

The Effect of the Guided Inquiry Learning Model on Cognitive Learning Outcomes and Student Learning Activeness of Grade 10 Students at MA Miftahul Ulum Bettet

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Abstract: This study was motivated by low science learning outcomes and the demands of 21st-century skills, which emphasize activeness, higher-order thinking, and students' independent engagement in the learning process. The study aimed to analyze the effect of the guided inquiry learning model on cognitive learning outcomes and student activeness among Grade 10 students at MA Miftahul Ulum Bettet, Pamekasan. A quantitative approach was employed using a quasi-experimental nonequivalent pretest–posttest control group design. The participants were female students in Grade X Science B (control: conventional/lecture-based instruction) and Grade X Science C (experimental: guided inquiry). Cognitive learning outcomes were measured using a five-item essay test, while student activeness was assessed using an observation sheet based on a rubric. Data were analyzed using Jamovi 2.0. Because the parametric assumptions were not met, the Mann–Whitney test was used for hypothesis testing. The results indicate that the experimental class achieved substantially higher mean cognitive posttest scores and activity scores than the control class, with statistically significant differences ($p < 0.001$) and a very large effect size. These findings suggest that guided inquiry is effective in improving students' cognitive learning outcomes and learning activity. It is therefore recommended as an alternative instructional model for Biology in Madrasah Aliyah (MA).

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Introduction

Education is widely recognized as a strategic process for preparing learners to become productive, innovative, creative, and autonomous members of society who are capable of making informed decisions in their present and future lives. The more varied the ways students can access, process, and integrate information, the more effectively they can solve problems and make appropriate decisions in real-life contexts (Huryah et al., 2017). In the twenty-first century, learning is expected to cultivate higher-order thinking skills, including problem formulation, information seeking across multiple sources, analytical reasoning, collaboration, and communication (Kuncahyono et al., 2020; Jayadi et al., 2020). These competencies are closely aligned with science education, which is intended not only to transmit factual knowledge but also to develop scientific literacy, metacognition, and the ability to respond adaptively to complex challenges. However, international large-scale assessments show that Indonesia's science competence remains low. Results from the Programme for International Student Assessment (PISA) indicate that Indonesia ranks near the bottom among participating countries, with the average science score (396) consistently below the OECD average of 489, revealing a persistent gap between the intended goals of science education and students' actual performance (OECD, 2019; Sahyar et al., 2019).

This macro-level challenge is reflected in classroom practices, particularly in biology instruction. Biology as a school science subject is expected to help students understand concepts meaningfully and relate them to everyday experiences through active participation in the learning process (Ante et al., 2020). Yet preliminary observations conducted in class X IPA B at MA Miftahul Ulum Bettet Pamekasan on 2 and 9 November 2021 showed that learning remained predominantly conventional and teacher-centred, with instruction dominated by lecturing and rote memorization. Students tended to be passive listeners; some showed low engagement (e.g., talking with peers, falling asleep), and opportunities for practical work were limited. Consequently, students' learning outcomes in science, particularly biology, were generally low, and many did not achieve the minimum mastery criterion (KKM). To compensate, the biology teacher reported that they augmented test scores through daily participation or additional assignments rather than systematically improving instructional quality. These observations underscore a misalignment between the demands of twenty-first-century learning and the instructional reality in the classroom, and they point to the need for student-centred, inquiry-oriented learning models that can simultaneously enhance cognitive achievement and student activeness.

One promising approach is the guided inquiry learning model, which positions students as active constructors of knowledge by engaging them in questioning, investigating, and drawing conclusions with structured guidance from the teacher. Guided inquiry provides opportunities for students to search for information independently, communicate scientific ideas, think critically and creatively, and collaboratively solve problems (Budiasa & Gading, 2020; Aristianti, 2018). Empirical studies have reported that guided inquiry can improve students' learning outcomes and learning experiences (Mahardhika et al., 2016) and has a positive effect on both achievement and activeness (Khaharman, 2021; Wulan, Sutarman, & Sungkowo, 2021; Muchindasari, 2016; Sari et al., 2020). Nonetheless, the existing literature still exhibits several gaps. Many prior studies have been conducted across different school types, grade levels, and subject contexts, with limited evidence from madrasah aliyah (MA) settings in Indonesia. Moreover, most studies tend to focus either on cognitive outcomes or on student engagement, without simultaneously and systematically examining both dimensions within the same instructional intervention, particularly in biology learning explicitly framed by twenty-first-century skill demands. To address these gaps, the present study investigates the effect of the guided inquiry learning model on both cognitive learning outcomes and student activeness in class X, MA Miftahul Ulum Bettet. Specifically, the study aims to determine (1) the effect of guided inquiry on students' cognitive achievement in biology and (2) the effect of guided inquiry on students' activeness during learning.

Research Method

Research Design and Participants

This study employed a quantitative approach with a quasi-experimental nonequivalent pretest–posttest control group design (Sugiyono, 2018). The design was used to examine the effect of implementing the guided inquiry learning model on students' cognitive learning outcomes and activeness. The study's schematic design is presented in Table 1.

Table 1. Research Design of the Pretest–Posttest Control Group

Group	Pretest	Treatment	Posttest
Experimental	O ₁	X ₁	O ₂
Control	O ₃	X ₀	O ₄

Notes: O₁, O₃: pretests to measure cognitive learning outcomes and student activeness before the intervention; O₂, O₄: posttests to measure cognitive learning outcomes and student activeness after the intervention; X₀: conventional instruction (lecture), and X₁: instruction using the guided inquiry learning model.

The study was conducted at MA Miftahul Ulum Bettet, Pamekasan, during the even semester of the 2021/2022 academic year. The population comprised all Grade 10 female students at MA Putri Miftahul Ulum Bettet, Pamekasan. Samples were selected as intact groups (non-random) based on existing classes: Grade X Science B (35 students) as the control class and Grade X Science C (35 students) as the experimental class. The independent variable was the guided inquiry learning model, while the dependent variables were cognitive learning outcomes and student activeness.

Instruments, Instructional Materials, and Procedures

The instructional materials used included a syllabus, lesson plans (RPP), student worksheets (LKS), learning-outcome test instruments, and observation sheets to assess the implementation of guided-inquiry syntax and student activeness. The syllabus referred to the Grade 10 Biology syllabus for SMA/MA (even semester) on the topics of Animalia and ecosystems. Lesson plans were developed for each Basic Competency and included learning steps, learning resources, and assessment procedures, adapted to the guided inquiry syntax for the experimental class and to conventional instruction for the control class. The student worksheets were designed to align with the stages of guided inquiry and served as student guides for practical activities and problem-solving during the learning process. All instructional materials (syllabus, lesson plans, and worksheets) were validated by expert lecturers before use in the study.

The primary instrument for measuring learning outcomes was a written essay test consisting of five items. The test was developed with reference to the cognitive domain of Bloom's taxonomy as revised by Anderson and Krathwohl (2001), which encompasses remembering (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5), and creating (C6). Content validity and construct validity were examined through expert judgment by lecturers and with support from Jamovi software, ensuring that the items aligned with the learning objectives and competency indicators being measured. In addition, item difficulty and reliability indices were tested using Jamovi, and the reliability coefficient was also obtained from the same application.

Student activeness was measured using an observation sheet of learning activities developed based on activeness indicators in the context of science learning (e.g., asking questions, answering, expressing opinions, participating in discussions, conducting practical activities, and taking important notes). Observations were conducted systematically in every meeting. The research procedure included: (1) administering a pretest in both classes to measure baseline cognitive ability; (2) implementing instruction according to the assigned treatment—the experimental class used the guided inquiry model, while the control class used the lecture method; (3) observing student activeness during instruction; and (4) administering a posttest in both classes to measure changes in cognitive learning outcomes after the intervention.

Data Collection and Statistical Analysis

Data were collected using two main techniques: tests and observations. The test was used to measure students' cognitive learning outcomes before (pretest) and after (posttest) instruction. Test items were grouped into three cognitive levels: Level 1 (knowledge and understanding), Level 2 (application), and Level 3 (higher-order reasoning, including analysis, synthesis, and evaluation). Scoring was guided by a rubric developed based on cognitive-ability indicators. Observations were

used to measure student activity during the learning process in both the experimental and control classes, using an observation sheet prepared and validated previously.

Data analysis was conducted quantitatively using Jamovi 2.0. Before hypothesis testing, statistical assumption tests were performed, including: (1) homogeneity of the covariate to ensure that baseline ability (pretest) was homogeneous between groups; (2) parallelism of regression lines between the covariate and the dependent variable in both groups; (3) normality of the posttest data distribution; and (4) homogeneity of posttest variances in the experimental and control classes. If all assumptions were met, hypothesis testing would be conducted using Analysis of Covariance (ANCOVA) to examine the effect of treatment differences on changes in cognitive learning outcomes and student activeness. Decision criteria were: (1) if $p > 0.05$, H_0 is accepted and H_1 is rejected, indicating no significant effect of the learning model on response changes; (2) if $p < 0.05$, H_0 is rejected and H_1 is accepted, indicating a significant effect of treatment differences on response changes. If one or more parametric assumptions were not met, the analysis proceeded with an appropriate nonparametric statistical test.

Result and Discussion

This section briefly yet comprehensively presents the results of the analysis of the effect of the guided inquiry learning model on cognitive learning outcomes and student activeness among Grade 10 students at MA Miftahul Ulum Bettet. The presentation includes descriptive statistics, a summary of assumption testing, and hypothesis-test results for each variable.

Cognitive Learning Outcomes

Descriptively, the guided inquiry learning model produced substantially better cognitive learning outcomes than conventional instruction. The mean cognitive-learning-outcome posttest score in the experimental class was 68.5 (SD = 2.59), whereas the control class mean was 43.0 (SD = 5.40). Scores in the experimental class ranged from 58 to 70, while those in the control class ranged from 35 to 52. This mean difference of more than 25 points indicates that students taught through guided inquiry achieved substantially stronger mastery of the subject matter than those taught through lecture-based instruction.

Before hypothesis testing, several parametric assumption tests were conducted. The results showed that baseline ability in the two classes was not homogeneous, the regression lines between the covariate and the dependent variable were not parallel, the distribution of final-ability data was not normal, and the variances of final ability in the two classes were not homogeneous ($p < 0.05$). In other words, the assumptions required for parametric analyses (such as ANCOVA) were not met; therefore, group differences in cognitive learning outcomes were more appropriately analyzed using nonparametric statistics.

Based on the Mann–Whitney test on posttest scores, $U = 0.00$ with $p < 0.001$, indicating that the null hypothesis was rejected. This result shows a statistically significant difference between the mean cognitive learning outcomes of the experimental and control classes, with a very large magnitude of difference (as indicated by high effect sizes, for example, Cohen's d and the rank-biserial correlation approaching 1.00). These findings indicate that the guided inquiry learning model has a strong, positive effect on students' cognitive learning outcomes compared with conventional lecture-based instruction.

Student Activeness

Descriptive results for student activeness show a pattern consistent with cognitive learning outcomes. Student activeness in the experimental class was markedly higher than in the control class. The experimental class mean activeness score was 57.8 (SD = 10.3), with a range of 36 to 72. In contrast, the control class mean was 25.1 (SD = 6.11), with scores ranging from

15 to 36. This mean difference of approximately 32–34 points suggests that students learning through guided inquiry were far more active in asking and answering questions, participating in discussions, and engaging in learning activities than students in lecture-based learning.

Assumption tests on activeness data indicated that activeness variances in the two classes were not homogeneous and that the data distribution deviated from normality ($p < 0.05$). Thus, as with cognitive learning outcomes, activeness data did not meet the assumptions required for parametric analysis. Accordingly, differences in activeness between the experimental and control classes were tested using the nonparametric Mann–Whitney test.

The Mann–Whitney test on student activity scores yielded $U = 1.00$, $p < 0.001$. Because p was smaller than 0.05, the null hypothesis was rejected, indicating a statistically significant difference in activeness between the experimental and control classes. The effect size was also very large (e.g., Cohen's $d = -3.83$ and the rank-biserial correlation ≈ 0.998), suggesting that guided inquiry not only increased activity significantly but also had a very strong impact on students' engagement in the learning process. Therefore, the guided inquiry model can be concluded to be effective in substantially increasing student activeness compared with conventional instruction.

Discussion

1. The Effect of the Guided Inquiry Learning Model on Student Learning Outcomes at MA Miftahul Ulum Bettet, Pamekasan

The findings show that the guided inquiry learning model had a significant effect on the learning outcomes of Grade 10 students at MA Miftahul Ulum Bettet, Pamekasan. Descriptively, the experimental class had a higher mean pretest score than the control class, indicating better initial input in the experimental group. This baseline difference contributed to the failure to meet the assumption of covariate homogeneity. Nevertheless, after the intervention, the mean learning-outcome difference between the experimental (guided inquiry) and control (lecture) classes became more pronounced. Statistical analysis yielded a significance value of 0.001 ($p < 0.05$), so H_0 was rejected. This indicates a statistically significant difference in mean learning outcomes between the two groups, and that the guided inquiry model had a meaningful effect on students' learning outcomes compared with the lecture method.

Theoretically, these findings can be explained by the characteristics of guided inquiry, which position students at the center of learning activities. Through guided inquiry, students do not merely receive information passively; rather, they actively construct understanding through investigating, formulating problems, collecting and analyzing data, and drawing conclusions (Yendrita, 2021). Teachers serve as facilitators who provide adequate guidance and scaffolding so that students feel confident to engage in searching for and discovering scientific concepts and principles, including through structured practical work (Lovisia, 2018). Practical activities, whether in real or virtual formats, have been shown to improve learning outcomes because they allow students to build concepts through direct experience with the objects being studied. Accordingly, the improvement in the experimental class is consistent with the pedagogical mechanisms of guided inquiry, which foster deeper cognitive engagement and scientific thinking.

These results are also consistent with previous studies reporting that guided inquiry positively affects students' learning outcomes (Widya, 2020; Kamaluddin & Firmansyah, 2022; Amijaya et al., 2018; Lalu et al., 2018; Maria et al., 2018; Siregar, 2019; Kurnianto, 2021). Within this framework, learning is understood as a process of behavioral change based on experience (Hadisaputra, 2020; Mahjatia et al., 2020), while learning outcomes encompass knowledge, skills, and higher-order thinking abilities in analyzing, problem solving, planning, and completing tasks (Sapitri, 2022). Improving learning outcomes requires adequate facilitation and instructional support, including guided-inquiry-based worksheets that encourage students to discover concepts independently (Hamidah & Haryani, 2018) and

practical activities that provide flexibility for scientific work (Nahak, 2020; Syamsu, 2017). Therefore, this study reinforces the idea that guided inquiry is a strategic alternative in Biology instruction at Madrasah Aliyah (MA) for improving student learning outcomes compared with conventional lecture-based instruction.

2. The Effect of the Guided Inquiry Learning Model on Student Activeness in Grade 10 at MA Miftahul Ulum Bettet, Pamekasan

The analysis indicates that the guided inquiry learning model had a significant effect on the activeness of Grade 10 students at MA Miftahul Ulum Bettet, Pamekasan. The significance value of 0.01 ($p < 0.05$) indicates that H_0 was rejected and H_1 accepted, indicating a real difference in activity between students taught through guided inquiry and those taught through conventional lecture-based instruction. Descriptively, the experimental class mean activeness score reached 57.8, while the control class mean was only 25.1. Student activeness was measured using a rubric comprising 11 observed activity aspects, and the results showed that the mean activeness score in the experimental class increased clearly from pretest to posttest. These findings suggest that guided inquiry not only changes classroom interaction patterns but also measurably strengthens students' active participation in the learning process.

Theoretically and empirically, these findings align with previous research showing that guided inquiry significantly influences student activeness (Sasmita, 2017; Prasetyowati, 2020; Nurhidayati et al., 2018; Wardani et al., 2016; Furmanti et al., 2019). In guided inquiry, the teacher serves as a mentor, providing broad guidance and direction, thereby encouraging students to engage in experiments actively and to develop scientific attitudes through direct learning experiences (Endang, 2018; Syamsu, 2017). The inquiry stages—from orientation, problem formulation, and hypothesis generation to data collection, data analysis, and conclusion drawing—require students to use their thinking skills independently and systematically (Mansur, 2021). This process promotes increased mental and physical activeness, including asking questions, expressing opinions, participating in discussions, and conducting observations and experiments (Amijaya, 2018; Wulandari & Wardani, 2019; Yendrita, 2021). Thus, increased activeness in the experimental class aligns with the inherent orientation of guided inquiry toward active learning.

Furthermore, increased student engagement is supported by instructional strategies that utilize contextual media and activities, such as images and videos on Animalia and ecosystems, and field practicums that draw on the school's surrounding environment (Budiasa & Gading, 2020). Student involvement in group work, discussions, direct observation, data collection and analysis, and hypothesis testing provides space for students to think, move, and interact actively (Ahyadi et al., 2018; Furmanti et al., 2019). Activeness in this sense is not limited to physical engagement but also includes intellectual and emotional involvement, integrating cognitive, affective, and psychomotor domains that support successful learning (Wulandari & Wardani, 2019). Accordingly, these results strengthen the view that guided inquiry is an effective alternative for improving student engagement, particularly in Biology learning, because it directly engages students in scientific thinking, problem-solving, and evidence-based decision-making (Prasetyowati, 2020; Syamsu, 2017).

Conclusion

Based on the data analysis and discussion, it can be concluded that implementing the guided inquiry learning model significantly improves both cognitive learning outcomes and student activeness among Grade X students at MA Miftahul Ulum Bettet, Pamekasan, compared with conventional lecture-based instruction. Quantitatively, the experimental class achieved much higher mean cognitive learning-outcome scores and activeness scores than the

control class, and the Mann–Whitney test indicated statistically significant differences for both variables with very large effect sizes. Pedagogically, these findings reinforce that guided inquiry—by positioning students as active agents through investigations, practical work, discussions, and problem-solving under teacher guidance—can promote deeper cognitive engagement and participation in learning. Therefore, this model is recommended as a strategic alternative for Biology instruction in Madrasah Aliyah (MA) to improve the quality of learning outcomes and student activeness.

Recommendation

Based on the research findings, the guided inquiry learning model is strongly recommended for Biology instruction at the Madrasah Aliyah level, particularly to enhance students' cognitive learning outcomes and learning activeness. Teachers are encouraged to design inquiry-based activities that actively involve students in investigations, discussions, and problem-solving processes under structured guidance, as this approach has been shown to be significantly more effective than conventional lecture-based instruction. Schools are also advised to support the implementation of guided inquiry learning by facilitating teacher training and providing adequate learning resources to optimize student engagement and learning quality.

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References

- Abidin, A. M. (2019). Kreativitas guru menggunakan model pembelajaran dalam meningkatkan hasil belajar siswa. *Didaktika: Jurnal Kependidikan*, 11(2), 225–238. <https://doi.org/10.30863/didaktika.v11i2.168>
- Ahyadi, A., Cahyani, D., & Ubaidillah, M. (2018). Peningkatan literasi biologi dalam penggunaan lembar kerja siswa (LKS) berbasis inquiry terbimbing pada konsep ekosistem. *Jurnal Ilmu Alam Indonesia*, 1(3).
- Amijaya, L. S., Ramdani, A., & Merta, I. W. (2018). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar dan kemampuan berpikir kritis peserta didik. *Jurnal Pijar Mipa*, 13(2), 94-99.
- Anderson, L. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives (Complete edition)*. Addison Wesley Longman, Inc.
- Anggraini, B. N. W., Ar, S. A. S., & Ramdani, A. (2020). Pengaruh penerapan model pembelajaran inkuiri terhadap hasil belajar tentang sistem gerak. *Jurnal Pijar Mipa*, 15(1), 32–36. <https://doi.org/10.29303/jpm.v15i1.1056>
- Ante, G., Ngangi, J., & Moko, E. (2020). Pengaruh model pembelajaran inkuiri terhadap hasil belajar siswa di SMA Negeri 3 Tondano. *JSPB BIOEDUSAINS*, 1(1), 19–24.
- Aristianti, A. (2018). The influence of cognitive styles and students' learning attitudes towards understanding chemical concepts (Survey at Vocational High School in Bekasi). *ALFARISI: Jurnal Pendidikan MIPA*, 1(1).

- Ayu, W. (2021, September 13). *Pengaruh metode cooperative learning tipe Numbered Head Together (NHT) terhadap pemahaman konsep dan keaktifan siswa pada mata pelajaran Pendidikan Agama Islam di SMAN 1 Boyolangu Tulungagung* [Skripsi]. IAIN Tulungagung.
- Budiasa, P., & Gading, I. K. (2020). Model pembelajaran inkuiri terbimbing berbantuan media gambar terhadap keaktifan dan hasil belajar IPA. *MIMBAR PGSD Undiksha*, 8(2), 253–263. <https://doi.org/10.23887/jjpsgd.v8i2.26526>
- Effendi, R. (2017). Konsep revisi taksonomi Bloom dan implementasinya pada pelajaran matematika SMP. *JIPMat*, 2(1). <https://doi.org/10.26877/jipmat.v2i1.1483>
- Lovisia, E. (2018). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar. *SPEJ (Science and Physic Education Journal)*, 2(1), 1-10.
- Furmanti, T., & Hasan, R. (2019, October). Pengaruh model pembelajaran inkuiri terbimbing terhadap kemampuan berpikir kritis, motivasi dan keaktifan siswa di SMP N 5 Seluma. In *Seminar Nasional Sains & Entrepreneurship* (Vol. 1, No. 1, pp. 1-9).
- Hadisaputra, S. (2020). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar kimia siswa materi pokok hidrokarbon. *Chemistry Education Practice*, 3(1), 17-22.
- Hamidah, N., Haryani, S., & Wardani, S. (2018). Efektivitas lembar kerja peserta didik berbasis inkuiri terbimbing untuk meningkatkan hasil belajar siswa. *Jurnal Inovasi Pendidikan Kimia*, 12(2).
- Amijaya, L. S., Ramdani, A., & Merta, I. W. (2018). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar dan kemampuan berpikir kritis peserta didik. *Jurnal Pijar Mipa*, 13(2), 94-99.
- Huryah, F., Sumarmin, R., & Effendi, J. (2017). Analisis capaian literasi sains biologi siswa SMA kelas X sekota Padang. *Jurnal Eksakta Pendidikan (JEP)*, 1(2), 72–79. <https://doi.org/10.24036/jep.v1i2.70>
- Isrok'atun, & Rosmala, A. (2021). *Model-model pembelajaran matematika*. Bumi Aksara.
- Jayadi, A., Putri, D. H., & Johan, H. (2020). Identifikasi pembekalan keterampilan abad 21 pada aspek keterampilan pemecahan masalah siswa SMA Kota Bengkulu dalam mata pelajaran fisika. *Jurnal Kumparan Fisika*, 3(1), 25–32. <https://doi.org/10.33369/jkf.3.1.25-32>
- Khaharman, Y. (2021). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil dan ketuntasan belajar biologi pada siswa SMA Negeri 1 Bonjol Kabupaten Pasaman. *Inovasi Pendidikan*, 8(2).
- Kuncahyono, K., Suwandayani, B. I., & Muzakki, A. (2020). Aplikasi E-Test “That Quiz” sebagai digitalisasi keterampilan pembelajaran abad 21 di Sekolah Indonesia Bangkok. *Lectura: Jurnal Pendidikan*, 11(2), 153–166. <https://doi.org/10.31849/lectura.v11i2.4687>
- Kurnianto, B. (2021). Implementasi model inkuiri terbimbing dalam meningkatkan keterampilan komunikasi dan kepuasan belajar mahasiswa PGSD Undaris. *WASPADA (Jurnal Wawasan Pengembangan Pendidikan)*, 9(1).
- Madaeni, S. (2019). *Pengaruh model pembelajaran inkuiri terhadap keaktifan dan hasil belajar IPS siswa kelas VIII MTsN 4 Blitar* [Skripsi sarjana, Universitas Islam Negeri Maulana Malik Ibrahim]. <http://etheses.uin-malang.ac.id/16136/>
- Mahardhika, P. Y., Renda, D. N. T., & Sudhita, I. W. R. (2016). Penerapan model inkuiri terbimbing untuk meningkatkan keaktifan dan hasil belajar Ilmu Pengetahuan Alam (IPA) pada siswa kelas III semester II SD Negeri 1 Penarukan. *MIMBAR PGSD Undiksha*, 4(2). <https://doi.org/10.23887/jjpsgd.v4i2.7582>
- Mahjatia, N., Susilowati, E., & Miriam, S. (2021). Pengembangan LKPD berbasis STEM untuk melatih keterampilan proses sains siswa melalui inkuiri terbimbing. *Jurnal Ilmiah Pendidikan Fisika*, 4(3), 139.

- Mansur, S. (2021). Penerapan metode inkuiri terbimbing terhadap keterampilan proses sains dan hasil belajar siswa SMP. *Jurnal Diklabio Pembelajaran Biologi*, 5(2), 140–146.
- Muhsyanur. (2020). *Kapita selekta pendidikan: Menelaah fenomena pendidikan di Indonesia dari pelbagai disiplin ilmu*. Mitra Mandiri Persada.
- Mushindasari, D. (2016). Penerapan pembelajaran inkuiri terbimbing untuk meningkatkan keaktifan dan hasil belajar IPA pada siswa kelas VIII-B SMPN 4 Madiun. *JEMS (Jurnal Edukasi Matematika dan Sains)*, 4.
- Nahak, R. L. (2020). Efektivitas model pembelajaran inkuiri terbimbing berbantu lembar kerja siswa berbasis saintifik terhadap hasil belajar siswa. *Jurnal Kependidikan*, 6(2), 230–237.
- Nurhidayati, S., Zubaidah, S., & Indriwati, S. E. (2015). Pengaruh Metode Inkuiri Terbimbing Terhadap aktivitas Dan Hasil Belajar Biologi Siswa. *Jurnal Kependidikan*, 14(3), 285-294.
- Octavia, S. A. (2020a). *Motivasi belajar dalam perkembangan remaja*. Deepublish.
- Octavia, S. A. (2020b). *Model-model pembelajaran*. Deepublish.
- OECD. (2019). *PISA 2018 results: Where all students can succeed*.
- Oktaviana, D., & Prihatin, I. (2018). Analisis hasil belajar siswa pada materi perbandingan berdasarkan ranah kognitif revisi taksonomi Bloom. *Buana Matematika: Jurnal Ilmiah Matematika dan Pendidikan Matematika*, 8(2), 81–88.
<https://doi.org/10.36456/buanamatematika.v8i2.1732>
- Prasetyowati, T., Wiharti, T., & Nugroho, A. A. (2020). Peningkatan Aktivitas dan Hasil Belajar Materi Sistem Ekskresi Melalui Inkuiri Terbimbing Pada Siswa SMP Negeri 1 Kemalang. *Journal of Biology Learning*, 2(2), 67-77.
- Sahyar, Bunawan, W., Rangkuti, M. A., & Yanti, J. (2019). High-level comprehension skill by using competencies PISA in Indonesia's education system. *Advances in Social Science, Education and Humanities Research*, 384.
- Sapitri, F., Ningsih, K., & Titin, T. (2022). Meningkatkan hasil belajar peserta didik dengan menggunakan model inkuiri terbimbing pada materi klasifikasi makhluk hidup. *Jurnal PTK dan Pendidikan*, 8(1).
- Sasmita, P. R. (2017). Penerapan metode inkuiri terbimbing menggunakan media kit fisika: upaya meningkatkan aktivitas dan hasil belajar fisika siswa. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, 6(1), 95-102.
- Sinar. (2018). *Metode active learning—Upaya peningkatan keaktifan dan hasil belajar siswa*. Deepublish.
- Siregar, S. (2019). Analisis keterampilan metakognitif dan sikap ilmiah siswa melalui metode pembelajaran inkuiri. *Biotik: Jurnal Ilmiah Biologi Teknologi Dan Kependidikan*, 7(2), 141-145.
- Suardi, M. (2018). *Belajar & pembelajaran*. Deepublish.
- Sugiyono. (2018). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Suwarni, & Lifya. (2018). *Guru berani menulis artikel ilmiah*. Perahu Litera.
- Syamsu, F. D. (2018). Pengembangan penuntun praktikum ipa berbasis inkuiri terbimbing untuk siswa smp siswa kelas vii semester genap. *Bionatural: Jurnal Ilmiah Pendidikan Biologi*, 4(2).
- Wardani, S., Setiawan, S., & Supardi, K. I. (2016). Pengaruh pembelajaran inkuiri terbimbing terhadap pemahaman konsep dan oral activities pada materi pokok reaksi reduksi dan oksidasi. *Jurnal Inovasi Pendidikan Kimia*, 10(2).
- Wibowo, N. (2021). Upaya meningkatkan keaktifan siswa di masa pandemi COVID-19 melalui metode pembelajaran Teams Games Tournament di SMK Negeri 1 Saptosari. *Jurnal Pendidikan Vokasi Otomotif*, 3(2), 19–34.
<https://doi.org/10.21831/jpvo.v3i2.40211>
- Wijoyo, A. (2018). Pengaruh hasil belajar siswa dengan menggunakan multi media pembelajaran interaktif untuk sekolah menengah pertama dan sekolah menengah atas. *Jurnal Informatika Universitas Pamulang*, 3(1), 46.

<https://doi.org/10.32493/informatika.v3i1.1519>

- Wulan, D. D., Sutarman, S., & Sungkowo, B. T. (2021). Pengaruh model pembelajaran inkuiri terbimbing terhadap penguasaan konsep fisika siswa kelas X SMA Negeri 1 Lawang pokok bahasan suhu dan kalor. *Jurnal MIPA dan Pembelajarannya (JMIPAP)*, 1(7), 570–577.
- Wulandari, F. A., & Wardani, K. W. (2019). Peningkatan keterampilan berpikir kreatif siswa kelas 5 menggunakan model mind mapping. *Jurnal Ilmiah Sekolah Dasar*, 3(1), 10–16.
- Yuhana, A. N., & Aminy, F. A. (2019). Optimalisasi peran guru Pendidikan Agama Islam sebagai konselor dalam mengatasi masalah belajar siswa. *Jurnal Penelitian Pendidikan Islam*, 7(1), 79. <https://doi.org/10.36667/jppi.v7i1.357>
- Zaeni, Z., Aulia, J., Hidayah, H., & Fatichatul, F. (2017). Analisis keaktifan siswa melalui penerapan model Teams Games Tournament (TGT) pada materi termokimia kelas XI IPA 5 di SMA N 15 Semarang. *Prosiding Seminar Nasional & Internasional*.