

## Effects of Using Student Worksheets Integrated With Context-Based Learning Videos on Collaboration and Science Communication Skills Students

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### ABSTRACT

*Collaboration and science communication are skills that are needed and must be possessed by students. In reality, students are less trained to work together and express ideas well, so students' science collaboration and communication skills are still weak. Therefore, student worksheets integrated with context-based learning videos are used as a solution. This study aims to see the influence of using student worksheets integrated with context-based learning videos on improving students' collaboration skills and science communication skills. Students of class XI IPA 3 at SMAN 3 Payakumbuh were used as the research sample. The instruments used were observation sheets on collaboration and science communication skills. The results of the data analysis showed: 1) there was an increase in students' collaboration skills score from 40.29 to 85.59 with an excellent category, and 2) there was an increase in students' science communication skills score from 40.29 to 76.91 with a good category. Based on the t-test conducted, there is a positive effect of using student worksheets integrated with context-based learning videos on students' collaboration and science communication skills.*



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## INTRODUCTION

The 21st century, as an era of globalization, demands the readiness of human resources (HR) to be able to survive and compete globally. In an increasingly advanced era, the development of science is increasing more rapidly, which also encourages every education sector to improve its quality (Febrianti & Mufit, 2024; Nafi et al., 2024). For this reason, an individual needs to be trained to have skills, the ability to innovate, and the ability to use media and information technology (Rahmawati et al., 2019; Parwati et al., 2020). The skills that must be possessed in the 21st century are called 4C skills, which include collaboration skills, communication skills, critical thinking skills, and creativity

(Mumtaza & Agustinaningsih, 2023). These skills need to be honed in education so that students can adapt to changing times and make it easier for them later in the world of work (Aulia et al., 2024).

Creativity is a person's ability to see change and a natural desire to get new ideas, thoughts, or even actions (Mardiyana & Novitasari, 2022). Creativity means that it requires courage because new things can cause problems due to unpreparedness (Widodo & Wardani, 2020). A student can be said to be creative if he can produce new ideas, solve problems with his ideas, be responsive to new perspectives, and be open to differences (Fajri et al., 2024; Lestari & Ilhami, 2022). Creativity can strengthen critical thinking skills. Critical thinking is a directed and clear process (Septikasari & Frasandy, 2018). Critical thinking means being able to weigh all information logically and responsibly. Therefore, educators need to be able to develop students' creative capacity and critical thinking so that they can learn, work, and live in society (Gu et al., 2019).

Collaboration skills are interpersonal competencies that must be possessed today and are even required in work (Van Laar et al., 2019; Nemiro, 2021). Collaboration, or working together, is the skill of carrying out activities with two or more people with the same goal (Devi et al., 2018). Collaboration is the ability to be able to synergize with each other, be able to adapt, have responsibility, and be able to respect other people's differences (Arnyana, 2019). Collaboration is built from relationships with other people, efforts, suggestions, and contributions of ideas from team members, accompanied by a sense of mutual responsibility and respect for differences of opinion (Trisdiono et al., 2019). Thus, collaboration can be interpreted as an effort to work in a team by paying attention to the ideas and opinions of team members to achieve common goals.

Communication is a student's ability to present what they have learned, both orally and in writing (Hastuti & Hidayati, 2018). Students who have good communication skills have the ability to receive information and have the knowledge to convey it; this will help students obtain good learning outcomes (Hidayati et al., 2020). Meanwhile, science communication skills are activities related to research that involve conveying the information obtained and concluding compliance verbally, in writing, and in other media (Sari, 2020). Science communication skills can influence students' understanding of a concept, so teachers need to be able to develop these skills in students (Oktasari et al., 2019).

The fundamental skills that students must have are collaboration and science communication skills. Creative ideas and critical thinking will emerge if students can work together and communicate well so that students can solve problems that occur in their lives wisely. Students who have collaboration skills will be able to play an active role in learning activities. Students can discuss and convey ideas or exchange ideas with their friends. Collaborating will train students to support each other in their group so that students will understand the lesson better (Mawaddah et al., 2022). Students who can collaborate well will be able to communicate the knowledge they have gained; therefore, the role of teachers in training these skills is important for students (Ntelok, 2021). Students' collaboration and science communication skills will develop their potential to be able to think reflectively in solving problems, which is useful for improving group work and determining success in learning and social relationships in society (Fitriyani et al., 2019; Fadly, 2017).

Collaboration and science communication skills can be trained in physics learning. Both of these skills can be trained through group work using certain media or teaching materials. The media that can be used for learning are context-based learning videos. Video is very effectively used for mass learning processes, both individually and in groups (Yolanda et al., 2019). Context is used to find out the relevance of teaching to what is experienced in everyday life (Windyarani, 2019). Context-based learning videos are also used as a distinct advantage for students because students get a real picture of the concepts

being studied, so indirectly, students are invited to understand real concepts in the environment (Nanda et al., 2017).

Student worksheets are one of the learning resources that can be developed by the teacher as a facilitator in teaching and learning activities (Nilawati et al., 2017). Student worksheets are sheets of assignments that students must complete that are prepared and developed by teachers based on learning objectives, skills to be achieved, and learning situations and conditions (Wati & Suliyanah, 2018). Student worksheets are a form of teaching material that includes material, exercises, or assignments according to the material to be achieved (Soenarko et al., 2022). Student worksheets also contain experimental activities to guide students in learning which of the assignment sheets (Putri et al., 2019). Student worksheets can be used to facilitate the interaction of students to work together in groups, collect data, share information, and listen to the opinions of group members, so that student worksheets are suitable for improving students' collaboration and science communication skills (Suryawati et al., 2020).

Based on observations and an interview with a physics teacher at SMAN 3 Payakumbuh, it was determined that the learning resources used were teaching materials and textbooks at school. When learning takes place, the media used by the teacher are usually images related to certain materials. The media and learning resources used by the teacher are not interactive and one-way in nature, so they've not been suitable for honing students' collaboration and communication skills. Teachers more frequently use the direct learning model with the lecture method in the classroom. Students rarely work together in groups. If group discussions are held, the teacher only releases students to discuss physics questions in groups without any written guidance from the students. The lack of group activities shows that students' collaboration skills have not been trained optimally, so students' collaboration skills can be said to be still low.

Students' science communication skills also appear to be low. When presenting in front of the class, students weren't able to convey their discussion points or ideas well and were still stuck to the language of the book. Students still have difficulty answering questions and conveying the focus of the problem, and explanations are still short and shallow. This means that students have not been trained either orally or in writing to improve their science communication skills. Lack of interest in reading is also the reason for students' low communication skills. Students don't understand the material provided, so they don't dare to communicate this knowledge.

Rizawati (2022), in her observations at SMAN 1 Bengkulu, said that the tendency of teachers to teach conventionally makes teachers explain more material so that students don't have the opportunity to communicate verbally. Learning that is only dominated by teachers and does not familiarize students with being active in discussions and working in groups is a factor in students' low collaboration skills (Ivanková et al., 2022). The results of observations by Wijaya and Wilujeng (2024) found that students' low collaboration skills were due to students' lack of enthusiasm for learning because the teaching materials used were less interesting and also didn't contain steps that directed students to collaborate in solving problems. So there is a need for appropriate teaching materials, like student worksheets, that can guide students to collaborate and communicate science well.

Teachers should be ready to plan and implement 21st-century learning to train students' 4C skills (Haryani et al., 2021), especially collaboration and science communication skills. Teachers can use appropriate learning models and various media to achieve the expected skills. Anggrahini & Rusmini (2022) concluded that the use of worksheets can help improve collaboration skills, which are important to develop in the 21st century. Restapaty & Mardiaty (2018) stated in their research that the use of instructional video media can be an alternative means of improving communication skills. Research by Ledy et al. (2022) also

stated that learning media in the form of video can be applied to learning and training students' science communication skills. Based on the background presented, this study aims to see the influence of using student worksheets integrated with context-based learning videos on students' collaboration and science communication skills.

## METHODS

This study was conducted at SMAN 3, Payakumbuh. The research was conducted for approximately 2 months in 2022. This type of research is experimental with a quasi-experimental method. Quasi-experimental research aims to estimate the conditions achieved through actual experiments, but there is no control or manipulation of all relevant variables (Purnomo, 2020). Experimental research is research used to find and see the effects of certain treatments (Arifin, 2020).

The research design used a one-group pretest and posttest design. This design is done by comparing the results of observations before and after treatment in the group being tested. This study only uses one experimental class. After being given treatment in the sample class, the pretest and posttest results obtained will be compared. The research design can be seen in Table 1 below.

**Table 1.** The Design of One-Group Pretest and Posttest

Pretest	Treatment	Posttest
O <sub>1</sub>	X	O <sub>2</sub>

The research sample used was students in class XI IPA 3. The sample is part of the population taken in certain ways. The population of this study was all students of class XI IPA SMAN 3 Payakumbuh teaching 2021-2022, which is spread over four classes. The method of sampling was selected using the purposive sampling technique. The purposive sampling technique is a technique used to identify samples that are specifically selected based on certain considerations or objectives (Sundayana, 2016).

There are 3 stages of procedures in this study, consisting of the preparation stage, the implementation stage, and the completion stage. The things that need to be prepared at the preparation stage are determining the research site, research samples, and preparing learning tools, as well as instruments for data collection. The next stage is the learning implementation process carried out in one class, namely class XI IPA 3, by providing treatment using student worksheets integrated with context-based learning videos. At this stage, observations and data collection were carried out during the learning process using previously prepared instruments. The last stage is collecting observation data before and after treatment, processing and analyzing the data, and concluding the results of the data processing and the analysis used.

Data collection was done using collaboration skills and science communication skills. The instrument used is a student observation sheet in the form of an assessment rubric with skill indicators. The instrument consists of five indicators each to measure collaboration skills and science communication skills in students. This observation was carried out during the learning process. The data that has been obtained is then collected to be analyzed using data analysis techniques.

Data analysis techniques include the normality test, the data homogeneity test, and hypothesis testing using the t-test. Data analysis aims to test the truth of the hypothesis proposed in the study, whether the previous hypothesis is accepted or rejected. In this study, the t-test will be used to determine whether or not there is an effect of using student worksheets integrated with context-based learning videos on students' collaboration skills and science communication skills. Before testing the data, the score is first converted to a

value using a percentage assessment. This is because the score is still the raw result of data collection. The converted values will be interpreted according to the criteria in Table 2.

**Table 2.** The Criteria of Value Interpretation

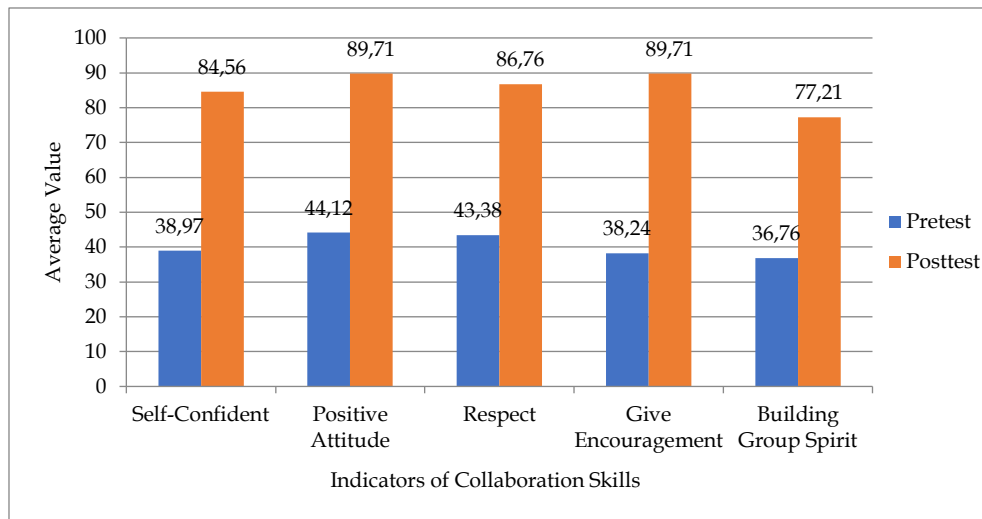
Value	Predicate	Criteria
$\geq 85$	A	Very good
75-84	B	Good
65-74	C	Enough
55-64	D	Not enough
$\leq 55$	E	Very less

(Ratnawulan & Rusdiana, 2015)

## RESULTS AND DISCUSSION

### Results

The data collection was obtained during the learning process. Data collection was carried out by two observers using instruments' collaboration and science communication skills. Students' collaboration skills can be observed from the average value of each indicator on the instrument. There are 5 indicators of collaboration skills, including self-confidence, a positive attitude, respect, encouragement, and building group spirit. After the calculation, there is a difference in the average value for each indicator of collaboration skills before and after treatment. The average value of students' collaboration skills for each indicator can be seen in Figure 1 below.

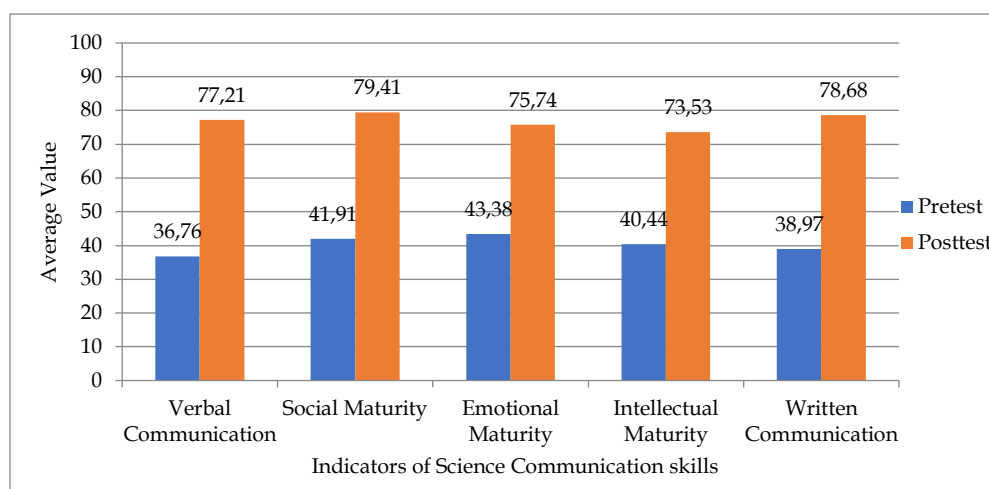


**Figure 1.** The Average Value of Students' Collaboration Skills Based on Collaboration Skills Indicators

The graph in Figure 1 shows that there is an increase in students' collaboration skills after treatment for each indicator. The value of the collaboration skills pretest data obtained in the initial observation ranged from 36 to 44, with an average of 40.29. If interpreted with the value criteria by Ratnawulan & Rusdiana (2015) in Table 2, the value is categorized as very less. Then the treatment was applied using student worksheets integrated with context-based learning videos to improve collaboration skills in students. After the treatment, students obtained scores ranging from 77 to 89 in each indicator, with an average score of 85.59. The results of this posttest value are categorized as very good, meaning that there is a significant increase in students' collaboration skills.

The collaboration skills data obtained was then analyzed using the normality test. The results obtained were  $L_h$  of 0.114 before treatment and  $L_h$  of 0.139 after treatment, while  $L_t$  was 0.152. Because  $L_h < L_t$ , the value of collaboration skills before and after treatment is normally distributed. Furthermore, a homogeneity test was conducted on the two groups of data. The result of  $F_h$  is 1.390 and  $F_t$  is 1.788. Because  $F_h < F_t$ , the two groups of data are declared homogeneous. After the data is declared homogeneous, the last step of this data analysis is to test the hypothesis using the t-test. From the test results, the calculation result of  $t_h$  is 57.465 and  $t_t$  is 2.035. Because  $t_h > t_t$ , then  $H_0$  is rejected and  $H_a$  is accepted. The t-test results state that there is a positive effect of using student worksheets integrated with context-based learning videos on student collaboration skills.

Students' science communication skills can be observed from the average value of each indicator on the instrument. There are 5 indicators of science communication skills, including oral science communication, social maturity, emotional maturity, intellectual maturity, and written science communication. Data on students' science communication skills were then calculated and analyzed. The result is that there is a difference in the average value for each indicator of science communication skills before and after treatment. The average value of students' science communication skills for each indicator can be seen in Figure 2 below.



**Figure 2.** The Average Value of Students' Science Communication Skills Based on Communication Skills Indicators

The graph in Figure 2 shows an increase in students' science communication skills after treatment for each indicator. The value of the pretest data on science communication skills obtained ranged from 36 to 43, with an average of 40.29 and a very less value category. After being given treatment, the scores obtained by students ranged from 73 to 79 in each indicator, with an average score of 76.91. The results of the posttest value of science communication skills are categorized as good, meaning that there is an increase in students' science communication skills.

The data on science communication skills that have been obtained are also analyzed using the normality test. The calculation result of  $L_h$  is 0.114 before treatment, and  $L_h$  after treatment is 0.138, while  $L_t$  is 0.152. Because  $L_h < L_t$ , the value of science communication skills before and after treatment is normally distributed. Furthermore, a homogeneity test was conducted on the two groups of data. The result of  $F_h$  is 1.406 and  $F_t$  is 1.788. Because  $F_h < F_t$ , the two groups of data are declared homogeneous. After the data is declared homogeneous, the last step of this data analysis is to test the hypothesis using the t-test. From the test results, the calculation result of  $t_h$  is 12.766 and  $t_t$  is 2.035. Because  $t_h > t_t$ ,  $H_a$  is accepted,

which means that there is a positive effect of using student worksheets integrated with context-based learning videos on students' science communication skills.

## Discussion

Learning that has been implemented can train learners' ability to collaborate and science communication skills. Learners will learn to be responsible and can achieve a common goal in groups (Mumtaza & Firdaus, 2023). This is assisted by student worksheets, which can trigger interaction and guide collaborative activities. Based on the results of calculations and data analysis of students' collaboration skills, it can be seen that after being given treatment using student worksheets integrated with context-based learning videos, students' collaboration skills are higher or have increased scores compared to before using worksheets. The results of research conducted by Mawaddah et al. (2022) also found a significant increase in the average post-test score in classes that used student worksheets. This means that using worksheets can improve collaboration skills.

The use of student worksheets in learning can help teachers improve collaboration skills and students' science communication skills. This is reinforced by research conducted at SMPN 32 Padang by Chairiyah and Fadilah (2023) that shows collaboration skills can be improved with the help of student worksheets. Naila et al. (2020), in their research, stated that teaching materials in the form of student worksheets are feasible to use and can train the cooperation and skills needed today. Research by Setiawaty et al. (2019) also states that student worksheets are feasible and categorized as very good for elementary school students to use as a learning resource. Student worksheets are also used to assist students in learning activities to master understanding and improve skills. This agrees with Kusumaningsih et al. (2019) that worksheets can guide students in understanding learning materials so that students master learning materials and have good skills.

The value of students' science communication skills after being treated using student worksheets integrated with context-based learning videos looks higher and has increased compared to before treatment. This is because using student worksheets integrated with context-based learning videos helps improve students' science communication skills during learning. Sudariana et al. (2023) concluded from their research that worksheets can help students learn flexibly and can improve students' communication skills. Student worksheets can make it easier for students to solve a problem through discussion between students or between students and teachers. The teacher can ask students to present the results of their group's observations and discussions, while other groups listen and respond to the results of the presentation (Puspita & Dewi, 2021).

The student worksheets used can help guide students in solving problems or cases in the learning videos provided. In context-based learning videos, several video cases must be resolved by students. Students will be asked to work together to solve the video case, and they will be assisted by student worksheets in the process. Students can collaborate in solving problems from the cases in the video, express opinions, and communicate their ideas. Students can improve social relationships and regulate their emotions when communicating with friends in their group. Thus, students' science communication skills can be further improved. Andi and Romlah (2021) argue that videos in science learning can provide opportunities for students to work in groups and then communicate with others to discuss phenomena and explain concepts that have been presented.

Student worksheets integrated with contextualized learning videos can foster student characteristics such as an attitude of protecting the environment, confidence, responsibility, a sense of helping, and the ability to establish good interactions in teamwork (Putri et al., 2019). By using context-based learning videos, students are more interested in learning

because they can provide examples of real events through videos. The use of context-based learning videos is good to use in learning because they can help students understand the material by seeing real events, especially in physics learning, some of which are difficult to show directly, so that students do not find it difficult to imagine the events because they can be seen from the video. This means that it is Hamidah and Desnita's (2020) opinion that learning videos are effective media used in learning.

Research conducted by Restapaty and Mardiaty (2018) states that learning video media can be an alternative medium that can be used to improve communication skills. This is in line with Raupu's opinion (2019) that digital media can display interesting variations and can develop students' skills. According to Okra & Novera (2019), learning media should be practical and innovative because media is one of the determining factors in the success of achieving learning objectives. So it can be said that the use of student worksheets and learning video media can be a suitable combination to be used in improving students' skills as well as learning outcomes. Thus, the use of student worksheets integrated with context-based learning videos can be used in the learning process and can help improve students' collaboration skills and science communication skills.

## CONCLUSION

Based on the results and discussion that have been described, there is an increase in the value of students' collaboration and science communication skills after the use of student worksheets integrated with context-based learning videos in class XI IPA 3 students at SMAN 3 Payakumbuh. This is evidenced from the calculation and analysis of data using hypothesis testing (t-test) that there is a positive influence after being given treatment on students' collaboration and science communication skills. The increase in value can also be seen from the results of the pretest and posttest of each indicator of collaboration skills and science communication skills of students. The average value of students' collaboration skills increased from 40.29 to 85.59 and was categorized as very good. Students' science communication skills also increased in average value from 40.29 to 76.91 in the good category. These skills can continue to be trained so that students have qualified skills that can be useful for them in learning, in the world of work, or in society.

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