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Student Collaboration Skills through the Implementation of the Project Based Learning (PjBL) Model on Blood Circulatory System Material

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Abstract

Education in the 21st century has the challenge of preparing human resources that are able to compete in the era of globalization, so it is important to master 4C learning skills, one of which is collaboration skills. The PjBL model is related to collaboration skills because throughout the learning implementation process, students generally have the potential to increase self-involvement. This research aims to analyze the provision of students' collaboration skills through the application of a project based learning model on circulatory system material. In this research, the method used was a descriptive method with a sample of 36 students. The sample was obtained using a purposive sampling technique. Data was collected through instruments in the form of observation sheets. Research data was analyzed to get an overview of students' collaboration skills and a description of each group for each indicator. Based on the findings obtained, the overall average results of student collaboration skills are included in the very high category. Based on this, it can be concluded that the application of the project based learning model to the circulatory system material has been proven to be able to provide students with effective collaboration skills.

Keywords: bloodstream system; collaboration skills; project-based learning

INTRODUCTION

Fundamental changes in the field of education in the 21st century are different from industrial era education because the focus of development challenges in Indonesia is preparing human resources that are able to compete in the era of globalization. Preparing human resources for the 21st century can be fulfilled by providing a set of dynamic skills known as 21st century skills (Redhana, 2019; Aldriani *et al.*,, 2021; Mashudi, 2021). This skill is very popular in education and is important to develop because in the future it will have an impact on all their activities, including when entering the world of work and interacting with other people competently and with mutual respect (Septikasari & Frasandy, 2018; Zubaidah, 2020; Mashudi, 2021). As a means of developing human resources to become competitive individuals, especially in the 21st century, it is important to master 4C learning skills which involve a higher level of knowledge and applied skills (Septikasari & Frasandy, 2018; Partono *et al.*, 2021; Agustinova *et al.*, 2022). One of the 4C skills is collaboration skills because it can indirectly help students practice open communication in listening, giving, receiving and sharing opinions or information, negotiating, processing information, coordinating joint activities and helping each other to achieve common goals (Kusuma, 2018; Septikasari & Frasandy, 2018; Agustinova *et al.*, 2022).

Collaboration and social development are important aspects that need to be fostered in students

and are relevant to a cooperative attitude considering that as social creatures you will definitely coexist and need the help of other people in achieving common goals, so you need to provide skills in appreciating, respecting and maintaining relationships with other people (Astuti *et al.*, 2018; Saldo & Walag, 2020; Firman *et al.*, 2023). Thus, it is believed that collaboration skills can be developed through the learning process using appropriate learning methods and models, where in this learning the teacher should build an atmosphere for students to be able to learn together/in groups, forming a democratic space so that a sense of respect arises when there are differences of opinion, realizing mistakes. and a sense of responsibility in carrying out the work assigned (Istiyono *et al.*, 2014; Zainuddin, 2017; Sufajar & Qosyim, 2022).

Collaborative learning must be supported by good facilities, one of which is by implementing the Project Based Leaning (PjBL) learning model. With the PjBL learning model, students experience increased communication, collaboration and intelligence skills in concretizing scientific concepts, this happens because during the project work process students communicate with friends and teachers in class and outside class (Lam, 2019; Safarini, 2019; Baran *et al.*, 2021). One of the example of PjBL is doing observation in the field like measuring bivalves and gastrood diversity in Tanjung Rising (Fatonah *et al.*, 2023), echinoderms diversity in Drini Beach (Mufida *et al.*, 2023), or doing experiment both in the field and laboratory (Pertiwi & Saputri, 2020). The PjBL model is related to collaboration skills because throughout the learning implementation process, students generally have the potential to increase self-involvement by focusing on driving questions and interesting structured discussions as well as connecting core curricular ideas with scientific practice (Lam, 2019; Baran *et al.*, 2021; Juuti *et al.*, 2021).

Therefore, project-based learning will encourage students to develop scientific skills and attitudes in the learning process. This is closely related to the criteria for science learning, where a scientific attitude needs to be accompanied by aspects of science as a process. Science is a body of scientific knowledge, especially in biology content. Teaching biology content is not just about transferring knowledge, but there is a process of discovery (inquiry) that actively involves students to obtain deeper concepts, not just memorizing (Adhitama *et al.*, 2018; Panggabean *et al.*, 2021; Akbar, 2022). One of the abstract concepts in biology content is the circulatory system material because this material is quite complex, where students are required to analyze the structure and function of the organs involved and the processes in the circulatory system mechanism so it is not enough to just rely on books but requires in-depth exploration. through meaningful experiences during the learning process (Adhitama *et al.*, 2018; Akbar, 2022; Akbar *et al.*, 2022; Ibrahim & Rashid, 2022; Ratnasari & Hendriyani, 2022). However, currently learning science material about the circulatory system still uses the lecture method so that students cannot develop collaborative skills. Thus, research was carried out by providing students with collaboration skills through the application of PjBL to the circulatory system material. The aim of this research is to analyze collaboration skills by applying the project based learning model to the circulatory system material.

METHOD

The method used in this research is a descriptive method with the Collaborative Classroom Action Research type, this is because by using the Collaborative Classroom Action method the original data obtained does not require manipulation and/or engineering for the needs, interests and achievement of the research objectives. This research was conducted at a private junior high school in the city of Ciamis with a total of 26 participants in one class with heterogeneous abilities and without a control class. The population in the study were all class VIII students. The sampling technique used was purposive sampling. The consideration for selecting the sample class is that the number of participants must allow for group division and are class VIII students. This research focuses on the effectiveness of implementing the PjBL model on aspects of student collaboration skills. In this study, Collaboration skills data was measured during PjBL. In the initial stage of the research procedure, preparation was carried out by means of literature study, curriculum study, then compiling research instruments and then assessing the

research instruments with expert lecturers. After that, the next procedure is the implementation stage, where learning using the PjBL model is carried out according to the syntax stage, and data collection is carried out through observation with the help of an observer.

The final stage is processing the data that has been obtained, making discussions and drawing research conclusions and writing research publications. There are several types of instruments used in this research, including: collaboration skills instrument based on Greenstein (2012) in the form of an observation sheet with collaboration skills indicators as the main data source which contains 6 collaboration skills indicators and observers will assess based on the collaboration skills indicator rubric. student worksheets is used as a source of data to support the implementation of indicators for working productively, where these indicators are trained when students work on student worksheets and the collection time is timely. Project-based learning is carried out over 4 meetings. This research uses 6 indicators, namely, working productively, contributing actively, collaborating with various types of organizations, dividing tasks according to members' abilities, being responsible for completing work and participating respectfully.

The data obtained is used as a reference to describe students' collaboration skills. Meanwhile, the technical analysis of the data obtained will be analyzed in quantitative percentage terms, then converted into categories if the percentage of 81-100% is very high, 61-80% is high, 41-60% is medium. , 21-40% as low, and 0-20% as very low. Meanwhile, to calculate the scoring scale for each student, the data obtained is analyzed as a quantitative percentage which will then be interpreted using categories according to Saenab et al., 2019, namely 1.0-2.8 including the category level 1 (basic level), 29-3.1 level 2 (medium level), 3.2-3.5 as level 3 (trained level), and 3.6-4.0 as level 4 (high level) (Saenab *et al.*, 2019).

RESULT AND DISCUSSION

Collaboration skills in the classroom with the application of project based learning in this research include 6 indicators including: working productively, contributing actively, collaborating with various types of organizations, dividing tasks according to members' abilities, being responsible for completing work and participating respectfully. These six indicators were chosen based on consideration of the ability to observe student activities when learning using the PjBL model. The results obtained are then processed and converted into percentages which can show categories of collaboration skill indicator values which are presented in full in Figure 1.

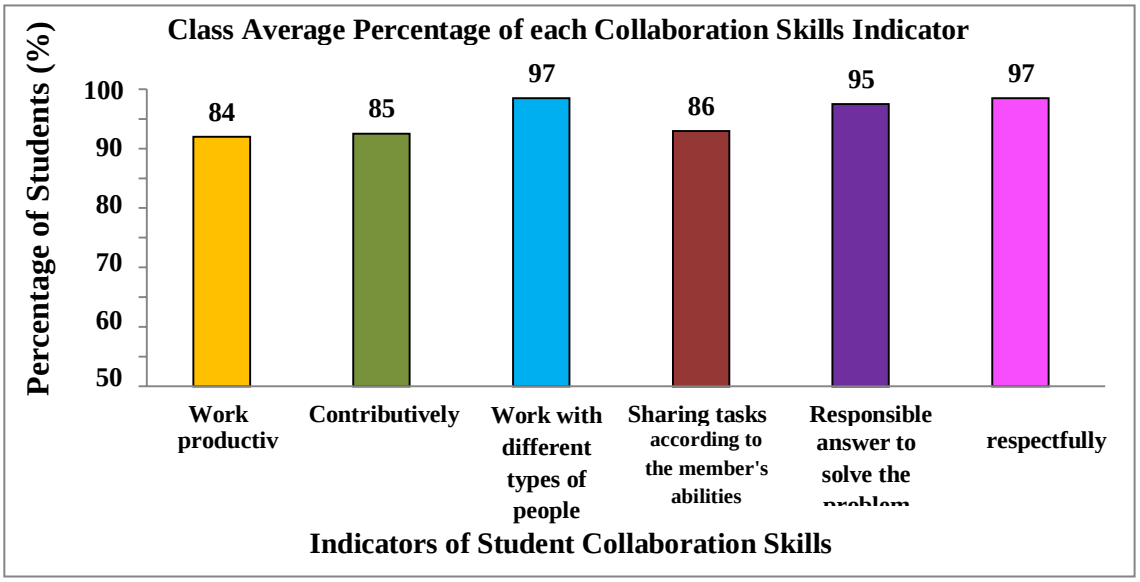

Figure 1. Graph of class average percentage for each collaboration skills indicator

Based on the research results in Figure 1, it was found that the average score for the six indicators of collaboration skills for class VIII students was 90.6% in the very high category. However, the percentages for each indicator are not identical, the indicator of working productively obtained an average of 84% in the very high category, this indicates that students have been able to use their time efficiently while continuing to carry out work without being ordered, and are able to work on student worksheets together. within 15-30 minutes. Aspects of productive work in collaboration skills can be observed through the products produced by students (Zainuddin, 2017; Ahwan & Basuki, 2023; Firman *et al*., 2023). The percentage of actively contributing indicators obtained by class VIII students is 85% and is included in the very high category. This achievement shows that students are able to follow directions in carrying out assignments and of course also contribute ideas, suggestions and solutions when carrying out discussions in each group. Thus, the application of the inquiry learning model, especially PjBL, which tends to encourage students to interact regularly and effectively regarding assignments, expressing ideas or opinions to obtain agreement in groups helps students to be more active in the learning process (Rahmawati *et al.*, 2019; Ibrahim & Rashid, 2022; Ahwan & Basuki, 2023).

Another thing is that the percentage of the indicator of working with various types of people shows similarities with the indicator of participating respectfully, where this indicator received the highest number of other indicators, namely 97% and is included in the very high category. This indicates that students have been able to show good social interactions, especially with their group members and also with other friends. An important aspect in collaborating is respecting every difference within the group, which can be in the form of gender, religion, ethnicity, point of view, and so on. Related to this, creating interaction in project activities requires cooperation between members so that simultaneously the output produced is not just a product but also knowledge in the content area and skills in self-control. Project work given to students is more effective in terms of achievement and product quality if the student group is large because the more students in the group, the more students will collaborate, be involved, interact, and make efforts in the project environment to achieve project goals (Astuti *et al.*, 2018; Al Mulhim *et al*., 2020; Nadhiroh & Pujiriyanto, 2020).

Based on observations made by observers, most of the student groups during the learning process of project work showed a good attitude of coordination and compromise, where this indicator obtained a percentage of 86% in the very high category. A compromise attitude that shows aspects of regular coordination is a characteristic of collaboration and shows teamwork in activities (Kusuma, 2018; Saldo & Walag, 2020; Firman *et al.*, 2023). There are various types of coordination carried out by students, starting from dividing work fairly according to the abilities of each group member, such as the task of working on student worksheets, completing designs, making products to being a speaker in product presentations. This is closely related to a series of directed and systematic learning tasks in PjBL activities. Apart from structured discussions, structured assignments can ensure that all members achieve their goals so that increased collaboration skills can be realized (Lam, 2019; Nadhiroh & Pujiriyanto, 2020; Ahwan & Basuki, 2023).

The percentage of indicators responsible for solving problems obtained by class VIII students is 95% and is included in the very high category. These findings show that the implementation of PjBL using inquiry steps can require students to continue collaborating, especially in terms of responsibility for completing their respective tasks according to the division of their groups. The division of tasks in groups creates consistent interaction and a sense of positive dependence that is useful. The positive dependence that arises between group members will have an impact on the accountability that members bear, thereby producing quality discussions and work results (Safarini, 2019; Baran *et al*., 2021; Ibrahim & Rashid, 2022).

Meanwhile, the 6th indicator, namely participating respectfully, which has similarities with the indicator of collaborating with various types of people, shows the highest percentage gain, namely 97% and is included in the very high category. Based on these findings, it can be seen that many students actively carry out discussions with their groups using a polite and polite attitude towards their other friends. The emergence of a polite and polite attitude in discussions is closely related to good communication skills and emotional management so that it can be represented in behavior during the

observation. In addition, the need for communication in teams develops accompanied by responsibilities that can increase respect for differences in opinions, habits and individual preferences (Lam, 2019; Trisdiono *et al.*, 2019; Baran *et al.*, 2021).

Students' collaboration skills in implementing the PjBL model are generally in the very high category. This category can be seen from the overall average indicator of collaboration skills for class VIII students with a total of 90.6% and the similarity of the categories shown in each indicator of collaboration skills is in the very high category. Apart from that, the high level of students' skills in collaborating can be shown by the data on the distribution of skills for each student which is presented in full in Figure 2 below.

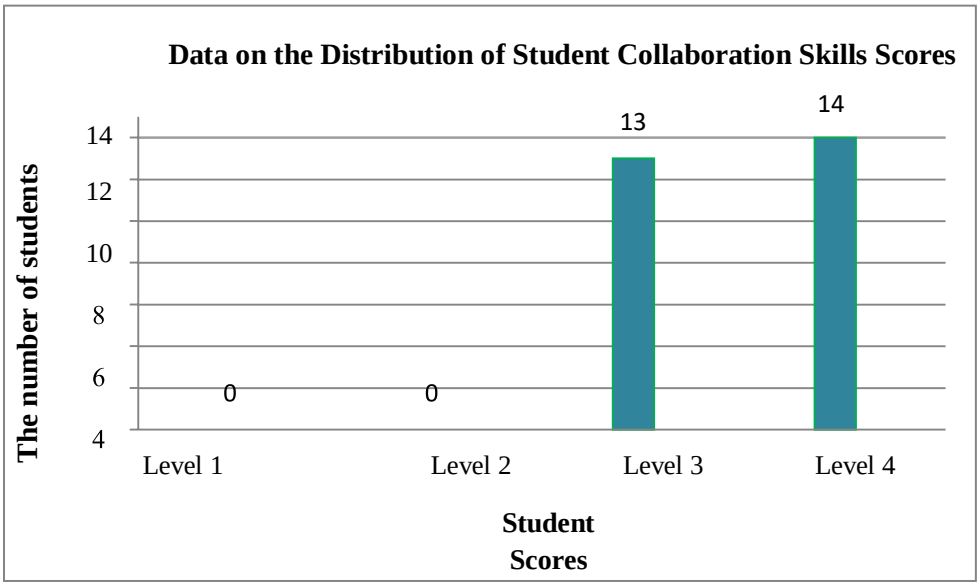

Figure 2. Data graph of the distribution of student collaboration skills scores

Based on the research results in Figure 2 above, it provides information that the ability of some students to collaborate when carrying out learning activities using the PjBL model can reach the highest score, namely Level 4 in the high level category and does not have a much different difference from students in the trained level category. Previous research conducted by Alfaeni *et al.*, (2022) showed that there was an increase in the level of collaboration skills from basic level (2.4) to high level (3.3) in students who were given treatment. This could indicate that learning using the PjBL model can be used as an alternative in providing students with collaboration skills in the 21st century.

CONCLUSION

Based on the results of research analysis of collaboration skills by applying the project based learning model to the circulatory system material. By assessing 6 indicators including working productively, contributing actively, collaborating with various types of organizations, dividing tasks according to members' abilities, being responsible for completing work and participating respectfully, the average was 90.6% in the very high category. Meanwhile, the ability of some students to collaborate when carrying out learning activities using the PjBL model can reach the highest score, namely Level 4 in the high level category. so that the application of the project based learning model to the circulatory system material has been proven to be able to provide students with effective collaboration skills. This research is useful for the country, especially teachers because it can increase teachers' insight to equip students with skills for the 21st century.

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