



The Influence of Practical Learning on Circulatory System Material on Social Emotional Competence and Students' Conceptual Understanding

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Abstract

The “Kurikulum Merdeka” emphasizes the active involvement of students in designing solutions to various problems through a contextual approach. One of them is through the application of a practicum method that allows students to link abstract concepts with real experiences. In this process, students need to have the ability to manage their own emotions and understand the feelings of others in order to resolve conflicts constructively. Social emotional competence is an important factor in building interactions between students while supporting understanding of the material being studied. This study aims to examine the effect of practicum learning on the circulatory system material on students' social emotional competence and conceptual understanding. The research method used is Pre-Experiment with One-Group Pretest-Posttest Design. The study was conducted at SMA Negeri 3 Semarang in the 2024/2025 academic year, involving three grade XI classes as samples. The data collection method used a Social Emotional Competence observation sheet, a learning implementation questionnaire, and a concept understanding test. The results of the study showed that practicum learning had a significant effect on improving conceptual understanding. In addition, the relationship between practicum learning and social emotional competence showed a moderate correlation ($r = 0.527$). There is also a significant positive relationship between conceptual understanding and social emotional competence with a moderate correlation level. Thus, practical learning has a positive effect on improving students' conceptual understanding and social emotional competence.

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INTRODUCTION

The independent curriculum requires students to have the ability to actively participate in creating solutions to local, national, or global problems in achieving sustainable development goals. (SDGs) (Kemendikbudristek 2022). Biology learning in the independent curriculum applies a contextual approach so that activities are student-centered and can cover various disciplines (Rahmayumita & Hidayati, 2023). The contextual approach (Contextual Teaching and Learning/CTL) emphasizes the relationship between learning materials and students' real experiences in everyday life (Hasudungan 2022). One strategy that supports this approach is the use of the practicum method. The practicum method emphasizes activities to conduct observations, experiments, data collection carried out in laboratories or other places that are similar to laboratories, conducting discussions and reporting so that students experience and prove for themselves what is being learned.

The results of teacher interviews showed that the circulatory system material is one of the topics that is difficult for students to understand because it is theoretical and requires high memory (Wahyuni 2022). The lack of student involvement in finding concepts causes their understanding of the material to be still low. Practical learning is an effective strategy in building an understanding of abstract concepts through scientific experiments (Rabiudin 2023). Studies state that the practical method contributes to improving understanding of biological concepts and student learning outcomes (Kasmawati, Jamilah, and Uyuni Taufiq 2021; Novallyan, Gusfarenie, and Safita 2023; Riyanti, Nur, and Lestari 2019). Research by Rahman (2014), also revealed that the use of practical-based learning on the circulatory system, can improve student learning outcomes. Practical work encourages students to actively observe, measure, and use tools safely in designing and carrying out experiments on biological objects (Masum et al. 2024; Nisa 2017). Practical work plays an important role because it can provide students with scientific method practice by following the instructions detailed in the instruction sheet. By doing practicums, students will also become more confident in one thing than just receiving from teachers and books, can enrich experiences, develop scientific attitudes, and learning outcomes will last longer in students' memories (Rustaman, 2011)

Practical activities that are meaningful, process skills and attitudes require students to interact, work together, and face scientific challenges that require emotional management and the ability to understand the feelings of others (Rabiudin 2023). This condition shows the importance of social emotional intelligence in supporting the success of the learning process. Social emotional intelligence includes the ability to manage emotions, empathize, and react according to the stimulus faced. Concrete skills built from social emotional intelligence such as the ability to empathize, manage conflict, cooperate, make ethical social decisions, and build positive relationships are called social emotional learning and competence.

Studies on the relationship between the learning process influenced by social emotional intelligence have been conducted by several researchers. Ventini & Sukardjo (2018) stated that emotional intelligence has an influence on student learning outcomes; the better the emotional intelligence of students, the higher their achievements in learning mathematics. This finding is reinforced by the research results of Asma (2021) dan Hasia (2022) which show a positive relationship between emotional intelligence and self-concept with the achievement of learning outcomes in biology subjects. Social emotional intelligence also has a significant influence on biology learning outcomes and plays an important role in a person's success in life and in following the learning process (Rizani et al., 2022). Based on this background, this study was formulated with the title "The Effect of Practical Work on Circulatory System Material on Students' Social Emotional Competence and Conceptual Understanding."

RESEARCH METHOD

This research was conducted at State SMA in Semarang 3 in the odd semester of the 2024/2025 academic year. The population in this study were students of class XI of State SMA in Semarang 3. The sampling technique used Purposive Sampling. The samples used were 3 classes, namely class XI 3, XI 4, and XI 5 with the consideration of the number of students as many as 108 students and teachers who teach in the same class. The data in this study include the results of the pretest and posttest of conceptual understanding, the results of observations of social emotional competencies, and responses to the implementation of practicums which are explained descriptively quantitatively.

The research was conducted in three meetings with the help of a module in accordance with the Learning Steps of the Practicum method. This learning is carried out by forming nine groups with each group consisting of four students. Each group carries out practical learning according to the Student Worksheet that has been made according to the predetermined learning steps. The practicums carried out were observing types of blood cells, blood type tests, and calculating pulse rates. Before conducting learning using the Practical, students first work on pretest questions, then after carrying out three practical activities with the practical, they are given posttest questions to find out the results after being given treatment. During the learning process, the social emotional competence aspect of students is assessed using an observation sheet. This instrument includes indicators and statements used to assess the extent to which social emotional competence is applied. Data collection was carried out by four observers, each of whom was tasked with observing one practical group. Each observer recorded the activities of individuals in the group they observed.

The effect of practical learning on the circulatory system material on social emotional competence is measured based on the achievement of predetermined indicators, namely 1) the relationship between the application of Practical and social emotional competence, which includes aspects of self-awareness, social awareness, relationship skills, self-management, and responsible decision making, analyzed using Spearman correlation, and (2) an increase in students' understanding of concepts as evidenced by the results of the Wilcoxon Signed Rank Test, the post-test score showed an increase compared to the pre-test.

RESULTS AND DISCUSSION

Practical learning has a significant influence on increasing scores before and after learning. The results of the analysis of the influence of practical work on pretest and posttest scores are presented in Table 1.

Aspect	N
Posttest < pretest	3 student
Posttest > pretest	99 student
Posttest = pretest	6 student
Total siswa	108 student

Table 1. Analysis of the Effect of Practical Learning on Students' Pretest and Posttest Scores

Most students showed an increase in learning outcomes after participating in the learning, which can be seen from the comparison of posttest scores which were higher than the pretest. Students can directly observe and determine blood types in the circulatory system, so that they can strengthen students' understanding of the concept. Learning Objective Achievement Criteria (KKTP) for students was set at 80. During the pretest, only a few students achieved this score, with an average of 70 students. However, after the posttest was carried out, the average student score increased and exceeded the KKTP with an average score of 95. These results indicate that the practicum approach significantly improves

students' understanding of concepts. This is supported by the statement (Kasmawati, 2021), that practicums emphasize group discussions carried out during learning allowing students to connect theory with practice. The following is a recapitulation of student test results in the three classes studied presented in Table 2.

Source of Variation	Experiment Class
Average pretest learning outcomes	70
Average posttest learning outcomes	95
Highest score	100
Lowest score	45
KTP	80

Table 2. Student Learning Outcomes using the Practical Method on the Circulatory System Material

Based on the study, the results of the pretest and posttest showed that out of 108 students, 99 students experienced an increase in scores after the practicum. In general, practicums have an effect on students' understanding of concepts. Before taking the practicum, students only relied on learning through supporting books. After the practicum was implemented, students' understanding of the circulatory system increased. Students can directly observe and determine blood types in the circulatory system, so that they can strengthen students' understanding of the concept. This increase is due to the active involvement of students in the learning process. This is supported by the statement that learning with the practicum method can improve students' understanding and learning outcomes to be good. In line with this, Rahman (2014) stated that practicum-based learning on the concept of the circulatory system can improve learning outcomes higher than conventional learning;

Practical learning is rooted in constructivism theory. Constructivism theory emphasizes the development of one's own understanding actively, creatively and productively based on previous knowledge and also meaningful learning experiences (Asrori 2020). Students express the results of their thought construction influenced by their knowledge and experience, then apply them through social interaction (Rahmatulloh, Rofik, and Khauser 2019). This is in line with the results of the learning implementation questionnaire, namely that most students stated that the practicum activities helped connect the circulatory system material with previously learned concepts. In addition, students were also able to identify the relationship between the practicum carried out and problems in the surrounding environment. The activity of identifying these problems is aligned with formulating problems and conveying them to the teacher.

Students play an active role during learning while teachers and researchers only play a role in supporting the learning process (Ambarwati 2019). The teacher has a limited role in conveying information related to the activities to be carried out and providing advice when needed by students. This is in line with the results of the learning implementation questionnaire, which shows that the majority of students agree with the statement, "I feel that the teacher provides helpful responses when I convey the results of group discussions.". Students who actively explore will find it easier to transfer knowledge to new situations, including in answering test questions that have different variations or contexts (Ekaprasetya et al., 2024). In other words, the practicum approach is able to provide a number of advantages in learning activities, including in improving conceptual understanding.

The Influence of Practicum on Social Emotional Competence

The relationship between the implementation of Practicum and social emotional competence includes five aspects, namely self-awareness, social awareness, relationship skills, self-management, and responsible decision making. Data on students' Social Emotional Competence were obtained during three student observation meetings. Based on the Spearman Rank Order Correlation output. SPSS, shows the number of samples as many as 108, the correlation relationship value of 0.527 is in the moderate correlation category. This shows that the implementation of practicum contributes quite

significantly to students' social emotional competence. Analysis of the relationship between indicators in the social emotional competence variable with the implementation is presented in the following figure 1.

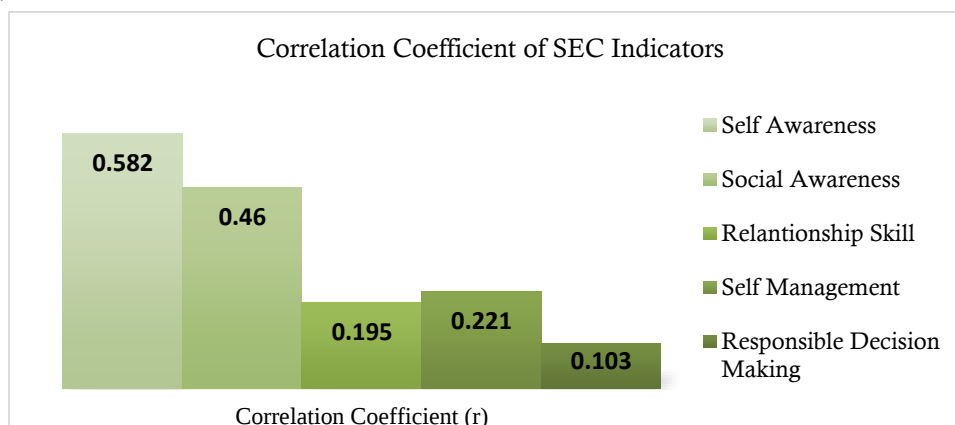


Figure 1. Correlation Coefficient (r) of SEC

The indicator that is most influenced by the implementation of the practicum is self-awareness. Meanwhile, the indicator with the lowest influence is responsible decision making. The measurement data using the practicum in three meetings showed an increase in each SEC indicator. The following figure presents the increase in the influence of the practicum on SEC based on the five indicators measured

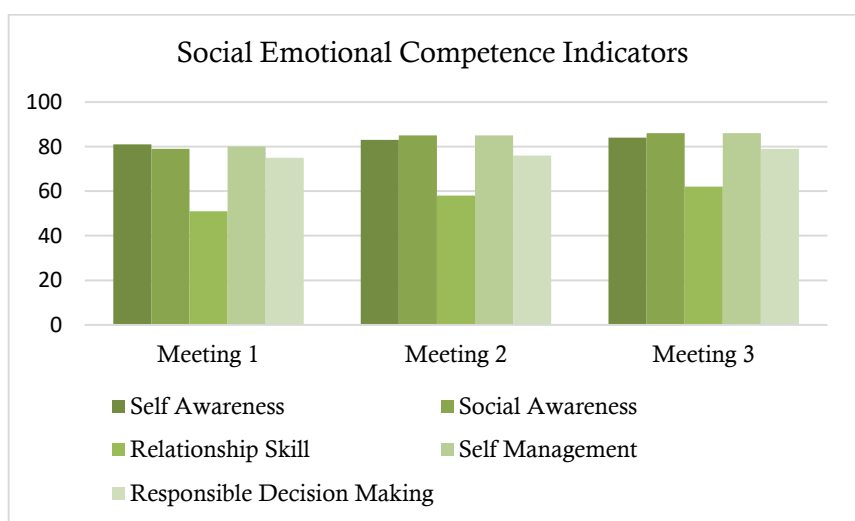


Figure 2. The Influence of Practicum on SEC Indicators in Each Meeting

Students' social-emotional competence increased from the first meeting to the third meeting. Self-awareness and self-management were the indicators with the highest and most stable values at each meeting. Relationship skills had the most significant development, although they were the indicators with the lowest values.

The ability of self-awareness is reflected when students are able to recognize their own strengths and weaknesses which are encouraged in practical learning where students actively explore, ask questions, and reflect on their thinking processes (Parta, 2017). This ability is seen when the results of the practical work do not match the initial theory or hypothesis. In this situation, students not only admit that there are mistakes, but also try to find alternative solutions and evaluate the factors that cause differences in results. Students' ability to identify errors during practical work and formulate solutions, as seen in the observation report, reflects the principles of Bandura's social cognitive theory, especially in the aspects of self-regulation and observational learning. Bandura states that individuals

learn through observation, self-reflection, and evaluation of the results of their actions (Asrori 2020). Students who realize that the results of the practicum are not in line with the initial theory or hypothesis demonstrate the ability to recognize errors, evaluate the causes, and formulate solutions based on observations and knowledge. This process shows active involvement in observing, reasoning, and making decisions as part of effective learning. Effective learning is based on self-awareness and self-efficacy, namely a person's belief in their ability to organize and carry out the actions needed during the learning process (Asrori, 2020).

In line with self-awareness, students who have high social awareness will consider how the use of time impacts the group, ensure that all members have the opportunity to contribute, and complete tasks efficiently without hindering other friends. (Sudirman et al. 2025). Social awareness is defined as an understanding of the contextual situation in the present that relates to what is happening, who is around, what is being done, how someone's emotions and attention are to their surroundings (Durlak et al. 2015). This awareness is seen when students are disciplined in complying with practicum procedures and managing time effectively.

Practical learning makes students involved in a social process through instruction and collaboration. The principle of social learning by Vygotsky states that students learn through interactions with adults or more capable friends. Social Learning Theory develops behavioral interventions by stating that children learn social behavior through the process of observing, imitating, and responding to verbal instructions and feedback (Durlak et al. 2015). Instructions related to social awareness are not only related to interactions between individuals, but also affect discipline and responsibility skills in learning. Students learn not only from personal experiences, but also through guidance and feedback from teachers and discussions with peers.

Indicators of self-management ability reflect how well students regulate and control themselves during the learning process. Self-management includes the ability to handle one's emotions, attention, and behavior in a productive way, especially in terms of being aware of feelings, monitoring them, expressing them (Durlak et al. 2015). The results of the observation questionnaire showed that indicators related to self-management reflect how well students regulate and control their attitudes during the learning process. This indicator includes several important things, such as students' ability to submit new ideas or proposals, arrive on time to the laboratory, and be ready to bring laboratory equipment such as lab coats, books, and the necessary tools. Self-management is evident from students' responsible attitudes towards the tasks and tools used, concern for the cleanliness of the work area, and ensuring that all equipment is returned to its original place. Students who have good self-management show high initiative without having to be directed by the teacher, and are able to submit assignments on time (Putri, et al., 2024).

The observation results show that students' self-management is quite good, but this aspect is still lower than self-awareness and social awareness. This may be because not all students have the same level of independence, so that practical learning in improving self-management can vary depending on the individual. These results are in line with the findings by Riptyawati, (2016) which showed that in the implementation of practical work, there were still some students who did not have the awareness to clean the practical area after the activity was completed. The development of self-management as part of character formation does not occur instantly, but rather through a learning process that takes place continuously and sustainably (Riptyawati 2016). The indicator of responsible decision-making has a weak relationship category. This indicator has the smallest influence because practical work trains more academic critical thinking skills than moral or ethical decision-making (Restudila et al. 2025). Balasubramanian et al., (2013) stated that decision making can be considered as a cognitive process that results in the selection of an action among several alternative scenarios. Each decision-making process results in a final choice. Based on the research questionnaire, several indicators related to responsible decision making include students being able to ask relevant and in-depth questions, and presenting the results of the analysis in a clear and structured format, namely observation

results, data analysis, discussion, and conclusions. This can be caused by several factors, namely decision making is often technical, for example in determining experimental methods or how to analyze data, not in a social context. The decisions made are academic, such as choosing research variables, formulating hypotheses, or determining experimental steps, which are different from decisions in real-life contexts that require broader social, emotional, and ethical considerations (Wang, Liu, and Liu 2022) Decision making can be interpreted as a process of making choices based on possible alternatives (Mamahit, et al., 2017). In line with the research of Pratama et al., (2018) showed that the discovery learning-based learning model accompanied by practicum involves structured activities that focus on developing students' critical and analytical thinking skills in an academic context so as to improve students' critical thinking and metacognition skills. Students who do assignments well according to learning and assessment criteria have good decision-making skills.

Relationship between Social Emotional Competence and Students' Conceptual Understanding

Social Emotional Competence (SEC) has a positive relationship with students' conceptual understanding. Students who have good SEC can support the learning process optimally so that they can improve conceptual understanding. Social emotional skills are cognitive aspects that can affect student learning. The relationship between learning outcomes measured through pre-post tests with social emotional competence (SEC) can be explained by constructivism and social-cognitive as put forward by Piaget and Vygotsky.

Constructivist learning occurs when students work on tasks that have not been learned but the task is still within their ability or the task is in the zone of proximal development (Asrori 2020). Students are in the Zone of Proximal Development (ZPD) if they are not yet able to solve a problem independently, but can solve it with help from adults or peers. This support is provided so that students are able to work on assignments or questions that have a higher level of complexity than their current cognitive abilities (Asrori, 2020).

Cognitive and social emotional development must go hand in hand so that students are not only academically smart, but also able to work together, empathize, and make wise decisions. Integration between cognitive abilities and social emotional competencies is very important to support students' holistic learning. Students are not only invited to remember and understand biological concepts, but are also encouraged to apply, analyze, evaluate, and even create solutions to biological problems that arise during learning (Anderson et al. 2001). Students who have good social emotional skills are better able to manage their study time, are able to set academic goals, and are able to maintain consistency in understanding concepts gradually and continuously (Febrian et al., 2025).

Research shows that students who are able to manage their emotions well tend to be more effective in dealing with stress, anxiety, or boredom in learning, so they can focus more on understanding the concepts found. A study by Sari (2024) found that there was a significant positive relationship between emotional regulation and student learning outcomes at SMP Negeri 11 Padang. Each student has the ability to control their emotions. The higher the student's emotional regulation, the higher the student's learning outcomes, conversely, the lower the student's emotional regulation, the lower the student's learning outcomes. The relationship between social emotional and conceptual understanding learning outcomes is also in line with research by Prasetyo Putri et al. (2023), there is a relationship between emotional regulation and learning outcomes in grade VII students of SMP Negeri 3 Mojolaban. Another study by Saputra (2017) found that the emotional regulation possessed by students was in the moderate category, student learning outcomes were in the high category, and there was a significant relationship between emotional regulation and student learning outcomes. Thus, increasing the ability to regulate emotions in students can contribute to improving student learning outcomes.

CONCLUSION

Based on the results of the analysis and discussion, it is concluded that practical learning has a significant effect on conceptual understanding and social emotional competence in the circulatory system material. This is indicated by the contribution of practical work of 27.77% or quite influential on students' social emotional competence, and there is a significant positive relationship between conceptual understanding and social emotional competence with a moderate correlation level. Thus, the application of practical learning is recommended as an effective strategy in learning the circulatory system, because it not only improves cognitive aspects but also supports students' social and emotional development.

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