Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

The Influence of Learning Models and Student Learning Activities on Collaboration Skills and Student Learning Outcomes

Debi M N Telaumbanua*, Dewi Syafriani
State University of Medan
***Corresponding Author: debimarpriani@gmail.com**

Abstract: This research was conducted to determine whether or not there are differences in the value of collaboration skills and student learning outcomes taught using various learning models and student learning activities with the help of Macromedia Flash media on chemical bonding material, as well as to see the interaction between learning models and student learning activities on collaboration skills and student learning outcomes. Experimental class I (X-6) applied the Discovery Learning model and experimental class II (X-10) applied the Guided Inquiry model. The instrument used is a test instrument, a non-test instrument. Hypothesis testing was carried out using two-way ANOVA with multivariate General Linear Model (GLM). The research results obtained a price of sig. 0.000 for collaboration skill value and sig price. 0.001 for learning outcomes. Price sig. < α (0.05) so there is a significant difference in the average value of collaboration skills and student learning outcomes with various learning models. Obtained sig value. 0.000 on collaboration skills and learning outcomes. Sig price value. < α (0.05) so there is a significant difference in the average value of collaboration skills and student learning outcomes with various learning activities. The interaction between the learning model and learning activities obtained a sig value. 0.045 for collaboration skills and sig. 0.014 for learning outcomes. From the two sig values. < α (0.05) so that Ha is accepted and Ho is rejected, there is an interaction between the learning model and student learning activities on the value of collaboration skills and student learning outcomes in the Chemical Bond material.

Article History
Received: 25-03-2024
Reviewed: 28-03-2024
Published: 30-04-2024

Key Words: Discovery Learning Model, Guided Inquiry Model, Learning Activities, Macromedia Flash Media, Collaboration Skills, Learning Outcomes, Chemical Bonds.

How to Cite: Telaumbanua, D., & Syafriani, D. (2024). The Influence of Learning Models and Student Learning Activities on Collaboration Skills and Student Learning Outcomes. *Jurnal Teknologi Pendidikan : Jurnal Penelitian dan Pengembangan Pembelajaran, 9*(2), 281-292. doi:https://doi.org/10.33394/jtp.v9i2.11184

https://doi.org/10.33394/jtp.v9i2.11184

Introduction

Chemistry is quite complex material for most high school students because the abstract chemistry material requires students to be able to understand or think abstractly, which ultimately results in students experiencing learning difficulties. This chemistry material includes material that contains many concepts such as chemical equations and calculations (Ristiyani & Evi, 2016). Chemical bond material is material that provides an explanation regarding the atoms that form bonds, both with the same and different atoms. In separate

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

conditions, a group of atoms shows a more stable bond because it has a lower energy level than the energy level of the constituent atoms (Effendy, 2013). In chemical bonds, the concepts contained therein are abstract so they are difficult to apply contextually (Widarti, et al., 2018). This will have an impact on the learning difficulties experienced by students, thus affecting their learning outcomes.

Learning outcomes are one indicator of learning success. According to Sudjana (2014), learning is a process characterized by changes in a person's self. These changes can be demonstrated in various ways, including changes in knowledge, understanding, attitudes and behavior, skills, abilities and abilities, reaction power and acceptance. Learning outcomes are very necessary as a benchmark to find out how much change has occurred in students after carrying out learning activities that can be observed and measured in the form of knowledge, attitudes and skills. Student learning outcomes increase or decrease depending on themselves. The learning process is also needed to obtain learning outcomes. Where the students in question can study individually or in groups (Rahayuningtiyas & Utami, 2022).

Collaboration skills can help students in the group learning process (Ping et al, 2020). This skill is one of the important skills in the 21st century. Collaboration is a specific type of social interaction and learning process where group members can be active and constructive in solving problems (Lee, et al., 2015). Collaboration has become an essential skill for achieving effective results. Currently, collaboration is considered as an interaction designed in such a way as to facilitate students in group learning efforts to achieve common goals. Students have the ability to collaborate and socialize to achieve academic goals (NEA, 2007; Fitriyani, et al., 2019). Thus, a teacher must teach academic skills and cooperation skills to students, because students will be needed in the group learning process to support their academic and social skills (Apriono, 2013). Based on the results of interviews and pre-research observations conducted on class This is because the concepts that students receive from teachers have not been well received. The lack of success in conveying concepts is due to the use of media and learning models that are inappropriate or less varied, so that students feel bored, become passive, and learning tends to be teacher centered (centered on the teacher) rather than student centered (student-centered).

For this reason, appropriate steps are needed so that students can construct concepts well and be more active in group learning. A varied learning model is one way to make students active in learning (Riswati, et al., 2018). One of them is, implementing the Discovery Learning (DL) learning model. DL can be used in chemistry material to improve student learning outcomes through the process of discovering their own concepts by students carried out in groups. Through the process of discovering existing concepts, students learn intensively by following scientific investigation methods under teacher supervision (Istiana, et al., 2015).

Apart from DL, the learning model that makes students active in learning is Guided Inquiry (IT). The IT learning model is one of the learning models developed to understand lessons and their relevance (Puspaningtyas, 2017). Through the process of organizing a Q&A session, students can establish methodology, assess results, and draw their own conclusions. Introducing topics, asking questions, and contributing to discussions are the teacher's duties as facilitators (Sugiarti, 2018).

Another supporting resource is the media. Learning media helps students gain a better understanding of certain concepts and provides a more varied learning experience (Fikri & Madona, 2018). Apart from helping teachers convey material to students, the use of learning media can also increase student motivation and enthusiasm. This is because the use of learning

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

media can influence students' learning situations, conditions and environments (Nurdyansyah, 2019). One of the media that can be used is Macromedia Flash media. Macromedia Flash is a multimedia platform and software used for animation, games and internet enrichment applications that can be viewed, played and run in Adobe Flash Player (Khairani , 2016). The use of learning media in the form of Macromedia Flash can have a good impact on teachers and students, namely as a tool in preparing teaching materials and organizing learning in the classroom. Based on the description above, researchers are interested in conducting research on "The Influence of Learning Models and Student Learning Activities on Collaboration Skills and Student Learning Outcomes on Chemical Bonding Material".

Research Method

This research uses the research type *quasi experimental* (quasi-experiment). The form of research design chosen was *Post-test Only Control Group Design* . Where this *quasi experimental* research uses the *nonequivalent control group design* form. The data collection techniques used in this research are initial observation, interviews, learning outcomes tests, and documentation. The population in this study were all students in class X, Even Semester, SMA Negeri 11 Medan 2023/2024, totaling 10 classes. Determining the research sample was carried out using the *purposive sampling* technique, namely 2 classes. Experimental class I applied the *Discovery Learning* model while experimental class II applied the Guided Inquiry learning model. The research design uses *Factorial Design* 2x2. *The factorial design paradigm* can be depicted in table 1.

Table 1. *Factorial Design* (2x2 Factorial Design)

Learning ModelLearning Activities	Discovery Learning(A1)	Guided Inquiry (A2)
High (B1)	A1B1	A2B1
Low (B2)	A1B2	A2B2

Based on the design that has been given, there are two groups in learning, namely, the group that is taught using the Discovery Learning learning model and the group that is taught using the Guided Inquiry learning model, each class uses learning media as a support, namely media learning using Macromedia Flash media. In each group there are two groups of students with different learning activities, namely the group of students with high learning activity (B1), the group of students with low learning activity (B2).

The data in this research was obtained through test and non-test instruments. The instruments used are multiple choice questions test instruments to obtain grades (posttest) and non-test instruments (observation sheets of learning activities and collaboration skills). The data obtained through student answer sheets in the two sample classes were processed using Standardized Residual in General Linear Model (GLM) multivariate using SPSS 25.0. software program. ~> for Windows at a significance level of 5% or 0.05. The homogeneity test can be carried out using the Levene's Test with the help of SPSS 25.0 software program. ~> for Windows , provided that the significance value $\alpha = 0.05$ and hypothesis testing is carried out in the SPSS 25.0 software program. ~> for Windows using two-way ANOVA

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

(ANOVA two-way) with General Linear Model (GLM) multivariate with significance level (α) 0.05. If sig < α (0.05) then H a is accepted, while if sig > α (0.05) then H 0 is accepted.

Results and Discussion

This research was carried out at SMA Negeri 11 Medan which is located on Jl. Pertiwi No. 93, Bantan Village, Medan, North Sumatra. In this research, two classes were used as experimental research classes. Experimental class I applied the Discovery Learning learning model and for experimental class II the Guided Inquiry learning model was applied. The same media Macromedia Flash was used as media in the learning process in both experimental classes.

The program SPSS software version 25 for windows is used to test data normality, namely the Standardized Residual normality test on General Linear Model (GLM) multivariate , with a significance level of α = 0.05. Based on this significance level, if the price is sig. > α (0.05) then it can be concluded that the data is normally distributed. The results of the normality test for this research data can be seen in table 2

Table 2. Normality test results

	Shapiro-Wilk		
	Statistics	Df	Sig.
Collaboration Skills	.097	62	161
Learning outcomes	.098	62	519

It can be seen from table 2, for collaboration skills data, it is known that the data value sig. 0.161 > α (0.05), so it can be concluded that the data on collaboration skills scores from both classes is normally distributed. Meanwhile, for learning outcomes data, the sig. 0.519 > α (0.05) so it can also be concluded that the learning outcome data for both classes is normally distributed.

The homogeneity test was carried out in the program SPSS software version 25 for windows , using the Levene's test , with a sig value. α = 0.05. The data from the homogeneity test results can be seen in table 3.

Table 3. Homogeneity test results

		Levene Statistics	df1	f2	Sig.
Collaboration Skills	Average	.875	3	8	.459
	Median	.806	3	8	.496
Learning outcomes	Average	.353	3	8	.596
	Median	.250	3	8	.783

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

Based on the data in table 3, it is known that the collaboration skills value is sig. 0.459 and learning outcomes with a sig. 0.596. From these two data the sig value. > α (0.05) then it can be concluded that the data is homogeneous.

The hypothesis test was carried out in the program SPSS version 25 software for windows using two-way ANOVA (ANOVA two-way) with General Linear Model (GLM) multivariate with a significance level (α) of 0.05. When sig. > α (0.05) then Ho is accepted and Ha is rejected. And, if sig. < α (0.05) then Ha is accepted and Ho is rejected. Hypothesis test result data can be seen in table 4.

Table 4. Hypothesis test results

		Sig.
Learning model	Collaboration Skills	.000
	Learning outcomes	.001
Learning activity	Collaboration Skills	.000
	Learning outcomes	.000
Learning Model *Learning Activities	Collaboration Skills	.045
	Learning outcomes	.014

Based on the results of hypothesis testing carried out on SPSS version 25 software for windows with a significance level (α) of 0.05, using two-way ANOVA (ANOVA two-way) with General Linear Model (GLM) multivariate , then the sig price is obtained. 0.000 < α (0.05) on collaboration skills which means Ha is accepted and Ho is rejected. So for the first problem formulation, there is a significant difference in the average collaboration skills score of class For various learning activities, the price is sig. 0.000 < α (0.05) then Ha is accepted and Ho is rejected, so that for the second problem formulation, there is a significant difference in the average collaboration skills score of class X students with varied student learning activities on chemical bond material.

Data on the value of learning outcomes, in various learning models obtained sig. 0.001 < α (0.05), then Ha is accepted and Ho is rejected, so that for the third problem formulation, there is a significant difference in the average learning outcome scores of class For various learning activities, the price is sig. 0.000 < α (0.05) then Ha is accepted and Ho is rejected. So for the fourth problem formulation, there is a significant difference in the average learning outcome scores of class X students with various learning activities on chemical bonding material.

Next, the fifth problem formulation is the interaction between the learning model and learning activities on sig price collaboration skills. 0.045 < α (0.05) then Ha is accepted and Ho is rejected. The interaction between the learning model and learning activities on learning outcomes obtained sig. 0.014 < α (0.05) then Ha is accepted and Ho is rejected. So it can be concluded that there is an interaction between the learning model and learning activities on learning outcomes and student collaboration skills in class X chemical bond material.

Based on research data, the collaboration skills score for experimental class I was 59.71 ± 19.88 and 73.74 ± 14.48 for experimental class II. For more details, see Figure 1.

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

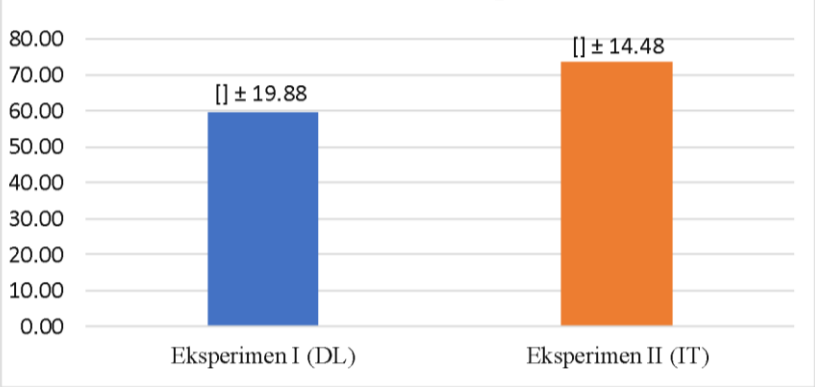

Figure 1. Graph of the average value of student collaboration skills with various models

Data on collaboration skills scores in experimental class II which were taught using the Guided Inquiry learning model were higher than the collaboration skills scores in experimental class I which were taught with the Discovery Learning learning model. This is because in the learning process, students have the same role in their group, so this process can be realized through the Guided Inquiry model which guides each group of students in collaborating with fellow group members to solve problems (investigation) and achieve learning goals. In line with research (Yudanegara et al, 2019) guided inquiry guides students to always be responsible so that students will be able to be responsible and contribute to all members of their group. Apart from that, research conducted (Sarifah & Tutut, 2023) states that by following the syntax of the guided inquiry model, students are taught to be able to work together with each group member and be able to accept and respect other people's opinions to solve problems so that students are able to improve collaboration skills by his group of friends. Students in their study groups are required to actively express their opinions. This will encourage students to work effectively in line with what is conveyed. Activities of finding ideas or solving problems can improve students' collaboration skills, namely working effectively (Mulyani & Fuadi, 2020). This research is supported by previous research conducted by (Ramadan & Oktavidiati, 2019) on one of the 4C skills (critical thinking), where the guided inquiry learning model is more effective in improving cognitive outcomes, critical thinking and scientific attitudes to student learning than Discovery Learning . In other research by (Sari, 2019), there is a significant difference in the effectiveness of the character-based Inquiry and Discovery Learning learning models on students' scientific process skills. It was concluded that guided inquiry better improves students' scientific process skills.

Based on posttest data, the average learning outcomes for experimental class I students were 69.84 ± 16.09 and 76.77 ± 10.12 for experimental class II. For more details, see Figure 2.

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

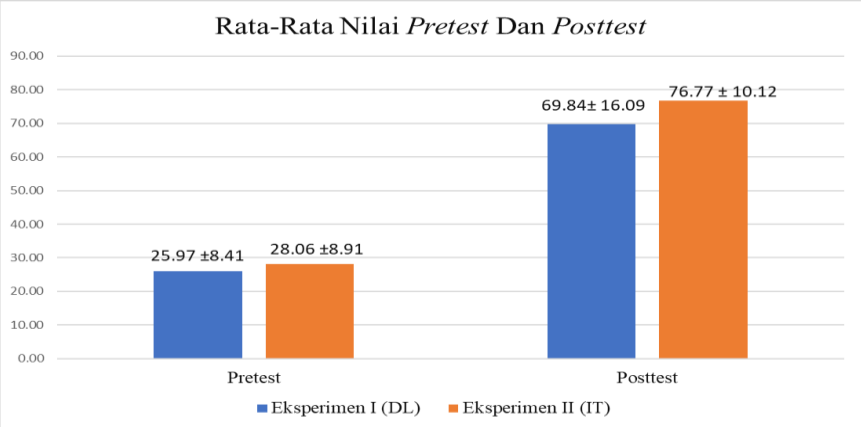

Figure 2. Graph of the average value of student learning outcomes with models vary

Based on Figure 4.2, it is known that there is a difference in the average learning outcome scores in experimental class I (DL) and experimental class II (IT). The average learning outcome value for experimental class II which was taught using the Guided Inquiry learning model was higher than the average learning outcome value for experimental class I which was taught using the Discovery Learning learning model. This research is supported by research conducted by (Permatasari et al, 2018), where the value of learning outcomes in the cognitive domain in the Guided Inquiry model is higher compared to the Discovery Learning model. This is in line with research (Utami et al, 2020) that the learning outcomes (posttest) in the experimental class taught using the Guided Inquiry model are higher than in the experimental class taught using the Discovery Learning learning model. In the learning process using the Guided Inquiry model, the teacher guides students in the investigation so that the learning takes place more focused. In research (Rahmi et al., 2022), the cognitive learning results (posttest) of experimental class I which were taught using the Guided Inquiry model were higher than the cognitive learning results (posttest) of experimental class II which were taught with Discovery Learning.

Data on the average value of collaboration skills for students taught with the Discovery Learning (DL) model with high activity was 68 ± 13.48 and low activity was 31.29 ± 7.85. Meanwhile, in the class taught using the Guided Inquiry (IT) model, the collaboration skills score with high activity was 78.5 ± 9.78 and low activity was 49 ± 7.87. For more details, see Figure 3.

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

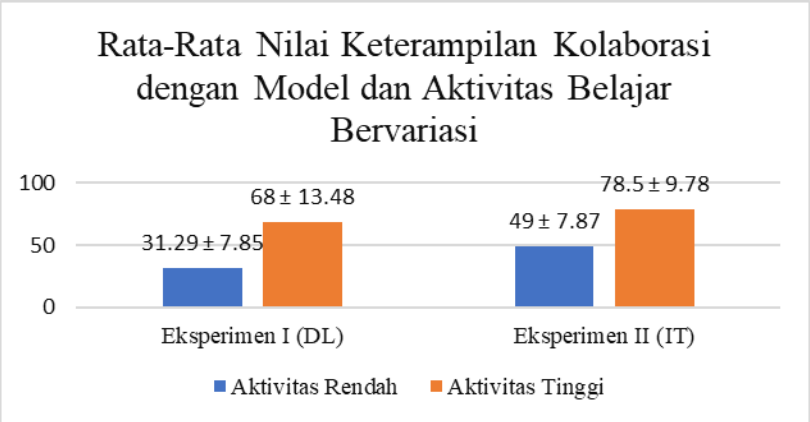

Figure 3. Graph of the average value of student collaboration skills with varied learning models and activities.

Based on the average data on student collaboration skill scores, it can be concluded that students with high activity have higher collaboration skill scores than students with low learning activity. This is because students' learning activities will encourage students to produce attitudes, values, changes in knowledge and skills in students (Hasmiati et al, 2017). So the level of student learning activity affects student learning skills. In line with research (Agustin, 2014) there is a positive influence between good student learning activities and students' problem solving abilities. Other research (Farokhatin, 2019) concluded that there is a significant influence of student learning activities on students' critical thinking abilities.

The average data on student learning outcomes taught using the Discovery Learning (DL) model with high activity was 77.08 ± 8.96, with low activity of 45 ± 7.64. Meanwhile, in classes taught using the Guided Inquiry (IT) model, the average learning outcomes for students with high activity were 79.81 ± 7.28 and low activity 61 ± 8.22. For more details, see Figure 4.

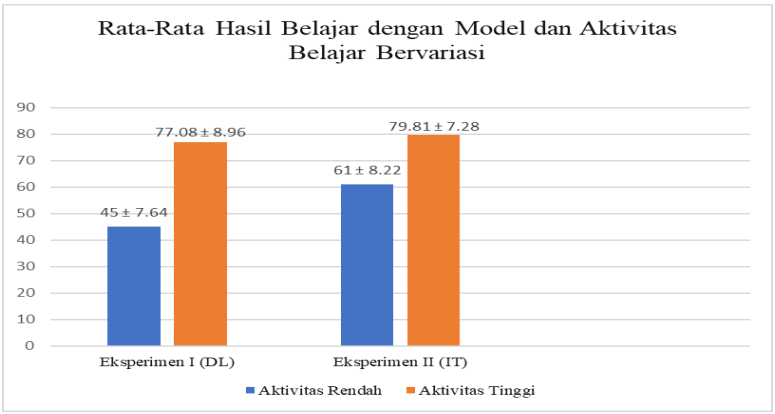

Figure 4. Graph of average student learning outcomes using the model and varied learning activities.

Judging from the pretest to measure students' initial abilities, it was found that the pretest experimental class II score which was taught using the Guided Inquiry (IT) learning model was higher than the pretest experimental class I score. which is taught using the Discovery Learning learning model. Experimental classes that have high initial abilities tend to have higher learning outcomes. This is in accordance with research conducted by (Yuliana,

Jurnal Teknologi Pendidikan:
Jurnal Penelitian dan Pengembangan Pembelajaran
https://e-journal.undikma.ac.id/index.php/jtp/index

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

2021) that samples with high initial abilities have higher learning achievements than samples with low initial abilities.

Based on hypothesis testing carried out at a significance level of 95%, for the first problem formulation a sig value was obtained. 0.000 < α 0.05 which means Ha is accepted and Ho is rejected so that there is a significant difference in the average value of students' collaboration skills on chemical bonding material taught using the Guided Inquiry learning model and the Discovery Learning learning model. For the second problem formulation, sig is obtained for high and low learning activities. 0.000 < α (0.05) so that Ha is accepted and Ho is rejected, it can be concluded that there is a significant difference in the average score of students' collaboration skills on chemical bond material with varied student learning activities.

In the third problem formulation, the sig value is obtained. 0.001 < α (0.05) which means that Ha is accepted and Ho is rejected, so there is a significant difference in the average learning outcome scores of class And in varied learning activities, the sig. 0.00 < α (0.05) then Ha is accepted and Ho is rejected. So for the fourth problem formulation, there is a significant difference in the average learning outcome scores of class X students with various learning activities on chemical bonding material.

For the fifth problem formulation, the interaction between learning models and learning activities on collaboration skills nilsi sig. 0.045 < α (0.05) then Ha is accepted and Ho is rejected. Meanwhile, the interaction between learning models and learning activities on learning outcomes with sig. 0.014 < α (0.05) then Ha is accepted and Ho is rejected. So it can be concluded that there is an interaction between the learning model and learning activities on students' learning outcomes and collaboration skills in class X chemical bond material. Learning activities and learning models influence learning outcomes and students' collaboration skills. A learning model with learning activities interacting with each other to influence students' learning outcomes and collaboration skills.

Based on the research results and discussions that have been explained, it can be concluded that the average learning outcomes and collaboration skills of students in the Guided Inquiry learning model are higher than the average learning outcomes and collaboration skills of students in the Discovery Learning learning model learning model. so that the Guided Inquiry learning model is better than the Discovery Learning learning model learning model. And judging from student learning activities, in experimental class II, the total number of students with high activity was 26 students and the total number of students with low activity was 5 students, while in experimental class I the total number of students with high activity was 24 students and 7 students with low activity. This shows that students in experimental class II who were taught using the Guided Inquiry learning model had higher student learning activities compared to experimental class I who were taught using the Discovery Learning learning model.

Conclusion

After conducting research, calculations and hypothesis testing, the conclusion obtained is: There is a significant difference in the average collaboration skills score of class There is a significant difference in the average collaboration skills score of class There is a significant difference in the average learning outcome scores of class There is a significant difference in the average learning outcome scores of class X students with various learning activities on Chemical Bonding material. There is an interaction between the learning model and student learning activities on collaboration skills and student learning outcomes in class X high school

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

chemical bond material. The most optimal learning model to improve collaboration skills and student learning outcomes is the Guided Inquiry learning model. The most optimal learning activity to improve collaboration skills and student learning outcomes is high student learning activity.

Recommendations

Based on the research results and conclusions, the suggestions that researchers can give are as follows: For teachers and prospective teachers, the Guided Inquiry learning model and *Discovery Learning* using assisted learning media *Macromedia Flash* can improve learning outcomes and students' collaboration skills, so they are good to apply during the learning process at school. For future researchers, it is hoped that the results of this research can be a reference to support and conduct further research with further variables.

Acknowledgment

The author would like to thank everyone who has helped the author in completing this article.

References

Agustin, R. N. (2014). The influence of motivation and learning activities on problem solving abilities. Unnes Journal of Mathematics Education, 3(2).

Apriono, D. (2013). Collaborative Learning. Unirow Journal Prospectus. (1): 292-304.

Effendy. (2013). VSEPR Theory, Polarity, and Intermolecular Forces, Edition 3. Malang: Bayumedia Publishing.

Farokhatin, A. (2019). The Influence of Student Learning Activities in Learning Together on Critical Thinking Ability. Continuous: Journal of Mathematical Didactic Research, 3(1), 15-22.

Fikri, H., & Madona, A. S. (2018). Development of Interactive Multimedia Based Learning Media. Yogyakarta: Blue Ocean (IKAPI Member).

Fitriyani, D., Jalmo, T., & Yolida, B. (2019). Using problem based learning to improve collaboration and higher order thinking skills. Journal of bioeducation, 7(3), 77-87.

Hasmiati, Jamilah, & Mustami, M. K. (2017). Activities and Student Learning Results in Learning Growth and Development using the Practicum Method. Biotech Journal, 5(1), 21–35.

Istiana, G.A., Catur S, A.N., and Sukardjo, J.S. (2015). Application of the Discovery Learning Learning Model to Increase Learning Activities and Achievement on the Main Topic of Buffer Solutions in Class XI Science Semester II Students at SMA Negeri 1 Ngemplak in the 2013/2014 Academic Year. Journal of Chemical Education (JPK) Sebelas Maret University, 4 (2).

Khairani, M.d. (2016). Development of Learning Media in the Form of Macromedia Flash Tube Material for Middle School Class IX. Journal of Applied Science and Technology, 10 (2), 95-102.

Lee, Huh, Reigeluth. (2015). Collaboration, intragroup conflict, and social skills in project-based learning. Instructional science. Volume 43, Issue 5, pp 561–590.

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

Mulyani, P. S., & Fuadi, S. I. (2020). Implementation of guided inquiry-based blended learning to improve students' communication skills and collaboration skills in the industrial era 4.0. Quality: Journal of Empirical Research in Islamic Education, 8(2), 341–358.

NEA. (2007). Preparing 21st Century Students for a Global Society: An Educator's Guide to the "Four Cs". London: Pearson

Nurdyansyah. (2019). Innovative Learning Media. East Java: UMSIDA Press.

Permatasari, I., Sesunan, F., & Wahyudi, I. (2018). Comparison of Student Learning Outcomes Between Guided Inquiry and Discovery Learning Models. Journal of Komodo Science Education, 1(01), 53-65.

Ping ILL, Halim L, Osman K. (2020). Explicit teaching of scientific argumentation as an approach in developing argumentation skills, science process skills and biology understanding. J Balt Sci Educ. 19(2):276–88.

Puspaningtyas, K. (2017). The Effect of Implementing the Guided Inquiry Model on Analytical Abilities and Science Process Skills. Indonesian Journal Of Science And Education, 1(1), 8–16.

Rahayuningtiyas, A., & Utami, N. R. (2022). Implementation of Numbered Heads Together (NHT) Learning Devices with Quiz Kahoot to Improve Student Learning Outcomes and Collaboration Skills in Reproduction System Materials. Journal of Biology Education, 11(1), 09-17.

Rahmi, A., Fitriani, H., Mellyzar, M., & Mauliani, C. N. (2022). Comparative Study of Guided Inquiry and Discovery Learning on Students' Cognitive Outcomes. CHEDS: Journal of Chemistry, Education, and Science, 6(1), 7-11.

Ramadan, E., Irwandi, I., & Oktavidiati, E. (2019, October). The difference between guided inquiry learning models and discovery learning on scientific attitudes, critical thinking and cognitive outcomes at SMP 2 Kepahiang. In National Seminar on Science & Entrepreneurship 1 (1).

Ristiyani, E., & Bahriah, E. S. (2016). Analysis of students' chemistry learning difficulties at SMAN X, South Tangerang City. Journal of Science Research and Learning, 2(1), 18-29.

Riswati, R., Alpusari, M., & Marhadi, H. (2018). Application of the Problem Based Learning Model to Improve Science Learning Outcomes for Class V Students at SD Negeri 019 Sekeladi Tanah Putih. Student Online Journal (JOM) in the Field of Teacher Training and Education, 5(1), 1-12.

Sari, F. F., Kristin, F., & Anugraheni, I. (2019). The Effectiveness of Inquiry and Discovery Learning Models Containing Character on the Scientific Process Skills of Class V Students in Thematic Learning. Indonesian Journal of Basic Education, 4(1), 1-7.

Sarifah, F., & Nurita, T. (2023). Implementation of a guided inquiry learning model to improve students' critical thinking and collaboration skills. PENSA: E-Journal of Science Education, 11(1), 22-31.

Sudjana, Nana. (2014). Assessment of Teaching and Learning Process Results. Bandung: PT. Rosdakarya Teenager

Sugiarti. (2018). Student Psychomotor Assessment in Physics Learning Through the Guided Inquiry Learning Model. Journal Of Physics And Science Learning, 2(1), 78–84.

April 2024. Vol. 9 No. 2
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 281-292

Utami, I. T., & Siagian, T. A. (2020). Differences in Student Mathematics Learning Outcomes Between the Discovery Learning Learning Model and the Guided Inquiry Learning Model at SMP Negeri 6 Bengkulu City. Journal of School Mathematics Learning Research (JP2MS), 4(1), 53-60.

Widarti, H. R., Safitri, A. F., & Sukarianingsih, D. (2018). Identify understanding of the concept of chemical bonds. J-PEK (Journal of Chemical Learning), 3(1), 41-50.

Yudhanegara, F., Susilo, S. V., & Astuti, E. D. (2019). Application of the guided inquiry model to improve student learning outcomes in social studies learning. Pendas Cakrawala Journal, 5(2), 210–219.

Yuliana, I. F. (2021). The Effect of Differences in Initial Ability on Learning Achievement in Basic Chemistry Courses. Essay: Journal of Education, Learning and Development, 3(1), 21-25.

