JPPIPA 10(4) (2024)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Identifying Collaboration Skills Through Discovery Learning with A Contextual Approach

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Received: January 15, 2024
Revised: March 22, 2024
Accepted: April 25, 2024
Published: April 30, 2024

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DOI: 10.29303/jppipa.v10i4.6943

Abstract: Passive learning results in low student collaboration skills and tends to be individualistic in chemistry. Discovery learning with a contextual approach is one solution to overcome this problem. This research aims to find out the improvement of students' collaboration skills through discovery learning with a contextual approach and can be one step to prepare students' adaptive collaboration skills in the future. This research is quantitative research with a sample of 69 students taken using random sampling technique. Data were collected using collaboration skills observation sheets, questionnaires, and interviews. The collaboration skills measured consist of 4 indicators, namely cooperation skills, communication skills, completing tasks, and commitment. Data analysis uses quantitative descriptive methods. The results of this research show that students' collaboration skills using discovery learning with a contextual approach increase at each meeting with an average of 79 collaboration skills (good category).

Keywords: Collaboration skills; Contextual approach; Discovery learning model

Introduction

Collaboration in the fields of literature science, art, society, law, and education means working as collaborators and collaborating to produce a collectively recognized work (Barkley et al., 2014). Collaboration skills are the ability to work together effectively and efficiently. This shows respect for differences. Demonstrates flexibility and willingness to make decisions to achieve goals (Supena et al., 2021). Collaboration is a set of actions or practices that follow this spirit but thinking of collaboration as presence and desire reveals something else. This means engaging in a strong and determined desire to work together in the field of science (Kane et al., 2005). Teaching and learning in collaboration create new challenges for the teacher who finds the ability to offer students different learning environments. This creates new challenges and opportunities for students and all these issues result in a dynamic and enriched relationship with the curriculum content for both teachers and students (Pramesti et al., 2022). Collaborating can build relationships between students and teachers, improve communication, and integrate expertise to maximize each person's contribution to the team (Gosselin, 2023).

The 21st century demands that students have the skills needed for the future. These skills are collaboration skills, critical thinking, communication, and creativity (Astuti et al., 2020; Harizon et al., 2023; Zhao et al., 2023). These skills are considered important in the world of business, education, and academia. Develop more effective collaboration using effective processes and approaches and use brain-based learning approaches to build relationships foster communication and integrate expertise to bring everyone into your team. Collaboration deserves to be included as a 21st century skill because the interpersonal skills required to collaborate are more complex than in previous industrial eras (Fiore et al., 2017).

How to Cite:
Nainggolan, E., & Purwaningsih, D. (2024). Identifying Collaboration Skills Through Discovery Learning with A Contextual Approach. *Jurnal Penelitian Pendidikan IPA*, *10*(4), 1739–1746. https://doi.org/10.29303/jppipa.v10i4.6943

Conventional learning causes students to become passive (Seery, 2015). Students spend their learning time listening to the teacher's explanations. Teachers only act as disseminators of information and students only act as recipients, listeners, and memorizers of information. Based on student and teacher interviews, several problems were found related to students' collaboration skills. One of them is that students tend to be individualistic due to the transition from COVID-19 learning. The learning carried out goes in one direction or focuses on the teacher so that students tend to only be listeners. Students lack the courage to express opinions. Usually, only a few students actively ask questions. This is caused by students who are afraid that the answers they give are wrong (Firman et al., 2023).

Apart from that, when students are formed into study groups, some students are just free riders in the group. Students feel unable to carry out assignments. Thus, learning needs to be given stimulation or orientation that arouses students' curiosity and curiosity about a learning topic. One of the difficult matters in chemistry is reaction rate. Chemistry is a branch of science that deals with the transformation of matter and energy changes (Murni et al., 2022; Supasorn et al., 2022, 2015; Widarti et al., 2023). Chemistry is often considered an abstract material (Akın et al., 2018; Fiolida et al., 2021; Hanum et al., 2020; Seçken et al., 2015; Wardah et al., 2020; Wiyarsi et al., 2018). This is different if the learning atmosphere is carried out in a collaborative situation, students are more active in learning.

There is a gap between teacher and student this can be overcome by transforming the way of teaching. Teachers have a great opportunity to create an interactive learning environment. Interactive learning must be built by adapting to the foundations of learning such as learning objectives, learning plans, student needs, student characteristics, and teacher abilities. Interactive activities build blocks for collaboration so that engagement in the activity provides both a means (interactivity) and an end (collaboration skills). Passive learning results in low student collaboration skills and tends to be individualistic in chemistry.

One solution to solution to solving this problem is the use of interesting models, techniques, and approach in chemistry learning, one of these is the use of discovery learning with a contextual approach. Discovery learning emphasizes students ability to actively and independently demonstrate hytpotheses through observational and experimental processes (Andayani, 2020; Basit et al., 2023). Using discovery learning influence students to participating in learning (Ayuningsih et al., 2023). According to Svinicki (1998), the main goal of a discovery learning model is to integrate new experiences into the existing network of the student. This is done by creating new networks or modifying existing networks to accommodate new information. By doing this, students can track new information to make connections and check their memory of related concepts.

Three key characteristics of discovery learning are a focus on active learning, develop meaningful learning, and the ability to change attitudes and values related to problem-solving (Svinicki, 2018) while context-based learning is learning and teaching as an approach whose learning activities are student-centered to make learning more meaningful and relevant to the context of real-world problems (Sari et al., 2017). In learning, discovery learning with a contextual approach can increase student activity. This is following research by Samputri (2020) which explains that discovery learning can encourage students to be active in learning by allowing students to construct their knowledge with coherent learning steps. The collaboration between discovery learning with a contextual approach which supports learning that is more meaningful and close to real situations in students' lives is very suitable for the reaction rate material because the reaction rate material can be linked and is very close to everyday life (Widarti et al., 2023).

In the end, students can increase their knowledge, and the reaction rate material is stored for a long time in students' memory. Apart from that, the use of discovery learning has a positive impact on students' cognitive learning outcomes (Bamiro, 2015; Martaida et al., 2017), collaboration and HOTS (Balqist et al., 2019), critical thinking (Akihary et al., 2023), student performance (Ott et al., 2018), creative thinking skills (Pramesti et al., 2022), student metacognitive (Fuldiaratman et al., 2023), conceptual understanding (Muhali et al., 2021), student activities (Nisa et al., 2023) and many other positive impacts. Apart from that, the contextual approach also provides many positive impacts besides collaboration skills such as attitudes, motivation, and student achievement (Magwilang, 2016), student interest in chemistry (Habig et al., 2018), chemical literacy (Cigdemoglu et al., 2015), student retention (Obikezie et al., 2020) and other positive influences.

In learning, each student in their group works together to build knowledge that does not yet exist after they carry out collaborative activities. By working together in a team, they will produce work or tasks together. In learning, students will learn as individuals, and students will learn as groups. The knowledge obtained is the result of the addition or collaboration of each individual.

Method

This research is a series of quantitative research with experimental methods. This research focuses on discuccing the profile of student's collaboration skills. This research was carried out at SMA Negeri 1 Kertek and involved 69 students of XI Classes. Sample selection used random sampling technique. Data collection techniques were performed using collaboration skills observation sheets. The validation skills observation sheet was content/theoretical validated by 4 chemistry education expert lecturers.

The observation skills sheet consists of 4 indicators which can be seen in Table 1 (Child et al., 2019; Griffin, 2017; Le et al., 2018).

Table 1. Collaboration Skills Indicator

Variable	Indicator
Collaboration skills	Cooperation skills
	Commitment skills
	Task Completion skills
	Communication skills

The collaboration skills sheet includes 36 statements observed by 3 observers which are based on the collaboration skills assessment rubric. Apart from that, the test technique is carried out using LKPD which is given to students at each lesson. At the end of the lesson, students were given a reflection questionnaire on the lesson and interviews with 2 observers who joined in the research. The learning process was carried out following the syntax of discovery learning with a contextual approach in 4 meetings. The data analysis technique used is quantitative descriptive. The criteria for student collaboration skills refer to the criteria assessment guidelines which can be seen in Table 2 (Widoyoko, 2009).

Table 2. Ideal Assessment Criteria

Score Range (i)	Category
$X > 122.4$	Very good
$100.8 < X \leq 122.4$	Good
$79.2 < X \leq 100.8$	Enough
$57.6 < X \leq 79.2$	Not enough
$X < 57.6$	Very less

Result and Discussion

Before the data was analyzed descriptively quantitatively, the collaboration skills data was tested for normality. Normality aims to ensure that the data obtained is a normal distribution (Mishra et al., 2019). The following test results are presented in Table 3.

Table 3. Normality Test Results

Variable	Tests of Normality	
Collaboration skills	Kolmogorov-Smirnova Sig.	Shapiro-Wilk Sig.
	0.200*	0.397

According to the results of the Kolmogorov-Smirnov and Shapiro-Wilk tests the Sig value is more than 0.05 i.e. Kolmogorov-Smirnov test (0.200 > 0.05) and Shapiro-Wilk test (0.397 > 0.05) which means the data is normally distributed. Next, a quantitative descriptive analysis was carried out. Data on collaboration skills was obtained during observations during 4 learning meetings on reaction rate material. Learning uses discovery learning with a contextual approach. The following is data on collaboration skills from 4 indicators during 4 meetings which can be seen in Table 4.

Table 4. Mean of Each Collaboration Skills Indicator

Cooperation	Commitment	Task completion	Communication
73.83	74.15	73.63	73.63
78.22	76.89	76.09	76.81
81.24	79.11	79.11	79.71
83.70	82.61	82.61	82.25

A visualization of the mean comparison of each indicator can be seen in Figure 1 below.

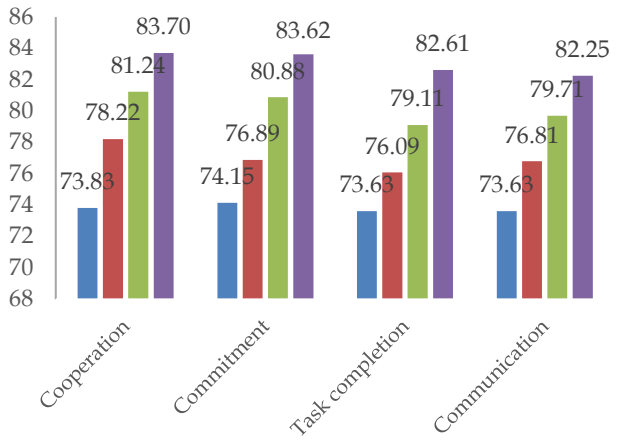

Figure 1. Mean of each collaboration skills indicator

The results of observations from observers showed that the mean of each indicator at each meeting had increased. This is caused by the application of discovery learning with a contextual approach. Learning chemistry specifically on reaction rate material encourages students to be active in collaboration. Students can interact actively with their group friends. Students share tasks and responsibilities in completing student worksheets. Apart from that, students

collaborate in forming concepts from the discovery process carried out. By collaborating students can understand commitment to learning, communication skills, and interaction between students and teachers (Friend et al., 2014).

The learning stages used are stimulation, problem statement, data collection, data processing, verification, and generalization (Darmawan et al., 2018). From these learning stages, students will be directly involved in learning experiences and experiments. Students will build their knowledge through concept formation (Puspitadewi et al., 2016). The discovery learning model make learning oriented to student (Yuniawati et al., 2021).

Students can find and group information, then process it with their group of friends, and together draw conclusions (Nelyza et al., 2015). The discovery learning efficiently improves active learning because it can integrate incoming new knowledge until appropriate knowledge is obtained (Rizki et al., 2021; Utomo et al., 2023). Teachers: In this way, students' collaboration skills will be formed and increasingly improved. Students are increasingly interested in learning reaction rate material because the material is taught with a contextual approach or real-life situations of students (Broman et al., 2014). By giving LKPD to students, students can learn independently in groups to solve a problem (Bahtiar et al., 2022). There are several indicators of collaboration skills, namely cooperation, commitment, completing tasks, and communication. The average of the collaboration skills indicators can be seen in Figure 2 below.

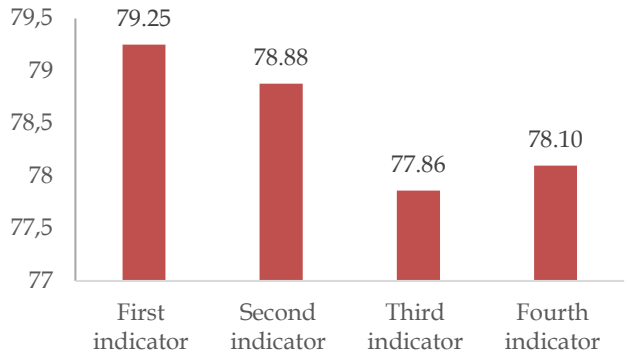

Figure 2. Collaboration skills indicators

The average collaboration skills of students at each meeting can be seen in Table 5 below. Thus, if adjusted to the assessment guideline criteria for each indicator, it is found that the indicators of cooperation, commitment, task completion, and communication skills are categorized as good. From the first to the fourth meeting, students study in groups. By being given LKPD, students have responsibility for completing assignments. In each session, students use illustrations of real-life student situations to engage and motivate their learning. At the first meeting, students were given a simple experimental task regarding the phenomenon of reaction rates. Students are actively involved in learning and interested in completing assignments with directions in the LKPD. The teacher serves as a facilitator in the learning process.

Each student has the task of participating in each learning activity. In this way, student cohesion is formed naturally to achieve this goal. This follows research by Minarni et al. (2022) which explains that the discovery learning model requires students to find their methods and the teacher's tasks are only to guide and advise. During the discovery process, students have the occasion to actively engage in learning. Collaboration between students is well formed as seen from the way students in groups manage time in carrying out learning starting from stimulation to generalization. At the first meeting, there were still some students who asked about the syntax in the LKPD but this did not happen at the second to fourth meetings. The teacher directs them to discuss first with their group friends. Finally, students show that they understand and comprehend what will be done next effectively and efficiently (Zakiah et al., 2015). In addition, student participation is formed actively and students are united in completing assignments. Learning with discovery learning using contextual approach by giving students problems will increase their curiosity and make them more willing to ask question and learning will be active (Nursakinah et al., 2023). This is following research from Muspahaji (2019) which explains that with discovery learning, students become active in learning, and participation in learning activities is formed.

There are many concepts in high school chemistry classes that are difficult for students to understand because the involve calculating chemical reactions and contain abstract concepts (Nursakinah et al., 2023). By using students' real context phenomena, it becomes easier for students to make analogies about chemical reaction rates with their existing knowledge. Context-based learning provides great opportunities for students to make connections between context phenomena and the concepts they will acquire (Borman et al., 2018). For example, in learning, stimulation is given in the form of providing illustrative images about carica. Karika is a type of sweet-tasting Wonosobo dessert widely consumed by residents and often served as a souvenir for both local and international tourists. Carica can be seen in Figure 3.

Figure 3. Carica

Illustrations from carica are used to stimulate students' curiosity to learn about the surface area factor on reaction rate. In this way, students already have initial knowledge related to the real context and continue with the concept discovery process (Overman et al., 2014).

Table 5. Average Collaboration Skills 4 Meetings

Meetings	Score
1	73.81
2	77
3	80.23
4	83.04

The visualization can be seen in Figure 4 below.

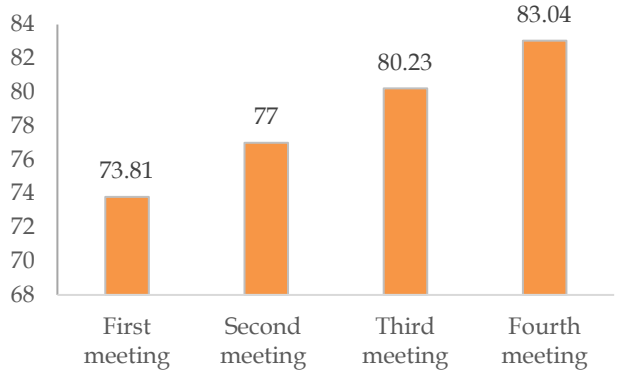

Figure 4. Average collaboration skills for 4 meetings

Based on the picture above, the final average score for students' collaboration skills is 79. Referring to the ideal criteria assessment guidelines, the good category is obtained. As seen in Figure 4, visual collaboration skills increase with each meeting. Learning with discovery learning with a contextual approach provides opportunities for students to learn actively. This is in line with Syafii's (2022) research showing the effectiveness of learning chemistry on buffer solution material using discovery learning which increased during meetings. Students carry out various tasks, increase the character of responsibility, and commitment, receive information and knowledge from various sources, and increase student activity in learning. Based on the reflection questionnaire on learning, several students' opinions were found which stated that "reaction rate learning is given a lot of examples from everyday life which makes it easier for students to understand the material." Chemistry is a science that deals with the problems of everyday lie in a scientific way (Rahmawati et al., 2023).

Apart from that, based on interviews conducted with 2 chemistry teachers as observers during the lesson, it was said that learning using the discovery learning model with a contextual approach provides opportunities for students to actively participate in learning. Learning is not monotonous and the material is taught close to students' lives, stimulating students to be curious about the reaction rate material. The process of learning chemistry is seen as an opportunity to provide meaningful experiences that can develop knowledge skills, abilities or other competencies deemed important (Manurung et al., 2023). Thus, good student collaboration skills can improve other student achievements (Friend et al., 2014).

Conclusion

Implementing discovery learning with a contextual approach can improve students' collaboration skills. The average overall collaboration skills at meeting 1 to meeting 4 respectively were 73.81, 77, 80.23, and 83.04, including in the good category. The total score for students' collaboration skills is 79 which is categorized as good. Thus, discovery learning with a contextual approach can improve students' collaboration skills on reaction rate material.

Acknowledgments
The authors wish to acknowledge the SMA Negeri 1 Kertek and all the teachers and students who participated in this study.

Author Contributions
Conceptualized the research data, E. N; designed of methodology, E. N, D. P; analyzed the data, E. N, conducted this research, E. N, D. P; conducted the literature review, D. P; critical feedback on the manuscript, D. P; review, D. P, and editing, D. P, E. N. All authors have read and agreed to the published version of the manuscript.

Funding
The study was supported by DRTPM through Penelitian Tesis Magister (PPS-PTM).

Conflicts of Interest
We declare that there is no conflict of interest regarding this work.

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