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Analysis Effectiveness of Guided Inquiry Implementation to Improve Students' Science Process Skills

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ABSTRACT

In improving science process skills, several learning approaches are carried out by teachers to achieve these objectives. One of the learning approaches used is the guided inquiry implementation. The objective of this research was to analyse effectiveness of the guided inquiry implementation to improve science process skills for elementary, junior high, and senior high school students. The research method used is study literature from various studies that have been published in journals, both nationally and internationally. Based on the analysis of 30 articles using the guided inquiry implementation, it is concluded that this learning approach is effective in improving science process skills, but teachers need to be aware for some strengths and weaknesses of this learning approach, so they need to be creative and innovative to develop the method used based on the characteristics of students in order to achieve the objective. Additionally, the use of the guided inquiry implementation can also improve long term memory, critical and creative thinking skills, motivation to learn science, and improve cognitive learning outcomes in science.

INTRODUCTION

Science is one of the knowledge that study everything around us systematically. Science is included in the category of special knowledge because it includes observation, experimentation, conclusion and the formulation of theories that are interrelated one another (Vom Brocke et al., 2020; Baskerville et al., 2018). In this case, science is more likely to learn something that has a process in improving students' abilities and skills so that certain learning approaches are needed to make students understand and apply learning materials easier in order the material delivered will be stored in student's long-term memory indirectly.

Nowadays, suspicion arises that science learning at school tends to be bored which is dominated by lecture method implementation. The main orientation of the science learning was suspected only at the completion of the material according to the allocated time based on the school curriculum used and it will make science learning cannot be optimal to develop student potential. The science learning approaches recommended by many experts is student-centered learning whereas provide opportunity for the students to learn "learning", not to learn "receiving" only (Ha & Kim, 2019). Discovery learning opportunities are developed in the form of inquiry base learning approach (Mariyana et al., 2020; Behfar & Okhuysen, 2018). Inquiry base curriculum is allocated 50% of the time for doing experiment so the students can solve the problem by finding their own concept and develop their curiousity.

Several methods of learning science are carried out by teachers, one of the methods used is inquiry (Quintana et al., 2018; Zhai, 2021; García-Carmona, 2020). According to

Piaget, inquiry method is a learning method that prepares students to conduct extensive self-experiments in order to observe what is happening, explore what they do, ask questions, and find answer on their own, as well as linking one discovery to another. Inquiry is a learning method developed so that the students find and use various sources of information and ideas to improve their understanding of certain problems, topics and issues (Zhai, 2021).

There are three types of inquiry method, they are guided inquiry, free inquiry and modified free inquiry. Guided inquiry is an inquiry method that uses guidelines in the form of questions that are used to guide students, while free and modified inquiry are more likely to provide opportunities to conduct the students' research to solve the problems through observation, exploration and research procedures. In guided inquiry learning approach, teacher acts as a facilitator in learning where teacher provides stimuli in the form of sentences or questions so that students become more active and motivated to develop their passion of thinking (Alamer & Al Khateeb, 2021). Additionally, the teacher also plays a role in providing instructions when students face difficulties in learning and being aware of mistakes by students during the research process and developing their self-confidence (Hong et al., 2021; García-Carmona, 2020).

Practically, learning activities using a guided inquiry learning approach consist of six steps starting from presenting problems, making hypotheses, designing experiments, conducting experiments, analysing data and making conclusion. The implementation of this approach requires students' activeness from the beginning to the end of learning process and encourage students to be more creative and innovative in solving problems occured when conducting experiments (Husni, 2020; Gunawan et al., 2019). The guided inquiry implementation in this study aims to improve science process skills so that it can be the basic skill in developing themselves to be able to think critically, logic, analytically and systematically. Science process skills are basic skills that facilitate learning in science, enable students to be active, develop a sense of responsibility, improve learning and research methods. Science process skills help students develop a sense of responsibility in learning and increase the importance of research methods in the learning process (Zhai, 2021; García-Carmona, 2020). In this case, students will experience development and improvement continuously both physically and mentally.

Science process skills are divided into two groups, they are basic process skills and integrated skills. The basic process skills consist of observing, inferring, measuring, communicating, classifying and predicting. Meanwhile, integrated skills include controlling variables, defining operationally, formulating hypotheses, interpreting data, experimenting, and formulating models. This literature study is needed since analysis effectiveness of guided inquiry is not clearly understood. Therefore, this research need to be conducted to determine the effectiveness of guided inquiry implementation to improve students' science process skills. The result of the literature study can inform teachers, educators, and Education Government to develop their learning approach in science class so the students can improve the science process skills continuously and also develop themselves to learn and get science experience more lively as the long life learner eventhough there is no science teacher to teach and supervise them, because the students' curiousity and skills are already develop in the science learning process independently previously.

RESEARCH METHOD

This research uses a literature study to describe and analyse effectiveness of the guided inquiry implementation in improving science process skill by finding the strength and weakness of guided inquiry implementation in every literature analysed. This research conducted by several previous researchers (Juhji, 2016). This literature study is taken from 30 articles or journals from various sources published over last 10 years between 2013-2022 regarding guided inquiry implementation. The steps of the literature study to analyse effectiveness of the guided inquiry implementation to improve science process skill is shown in Figure 1.

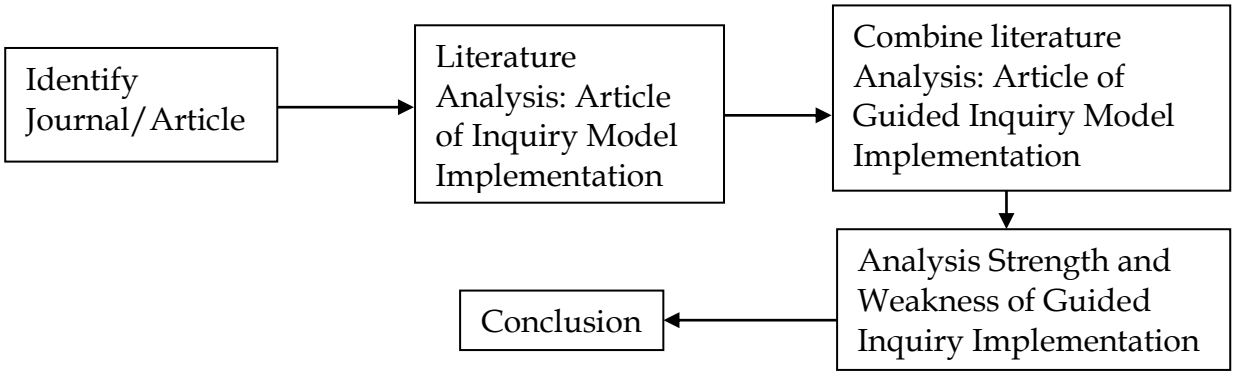

Figure 1. Flowchart of literature study research of analysis effectiveness of guided inquiry implementation to improve students' science process skills

RESULTS AND DISCUSSION

Analysis results of guided inquiry implementation are shown in Table 1 (Appendix). The guided inquiry implementation has slightly different characteristics from other learning implementation since this learning approach prioritize the student learning center, where the teacher does not deliver material to students at the beginning of the learning, but rather gives questions or statements that trigger students to find the answer by their own. In this case, the teacher acts as a facilitator during the learning process. This learning approach will be able to develop students' science process skills in accordance with the planning and learning objectives both direct and indirectly. This implementation also needs teacher's creativity in triggering the abilities and students' thinking process skills so they have a broad view in investigating and solving a scientific problem.

From the study literature research finding in Table 1, some shows in general that the inquiry implementation carried out for various level (Elementary, Middle, and Senior High School students) can improve cognitive learning outcomes, in the form of critical thinking ability and learning results, and also can improve psychomotor learning outcomes, in the form of basic and integrated science process skills and critical thinking skills. According to Susilawati et al. (2015), students in guided inquiry class have better science process skills compared to students in conventional class learning approach. The same idea also mention by Alhudaya et al. (2018) that students science process skill and concept understanding who learned using guided inquiry are better than students who learned using discovery learning. It shows that the guided inquiry implementation is considered effective for improving science learning skills and outcomes. This learning approach implementation also have positive effect between science process skills to cognitive learning result (Iswatun et al., 2017).

There are some methods developed by teachers when guided inquiry learning approach is implemented. Teachers can develop their own idea and creativity based on the Science topic delivered to the students. Guided inquiry learning approach using direct practical activity and virtual are considered to be better than direct method to improve student's physics learning outcomes. Another guided inquiry implementation using question approach is effective for the concept understanding and science process skill (Widyawati et al., 2019). Sukariasih et al. (2019) also stated that the implementation of guided inquiry learning model assisted by science KIT could improve the learning outcomes of knowledge and inquiry skill domain in the subject matter of light in atmosphere. It shows that teachers need to be creative and innovative in implementing guided inquiry learning approach using new method or they can use the previous method, but developed based on the students' characteristics, so this method can improve the students' science process skills as well as other skills will be improved also when the method is implemented. There are some strengths of guided inquiry implementation. The strengths are: (1) It helps the students' development in scientific literacy and process, vocabulary knowledge and concept understanding, (2) critical thinking, (3) positive attitude, and (4) give long life learning experiences. This implementation helps students to develop their cognitive and skill's process, providing opportunities to move forward according to the students' abilities, and also students are motivated to learn since they are directly involved in the learning process. Additionally, this method also develop students' enthusiasm through the investigation and also giving experience of success and failed during investigation process.

In other side, guided inquiry implementation has some weaknesses. The first one is in the time allocation, where the students need a long time to find and collect data or information during investigation, compared with the conventional method where the teacher directly deliver the material to students. Another weakness is related to the number of students in class, if there are too many students in class, this method will not be effective enough compared to the class with small numbers of students. Too many students in the class will also make some students tend to be less active in the investigation carried out by the group. Therefore, in implementing guided inquiry learning approach, teachers need to make plan and make a learning program carefully to avoid obstacles as mentioned in the weakness of the implementation above. It is necessary to make a learning implementation plan or learning objective flow specifically including the characteristics of students with various cognitive level and time allocation during learning process so this learning approach can be very effective to improve students' science process skills (Sukariasih et al., 2019). The author suggests designing learning in the form of group work and dividing groups of students proportionally by combining students who are in the high, medium, and low cognitive level in the same group. Hopefully, through this study literature analysis, the guided inquiry implementation runs smoothly based on the objective which is to improve students' science process skills according to the specified learning plans and achievements and also can fulfill the time allocation planned.

CONCLUSION

Based on the study literature review of guided inquiry implementation in 2013-2022, it can be concluded that this method is considered effective and has a positive value in improving students' science process skills. The implementation of this learning

approach is also useful for improving students' reasoning abilities, scientific and critical thinking skills and students' learning outcomes. There are some strengths and weaknesses of guided inquiry implementation. Teachers need to be aware when implement this learning approach to avoid obstacles during learning acitivity. In order to achieve the objective, teachers need to prepare the lesson plan carefully based on the students' characteristics. For the future research, the scale used for the study literature review can be made wider, especially for the objective, not only to improve students' science process skills, but also included to improve another science skills, such as critical, high order, and scientific thinking skill. Another thing can be develop is the method used in guided inquiry implementation. It needs teachers' creativity and innovation to develop the method used to improve not only science process skills, but another skills as well, using "new fresh method" based on students' characteristics nowadays, not only using direct or practical activity method.

REFERENCES

Aiman, U., Hasyda, S., & Uslan, U. (2020). The influence of process oriented guided inquiry learning (POGIL) model assisted by realia media to improve scientific literacy and critical thinking skill of primary school students. *European Journal of Educational Research, 9*(4), 1635-1647. https://doi.org/10.12973/eu-jer.9.4.1635

Aji, A. C., Santosa, S., & Probosari, R. M. (2014). Pengaruh model pembelajaran inkuiri terbimbing berbasis joyful learning (interjoy) terhadap keterampilan proses sains siswa kelas X SMA negeri 2 surakarta tahun pelajaran 2012/2013. *Bio-Pedagogi: Jurnal Pembelajaran Biologi, 3*(1), 23-36. https://doi.org/10.20961/bio-pedagogi.v3i1.5312

Alamer, A., & Al Khateeb, A. (2021). Effects of using the WhatsApp application on language learners motivation: a controlled investigation using structural equation modelling. *Computer Assisted Language Learning*, 1-27.

Alhudaya, M. T., Hidayat, A., & Koeshandayanto, S. (2018). Pengaruh inkuiri terbimbing terhadap keterampilan proses sains dan pemahaman konsep optik siswa kelas VIII. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan, 3*(11), 1398-1404. http://dx.doi.org/10.17977/jptpp.v3i11.11747

Astuti, M. W., Hartini, S., & Mastuang, M. (2018). Pengembangan mdul IPA dengan menggunakan model pembelajaran inkuiri terbimbing pada materi suhu dan kalor untuk melatihkan keterampilan proses sains. *Berkala Ilmiah Pendidikan Fisika, 6*(2), 205-219. http://dx.doi.org/10.20527/bipf.v6i2.4934

Azizah, A., & Nuraini, H. (2016). Penggunaan metode inquiry untuk meningkatkan keterampilan proses sains siswa sekolah dasar. *Jurnal Agama dan Pendidikan Islam, 8(2),* 16-31.

Baskerville, R., Baiyere, A., Gregor, S., Hevner, A., & Rossi, M. (2018). Design science research contributions: Finding a balance between artifact and theory. *Journal of the Association for Information Systems*, *19*(5), 3.

Behfar, K., & Okhuysen, G. A. (2018). Perspective—Discovery within validation logic: Deliberately surfacing, complementing, and substituting abductive reasoning in hypothetico-deductive inquiry. *Organization Science*, *29*(2), 323-340.

Budiyono, A., & Hartini. (2016). Pengaruh model pembelajaran inkuiri terbimbing terhadap keterampilan proses sains siswa SMA. *Jurnal Pemikiran Penelitian Pendidikan dan Sains, 4*(2), 141-149. https://doi.org/10.31102/wacanadidaktika.4.2.141-149

Farumananda, F. P., Yulianto, A., & Astuti, B. (2018). Profil pencapaian keterampilan proses sains dan peningkatan kemampuan kognitif siswa kelas X dalam pembelajaran fisika dengan bantuan LKS inquiry activity berbasis model pembelajaran curious note

program (CNP). *Jurnal Phenomenon, 8*(1), 13-25. http://dx.doi.org/10.21580/phen.2018.8.1.2491

Fitriyani, R., Haryani, S., & Susatyo, E. B. (2017). Pengaruh model inkuiri terbimbing terhadap keterampilan proses sains pada materi kelarutan dan hasil kali kelarutan. *Jurnal Inovasi Pendidikan Kimia, 11*(2), 1957-1970. https://doi.org/10.15294/jipk.v11i2.10623

Fitriyanti, I., & Munzil, M. (2016). Penerapan strategi pembelajaran inkuiri terbimbing berbantuan media untuk meningkatkan ketrampilan berpikir ilmiah siswa pada pembelajaran IPA SMP. *Jurnal Penelitian Pendidikan IPA, 1*(1), 1-6. https://doi.org/10.26740/jppipa.v1n1.p1-6

García-Carmona, A. (2020). From inquiry-based science education to the approach based on scientific practices. *Science & Education*, *29*(2), 443-463.

Gunawan, G., Harjono, A., Hermansyah, H., & Herayanti, L. (2019). Guided Inquiry Model Through Virtual Laboratory To Enhance Students'science Process Skills On Heat Concept. *Jurnal Cakrawala Pendidikan*, *38*(2), 259-268.

Ha, H., & Kim, H. B. (2019). A theoretical investigation on agency to facilitate the understanding of student-centered learning communities in science classrooms. *Journal of the Korean Association for Science Education*, *39*(1), 101-113.

Hong, J. C., Hsiao, H. S., Chen, P. H., Lu, C. C., Tai, K. H., & Tsai, C. R. (2021). Critical attitude and ability associated with students' self-confidence and attitude toward "predict-observe-explain" online science inquiry learning. *Computers & Education*, *166*, 104172.

Husni, H. (2020). The Effect of Inquiry-based Learning on Religious Subjects Learning Activities: An Experimental Study in High Schools. *Jurnal Penelitian Pendidikan Islam*, *8*(1), 43-54.

Islami, M., Khaeruddin, K., & Aziz, A. (2019). Pengaruh lembar kerja peserta didik (LKPD) berbasis inkuiri terbimbing terhadap keterampilan proses sains peserta didik kelas XI SMAN 8 makassar. *Jurnal Sains dan Pendidikan Fisika, 15*(2), 39-49. http://dx.doi.org/10.35580/jspf.v15i2.11035

Iswatun, I., Mosik, M., & Subali, B. (2017). Penerapan model pembelajaran inkuiri terbimbing untuk meningkatkan KPS dan hasil belajar siswa SMP kelas VIII. *Jurnal Inovasi Pendidikan IPA, 3*(2), 150-160. http://dx.doi.org/10.21831/jipi.v3i2.14871

Juhji, J. (2016). Peningkatan keterampilan proses sains siswa melalui pendekatan inkuiri terbimbing. *Jurnal Penelitian dan Pembelajaran IPA, 2*(1), 28-70. http://dx.doi.org/10.30870/jppi.v2i1.419

Kurniati, F., Soetjipto, S., & Indana, S. (2018). Membangun keterampilan berpikir kreatif siswa melalui pembelajaran berbasis inkuiri terbimbing. *Jurnal Penelitian Pendidikan IPA, 3*(1), 15-20. https://doi.org/10.26740/jppipa.v3n1.p15-20

Lasmo, S. R., Bektiarso, S., & Harijanto, A. (2017). Pengaruh model pembelajarn inkuiri terbimbing dengan teknik probing-prompting terhadap aktivitas dan hasil belajar fisika di SMA. *Jurnal Pembelajaran Fisika, 6*(2), 166-172. https://doi.org/10.19184/jpf.v6i2.5016

Lovisia, E. (2018). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar. *Science and Physics Education Journal, 2*(1), 1-10.

Marheni, N. P., Muderawan, I. W., & Tika, I. N. (2014). Studi komparasi model pembelajaran inkuiri terbimbing dan model pembelajaran inkuiri bebas terhadap hasil belajar dan keterampilan proses sains siswa pada pembelajaran sains SMP. *e-Jurnal Program Pascasarjana Universitas Pendidikan Ganesha, 4*(1), 1-11.

Mariyana, R., Handini, M., & Akbar, M. (2020). The Effectiveness of Discovery and Inquiry Learning Strategies in Improving Students' Early Math Skills. *Journal of Education, Teaching and Learning*, *5*(1), 173-176.

Marwan, A., Hasruddin, H., & Yusnadi, Y. (2021). The effect of guided inquiry learning model on process skill science and student's higher-level thinking skills on heat and transfer themes of class V SD negeri 104260 melati. *Budapest International Research and Critics in*

Linguistics and Education (BirLe) Journal, 4(2), 901-910. https://doi.org/10.33258/birle.v4i2.1931

Novitasari, A., Ilyas, A., & Amanah, S. N. (2017). Pengaruh model pembelajaran inkuiri terbimbing terhadap keterampilan proses sains peserta didik pada materi fotosintesis kelas XII IPA di SMA yadika bandar lampung. *BIOSFER: Jurnal Tadris Pendidikan Biologi, 8*(1), 91-104. http://dx.doi.org/10.24042/biosf.v8i1.1267

Nurfausiah, N., & Suhardiman, S. (2016). Pengaruh model pembelajaran inkuiri terbimbing terhadap hasil belajar. *Jurnal Pendidikan Fisika, 4*(1), 21-31. https://doi.org/10.26858/jnp.v5i1.3285

Quintana, C., Reiser, B. J., Davis, E. A., Krajcik, J., Fretz, E., Duncan, R. G., ... & Soloway, E. (2018). A scaffolding design framework for software to support science inquiry. In *The journal of the learning sciences* (pp. 337-386). Psychology Press.

Salamah, U., & Mursal, M. (2017). Meningkatkan keterampilan proses sains peserta didik menggunakan metode eksperimen berbasis inkuiri pada materi kalor. *Jurnal Pendidikan Sains Indonesia, 5*(1), 59-65.

Sari, K., Syukri, M., & Halin, A. (2015). Pengaruh penerapan metode eksperimen dan inkuiri terbimbing terhadap keterampilan proses sains dan sikap ilmiah siswa. *Jurnal Penelitian Pendidikan IPA, 3*(2), 51-55.

Sari, R. D., Agustini, R., & Widodo, W. (2021). The effectiveness of science e-magazine of socioscientific issues-based inquiry model to improve critical thinking skill of junior high school student. *Studies in Learning and Teaching Journal, 2*(3), 10-20. https://doi.org/10.46627/silet.v2i3.72

Siahaan, K. W. A., Lumbangaol, S. T. P., Marbun, J., Nainggolan, A. D., Ritonga, J. M., & Barus, D. P. (2021). Pengaruh model pembelajaran inkuiri terbimbing dengan multi representasi terhadap keterampilan proses sains dan penguasaan konsep IPA. *Jurnal Basiedu, 5*(1), 195-205. https://doi.org/10.31004/basicedu.v5i1.614

Sukariasih, L., Saputra, I. G. P. E., Ikhsan, F. A., Sejati, A. E., & Nisa, K. (2019). Improving the learning outcomes of knowledge and inquiry skill domain of third grade students at SMP negeri 14 kendari using guided inquiry learning model assisted by science kit. *Jurnal Geosfera Indonesia, 4*(2), 175-187. https://doi.org/10.19184/geosi.v4i2.10097.

Susilawati, S., & Sridana, N. (2015). Pengaruh model pembelajaran inkuiri terbimbing terhadap keterampilan proses sains siswa. *Jurnal Tadris IPA Biologi FITK IAIN Mataram, 8*(1), 1-10. http://dx.doi.org/10.17977/jptpp.v3i10.11625

Susilawati., D. A., Artayasa, P., Soeprianto, H., & Harjono, A. (2021). Analysis of validation development science learning tools using guide inquiry model assisted by real media to improve the understanding concepts and science process skills of students. *Jurnal Penelitian Pendidikan IPA, 7*(1), 41-44. https://doi.org/10.29303/jppipa.v7i1.473

Taib, H., Haerullah, A., & Roini, C. (2020). Pengaruh pembelajaran inkuiri terbimbing terhadap keterampilan proses sains siswa SMP. *Jurnal Edukasi, 18*(2), 1-7. http://dx.doi.org/10.17977/jptpp.v3i11.11747

Vom Brocke, J., Winter, R., Hevner, A., & Maedche, A. (2020). Special issue editorial–accumulation and evolution of design knowledge in design science research: a journey through time and space. *Journal of the Association for Information Systems*, *21*(3), 9.

Widyawati, T., Adnyana, P. B., & Warpala, I. W. S. (2019). Efektivitas penerapan model pembelajaran inkuiri terbimbing berbasis pertanyaan terhadap pemahaman konsep IPA dan keterampilan proses sains dalam materi interaksi makhluk hidup dengan lingkungannya di kelas VII di SMP negeri 3 banjar. *Jurnal Penelitian Biologi Undhiksa, 6*(2), 83-93. https://doi.org/10.23887/jjpb.v6i2.21926

Wijayaningputri, A. R., Widodo, W., & Munasir, M. (2018). The effect of guided inquiry model on science process skills indicators. *Jurnal Penelitian Pendidikan Sains, 8*(1), 1542-1549. https://doi.org/10.26740/jpps.v8n1.p%25p

Yuniastuti, E. (2013). Peningkatan keterampilan proses, motivasi, dan hasil belajar biologi dengan strategi pembelajaran inkuiri terbimbing pada siswa kelas VII SMP kartika V-1 balikpapan. *Jurnal Penelitian Pendidikan, 13*(1), 80-89. https://doi.org/10.17509/jpp.v13i1.3509

Zhai, X. (2021). Advancing automatic guidance in virtual science inquiry: from ease of use to personalization. *Educational Technology Research and Development*, *69*(1), 255-258.

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Appendix

Table 1. Table article analysis of guided inquiry implementation.

Author and Year	Sample Characteristics	Research Methodology	Result/Finding
(Sari, 2021)	16 students grade VIIIA	Research and Development	a. Learning Implementation • Average percentage in 1st meeting is 83%, in 2nd meeting is 80% and in 3rd meeting is 79% • Reliability: 85.71% (categorized as reliable since it is more than 75%) b. Critical thinking result • 8 students are categorised as medium and low category
(Fitriyanti & Munzil, 2016)	Grade VIII students of State Junior High School 3, Sanggau, Kalimantan Barat	• Classroom action research using Kemmis and Tagrad model with 3 cycles, consist of planning, action, observation and reflection • Data sampling is taken using observation	There was an increase in students' scientific thinking skill from cycle 1 to 3. In cycle 1, the average scientific thinking skill is 70%, cycle 2 rose to 75%, and cycle 3 increased to 83.75%
(Kurniati et al, 2018)	Students grade VIII of State Junior High School 4 Lamongan, odd semester academic year 2016/2017	Descriptive quantitative research using one group pretest-posttest design	• Average score for creative thinking skill students in the pre-test is 41.67, meanwhile in the post-test is 79.17 with N-Gain 0.79, which is in high category • Students response are positive in the guided inquiry learning model with a percentage of 95.79%
(Lasmo et al, 2017)	Students at Senior High School 1 Pakusari	• Practical activity research using post-test control group design • Data sampling is taken by	• Students learning activity using guided inquiry method with probing-prompting technique is included in an active criteria

Author and Year	Sample Characteristics	Research Methodology	Result/Finding
		documentation, observation, interview and test	with a percentage of 85.80% that have a significant effect in Physics science lerning result at Senior school
(Iswatun et al, 2017)	Grade VIII students of State Junior High School 1 Bojong, Pekalongan District, academic year 2016/2017	Quasi experiment research using control design group pretest posttest. Data is taken using test method and observation	• Science process skills improvement for the experiment class is 0.52 and for the control class is 0.33 • Maximum science process skills aspects are in the observation, measurement, doing experiment and communication parts. • Cognitive learning result improvement for the experiment class is 0.53 and for the control class is 0.38 • Guided inquiry learning implementation can improve science process skills and students cognitive learning result and also have positive effect between science process skills to cognitive learning result
(Nurfausiah & Suhardiman, 2016)	grade IX students of Islamic Junior High Scool Madani Alauddin Pao-pao	10 numbers Multiple Choice Question and 3 essay questions Implementation of learning method by observation and documentation	Student's average result before guided inquiry method was implemented is in high category, but after guided inquiry was implemented, it is in very high category Inferential result is $t_{hitung} > t_{tabel}$ so there is no significant difference to improve student's result in Physics Science lesson
(Aji et al, 2014)	All grade X	Science Process	Interjoy guided inquiry

Author and Year	Sample Characteristics	Research Methodology	Result/Finding
	students of State Senior High School 2 Surakarta academic year 2012/2013	Skills Test, observation sheet, and document	implementation had direct effect to the science process skill grade X students of State Senior High School 2 Surakarta
(Budiyono & Hartini, 2016)	Grade X students of Islamic Senior High School Matsaratul Huda Pamekasan	Science process skills instrument test	• Pretest and posttest score in the control class are 33.13 and 56.06, and pretest and posttest score in the experiment class are 31.04 and 85. • Data analysis used t-test, whereas t_{hitung} is 8.94, t_{tabel} in the significant level 0.05 is 2.01 or $t_{hitung} < t_{tabel}$, it was concluded that there is a significant affect implementing guided inquiry method to improve science process skills compared to conventional method. • Science process skills improvement in the experiment class is 0.78 or categorized as high level, meanwhile for the control class is 0.34 or in the medium class.
(Lovisia, 2018)	Grade X students of State Senior High School 6 Lubuklinggau	Experiment research. Data collecting technique used is test analysis	Based on posttest with reliability of 5%, it was found that $t_{obtained} = 2.61$ and $t_{table} = 2.02$ since $t_{obtained} > t_{tabel}$. It was concluded that there is a significant effect for the students result using guided inquiry method.
(Juhji, 2016)	Grade VI students of Al Ikhlas Islamic Elementary School Cipete academic year 2008/2009	Class Action Research	Percentage of science process skills is improved 10.55%, whereas from 62.89% to 73.44% in good level category.
(Azizah & Nuraini, 2016)	Grade V students of Sidomulyo State	Class Action Research	• Inquiry implementation can improve science

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	Elementary School 04 Ungaran Timur, Kabupaten Semarang		process skills students result • Observation skill is improved from 83% to 90%, measurement skill is improved from 76% to 90%, classifying skill is improved from 69% to 93%, communication skill is improved from 72% to 93%, prediction skill is improved from 62% to 83%, interference skill is improved from 69% to 90%
(Novitasari et al, 2017)	58 grade XII students of Senior High School Yadika Bandar Lampung using *cluster random sampling*	Quasy experiment with posttest only control design	There is a significant difference between guided inquiry and one direction method, it is proven from the sig result whereas 0,00 < 0,05, it shown that inquiry method influenced the science process skills.
(Marwan et al, 2021)	Grade V students of State Elementary School 104260 Melati	Science process skilss observation and high order thinking skill test	• Science process skills average score in class that used guided inquiry model is 81.62 and in one direction method class is 79.02 • High order thinking skill average score in the class that used guided inquiry method is 75.57, meanwhile in the class that used one direction method is 67.43
(Farumananda et al, 2018)	32 students grade X of State Senior High School 7 Yogyakarta	One group pretest-posttest design	• After using Inquiry Worksheet, it is found that achievement profile for science process skill in term of questions, result and discussion, and also based theory are in the good category level with score of 4.00, 4.11,

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			dan 3.53. • Investigation activity skill was improved in the average score of 4.50 in good level category • Students' cognitive ability are improved at score 4.32 in good level category • Inquiry activity based on CNP learning model got score 3.57 in good level category
(Wijayaningputri et al, 2018)	90 students of XI-Science State Senior High School 1 Pasuruan	One group pre-test post-test design	There was a significant increase in the indicators of students' science process skills for 3 classes with the N-gain score of 0.49. The guided inquiry method has a good effect on indicators of improving science process skills for Vibration and Wave materials.
(Sari et al., 2015)	45 students grade X of State Senior High School 1 Unggul Baitussalam	Pretest-posttest control group design	The guided inquiry method had an effect on students' scientific process skills and scientific attitudes, with the N-gain value of science process skills by 71% and students' scientific attitudes by 52%
(Fitriyani et al., 2017)	Students of State Senior High School at Semarang city academic year 2015/2016	True-experimental	The average post-test score of the experimental class was 71.12 and the control class was 66.26, there was a significant difference between the science process skills of the experimental class students and the control class students' science process skills. The post-test data analysis of the two classes showed that the

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			guided inquiry implementation could improve students' science process skills with a determination coefficient of 10%, while the correlation coefficient of 0.32 was in the low category. It can be concluded that the guided inquiry implementation can improve students' science process skills, namely designing experiments.
(Salamah & Mursal, 2017)	All students grade X Islamic Senior High School 1 Kembang Tanjong	Pre-experimental with one group pretest-posttest design	The results of data analysis of the inquiry implementation based on experiment can improve students' science process skills on heat material at Islamic Senior High School 1 Kembang Tanjong. Science process skill data shows the minimum pretest score is 2.0, the posttest minimum value is 12.0, and the N-gain is 0.5 with a scale of 0-18. Students shows positive response to inquiry implementation based experimental method in teaching and learning process.
(Islami et al., 2019)	240 students of State Senior High School 8 Makassar	Quasy experimental study	Science process skills in the experimental class are in the high category, while the control class is in the low category. There is a significant difference between science process skills in the class using guided inquiry and the conventional method where $\alpha = 0.05$.
(Widyawati et al.,	32 students of	Test and observation	Guided inquiry

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2019)	grade VII-5 State Junior High School 3 Banjar	method	implementation using question approach is effective for the concept understanding and science process skill.
(Aiman et al., 2020)	58 students of fourth grade Elementary School of Inpres Oeba 2 Kupang City, NTT	Quasi-experiment research used single factor independent group design	Process Oriented Guided Inquiry Learning (POGIL) assisted by realia media has an influence on the students' scientific literacy and critical thinking.
(Sukariasih et al., 2019)	26 students of class VIII-5 State Junior High Scool 14, Kendari, academic year 2016/2017	Classroom action research with research design	The implementation of guided inquiry learning model assisted by science KIT could improve the learning outcomes of knowledge and inquiry skill domain in the subject matter of light in atmosphere.
(Siahaan et al., 2021)	Students of Junior High School Surya Pematangsiantar	Quasi experiment with post-test only control group design	There are no differences science process skills between experimental and control class students, while the mastery of science concept experimental class differences than control class students, and science process skills students have positive correlation with science concept mastery.
(Susilawati et al., 2015)	62 students of State Junior High School 10 Mataram, academic year 2014/2015	Quasi experimental research	Students in guided inquiry class have better science process skills compared to students in conventional class learning approach.
(Yuniastuti, 2013)	VII grade students of Kartika V-1 Junior High School, Balikpapan	Classroom action research	• Science process skills increase 55% in 1st cycle, 69.38% in 2nd cycle, and 80.63% in 3rd cycle • Students learning motivation increase 60.74% in 1st cycle, 69.63% in 2nd cycle, and

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			80% in 3rd cycle) • Students learning result increase 45.56% in 1st cycle, 58.89% in 2nd cycle, and 86.67% in 3rd cycle)
(Marheni et al., 2014)	VII grade students of State Junior High Scool 3 Payangan	Quasi experimental research with post test design only	It was found that there was a difference between students learning result and science process skills for the students who join guided inquiry class and students who join free inquiry class. The result shows that the students who join guided inquiry class have better score and skills compared to the students who join free inquiry class.
(Astuti et al., 2018)	29 students VII-C grade State Junior High School 13 Banjarmasin	R & D using ADDIE model	• Science modul validity in good category • Science modul practicality in very good category • Science modul effectiveness in middle category • Science process skills achievement in very good category
(Alhudaya et al., 2018)	61 students of State Junior High School 2 Sukorejo, Pandaan, Pasuruan, East Java	Quasi experimental using pretest posttest control group design	Students science process skill and concept understanding who learned using guided inquiry are better than students who learned using discovery learning
(Taib et al., 2020)	32 students of State Junior High School 1 West Halmahera	Experimental research design	Students science process skills in guided inquiry class have higher score rather than control class