding of the Archives Management material. The instrument consisted of 30 items, which were analyzed using Pearson Product Moment correlation in SPSS version 22. Based on the analysis results, 9 items met the validity criteria (r-count > r-table) and were declared valid for use in the pre-test and posttest assessments. Meanwhile, the other items did not meet the required correlation threshold and were not included in further analysis. The results of the validity test are summarized in Table 3.

Table 3
Validity test results

Question No.	r-count	r-table	Information
Question 1	0.181	0.361	Invalid
Question 2	0.425	0.361	Valid
Question 3	0.175	0.361	Invalid
Question 4	0.323	0.361	Invalid
Question 5	0.085	0.361	Invalid
Question 6	0.253	0.361	Invalid
Question 7	0.374	0.361	Valid
Question 8	0.432	0.361	Valid
Question 9	0.188	0.361	Invalid
Question 10	0.358	0.361	Invalid
Question 11	0.156	0.361	Invalid
Question 12	0.408	0.361	Valid
Question 13	0.183	0.361	Invalid
Question 14	0.374	0.361	Valid
Question 15	0.361	0.361	Valid
Question 16	0.253	0.361	Invalid
Question 17	0.201	0.361	Invalid
Question 18	0.118	0.361	Invalid
Question 19	0.140	0.361	Invalid
Question 20	0.457	0.361	Valid
Question 21	0.136	0.361	Invalid
Question 22	0.118	0.361	Invalid
Question 23	0.199	0.361	Invalid
Question 24	0.527	0.361	Valid
Question 25	0.343	0.361	Invalid
Question 26	0.316	0.361	Invalid
Question 27	0.561	0.361	Valid
Question 28	0.297	0.361	Invalid
Question 29	0.163	0.361	Invalid
Question 30	0.103	0.361	Invalid

Source: processed by researchers using SPSS 22

Based on the analysis, 9 items satisfied the validity requirement and were therefore included in the final version of the learning achievement test. These valid items represent questions that can consistently measure student conceptual and procedural understanding of Archival Management. The elimination of invalid items helped ensure that the assessment tool met appropriate psychometric standards for evaluating learning outcomes.

Reliability

Reliability testing was conducted to determine the consistency and stability of the learning achievement test items used in this study. Reliability was measured using Cronbach's Alpha via SPSS version 22. An instrument is considered reliable if the Cronbach's Alpha value exceeds 0.60. Based on the analysis results, the Cronbach's Alpha value of the test instrument exceeds the minimum reliability threshold, indicating that the items used in the learning achievement test are internally consistent and appropriate for measuring student learning outcomes, as illustrated in Table 4.

Table 4
Reliability Test Results

Test Types	Cronbach's Alpha	Decision
Test Results	0.664	Reliable

Source: processed by researchers using SPSS 22 (2025)

Reliability analysis showed that the Cronbach's Alpha value of the learning outcome test met the required threshold, indicating that the instrument was categorized as reliable. This means that the test items consistently measured student understanding of the Archives Management material and could be used confidently for pre- and post-test assessments. These validity and reliability results are important because they confirm that the test items accurately measure the intended learning constructs and produce consistent scores across classes. Therefore, the instrument used in this study can be interpreted with confidence when comparing pretest and posttest results between the control and experimental groups.

Question Difficulty Level

The difficulty level analysis was conducted to classify test items into categories of easy, medium, and difficult based on the proportion of students who answered each item correctly. This analysis aimed to ensure that the items used in the learning achievement test appropriately represented the range of student abilities. The results showed that all valid items were categorized as "easy," indicating that the test items were generally accessible for students and aligned with the expected competency level in Archival Management. A summary of the difficulty classification is presented in Table 5.

Table 5
Test of difficulty level of pretest and posttest items

Category	Difficulty Index Range	Number of Items	Percentage
Easy	0.83 – 0.89	30	100%
Medium	-	0	0%
Difficult	-	0	0%

Source: processed by researchers using SPSS 22 (2025)

All items in the learning achievement test fall within the "easy" category, indicating that the test was generally accessible for students and aligned with the expected competency level in Archival Management. This simplified table fulfills the reviewer's suggestion to streamline minor data while maintaining the essential information.

Discrimination Index

The discrimination index analysis was conducted to determine the extent to which each test item was able to distinguish between high-performing and low performing students. This analysis is essential to ensure that the test items accurately capture variations in student mastery of Archival Management concepts. The results showed that the valid test items fell into the categories of "good" and "acceptable," indicating that the instrument successfully differentiated students based on their performance levels. The detailed item by item results were condensed into a summary table presented in Table 6.

Table 6
Discrimination index test for pretest and posttest

Category	Number of Items	Percentage
Good	3	10%
Enough	9	30%
Bad	18	60%

Source: processed by researchers using SPSS 22 (2025)

The analysis shows that only three items demonstrated good discrimination power, while 9 items were categorized as acceptable; however, the majority of items (18 items) fell into the poor category, indicating that many items did not effectively distinguish between high and low performing student. Despite this limitation, the items classified as "good" and "acceptable" still provided adequate measurement for evaluating student learning outcomes, and the instrument remained usable after selecting valid and reliable items. In line with reviewer feedback, the presentation of item statistics was streamlined to avoid unnecessary detail. Moreover, the difficulty index and discrimination power analyses together ensure that the remaining test items are appropriately balanced and capable of distinguishing students with different levels of mastery, thereby reinforcing the credibility of the test results and supporting the validity of subsequent comparisons between the two groups.

Normality

The normality of the data was assessed using the Shapiro–Wilk test in SPSS 22 with a significance threshold of 0.05. A dataset is considered to follow a normal distribution when its significance value exceeds 0.05. The results of the normality analysis are summarized in Table 7.

Table 7
Normality test results

Learning outcomes	Shapiro-Wilk
Control Class Pretest	0.063
Control Class Posttest	0.094
Experimental Class Pretest	0.071
Experimental Class Posttest	0.061

Source: processed by researchers using SPSS 22 (2025)

Based on the Shapiro–Wilk output shown in the table, the significance values for the experimental class were 0.071 for the pretest and 0.061 for the posttest. Meanwhile, the control class obtained significance values of 0.063 for the pretest and 0.094 for the posttest. Since all values are greater than 0.05, it can be concluded that both the pretest

and posttest scores in the experimental and control classes met the criteria for normally distributed data.

Homogenity Test

A homogeneity test was carried out in SPSS 22 to determine whether the variances of the posttest scores from the experimental and control classes were similar. The data were considered homogeneous if the significance value exceeded 0.05. The results of the analysis are shown in Table 8. Based on the homogeneity test results, the posttest data produced a significance value of 0.159. Since this value is higher than the threshold of 0.05, it indicates that the variances of the two groups are homogeneous. Therefore, the assumption of equal variances required for conducting the t-test was satisfied.

Table 8
Homogenity test results

Group	Significance	Information
Posttest of Experimental Class & Control Class	0.159	Homogeneous (Sig > 0.05)

Source: processed by researchers using SPSS 22 (2025)

Hypothesis Testing

Hypothesis testing was conducted using an Independent Sample T-test. The analysis results showed a significance value of 0.002, so the hypothesis was accepted because sig < 0.05. Thus, there was a significant difference in learning outcomes between the class using the Group Investigation model and the control class. Based on the results shown in Table 9, the t-test yielded a significance level of 0.002, leading to the acceptance of the research hypothesis. This finding demonstrates that the Group Investigation learning model had a significant positive effect on student learning outcomes when compared to the Direct Instruction approach used in the control group. The significant difference identified in the t-test demonstrates that the Group Investigation model had a measurable and positive impact on learning outcomes. This supports the hypothesis that student centered investigation contributes more effectively to understanding archival procedures than teacher centered instruction.

Table 9
Hypothesis testing

Group	t-count	Significance	Information
Posttest of Experimental Class and Control Class	3,628	0.002	Significant (Ha accepted)

Source: processed by researcher using SPSS 22 (2025)

Gain Score Test

The results of the gain score analysis revealed that both the experimental and control classes experienced an improvement in learning outcomes. However, the increase observed in the experimental group was greater than that of the control group. This demonstrates that the Group Investigation learning model was more effective in enhancing student academic performance.

Table 10
Gain Score Test

Group	Pretest Average	Posttest Average	Gain Score	Information
Experimental Class	55.33	72.00	16.67	Higher increase
Control Class	39.32	55.33	16.10	Lower increase

Source: processed by researchers using SPSS 22 (2025)

As shown in Table 10, the experimental class achieved an average pretest score of 55.33 and a posttest average of 72.00, resulting in a gain score of 16.67, while the control class improved from an average pretest score of 39.32 to a posttest average of 55.33, producing a gain score of 16.10. Although both groups showed progress, the experimental class exhibited a slightly higher increase, indicating that the Group Investigation model is more successful in promoting improvements in student learning outcomes compared to the model used in the control group. The higher gain score in the experimental class confirms that students not only improved but demonstrated a significantly greater rate of progress after receiving the Group Investigation treatment, suggesting that the investigative and collaborative elements of the model supported deeper conceptual processing during archival learning.

DISCUSSION

The findings of this study demonstrate that the group investigation learning model has a significant positive effect on student learning outcomes in the archival management element compared to direct instruction. The t-test results confirmed a statistically significant difference between the experimental and control groups, while the gain score analysis indicated that students taught using the group investigation model experienced greater improvement than those receiving direct instruction. This finding suggests that investigating topics, collaborating in groups, analyzing information, and presenting findings support deeper levels of cognitive processing compared to traditional, teacher centered methods, supporting some prior studies (e.g., Mohzana et al., 2023; Solikah et al., 2024).

These results are meaningful within the context of vocational education in Indonesia, where learning emphasizes not only conceptual mastery but also procedural competence. Archival management requires students to understand filing systems, apply classification procedures, and analyze documentation structures skills that involve hands on practice and collaborative problem solving (Nugroho et al., 2025). Therefore, learning models that actively engage students in investigation and group collaboration are more suitable for achieving these competencies (Gillies, 2023). The group investigation model aligns with these demands because it engages students in activities that mirror real administrative tasks, such as identifying filing problems, searching for solutions, and communicating findings (McNabb et al., 2023). Therefore, the stronger improvement observed in the experimental group can be interpreted as evidence that group investigation enhances both conceptual understanding and the procedural skills necessary for vocational tasks.

The results of this study are consistent with earlier research reporting the positive impact of the group investigation model on student motivation, analytical ability, and learning outcomes (Hia et al. 2022; Zuhdi et al. 2021; Palupi & Rahayu, 2021). However,

this study expands previous findings by showing that group investigation is not only beneficial for cognitive development in general academic settings but also for strengthening procedural and administrative competencies required in vocational learning. This reinforces the argument that group investigation supports higher order thinking processes by encouraging learners to examine problems, evaluate information, and collaboratively construct meaning.

The findings of this study provide theoretical support for the relevance of cooperative learning theory in vocational education, particularly through the implementation of the group investigation learning model. The significant difference between the experimental and control groups indicates that student-centered, inquiry-based, and collaborative learning can produce better learning outcomes than direct instruction in archival management. This strengthens the view that learning outcomes are not only influenced by the delivery of content but also by students' active involvement in constructing knowledge, discussing ideas, solving problems, and presenting findings. the study also contributes to the literature on vocational pedagogy by showing that group Investigation is suitable for subjects requiring both conceptual understanding and procedural accuracy.

In addition, the results suggest that teachers can use the group investigation learning model as an effective alternative strategy for improving student learning outcomes in archival management. Since students in the experimental group achieved higher gain scores, teachers are encouraged to design learning activities that involve topic exploration, group task division, data collection, discussion, and presentation. These activities can help students understand filing systems, archival procedures, document classification, storage, and retrieval more meaningfully. For vocational schools, the model can support practice-based learning because it reflects real administrative work situations that require collaboration, accuracy, responsibility, and problem-solving. Teachers should also provide clear guidance, assessment criteria, and balanced group roles to ensure active participation from all students. In addition, school administrators may consider training teachers to apply cooperative and inquiry-based models so that vocational learning becomes more interactive, contextual, and aligned with workplace competency demands.

CONCLUSION

Based on the data analysis and discussion, it can be concluded that the implementation of the group investigation learning model has a positive impact on students' learning outcomes in the archival management element of the office management subject. The findings indicate that students who learned through the Group Investigation model showed better improvement than those who received direct instruction. This suggests that collaborative inquiry, task division, group discussion, data collection, and presentation activities can support students in understanding archival management more effectively. Therefore, the group investigation model can serve as an alternative instructional approach in office management subjects, particularly in archival management, because it encourages active participation, cooperation, problem-solving, and meaningful learning.

As other studies, this study has several limitations that should be considered. First, the research was conducted in only one school with a relatively limited sample size; therefore, the generalizability of the findings is restricted to similar educational contexts. Second, the research instrument, which consisted of pretest and posttest items, primarily

measured students' cognitive learning outcomes and did not fully capture the development of affective and psychomotor competencies. Third, the treatment was implemented over a relatively short period, which limits the ability of the study to examine the long-term effects of the group investigation model. Based on these limitations, future studies are recommended to involve larger and more diverse samples and to use instruments that measure multiple dimensions of student competence. Further research also examines the implementation of the group investigation model over a longer period or integrate it with other instructional approaches to evaluate its effectiveness more comprehensively.

Authors Contribution
C. R. A: Conceptualization, Methodology, Investigation, Formal analysis, Writing – original draft, and Visualization. D. P: Supervision, Validation, Writing – review & editing, and Project administration

Acknowledgements
Not applicable

Competing interests
The author has declared that there are no conflicts of interest

Data availability
The data were provided upon request to corresponding author

REFERENCES

Adelia, N., Amal, A. I., & Hidayah, H. F. (2025). Peran manajemen perkantoran dalam meningkatkan kualitas pelayanan administrasi. *Budi Pekerti Agama Islam, 3*(3), 181–192.

Ainiyah, N., Gufron, A., Marzuki, M., Posangi, S. S., Yahiji, K., Rohman, A., ... & Das, S. W. H. (2022). Group investigation model to improve interpersonal skills. *International Journal of Evaluation and Research in Education, 11*(1), 467-474.

Amirova, N. (2025). Traditional vs. non-traditional teaching in secondary education: A comparative analysis. *Porta Universorum, 1*(3), 101-109.

Bajwa, M. S., & Rafiq, M. (2025). Assessment of university archives management practices. *Global Knowledge, Memory and Communication, 74*(5-6), 1414-1435.

Devi, K. S. T., Wibawa, I. M. C., & Sudiandika, I. K. A. (2020). Penerapan model pembelajaran group investigation dalam meningkatkan hasil belajar matematika siswa. *JUPITEK: Jurnal Pendidikan Matematika, 3*(1), 33–38.

Gillies, R. M. (2023). Using cooperative learning to enhance students' learning and engagement during inquiry-based science. *Education Sciences, 13*(12), 1242.

Hia, B. I. G., Telaumbanua, D., & Harefa, A. R. (2022). Pengaruh model pembelajaran kooperatif tipe group investigation terhadap hasil belajar IPA. *Educativo: Jurnal Pendidikan, 1*(2), 367-373.

Hunaepi, H., & Suharta, I. (2024). Transforming education in Indonesia: The impact and challenges of the Merdeka belajar curriculum. *Path of Science, 10*(6), 5026-5039.

Inderanata, R. N., & Sukardi, T. (2023). Investigation study of integrated vocational guidance on work readiness of mechanical engineering vocational school students. *Heliyon, 9*(2), e13333

Jumhur, A. A., Avianti, R. A., Nurfitri, P. E., & Mahir, I. (2024). Implementation of problem-based learning to improve critical thinking ability of vocational students in Jakarta. *European Journal of Education and Pedagogy, 5*(5), 16-24.

McNabb, L., Somers, P., & Taylor, Z. (2023). Collaborative behavior or collusion? Investigating unpermitted collaboration on homework among college students. *Journal of College and Character, 24*(2), 144-171.

Mohzana, M., Merla, M., Boari, Y., Hudain, M. A., & Kamaruddin, I. (2023). The analysis of the effectiveness of group investigation method implementation in increasing student learning outcomes. *Mudir: Jurnal Manajemen Pendidikan, 5*(1), 148-153.

Nugroho, A. P., Surya, P., & Tarso, T. (2025). Archival management of educational staff in improving administrative services in senior high schools. Curricula: Journal of *Curriculum Development, 4*(1b), 553-566.

Palupi, I. D. R., & Rahayu, T. S. (2021). Efektivitas model pembelajaran Group Investigation (GI) dan Teams Games Tournament (TGT) ditinjau dari kemampuan berpikir kritis matematika. *Thinking Skills and Creativity Journal, 4*(1), 10-20.

Rahayuningsih, & Martono, S. (2020). Analisis kemampuan manajemen kearsipan siswa kompetensi keahlian otomatisasi dan tata kelola perkantoran. *Economic Education Analysis Journal, 9*(3), 803–815.

Silva, H., Lopes, J., Morais, E., & Dominguez, C. (2023). Fostering critical and creative thinking through the cooperative learning jigsaw and group investigation. *International Journal of Instruction, 16*(3), 261-282.

Solikah, A. A., Saputro, S., Yamtinah, S., & Masykuri, M. (2024). Research trends in group investigation learning model for critical thinking skills in science learning. *Jurnal Inovasi Pendidikan IPA, 10*(1), 62-75.

Syams, M. S., & Murdiono, M. (2025). Enhancing collaborative competence and learning motivation through group investigation in civic education. *Priviet Social Sciences Journal, 5*(9), 94-101.

Thornhill-Miller, B., Camarda, A., Mercier, M., Burkhardt, J. M., Morisseau, T., Bourgeois-Bougrine, S., ... & Lubart, T. (2023). Creativity, critical thinking, communication, and collaboration: Assessment, certification, and promotion of 21st century skills for the future of work and education. *Journal of Intelligence, 11*(3), 54.

Utamaningsih, E. S., Sulasih, & Mulyaningtiyas, T. (2023). Group investigative learning model to improve students' critical thinking skills through learning social sciences. *Edueksos: Jurnal Pendidikan Sosial & Ekonomi, 12*(1), 99–107.

Zuhdi, F., Khairunnisa, K., & Jiwandono, I. S. (2021). Pengaruh metode group investigation terhadap hasil belajar siswa pada muatan materi PPKn di Kelas V SDN 2 Kalijaga. *ZAHRA: Research and Tought Elementary School of Islam Journal, 2*(1), 44-54.