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Comparison of Guided Inquiry Learning Models with Direct Instruction Learning Models on Physics Learning Outcomes

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ABSTRACT

The teacher's ability to plan and implement instruction significantly impacts students' learning outcomes. One way teachers can improve results is by selecting an appropriate instructional model aligned with the learning objectives and content. This study aims to compare physics learning outcomes between students taught using the guided inquiry and direct instruction models in Class XI at Senior High School 1 Padang. It employs a quasi-experimental, posttest-only control design, focusing on the Class XI students of Senior High School 1 Padang in the 2023/2024 academic year. The sample, selected through purposive sampling, consists of Class XI F.4 as experimental class 1 and Class XI F.5 as experimental class 2. Data collection involves student learning results in the knowledge domain, using a multiple-choice test instrument. The analysis includes descriptive evaluation, normality and homogeneity tests, and a hypothesis test at a significance level (α) = 0.05. Based on the findings, the average learning outcomes were 76.67 for experimental class 1 and 69.86 for experimental class 2. Hypothesis testing yielded a t-value of 2.049, leading to the rejection of H0 and the acceptance of H1, indicating a significant difference in learning outcomes between students exposed to the guided inquiry and direct instruction models for vector material and rectilinear motion kinematics.

Keywords: *Guided Inquiry; Direct Instruction; Learning Outcomes*

I. INTRODUCTION

The 21st century, that's marked because the century of globalization, needs developments in diverse regions of human life. Life inside the 21st century calls for nice human sources produced by profesionally managed institutions with the intention to reap advanced consequences. One manner to upgrade the nice of human resources is thru schooling. The essence of countrywide training development is efforts to expand advanced human sources with the intention to prepare society and the nation to stand the age of knowledge as a aggressive generation [1]. Education is something important and must be provided to citizens so that a country can develop rapidly and produce quality human resources. Education plays an important role in preparing human resources and providing skills to society to develop their potential to maximum [2].

The present status of training in Indonesia is as of now encountering a serious level of pressure. This can be confirmed by the aftereffects of the Program for Worldwide Understudy Appraisal (PISA) in Indonesia, which remain remarkably lacking. The results of the 2018 PISA study, directed and delivered by the Association for Financial Co-activity and Advancement (OECD), feature that Indonesian understudies' capability in perusing earned a normal score of 371, contrasted with the OECD normal of 487. In the space of science, the typical score came to 379, with the OECD normal leftover at 487. Similarly, in the field of science, the average score for Indonesian students was 389, whereas the OECD average stood at 489 [3]. These findings from the PISA test underscore the persistently low quality of education in Indonesia. Several factors contribute to this substandard quality of education in Indonesia, including: 1) learning approach; 2) curriculum changes; and 3) teacher competency [4].

The low quality of Indonesian education shown by the PISA test results can also mean that student learning outcomes in Indonesia are relatively low. Learning outcomes are changes in student behavior after students participate in the teaching and learning process based on the level of mastery of the subject matter [5]. Bloom

defines that student studying outcomes are determine within the cognitive, affective and psychomotor domain names [6]. Student learning outcomes can be seen from the students' Physics final examination scores. The average of final exam score for even semester students of class XI phase F at Senior High School 1 Padang is 51.82, which is still in the poor category. From the final exam scores, it can be seen that student learning outcomes in physics subjects are still relatively low. Low student learning outcomes can be caused by several factors, including students being less interested in studying physics and the learning process being ineffective.

A teacher's ability to plan and implement learning greatly influences student learning outcomes [7]. A teacher must be able to create an effective and enjoyable learning atmosphere, so that it can significantly increase student activity and involvement which will ultimately improve student learning outcomes. One way that teachers can improve student learning outcomes is by implementing innovative learning models. Choosing the right learning model must refer to the learning objectives and material to be taught in class, so that the learning model applied can be more effective.

Physics is part of natural science (science), namely the science that studies natural phenomena or natural phenomena in order to understand and reveal various secrets of the universe to improve human welfare. Learning physics can be a vehicle for students to develop thinking skills and solve problems in everyday life [8]. Studying physics is not just about memorizing, but you also have to understand the concepts. It is a challenge for a teacher to present physics material in an interesting way that students can understand. Some high school students are less interested in studying physics because they think that physics is difficult, causing low student physics learning outcomes [9]. One of the reasons why the quality of learning and students' physics learning outcomes are still low is that the learning models applied by teachers are still less varied [10]. Therefore, in teaching physics, the learning model must be chosen appropriately according to the characteristics of the physics material to be taught.

One of the materials in physics lessons is vectors and the kinematics of rectilinear motion. Vectors are a concept in physics lessons that are related to other materials such as motion, force, momentum, impulse, etc. [11]. Meanwhile, kinematics is a fundamental topic in physics learning [12]. Vector material and rectilinear motion kinematics can be taught using the guided inquiry learning model. Based on research conducted by [13], the implementation of the guided inquiry learning model has a high-quality effect on students' mastery in vector material. Apart from that, [14], in his research stated that there is a positive influence of the use of the guided inquiry learning model on student learning outcomes in kinematics material.

The guided inquiry learning model is a sequences of studying activities in which students are required to search for and discover answers to a problem themselves. Guided inquiry learning is learning where the teacher guides students in carrying out activities by asking initial questions and directing students in discussion situations [15]. Guidance from the teacher is given at the beginning of learning in the form of questions, as the learning process progresses this guidance is reduced so that students are more active in building and discovering their own concepts of the material being studied. Inquiry learning is based on search where knowledge is the result of the process of finding it yourself, not a number of facts result from remembering [16]. Learning about vectors and kinematics of rectilinear motion can also use direct instruction learning model. Based on research conducted by [17], implementation of the direct instruction learning model in the material pressure, vibration and waves can have a high-quality impact on student gaining knowledge of effects. Apart from that, the implementation direct Instruction can also improve student learning results in rectilinear motion material [18]. Direct instruction learning model that uses teacher demonstration and explanation combined with practice and student feedback to help them gain real knowledge and skills needed for further learning [19].

The direct instruction learning model involves the active engagement of students in the subject matter, facilitated by the teacher through guided and explained activities. This model encompasses not only traditional lectures but also practical exercises, demonstrations, and collaborative group work. Previous researchers, including Fatimah (2020), have successfully implemented the direct instruction learning model, leading to noticeable enhancements in student learning outcomes within the domain of physics [20].

Based totally at the results of preceding research, it may be visible that the guided inquiry learning model and *direct instruction learning model* can impact student gaining knowledge of consequences in physics topics. Primary based at the problems presented, the aim of this research is to see differences in student learning results by comparing the guided inquiry learning model with the *direct instruction* learning model.

II. METHOD

This studies uses quantitative studies methods. The kind of this studies is quasi-experimental studies with a posttest only control design. This studies did not use a control class because it wanted to see a comparison between two experimental classes, namely experimental class 1 which implemented the guided inquiry learning model and experimental class 2 which implemented the direct instruction learning model.

Populace is the whole studies item which includes human beings, items, animals, plants, signs and symptoms, take a look at ratings, or events as sources which have which have a sure traits in a observe [21]. The populace in this study became all students in class XI phase F of Senior High School 1 Padang, totaling 180 students. The sample is a part of the variety and characteristics of the populace [22]. Through using purposive sampling method, it became found that class XI F.4 as experimental class 1, totaling 36 students, was given learning using the guided inquiry model and class XI F.5 as experimental class 2, totaling 36 students, was given learning using the direct instruction model.

This studies makes use two varieties of variables, namely independent variables and dependent variables. The independent variables in this studies are the application of the guided inquiry learning model and the direct instruction learning model. The dependent variable in this studies is student learning results in the knowledge aspect. The kinds of data used in this studies are primary data and secondary data. Primary data is data gathered immediately by way of researchers, while secondary data is data obtained indirectly from different events. The primary data in this research is data on student learning results in the final test (posttest) from experimental class 1 and experimental 2. Meanwhile, secondary data in this research is the final semester students' final exam scores in class X physics material at Senior High School 1 Padang.

The instrument used in this studies is a studying outcomes test in the shape of a multiple choice test with 20 questions. Before the questions are used for the posttest, content validity, reliability, level of difficulty and differentiability of the questions are first tested. Student learning outcome data was analyzed using descriptive analysis and inferential analysis. Analysis of research data was carried out with the aim of testing the truth of the hypothesis proposed in the research.

The normality test goals to look whether or not the population is normally distributed. To test normality, the Lilliefors test was used. To determine whether the two groups of data have homogeneous variances, a homogeneity check is completed. To test homogeneity, the F-test is used. If the statistic is normally distributed and has a homogeneous variance, then a hypothesis take a look at is performed. Hypothesis trying out is accomplished with the aim of proving the truth of the proposed hypothesis. Hypothesis checking out on this look at used the independent sample t-test.

III. RESULTS AND DISCUSSION

A. Result

This studies was performed from 10 July to 8 September 2023 at Senior High School 1 Padang. The studies consequences received are in the form of studying outcomes for students in class XI F.4 (experimental class 1) and The learning outcomes obtained are inside the form of an assessment of student learning outcomes in the knowledge aspect. Assessment data students' knowledge is obtained from the posttest results to the two experimental classes that are carried out at the end of learning.

Experimental class I (XI F.4) was given treatment through applying the guided inquiry learning model to the physics of vector material and the kinematics of rectilinear motion. At the end of the lesson students are given posttest to assess student learning outcomes in the knowledge aspect. Instruments used I nposttest in the form of a written test with 20 multiple choice questions equipped with a question grid. The learning results of experimental class 1 students are obtained from posttest grades then sorted from the lowest value to the highest value which is presented in Table 1.

Table 1. Posttest Score of Experimental Class 1

No	Mark	Frequency	Percentage
1	35	1	2.8%
2	50	2	5.6%
3	60	2	5.6%
4	65	1	2.8%
5	70	4	11.1%
6	75	6	16.7%
7	80	8	22.2%
8	85	7	19.4%
9	90	2	5.6%
10	95	1	2.8%
11	100	2	5.6%
Amount		36	100,0%

Based on the statistics in Table 1, it may be observed that the lowest rating for college students in experimental class 1 is 35 with a frequency of 1 person, and the highest score is 100 with a frequency of 2 people. The frequency of student learning results in experimental class 1 may be visible inside the frequency distribution graph shown in Figure 1.

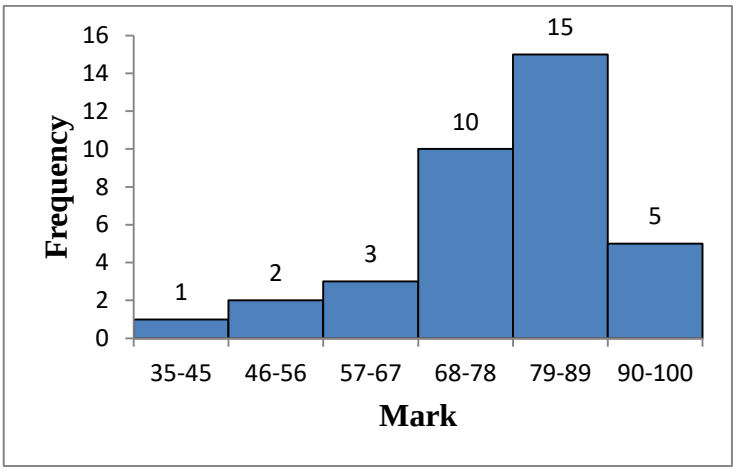

Figure 1. Graph of Learning Results for Experimental Class 1

Based totally on Figure 1, it is able to be visible that frequency 15 is the highest frequency with a percentage of 41.7, namely in the intervals 53-60 and 79-89. Meanwhile, the lowest frequency is frequency 1 with a percentage of 2.8% in the 35-45 interval.

Experimental class 2 (XI F.5) received instruction through the implementation of the direct instruction learning model in the study of physics, specifically focusing on vector material and the principles of rectilinear motion kinematics. Upon completion of the instructional session, students were administered a posttest to evaluate their learning outcomes within the realm of knowledge. The results of the posttest for the students in experimental class 2 were collected and arranged from the lowest to the highest values, as depicted in Table 2.

Table 2. Posttest Scores of Experimental Class 2

No	Mark	Frequency	Percentage
1	30	1	2.8%
2	45	2	5.6%
3	55	4	11.1%
4	60	3	8.3%
5	65	5	13.9%
6	70	2	5.6%
7	75	7	19.4%
8	80	4	11.1%
9	85	3	8.3%
10	90	3	8.3%
11	95	2	5.6%
12	30	1	2.8%
Amount		36	100,0%

Based on the statistics in Table 2, it can be observed that the lowest rating for students in experimental class 2 is 30 with a frequency of 1 person, and the highest score is 95 with a frequency of 2 people. Average student learning results in experimental class 1 obtained from grades posttest namely 69.86. The frequency of student learning results in experimental class 2 may be visible inside the frequency distribution graph shown in Figure 2.

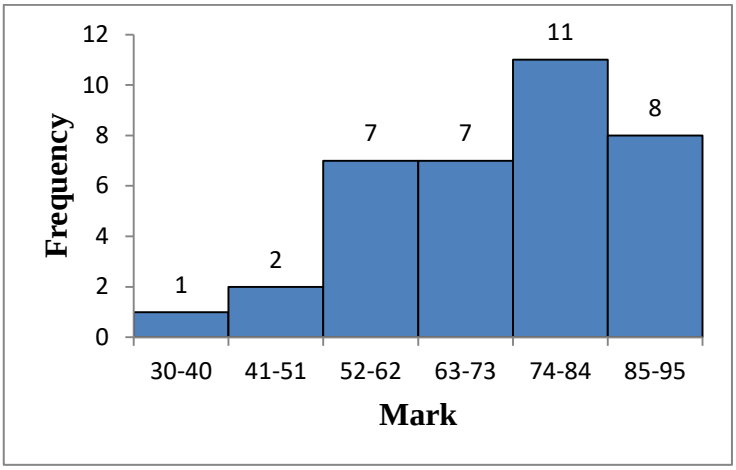

Figure 2. Graph of Learning Results for Experimental Class 2

Based totally on Figure 2, it can be seen that frequency 11 is the highest frequency with a percentage of 30.6% found in the 74-84 interval. Meanwhile, the lowest frequency is frequency 1 with a percentage of 2.8% in the 30-40 interval.

Based on descriptive evaluation of the gaining knowledge of effects of college students in experimental class 1 and experimental class 2, a assesment of the average gaining knowledge of effects of college students within the two lessons was received. Comparison graph of knowledge scores in classes that observe the guided inquiry learning model with classes that observe the direct instruction learning model can be visible in Figure 3.

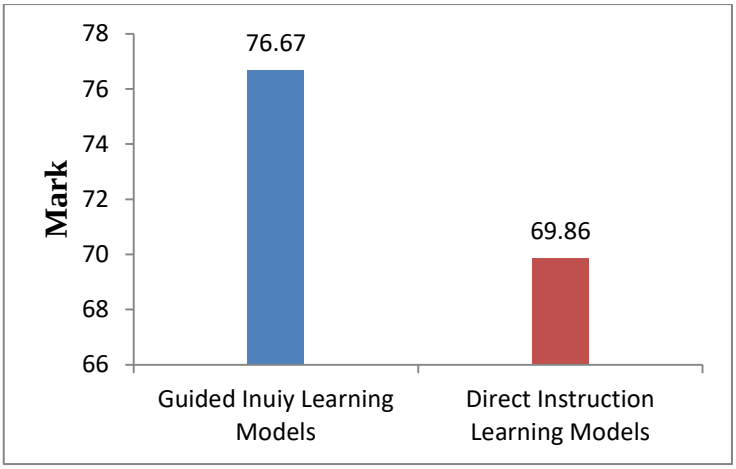

Figure 3. Graph of Average Student Learning Results in the Two Experimental Classes

Based totally on Figure 3, it may be determined that there may be a distinction in the average learning outcomes of students between classes that apply the guided inquiry learning model and classes that apply the direct instruction learning model. In Figure 5, it could be visible that the average knowledge score of college students in training that practice the guided inquiry learning model is higher than in training that practice the direct instruction learning model, namely the guided inquiry class gets an average score of 76.67 while the direct instruction class gets a score average 69.86. If presented, there is a difference of 6.81% in the class that uses the guided inquiry learning model which is better than the class that uses the direct instruction learning model.

The normality test was carried out to dicide whether or not the take a look at data on student learning results in the two experimental classes was normally distributed. The normality check used is the Lilliefors check with a significance level of 0.05. The consequences of the normality check completed in experimental class 1 obtained an $L_0 = 0.129$ and in experimental class 2 the value $L_0 = 0.067$. The value $L_t = 0.148$ for a significance level (α) = 0.05 and n = 36. From the consequences of the Lilliefors check, the $L_0 < L_t$ in both experimental classes in order

that it may be concluded that the learning results scores in both experimental classes are normally distributed.

Next, a homogeneity check was carried out to look whether or not the two experimental classes had homogeneous data variance. The homogeneity check achieved became the F test. The results of the homogeneity check for the two experimental classes obtained an F_0 = 1,227. The value F_t = 1.765 at the significance level (α) = 0.05, dk_1 = 35 and dk_2 = 35. Based at the outcomes of the homogeneity check that has been done, it shows that $F_0 < F_t$ this means that the data in each experimental classes come from a population that has homogeneous variance.

Going before assessments, including checks for ordinariness and homogeneity, have been embraced, asserting that the information from classes carrying out the directed request learning model and the immediate guidance learning model stick to the measures of ordinary conveyance and uniform difference. When the factual information has been affirmed as ordinary and homogeneous, a speculation test, explicitly the free example t-test, was directed to learn the legitimacy of the proposed theories inside the review. The information coming about because of the speculation test are framed in Table 5.

Table 5. Hypothesis Check Outcomes

Class	N	X	S	S^2	t_h	t_t
Experiment 1	36	70,72	14,04	197,12	2,049	1,999
Experiment 2	36	62,50	16,57	274,56		

From the data from the speculation check results introduced in Table 9, the outcomes acquired are t0= 2.049 > tt = 1.999, so H0 is dismissed. This really intends that there's a far and wide contrast in concentrating on results between undergrads who practice the directed request learning model and understudies who practice the immediate guidance learning model.

B. Discussion

This reviews was completed determined to perceive how the concentrating on information on outcomes look at between undergrads who have been shown utilizing the directed request learning model and understudies who have been shown utilizing the immediate guidance learning model on vector material and kinematics of rectilinear movement. The concentrating on impacts evaluated in this reviews are the information perspective. To get the examinations goals, speculation giving a shot changed into played out the utilization of the t-test with an importance degree (α) = 0.05. Principally based at the speculation check that has been played out, the results got are t0 = 2,049 > tt = 1.999 for an importance degree (α) = 0.05 and dk = 70. Accordingly the t0 is in the H0 dismissal region, till H0 which expressed that there has been no differentiation in understudy concentrating on results between exploratory class 1 and trial class 2 changed into dismissed and H1 acknowledged which expresses that there are varieties in understudy concentrating on results between exploratory class 1 and trial class 2 is acknowledged.

The effects of the studies that has been finished indicate good sized differences in students' physics learning results in vector material and rectilinear motion kinematics between classes that practice the guided inquiry learning model and classes that practice the.direct instruction learning model. Based on the posttest results obtained from both magnifience class show that the class that uses the guided inquiry learning model achieves better learning results than the class that uses the.direct instruction learning model, where the average learning outcome for experimental class 1 was 76.67, better than the average learning outcome for experimental class 2, which was 69.86.

Widespread variations in studying effects among students who practice the guided inquiry learning model and students who practice the direct instruction learning model. This is due to differences in syntax or learning steps in the two classes. The syntax of the learning model regulates how getting to know activities can be executed by using college students all through class. In experimental class 1 which practice the guided inquiry learning model, the syntax or studying steps used are: offering questions or troubles, making hypotheses, designing investigations, accomplishing investigations to achieve statistics, collecting and analyzing information, and making conclusions.

In learning activities using the guided inquiry learning model, college students are actively worried in getting to know, namely within the activities of making hypotheses, designing investigations, undertaking investigations to attain data, amassing and analyzing information, and making conclusions. When students carry out investigations to obtain data, students are more actively involved in obtaining information. With active students, information obtained independently will last longer in students' memories. Apart from that, in analyzing information, students discuss with other groups so that the information obtained will be more accurate. The active involvement of students in this learning makes students learn meaningfully, where students do not only learn by memorizing but students build and understand the concept itself. In step with studies conducted by [11], [12], and [23] which states that the implementation of the guided inquiry learning model influences student studying results.

In implementing the guided inquiry learning model, college students are directed to look for and find their personal answers to something they may be asking about. At the beginning of learning, the teacher provides a lot of guidance in the form of questions and discussions, then at later stages the guidance is reduced so that students are able to learn independently. Students utilize structured student worksheets in use the inquiry learning method. Based on research conducted by [24], learning using LKPD integrated with guided inquiry is effective in studying and can improve student studying results. Therefore, in learning with the guided inquiry model, there is more student activity so that students are greater actively concered inside the studying process. This is consistent with [25] opinion which states that increasing student studying activities can enhance student learning results.

The limitation of this research is that the material studied is only vector material and rectilinear motion kinematics. During direct practice in class, there were limitations so that the research was less than perfect. Time for teaching is limited so not all groups of students can present the results of their discussions. Apart from that, difficulties in managing the class were also an obstacle in this research. Some students lack discipline when studying, some are late, and some often talk about things outside of learning.

IV. CONCLUSION

Essentially based at the impacts of realities assessment that has been finished in regards to the difference of the directed request learning model with the immediate guidance learning model on understudy concentrating on results done in class researcher learning brings about vector material and rectilinear movement kinematics between understudies who have been shown utilizing the directed request learning model and understudies who have baan shown utilizing the immediate guidance learning model. The normal getting to know consequences of understudies who utilize the directed request learning model are superior to undergrads who utilize the immediate guidance learning model. This exploration is as yet restricted to vector material and rectilinear movement kinematics in class XI stage F. Ideas for other examination are to utilize more intricate material with a more extensive space.

REFERENCES

[1] E. Y. Wijaya, D. A. Sudjimat, A. Nyoto, and U. N. Malang, "Transformasi pendidikan abad 21 sebagai tuntutan pengembangan sumber daya manusia di era global," vol. 1, pp. 263–278, 2016.

[2] A. Hermino and I. Arifin, "Contextual Character Education for Students in the Senior High School," *Eur. J. Educ. Res.*, vol. 9, no. 3, pp. 1009–1023, 2020, doi: 10.12973/EU-JER.9.3.1009.

[3] Kemdikbud, "HASIL PISA INDONESIA 2018: Akses Makin Meluas, Saatnya Tingkatkan Kualitas," *kemdikbud.go.id*, 2019.

[4] S. Fadia and N. Fitri, "Problematika Kualitas Pendidikan di Indonesia," vol. 5, pp. 1617–1620, 2021.

[5] Yusrizal, *Pengukuran & Evaluasi Hasil dan Proses Belajar*. Yogyakarta: Pale Media Prima, 2016.

[6] Ansori, *Teori Taksonomi Bloom*. Jakarta: Rineka Cipta, 2008.

[7] R. F. Putri and J. Jumadi, "Kemampuan Guru Fisika dalam Menerapkan Model-Model Pembelajaran pada Kurikulum 2013 serta Kendala-Kendala yang Dihadapi," *J. Inov. Pendidik. IPA*, vol. 3, no. 2, pp. 201–211, 2017.

[8] nina risti Ananda, Hufri, and Nurhayati, "Pengaruh Penerapan LKS Bernuansa Keterampilan Berpikir Kritis dalam Pendekatan Sintifik Terhadap Hasil Belajar Fisika Siswa Kelas X SMA N 2 Padang," *Pillar Phys. Educ.*, vol. 7, pp. 41–48, 2016.

[9] R. I. Sari, "Analisis Tingkat Kemandirian Belajar Siswa pada Mata Pelajaran Fisika Kelas XII MAN 1 Batang Hari," *J. Pendidik. Fis. dan Teknol.*, vol. 5, no. 2, pp. 296–304, 2019.

[10] D. Telaumbanua, "Analisis Kualitas Pembelajaran dan Hasil Belajar Fisika," *Educ. J. Pendidik.*, vol. 1, no. 1, pp. 278–282, 2022.

[11] P. Barniol and G. Zavala, "Test of understanding of vectors: A reliable multiple-choice vector concept test," *Phys. Rev. Spec. Top. - Phys. Educ. Res.*, vol. 10, no. 1, 2014, doi: 10.1103/PhysRevSTPER.10.010121.

[12] D. Sarkity and P. D. Sundari, "Pemahaman Konsep Fisika Calon Guru Biologi Pada Topik Kinematika," *Pdagog. Hayati J. Ilm. Pendidik. Biol.*, vol. 4, no. 2, pp. 106–116, 2020.

[13] nover tiara Jelita, abdul haris Odja, and dewa gede eka Setiawan, "Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbantuan Video dengan Implementasi Blended Learning Terhadap Hasil Belajar," *ORBITA J. Kajian, Inovasi, dan Apl. Pendidik. Fis.*, vol. 8, no. 1, pp. 109–114, 2022.

[14] O. B. Pramesti, Supeno, and S. Astutik, "Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Komunikasi Ilmiah dan Hasil Belajar Fisika Siswa SMA," *JIFP (Jurnal Ilmu Fis. dan*

Pembelajarannya, vol. 4, no. 1, pp. 21–30, 2020.
[15] K. Anam, *Pembelajaran Berbasis Inkuiri: metode dan aplikasi*. Pustaka Belajar, 2016.
[16] R. Novia, Hufri, and L. Dwiridal, "Pengembangan LKPD Berorientasi Inkuiri Terbimbing pada Materi Momentum, Impuls, dan Tumbukan untuk Siswa SMA/MA Kelas X," *Pillar Phys. Educ.*, vol. 10, pp. 97–104, 2017.
[17] N. Trisna, T. Ariani, and E. Lovisia, "Model Direct Instruction dengan Teknik Probing Prompting: Dampak Terhadap Hasil Belajar Fisika Siswa Kelas X SMA Negeri 4 Lubuklinggau Tahun Pelajaran 2018/2019," *J. Pendidik. Ilmu Fis.*, vol. 1, no. 1, pp. 24–37, 2019.
[18] Sazali, T. Djudin, and Hamdani, "Peningkatan Hasil Belajar dengan Model DI Berbantuan Text Transformation pada Materi GLB di SMP," *J. Pendidik. dan Pembelajaran Khatulistiwa*, vol. 5, no. 1, pp. 1–14, 2016.
[19] P. Eggen and D. Kauchak, *Strategi dan Model Pembelajaran: mengajarkan konten dan keterampilan berpikir*. Jakarta: Indeks, 2012.
[20] Fatimah, "Peningkatan Hasil Belajar Siswa Melalui Model Pembelajaran Direct Instruction (DI) pada Pembelajaran Fisika," *Relativ. J. Ris. Inov. Pembelajaran Fis.*, vol. 3, no. 2, pp. 27–38, 2020.
[21] Hardani *et al.*, *Metode Penelitian Kualitatif & Kuantitatif*, no. March. CV Pustaka Ilmu, 2020.
[22] Sugiyono, *Metode Penelitian Kuantitatif*. Bandung: Alfabeta, 2018.
[23] L. Nurmayani, A. Doyan, and N. N. S. P. Verawati, "Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Fisika Peserta Didik," *J. Penelit. Pendidik. IPA*, vol. 4, no. 2, pp. 23–28, 2018.
[24] N. Aslinda, Hufri, and H. Amir, "Design LKPD Terintegrasi Inkuiri Terbimbing Berbantuan Virtual Laboratory pada Materi Fluida Dinamis dan Teori Kinetik Gas dalam Pembelajaran Fisika Kelas XI SMA," *Pillar Phys. Educ.*, vol. 10, pp. 57–64, 2017.
[25] Y. E. Kristanto and H. Susilo, "Pengaruh Model Pembelajaran Inkuiri Terbimbing terhadap Kemampuan Berpikir Kritis dan Hasil Belajar IPA Siswa Kelas VII SMP," *J. Pendidik. dan Pembelajaran*, vol. 22, no. 2, pp. 197–208, 2015.