Available online at
https://jurnal.uinsyahada.ac.id/index.php/Lavoisier/index

LAVOISIER: CHEMISTRY EDUCATION JOURNAL

Vol. 3 (2), 2024

The Analysis of Guided Inquiry Learning Model to XI Grader's Motivation on Thermochemistry

Alya Shifa Azzachra[1*], Fitria Fatichatul Hidayah [2*]

[1,2,3]Chemistry Education Study Program, Faculty Educational Sciences and Humanities, Muhammadiyah University of Semarang

*Correspondence: alyashifa112@gmail.com

Article History

Received 09 03th 2024
Revised 09 14th 2024
Accepted 09 22th 2024
Available Online 12 10th 2024

Keywords:
Learning Model
Motivation Learn
Inquire Guided

Abstract
Consistent learning is generally based on great curiosity, a drive of need or pressure that makes one inevitably have to recognise new things. The consistency of student learning ultimately requires the main driver commonly referred to as learning motivation. In addition to student learning motivation, careful learning preparation with the application of interesting learning models can be another success factor in education, one of these learning models is the guided inquiry model. The research method used is qualitative with a descriptive approach. The research subject chosen was class XI students in one of the high schools in Semarang City and the sample was all class XI students totalling 36 students consisting of 15 male students and 21 female students, with an age range of 16-18 years. The object of the research is the analysis of guided inquiry learning model on the interest in learning chemistry, especially thermochemistry material. The results showed that 47.2% of students strongly agreed that they had learnt many thermochemistry materials related to daily life. 61.1% of students strongly agree that they have applied the concept of thermochemistry in everyday life, for example by heating water, cooling water, and so on. 30.6% of students disagreed that they had difficulties in learning chemistry materials related to daily life. 91.7% of students answered that learning in the laboratory can maintain their interest in learning, especially in thermochemistry material. Therefore, this guided inquiry learning model is effective to maintain students' learning motivation supported by laboratory facilities.

1. Introduction

In a nation or civilisation, education is a turning point. Man plays a crucial role in improving the quality of education and the primary goal of its execution

(Pujiastuti, 2022). Under his generation, education has the potential to advance further. Consistency in his studies is the key to his movement (Amijaya, L. S., Ramdani, A., & Merta, 2018). One of the primary goals in Indonesia is to raise the standard of education (Dariyatun, 2020). Stage improvements in each learning process are one way to try to improve the quality of education. Numerous factors impact learning outcomes, such as the learning model employed, the implementation strategy, the shared teaching resources, and the degree of motivation demonstrated by students in the learning process. Form Consistent Study generally based on a sense of desire to know the big one, push need or the pressure that makes somebody Want to No Want to know matter new. Consistent Study participants educate in the end need A booster the usual main called motivation Study (Cahyani, NI, & Azizah, 2019). Motivation Study is one of the factors for the success of students in the educational process.

In addition to studying participants' motivation, preparing for mature learning through the use of an engaging learning model can contribute to educational success. Applying learning models to method learning while taking into account the learning objectives shown in the management class and the stages of exercise learning (Kristina, 2018). Inquiry-guided learning models are among the kinds of learning models that support students in developing their cognitive abilities and processes (Nasution, 2018). Furthermore, development technology must be matched with the use of learning models. Humans are currently entering the era of civilisation 5.0, which is defined as a technologically driven and human-centred social order (Nastiti, 2020). The use of technology can be done in developing various learning media. One way that can be done to improve student learning success is to utilise good and effective learning media (Mega, 2022).

Learning model inquiry guided is a learning model that focuses on the main thing aimed at students to find ideas from a Topic. Learning model This includes the student in finding answers to problems with activities learning. So that students can contribute maximum in the learning process, which leads to curiosity to know more. Learning with this model also stabilises the memory of student-related learning problems (R. Diyah, 2019). According to Faturohman (2017), learning model inquiry is a learning model in the class student-centred on involving them in the learning process, then the teacher as provider facilitator (Sa'adah & Kusasi, 2017). Learning model This demands students to be active

and critical of phenomena that occur during learning so that can develop Power pull students, skills to think critically, and digging potential they (Wildan, W., Hakim A., Siahaan, J., & Anwar, 2019). The inquiry learning model is one of the models that emphasise student activities where students are required to be able to find and find what is being asked and require students to think critically, systematically, and logically and, at the same time, involve the mental processes of students. Inquiry is a learning model where students are encouraged to learn through their active involvement with concepts and principles. A person acts as a scientist, conducts experiments, and can carry out the mental process of inquiry, namely, asking questions about natural phenomena, formulating problems, formulating hypotheses, designing investigative approaches (seeking information) which include experiments, conducting experiments, synthesising knowledge, and having a scientific attitude, including being objective, curious, open, wanting and respecting theoretical models and being responsible.

Inquiry is divided into three types of inquiry, namely Guided inquiry in its implementation is carried out by students based on instructions from the teacher. Instructions are generally given in the form of questions that are intended to guide students. With this guided inquiry, students learn more oriented towards guidance and instructions from the teacher so that students can understand the concepts of the lesson. Modified inquiry, student activities are emphasized on exploration, designing and carrying out experiments. When students carry out the learning process to find answers to problems posed by the teacher, the assistance that can be provided by the teacher is with the technique of questions, not in the form of explanations. Free inquiry, Free inquiry activities are carried out after students have studied and understood how to solve a problem have obtained sufficient knowledge about a particular field of study and have carried out modified discovery inquiry (Yulianda, 2019).

On the other side of the problem in motivation study, students are influenced by the level of difficulty of the information they learn and what they can understand. Students' comprehension of incorrect notions will lead to misconceptions about the material being taught. This frequently arises in the type of materials with the scheme. Chemistry, for example, is a difficult and sequential subject. Chemistry alone is the study of a material's structure composition, properties, and changes, as well as the accompanying energy change material (Mulyati, 2007). Science chemistry is also a science based on

facts, concepts, principles, theories, and laws that comprise declarative knowledge and how that information is created, which is classified as procedural (Asi, 2018). Chemistry is sometimes regarded as one of the most difficult topics, and students are reluctant to pursue additional studies in it. This is because many pupils still struggle to understand chemical principles (Simatupang, 2021). This is consistent with Wiseman's assertion that chemistry is one of the most challenging subjects for most middle school and college students. Chemistry lectures are highly relevant to everyday life and have brought numerous benefits to people (Camelia, 2022).

Misconceptions in scope education can also be referred to as errors in conceptual understanding that students have when studying material. One of the most common misconceptions in chemistry is thermochemistry. Thermochemistry is one of the chemistry topics covered in the Merdeka SMA/MA class XI Science curriculum. Draft material thermochemistry teaches you about change enthalpy and equation thermochemistry. According to Agustin (2017), certain Lots students in Palangka Raya City State Senior High School's XI IPA class struggled to grasp draft determination change enthalpy as viewed through the lens of Hess's Law. Sudijono defines conceptual comprehension as a person's ability to understand or comprehend anything once it has been learnt and retained (Biya, S. A., Isa, I., & Laliyo, 2023). Conceptual comprehension is also critical since comprehending the correct notion allows pupils to acquire, master, and retain the stuff they learn for a long time (Astri, 2013).

R. Diyah Puspitasari (2019) conducted study on learning models, guiding inquiry into how they affect classroom learning and how they affect students' conceptual understanding and idea discovery. Furthermore, Priska Anggita (2022) talks about inquiry-based learning methods that are meant to pique students' attention and have a significant impact on test scores. As a result, the researcher attempted to learn model analysis inquiry under the guidance of material thermochemistry class XI and discovered the differences between this study and earlier research.

2. Materials and Methods

This study employs a qualitative approach with a descriptive methodology. The research subject chosen is a student in class XI, which is

incorrect. One Semarang City high school, with a sample of all students in There are 36 pupils in class XI 3, 15 of whom are male and 21 of whom are female, ranging in age from 16 to 18. Regarding the subject of his study, he is guiding students' enthusiasm in studying chemistry, particularly material thermochemistry, through model analytical inquiry. The learning model is where? Student-centered, inquiry-guided discussion of current issues Still under instructor supervision, though.

Researchers employ observation and dissemination questionnaires to get data from students studying material thermochemistry. Researchers observed students during the learning process, focussing on pupils who were eager to learn, responding in class, and comprehending after the exercise was ended. Three key questions about understanding students in learning and motivation to study students for learning next are included in the distribution questionnaire for reflection students on material thermochemistry. The following are the questions on the provided questionnaire:

1. How many lots of thermochemistry-related stuff have you learnt in your daily life?
2. Is it accurate to say that you use the idea of thermochemistry regularly?
3. Do you find it difficult to comprehend topics about thermochemistry in your day-to-day life?
4. How do you keep your enthusiasm for studying chemistry?

Regarding the survey administered via Google Forms with type election, responses are provided on a linear scale from 1 (strongly disagree) to 5.

3. Results and Discussions

Results

Table 1 below shows the findings of the student distribution questionnaire.

Table 1. Answer results case study student

No	Points Question	Amount Student Answer				
		SS	S	CS	TS	STS
1	How many Lots You has learn material related thermochemistry with life daily?	17	12	7	0	0

2	Is it true You do application of the concept thermochemistry in life daily?	22	9	5	0	0
3	Whether You feel difficulty in understand Topic related thermochemistry with life daily?	9	3	3	11	10

Regarding the fourth form question, you can either submit your response or type different responses that are a vote from a variety of the solutions that have been provided. Students were permitted to select more than one response for this question in order to display more intricate responses. The student's response is displayed in Table 2 beneath this.

Table 2. Answer results questionnaire student

No	**Points Question**		**Amount Student Answer**
1	How method You maintain interest Study in chemistry	Study with friend	20 students
		Study in the Laboratory	33 students
		Study with draft daily	18 students

Discussion

The most efficient first step towards better comprehension and learning is a student's enthusiasm to study. So, is it challenging to work with a substance that is known as chemistry? due to its sequential pattern and abstract nature. Motivation studies are demonstrated by students' eagerness to participate in learning activities or by gathering feedback on their learning. for the learning process to continue evolving with the teacher's evaluation of existing input. There are 36 students in class XI took part in this study, and they were divided into 8 groups, each with four or five pupils. Every group provided Different types of questions that must be answered next. Division-type questions are randomly generated and taken by a representative group.

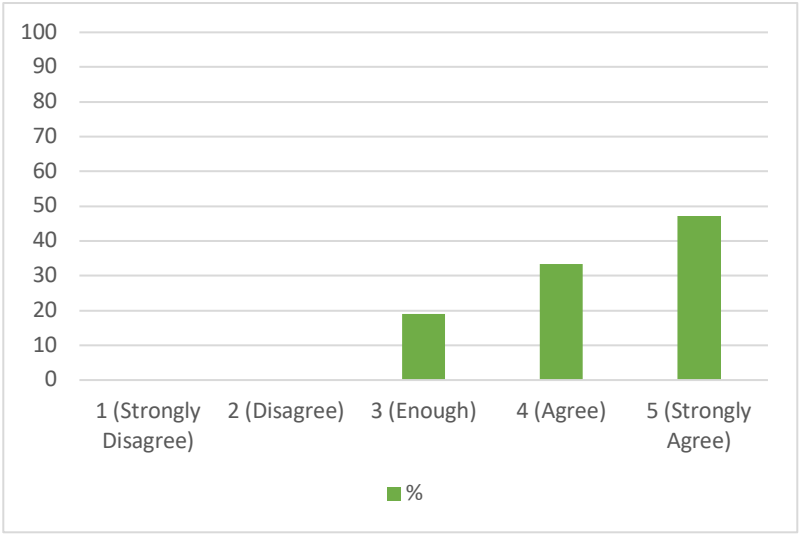


Figure 1. The proportion of students studying topics related to everyday life in thermochemistry

The use of a guided inquiry learning model in the implementation of learning with thermochemistry material produces feedback collected by the teacher at the end of the learning session. On the question of how much students have learned thermochemical material related to daily life, 17 out of 36 students or 47.2% of students strongly agreed that they have learned a lot of thermochemical material related to daily life. Meanwhile, 12 or 33.3% of students agreed that they had learned a lot of thermochemical material related to daily life. The remaining 7 students felt that they had learned enough thermochemical material related to daily life.

This has also been discussed in Nisa Yulianda's research (2019), learning thermochemistry using the guided inquiry learning model helps students be more active and master basic concepts (Yulianda, 2019). In addition, learning systems that involve everyday life also show better relevant results compared to those that do not relate them to everyday life. So that these results can percentage of students on thermochemical material above are relevant to the results of previous research.

Apart from the quantity of thermochemical material, students also get things related to everyday life, there are more important things obtained by students, namely the understanding and application of thermochemical

concepts that students have learned in everyday life. The percentage of students' application of thermochemical concepts in everyday life can be seen in Figure 2 below;

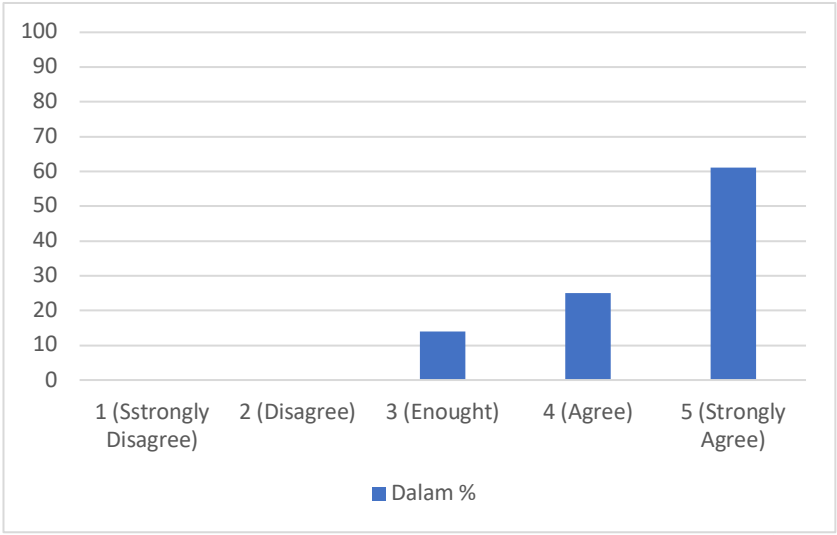


Figure 2. Percentage of Students' Application of Thermochemistry Concepts in Daily Life

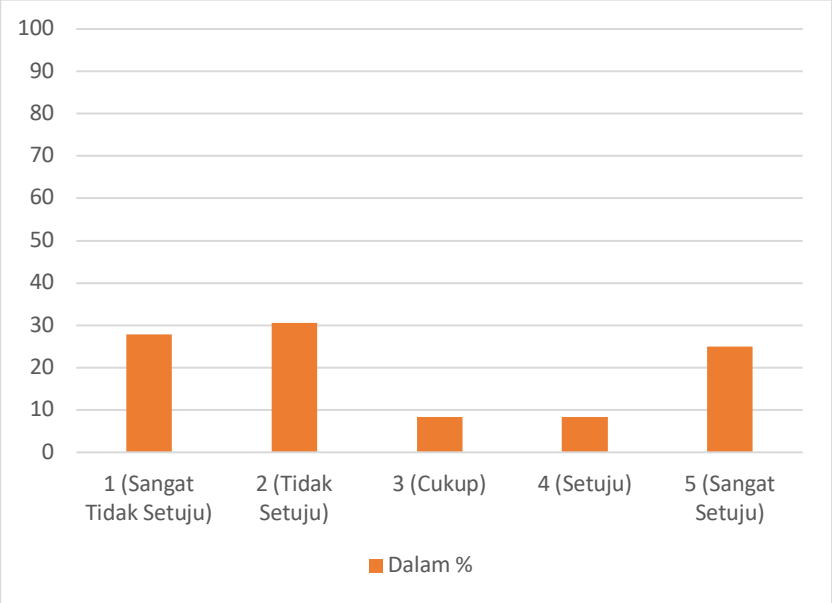
Students' level of understanding and application of thermochemical concepts in everyday life. In this case, 22 out of 36 or 61.1% of students answered strongly agree that they have applied the concept of thermochemistry in everyday life, for example by heating water, cooling water, and so on. While 9 or 25% of students answered that they agreed that they had implemented the concept of thermochemistry in everyday life. Then 5 or 13.9% of other students answered that they moderately agreed that they had done the implementation.

In many cases, thermochemical material of course often gets misconceptions by students because of a less basic understanding of the concept. Whereas the ability to understand thermochemical material is one of the steps to be able to understand other chemical materials because of its sequential learning concepts. This student difficulty has also been discussed in Sanaa Jauza R's research (2021). Students' difficulties in distinguishing heat and temperature, then in identifying exotherm and endotherm reactions, to applying reactions that take place using a calorimeter (Roghdah et al., 2021).

The solution to the problem that can be done by the teacher is to link the learning model with everyday life. Provide examples of real applications of thermochemical material with things that often occur in life. For example, doing

a simple practicum on heat transfer by heating water, burning wood, or storing hot water in a thermos. The application of a simple practicum that relates thermochemical material to everyday life will help students' concept understanding and memory because the activities are familiar.

The next question was about students' difficulties in understanding topics related to daily life. Unlike the previous question, where students consistently answered agree to strongly agree. The question of students' level of understanding of the topic of thermochemistry is diverse. The percentage graph



can be seen in Figure 3 below.

Figure 3. Percentage Percentage of Students' Difficulty in Understanding Thermochemistry Topics Related to Daily Life

From the graph above, it can be seen that still 25% of students or as many as 9 students who strongly agree feel difficulties in understanding topics related to thermochemistry with everyday life. Then 8.3% or 3 students agreed and moderately agreed that they still find it difficult to understand thermochemical topics related to everyday life. In this case, it means that not quite half of the students in the class still find it difficult to understand this thermochemical topic. On the other hand, 11 or 30.6% of students disagreed that they had difficulty in learning chemistry topics related to daily life. Then 10 or 27.8% of the remaining students felt very uncomfortable and agreed to have difficulty in understanding thermochemical topics related to daily life.

A number of experts and researchers certainly prove that more than 90% of students agree with the use of learning methods that relate to everyday life

whether it is using laboratory media or so on (Fauziyah & Gumilar, Gun Gun, 2024). However, it does not rule out the possibility that the remaining 10% need other approaches that are more suitable. By looking at the percentage results on the answers of students who disagree that they have difficulty in understanding thermochemical topics related to everyday life is greater, it can be concluded that most or average students find it easier to master thermochemical material with an approach that relates to everyday life. The learning process by linking everyday life to student subject matter, especially thermochemical material, at least helps the average student to better understand the concept and reduce the number of misconceptions that often occur. This is by the results of research conducted by Nita Sulema et al (2023) which discusses the identification of students' concept understanding in thermochemical materials (Nita Suleman, Astin Lukum, Nuramna, 2023).

In maintaining students' interest in learning, especially in thermochemical material, students are given a choice of questions that they can answer more than once or can add answers according to what they feel. In this case, the researcher provided three options for students to maintain their interest in learning. First, learning with the concept of everyday life. Second, learning by using the laboratory. And third, learning with peers. Of the three options, learning by using the laboratory gets the highest percentage, where 33 out of 36 students or 91.7% of students, answered that learning in the laboratory can maintain their interest in learning, especially in thermochemical material. In addition, students also feel that they can stay motivated in learning thermochemistry when they can learn with peers. This is evidenced by the percentage of choices answered by students in this option of 55.6% or 20 students agreed. Furthermore, 19 students or 52.8% of students, can maintain the learning interest they design in everyday life. The graph of the percentage of student's interest in learning can be seen in Figure 4 below.

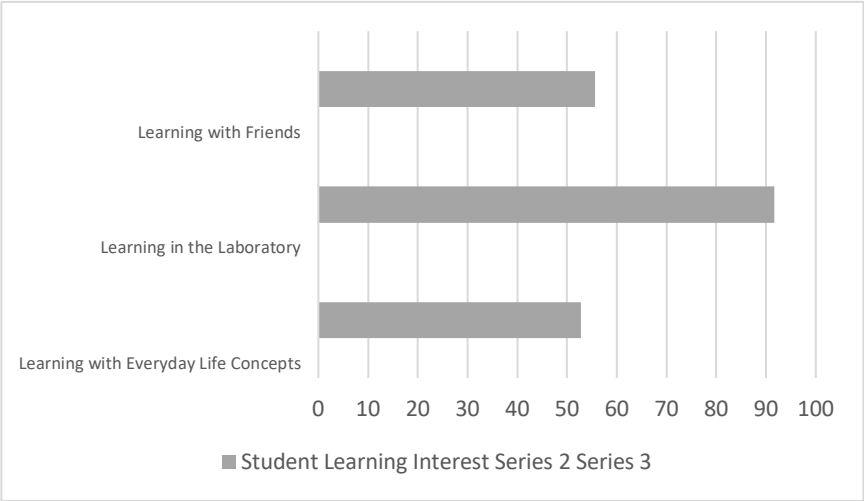


Figure 4. Percentage Maintaining Interest in Learning Student

Learning using laboratory media has also been studied and discussed by several researchers. Various problems arose such as the lack of facilities to the absence of teacher expertise in laboratory systematics. But in the end, some researchers found the solution. One of them is research by Delvy Hasna et al (2024) on the effect of PhET Colorado Virtual Lab learning media on thermochemical material on increasing student learning motivation. Judging from the material above, there are no more things that can be a difficulty for teachers in answering students' desires to be able to maintain their learning motivation.

From the results of student feedback on learning thermochemistry with guided inquiry learning models, there are still students who have difficulty in understanding thermochemical material related to everyday life. This can happen because of course chemical materials tend to be abstract and sequential so there needs to be a detailed explanation in the learning process, especially in materials that are dominant in calculations such as thermochemistry. Nevertheless, most students can still follow learning with this model which is characterized by the dominance of students who can understand and apply the concept of thermochemistry in everyday life. So that this guided inquiry learning model is effective in maintaining student learning motivation with the support of laboratory facilities.

Next are the results of teacher observations of students during the learning process in the classroom. Observations include student enthusiasm in

learning, student responses during class, and student understanding after learning activities are completed. There are two core activities that become the main points in this observation, namely the discussion activities of students with their groups to solve the problems given, and the delivery of discussion results by groups which then generate feedback from other groups.

The discussion activities of each small group showed equally good work results. Some students of course still depend on their friends in solving the problems given, but more students can work together and solve them together. At this stage, each group was given the same time of 5 minutes to answer one question. This activity can be seen in Figure 5 below.

Figure 5. Activities Discussion Student

The second activity after students discuss is that students present the results of the discussion to get feedback from other groups. This will help in understanding the basic problem design that they have solved. Each of the 8 groups was given 5 minutes to present and answer questions from other groups. The activity can be seen in Figure 6 below.

Figure 6. Activities Exposure Student

Learning was conducive despite the time constraints. Students with good abilities followed every rule but still actively asked questions in every presentation session conducted by other groups. In addition, it was also found that some students who had not had the opportunity to help in the problem-solving process were still able to explain well during the presentation session. This indicates that there is a strong motivation and desire to learn from these students so that they still explain well to their friends.

From the results of student feedback on learning thermochemistry with guided inquiry learning models, there are still students who have difficulty understanding thermochemical material related to everyday life. This can happen because of course chemical materials tend to be abstract and sequential so there needs to be a detailed explanation in the learning process, especially in materials that are dominant in calculations such as thermochemistry. Nevertheless, most students can still follow learning with this model which is characterized by the dominance of students who can understand and apply the concept of thermochemistry in everyday life. So that this guided inquiry learning model is effective in maintaining student learning motivation with the support of laboratory facilities.

5. Conclusions

This research was raised based on the results of the analysis of the guided inquiry learning model on the learning motivation of class XI students on thermochemistry material in one of the high schools in Semarang City. From the results of the questionnaires distributed, it can be concluded that:

a The guided inquiry learning model has a role in maintaining students' learning motivation in thermochemistry material for grade XI.
b Student learning outcomes with guided inquiry learning models with the help of learning media in the laboratory with friends can help maintain the learning motivation of class XI students.
c Student learning outcomes with guided inquiry learning models and the application of thermochemistry material to everyday life can help maintain the learning motivation of grade XI students.

References

Agustin, D. (2017). *Difficulties of Grade XI Science Students of Senior High School in Palangka Raya City in the 2016/2017 Academic Year in Understanding the Determination of Enthalpy Changes from Hess's Law (p. Undergraduate Thesis, unpublished). Palangka Raya University*.

Amijaya, L. S., Ramdani, A., & Merta, W. (2018). The influence of guided inquiry learning models on learning outcomes and critical thinking skills of students. FKIP UNRAM Journal, 14(1), 94–99.

Asi, N. . (2018). Dimensions of Knowledge and Levels of Thinking in Chemistry Learning. Kanderang Tingang Scientific Journal,, *9*(2 (Des.2018)), 103–113.

Biya, S. A., Isa, I., & Laliyo, L. A. R. (2023). The Influence of Discovery Learning Model on Concept Understanding in Thermochemistry Material at SMA Negeri 1 Mananggu. Journal of Chemical Education Undiksha, *1*(1), 23–28. https://doi.org/https://doi.org/https://doi.org/10.23887/jjpk.v7i1.59726

Cahyani, N. I., & Azizah, U. (2019). Application of guided inquiry learning model to train critical thinking skills in reaction rate material for class XI SMA. *Journal of Chemistry Education*, *8*(3), 320–326.

Camelia, P. (2022). Analysis of Factors Causing Students' Learning Difficulties in Solubility and Solubility Product Materials. *Blended Learning*, *1*(1), 23–16.

Dariyatun, T. (2020). Implementation of Lesson Study-Based Discovery Learning Model to Improve Student Learning Outcomes in Thermochemistry Material TP.2018/2019. *Jurnal Ilmiah EDU RESEARCH*, *9*(1).

Fauziyah, D. H., & Gumilar, Gun Gun, R. D. A. (2024). The Effect of Virtual

Laboratory Learning Media PhET Colorado on Thermochemistry Topic to Increase Learning Motivation. *Jurnal Riset Dan Praktik Pendidikan Kimia*, *12*(1), 1–9.

Kristina, N. M. W. (2018). Implementation of guided inquiry learning model to improve scientific attitude and student learning achievement in physics class X MIPA 3 at SMA Negeri 1 Kediri. Ganesha University of Education.

Mega. (2022). Preparing Education in the Era of Digital Trends (Society 5.0). BELAINDIKA Journal (Learning and Educational Innovation), *4*(3), 114–121.

Mulyati, A. (2007). *Chemistry Curriculum Development and Learning*. *Open University*.

Nastiti, &, A. N. (2020). Readiness of Indonesian Education Facing the Era of Society 5.0. Journal of Educational Technology Studies, *5*(1), 61–66.

Nasution, S. W. R. (2018). Application of guided inquiry model in improving critical thinking skills in physics learning. *Journal Education and Development*, *3*(1), 1–5.

Nita Suleman, Astin Lukum, Nuramna, M. P. (2023). Identification of Students' Conceptual Understanding of Thermochemistry Material Using Three-Tier Multiple Choice Diagnostic Test. *Jambura Journal of Educational Chemistry*, *5*(2).

Pujiastuti, E. (2022). Implementation of Problem Based Learning (PBL) Model in Improving Student Learning Outcomes in PPKn Subject in Grade IV of SD Negeri Labuang Baji 1 Makassar. Diponegoro University.

Roghdah, S. J., Zammi, M., & Mardhiya, J. (2021). Development of Four-Tier Multiple Choice Diagnostic Test to Determine Students' Concept Understanding Level On Thermochemical Material. *Jurnal Phenomenon*, *11*(1), 57–75.

Sa'adah & Kusasi, M. (2017). Improving scientific attitudes and conceptual understanding using guided inquiry learning models on chemical equilibrium material. *QUANTUM Jurnal Inovasi Pendidikan Sains*, *8*(1), 78–88.

Simatupang, A. (2021). The Relationship between Learning Motivation and Student Learning Outcomes in Chemistry Subjects at SMA Negeri 2 Jambi City. *Journal Inovasi Pendidikan Menengah*, *1*(3), 199–205.

Wildan, W., Hakim A., Siahaan, J., & Anwar, Y. A. S. (2019). A stepwise inquiry

approach to improving communication skill and scientific attitude on biochemistry course. *International Journal of Instruction*, *12*(4), 407–422.

Yulianda, N. (2019). Application of the Guided Inquiry Learning Model to Improve Student Learning Outcomes on Thermochemical Material at SMAN 1 Kureng Barona Jaya. *Repository Universitas Islam Negeri Ar-Raniry*, 44–45.