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The Influence of KOMAT Media-Based Guided Inquiry Learning Model on Matrix Learning Outcomes of Vocational High School Students

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Abstract

This study aims to (1) determine whether there is an influence of the KOMAT media-based Guided Inquiry learning model on the matrix learning outcomes of vocational high school students, and (2) determine the extent of the influence of the KOMAT media-based Guided Inquiry learning model on the matrix learning outcomes of vocational high school students. The study employs a quantitative approach and uses a quasi-experimental design with a posttest-only control group. The sampling technique used is purposive sampling. The research sample consists of class X TKRO 3 as the experimental group and class X TKRO 4 as the control group. Data were collected using test and documentation methods, while data analysis techniques included an independent sample t-test and effect size test. The results show that (1) the independent sample t-test on students' matrix learning outcomes yielded a Sig value of 0.000 < 0.05, thus H_1 was accepted, and (2) the effect size test results showed that the influence on students' matrix learning outcomes had an index of 1.932207, which, according to Cohen's table, corresponds to 97.1%, indicating a high category.

Keywords: *Guided Inquiry, komat, learning outcomes, matrix*

INTRODUCTION

Mathematics education in Indonesia has yet to fully align with the demands of the 21st century, which requires students to develop creativity, critical thinking, collaboration, and communication skills to enhance the quality of education in the country (Budi, 2016). This is corroborated by the 2018 PISA (Programme for International Student Assessment) survey, which indicated that Indonesia is in a state of emergency regarding mathematics education, ranking among the bottom seven globally (Tohir, 2019). Although mathematics education has evolved over time, field observations indicate that educators in Indonesia still cling to outdated guidelines and perceptions of mathematics. As a result, the teaching materials, instructional methods, and educational approaches are often considered outdated, as they tend to rely heavily on conventional methods. (Kamarullah, 2017).

A suitable update to the learning system needs to be implemented in mathematics education. This is not only to improve student learning outcomes but also to enhance students' understanding of the mathematical material delivered by teachers (Firgandi, 2020). Several issues in mathematics education can lead to low student learning outcomes. These outcomes are used as benchmarks for the success of the teaching process in the classroom and to assess the effectiveness of the current educational curriculum. If student learning outcomes are good, the system implemented in teaching can also be considered effective and appropriate for students. Therefore, addressing low mathematics learning outcomes is crucial, as mathematics education plays a significant role in preparing a high-quality workforce (Sri, 2019).

Based on observations conducted in January 2023, several findings were noted regarding mathematics education in schools. The teaching of mathematics is still predominantly using a teacher-centered model with conventional methods (lectures). Teachers deliver material based on a mandatory LKS (Student Worksheet) mathematics book, which contains summaries of the material and enrichment questions aligned with the basic competencies. Teachers have not utilized additional media to clarify the material for students. As a result, students struggle to grasp mathematical concepts and find mathematics uninteresting because it involves too much calculation with formulas that are difficult for them to remember.

This issue is particularly challenging in Islamic vocational schools, where students are required not only to focus on core subjects like mathematics but also on Islamic religious studies and vocational training according to their chosen specialization. Indirectly, this situation contributes to suboptimal mathematics learning outcomes, thereby impeding efforts to improve the quality of education.

Therefore, the issue of student learning outcomes needs to be addressed. One way to do this is by adopting more effective and efficient teaching strategies. In addition to using learning models that align with students' characteristics, having adequate facilities and appropriate teaching media can also help resolve the issue of low mathematics learning outcomes (Lina, 2019). Learning outcomes are divided into three domains: cognitive, affective, and psychomotor. To effectively address all three, the use of audiovisual media, such as videos, can be beneficial as it aids in material retention through both visual and auditory means (Lina, 2019). Upon further analysis, the solution to improving students' mathematics learning outcomes lies in utilizing the right teaching models and supportive media.

The Guided Inquiry learning model can be applied to address the

aforementioned issues in mathematics education. Guided Inquiry emphasizes students' understanding of concepts and mathematical reasoning. It has the following characteristics: (1) it emphasizes student engagement in discovering material concepts, (2) the teacher acts as a facilitator and motivator to help students uncover these concepts, and (3) it aims to develop students' critical and logical thinking abilities in understanding mathematical material (Ridwan, 2014). The Guided Inquiry model has several advantages, including enhancing students' intellectual abilities by allowing them to build their own understanding of a concept. It also helps students develop public speaking skills and reduces the reliance on the teacher as the sole source of knowledge. However, it may be less suitable for large classes (Wildan, 2017). Guided Inquiry consists of six learning stages: orientation (identifying the problem), selection (formulating a hypothesis), exploration (designing an experiment), formulation (conducting the experiment), collection (interpreting data and developing conclusions), and presentation (communicating the results) (Sukma, 2016).

The research was conducted on the topic of matrices, so to enhance the effectiveness of the Guided Inquiry learning model, it is essential to incorporate a supporting medium, namely Komat (Kotak Matriks). Komat is a manipulative, fixative, and distributive tool designed to solve matrix problems. The Komat medium offers several benefits, including clarifying material concepts, increasing student engagement, and providing new experiences in learning mathematics through the use of media.

METHODS

This study employs a quantitative approach with a quasi-experimental research design. The research design used is the **Posttest-Only Control Group Design**. The tests were conducted on February 24 and 25, 2023. The research population comprised all 289 students of Grade XI at SMK Islam 2 Durenan Trenggalek for the 2022/2023 academic year, spread across 10 classes. The research sample consisted of classes **TKRO 3** and **TKRO 4**, selected using purposive sampling by considering the similarity of student characteristics. TKRO 3, with 35 students, was chosen as the control class and taught matrix material using a conventional model. Meanwhile, TKRO 4, with 34 students, was selected as the experimental class and taught matrix material using the **Guided Inquiry** learning model supplemented by the Komat media.

The data collection technique in this study utilized tests. The test employed was the **posttest-only control group design**. The posttest was used to determine the difference in matrix learning outcomes between the control and experimental classes. The test consisted of 10 questions, including 5 multiple-choice questions and 5 essay questions. Following the posttest, prerequisite tests were conducted on the students' results, including normality tests, homogeneity tests, and an independent sample t-test, all with the assistance of **IBM SPSS 25.0**. Finally, an effect size test was performed using **Microsoft Excel 2013** to determine the magnitude of the impact of the **Guided Inquiry** learning model supplemented with Komat media.

RESULTS AND DISCUSSION

The research data was obtained from learning outcome tests administered to students through the application of the Guided Inquiry learning model based on Komat media in the experimental class and the conventional learning model in the control class. The test was used to determine whether there was any effect and the magnitude of the impact on the matrix learning outcomes of students taught using the Guided Inquiry learning model compared to the conventional learning model.

Before conducting the test, instrument tests were first performed on the test questions, including validity and

reliability tests. Next, prerequisite tests were conducted, namely normality and homogeneity tests. Finally, hypothesis testing was carried out using an Independent Sample T-test and effect size analysis with the help of IBM SPSS 25.0 and Microsoft Excel 2013. The results of the validity test can be seen in the following table:

Table 1.1 Instrument Validity Test

Tests of Normality

	Kelompok	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Nilai	1	.152	18	.200*	.930	18	.197
	2	.141	26	.198	.929	26	.072

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

From Table 1.1, it is known that there are 10 questions, so N=10, resulting in r_table=0.576. Based on Table 1.1, since all r_calculated > r_table (0.576), all questions are deemed valid. Next, a reliability test was conducted to measure the reliability level of the questions with the following criteria:

Table 1.2 Instrument Reliability Criteria

Koefisien Korelasi (r)	Keputusan
0,800 – 1000	Sangat Reliabel
0,600 – 0,799	Reliabel
0,400 – 0,599	Cukup Reliabel
0,200 – 0,399	Agak Reliabel
0,000 – 0,199	Tidak Reliabel

The above Table 1.2 is used to determine the validity of the post-test instrument that will be used for the research. The following are the results of the reliability test of the research instrument:

Table 1.3 Instrument Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
.806	10

From Table 1.3, it is known that the value of Cronbach's Alpha is 0.806, which, according to Table 1.2 on instrument reliability criteria, falls within the 'very reliable' category, as the correlation coefficient value of 0.800-1.000 is considered very reliable. Therefore, the post-test questions with a correlation coefficient of 0.806 are categorized as very reliable for use in testing.

The prerequisite test was continued on the test scores of students in the experimental and control classes using a normality test. The normality test in this research was conducted using the Kolmogorov-Smirnov test. The decision-making criteria for the normality test are as follows: if the Sig. (2-tailed) value is < 0.05, reject H_0 (data is not normally distributed), and if the Sig. (2-tailed) value is ≥ 0.05, accept H_0 (data is normally distributed)

Soal	r Hitung	r Tabel	Kesimpulan
	0,657	0,576	Valid
	0,698	0,576	Valid
3	0,984	0,576	Valid
4	0,621	0,576	Valid
5	0,661	0,576	Valid
6	0,699	0,576	Valid
7	0,686	0,576	Valid
8	0,643	0,576	Valid
9	0,880	0,576	Valid
10	0,642	0,576	Valid

Table 1.4 Normality Test

From Table 1.4, it is known that the significance value of the students' matrix learning outcomes in the experimental class is 0.200. This value is compared with the significance level of α = 0.05, so 0.200 > 0.05, which means we accept H_0. This indicates that the matrix learning outcomes of students in the experimental class are normally distributed. The significance value of the students' matrix learning outcomes in the control class is 0.198. This value is compared with the significance level of α = 0.05, so 0.198 > 0.05, which means we

accept H_0. This indicates that the matrix learning outcomes of students in the control class are normally distributed.

After the normality test is met, the next step is the homogeneity test. The decision rule for the homogeneity test is: if the significance value is <0.05, then reject H_0 (the data variance is not homogeneous); if the significance value is >0.05, then accept H_0 (the data variance is homogeneous) (Payadnya & Jayantika, 2018).

Here are the results of the homogeneity test:

Table 1.5 Homogeneity Test

		Levene's Test for Equality of Variances	
		F	Sig.
nilai	Equal variances assumed	1.573	.217
	Equal variances not assumed		

From the table 1.5, it can be seen that the significance value is 0.217. Since 0.217 > 0.05, we accept H_0, which means that both classes have the same data variance (homogeneous). After the prerequisite tests are met, the next step is hypothesis testing, which includes the T-test and effect size test. The test used is the Independent Sample T-test. This test aims to determine whether there is an effect of an intervention given to the experimental class. Here are the results of the Independent Sample T-test. The decision rule for the Independent Sample T-test is: if the Sig. (2-tailed) value > 0.05, then accept H_0 (No effect). Conversely, if the Sig. (2-tailed) value ≤ 0.05, then reject H_0 (There is an effect).

Tabel 1.6 Uji *Indepepndent Sample T-test*

From Table 1.6, it is known that the Sig. (2-tailed) value ≤ 0.05 is 0.000, so we reject H_0 and accept H_1, which means it can be concluded that there is an effect of the Guided Inquiry model based on media komat on the matrix learning outcomes of class XI students at SMK Islam 2 Durenan Trenggalek. The next test is the effect size test. This research uses Cohen's test for effect size to determine the impact of the Guided Inquiry model based on media komat on matrix learning outcomes. The data used in the effect size test are the post-test scores of the matrix learning outcomes from the experimental and control classes. This test is conducted manually with the help of Microsoft Excel 2013 to facilitate the calculations. The calculation formula is as follows:

$$S_{plooled} = \sqrt{\frac{(n_1 - 1)sd_1^2 + (n_2 - 1)sd_2^2}{n_1 + n_2 - 2}}$$

$$S_{plooled} =$$

$$\sqrt{\frac{(18 - 1)7{,}177^2 + (26 - 1)9{,}431^2}{18 + 26 - 2}}$$

$$S_{plooled} = \sqrt{\frac{927{,}1679 + 2312{,}538}{42}}$$

$$S_{plooled} = \sqrt{3239{,}706}$$

$$S_{plooled} = 8{,}845943$$

After calculating Spooled, the next step is to calculate the effect size using the following method:

$$d = \frac{\bar{X}_t - \bar{X}_c}{S_{plooled}}$$

$$d = \frac{80{,}28 - 63{,}31}{8{,}845943}$$

t-test for Equality of Means						
					95% Confidence Interval of the Difference	
t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
6.443	42	.000	16.970	2.634	11.655	22.286
6.771	41.556	.000	16.970	2.506	11.910	22.030

$$d = 1{,}932207$$

Based on the effect size calculation, the effect size index is 1.932207. According to Cohen's interpretation, an index of 1.932207 indicates that the effect of the Guided Inquiry model based on media komat on student learning outcomes is equivalent to 97.1% and is categorized as high.

CONCLUSION

1. There is an influence of the Guided Inquiry learning model based on Komat media on the learning outcomes of class XI students at SMK Islam 2 Durenan Trenggalek in matrix material. This conclusion is supported by the independent sample t-test with a sig (2-tailed) value of 0.000, which is ≤ 0.05, leading to the rejection of H_0 and acceptance of H_1.
2. The effect size of the Guided Inquiry learning model based on Komat media on the learning outcomes of class XI students at SMK Islam 2 Durenan Trenggalek in matrix material is 1.932207. When interpreted according to Cohen's guidelines, this effect size is 97.1% and is categorized as high.

REFERENCES

Ariani, Vivi dan Sesmiwati. (2019). Studi Tentang Faktor-Faktor Yang Mempengaruhi Hasil Belajar Siswa Pada Mata Kuliah Estimasi 1 Program Studi TEK. Universitas Bung Hatta: EBJPTBS, No.2 hlm 76

Budi Murtiyasa, Isu-Isu Kunci dan Tren Penelitian Pendidikan Matematika, (Surakarta: KNPMP I Universitas Muhammadiyah), hlm 4

Darmawan, Deni. (2013). Metode Penelitian Kuantitatif. Bandung: PT Remaja Rosdakarya.

Ekayani, Putu. (2017) Pentingnya Penggunaan Media Pembelajaran Untuk Meningkatkan Prestasi Belajar Siswa. Singaraja: Jurnal Fakultas Ilmu Pendidikan Universitas Pendidikan Ganesha, No.1 hlm 3

Firdaus, Muhammad dan Insih Wilujeng. (2018). Pengembangan LKPD Inkuiri Terbimbing Untuk Meningkatkan Keterampilan Berpikir Kritis dan Hasil Belajar Peserta Didik. Yogyakarta: Jurnal Inovasi Pendidikan, No.1 hlm 28

Firngadi, (2020) Mengatasi Gangguan Belajar Pada Anak, Salatiga: UKWS. hlm 3-4

Gazali, Reynaldo Kurnia. (2017). Effect Size Pada Pengujian Hipotesis. Yogyakarta: Sanata Dharma.

Hamid, Marwan dkk. (2019). Analisis Jalur dan Aplikasi SPSS Versi 25 Edisi Pertama. Bireuen: Bireuen Press.

Hosnah, Wildan Maulidatul. (2017). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Fisika Di SMA. Jember: FKIP Universitas Jember, No. 2 hlm 197

Kamarullah, Pendidikan Matematika Di Sekolah Kita. (2017). (Aceh: Al Khawarizmi Jurnal Pendidikan dan Pembelajaran Matematika. Vol.1 No.1, hlm 3

Lina Novita dkk. (2020). Penggunaan Media Pembelajaran Video terhadap Hasil Belajar Siswa, (Indonesian Journal of Primary Education. Vol.3 No.2, hlm 65

Mahmudi, Ihwan dkk. (2022) Taksosomi Hasil Belajar Menurut Benyamin S Bloom.Gontor: MUDIM, No.9 hlm 35

Mohammad Tohir. (2019). Hasil PISA Indonesia Tahun 2018 Turun Dibanding Tahun 2015, (Situbondo: Universitas Ibrahimy. Vol.1 No.1, hlm 1

Nasution, Mardiah Kalsum. (2017). Penggunaan Metode Pembelajaran dalam Upaya Peningkatan Hasil Belajar Siswa. Banten: Studia Didaktika. no.1:10

Norfai. (2020). Managemen Data Menggunakan SPSS. Banjarmasin: Universitas Islam Kalimantan Muhammad Arsyad Al-Banjary.

Nurhaliza, Diaz dkk. (2022). Pengaruh Penggunaan Alat Peraga Kotak Matriks (Komat) Terhadap Kemampuan Penalaran Matematis Siswa Kelas XI SMA Negeri 2 Bandar T.A 2022/2023. Sumatera Utara: FKIP Universitas HKBP. No.2 hlm 149

Palitin, Ivylentine Datu dkk. (2019). Hubungan Motivasi Belajar dengan Hasil Belajar Siswa. Magistra. No.2 hlm 2

Paramita, Ratna Wijayanti Daniar. (2021). Metode penelitian Kuantitatif. Lumajang: Widya Gama Press

Payadnya, I. P. A. A., & Jayantika, I. G. A. N. T. (2018). *Panduan Penelitian Eksperimen Beserta Analisis Statistik dengan SPSS*. CV Budi Utama.

Ridwan Abdullah Sani . (2019). Inovasi Belajar. Jakarta: Bumi Aksara. hml 89

Ropii, M dan M Fahrurrozi. (2019). Evaluasi Hasil Belajar. Lombok: Universitas Hamzan Wadi Press.

Sri Lindawati. (2019). Guide Inquiry Approach Learning to Entance Mathematical Understanding and Mathematical Communication. Pelalawan: Academia Acceleraty. hlm 15

Sudbyo, Nugroho A. (2019). Cara melakukan Uji Normalitas Kolmogorov Smirov. Boyolali: STMIK Duta Bangsa.

Sujarweni,V Wiaratna. (2014). Metodologi Penelitian: Lengkap, Praktis, dan Mudah Dipahami. Yogyakarta: Pustaka Baru.

Sukma dkk. (2016). Pengaruh Model Pembelajaran Inkuiri Terbimbing (Guided Inquiry) dan Motivasi Terhadap Hasil Belajar Fisika Siswa, (Samarinda:Jurnal Saintifika. Vol.18 No. 1 hlm 50

Suyono dan Hariyanto. (2014). Belajar dan Pembelajaran. Bandung: Rosda Karya. Syahrum dan Salim. 2012. Metodologi Penelitian Kuantitatif. Bandung: Cipta Pusaka.

Wahidmurni. (2017). *Pemaparan Metode Penelitian Kuantitatif*. Malang: UIN Maulana Malik Ibrahim Malang.

Wildan Maulidatul Hosnah. (2017). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Fisika Di SMA, Jember: FKIP Universitas Jember. Vol. 6 No. 2, hlm 197