Jurnal Paedagogy:
Jurnal Penelitian dan Pengembangan Pendidikan
https://e-journal.undikma.ac.id/index.php/pedagogy/index
Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

Student Perceptions of Collaboration and Scientific Communication Skills in Physics

S. Ratih Uswatun Khasanah*, Zulirfan, Syahril
Universitas Riau
*Corresponding Author. Email: sarifah.ratih@gmail.com

Abstract: This study analyzes students initial perceptions of their collaboration and scientific communication skills. This method of research was descriptive research with a qualitative and quantitative approach. The subjects of this study were students of class XI MIPA.1 MAN 1 Siak in the 2022/2023 academic year. The data collection technique used in this study was a questionnaire via Google Forms. Data on students collaboration and scientific communication skills perceptions were analyzed using descriptive statistics. The results of data analysis for indicators of collaboration skills are 2.13 in the low category, and scientific communication skills indicators were 1.92 in the low category. From the results of the data analysis, it can be concluded that students initial perceptions of their collaboration and scientific communication skills are in a low category. It is because of students not being used to learning in groups in class due to the online learning process for approximately two years in a row. The lack of training in student collaboration skills results in low scientific communication skills. That is because the essential subjects taught in the emergency curriculum during the pandemic barely touched the real of scientific communication skills.

Article History
Received: 06-01-2023
Revised: 23-02-2023
Accepted: 12-03-2023
Published: 07-04-2023

Key Words:
Student Perception; Collaboration Skills; Scientific Communication.

How to Cite: Khasanah, S., Zulirfan, Z., & Syahril, S. (2023). Student Perceptions of Collaboration and Scientific Communication Skills in Physics. *Jurnal Paedagogy*, *10*(2), 468-475. doi:https://doi.org/10.33394/jp.v10i2.6922

https://doi.org/10.33394/jp.v10i2.6922

Introduction

21st-century skills in the national education system are a much-discussed issue. 21st-century skills include communication, collaboration, critical thinking, and creative thinking. These four skills are mandatory for 21st-century students. It is expected to be a provision for students to live life in the future. To achieve this goal, an educator must understand how appropriate learning is to train these skills to achieve their competencies. 21st-century skills are closely related to the demands of the world of work. So schools as formal educational institutions must equip their students with contextual knowledge and in harmony with these demands (Sapudin, 2015). Joint decision-making, information sharing, collaboration, innovation, and work speed are critical aspects today. Today, success indicators are more based on skills to communicate, share, and use the information to solve complex problems, be adaptable and innovate in response to new demands and expand the power of technology to create new knowledge (Zubaidah, 2016).

Erdianto (2016) stated that based on a survey of the international student assessment program or PISA (Survey Program International Student Assessment), which is a world-class assessment that is held for three years, Indonesia's education ranking in 2015 was ranked 64 out of 72 member countries of the Organization for Economic Cooperation and Development (OECD). The survey results showed that the quality and quality of education in Indonesia was still lagging behind compared to other countries in the world. One of the educational problems facing the world of education today is the weak implementation of the learning

Jurnal Paedagogy:
Jurnal Penelitian dan Pengembangan Pendidikan
https://e-journal.undikma.ac.id/index.php/pedagogy/index
Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

process applied by teachers in schools. Weak implementation of the learning process occurs in almost all subjects, including physics subjects (Susanto, 2014) .

A person will be more successful in the world of work if he has good collaboration skills with colleagues and in a work team (Gardner, 2020). Collaboration involves interacting with other people by working together to achieve goals by respecting differences, participating in discussions, brainstorming, listening, and supporting others (Slater, 2004) . According to Friend and Cook (2010)), collaboration is a style of interaction in which two or more professionals work together to achieve goals. In contrast, Woolfolk (2007) argues that collaboration is a philosophy of relating to others (how to learn and work), dealing with others by appreciating differences, sharing power, and gathering knowledge from others. Therefore, collaboration has more meaning than cooperation.

Greenstein (2012) defines collaboration as a process study for planning and working together, weighing different views/perspectives, and participating in discussions on brainstorming, listening, and supporting others. Furthermore, Greenstein (2012) explains that in collaborative classes, students will work to share goals, learn together, be involved in meaningful assignments, and build upon prior knowledge to generate ideas and various kinds of products/artifacts.

According to the Ministry of Education and Culture (2017), Communication skills are *soft skills* that someone in the world of work and collaboration must possess. Communication is not only a lingual matter that is trained with verbal languages. Raymond Ross, in the book Implementation of 21st Century Skills Development in Learning Implementation Planning (2017), says that communication is the process of sorting, selecting, and sending symbols in such a way as to help listeners evoke responses/meanings from thoughts similar to those intended by the communicator. Communication is transmitting information, ideas, emotions, and skills using symbols, words, pictures, graphics, and numbers. To practice communication skills using symbols, words, pictures, graphics, and numbers, teachers can apply science communication skills (Zulirfan et al., 2017).

Scientific communication skills are part of Science Process Skills (KPS). *Process skills* involve cognitive, intellectual, manual, and social skills (Rustaman, 2005). Cognitive skills are trained by performing Student's science process skills using their minds. Manual skills are trained using tools and materials, measuring, preparing, or assembling tools. Social skills are trained by how students interact with each other in teaching and learning activities, for example, by discussing the results of observations. Someone who has good knowledge of process skills will try to explore the universe as deep and wide as he wants (Zulirfan et al., 2018) .

The results of the Asian study (2010) in the Indonesia Skills Report provide data on *the employee module* on the discussion of communication skills and team skills (collaboration), which are the most important and most needed in the world of work. However, these skills still need to improve in Indonesia (Reni, et al., 2021). Students' collaboration and scientific communication skills at MAN 1 Siak are still lacking. Therefore the researcher wants to conduct research at the school, especially in class XI MIPA 1. This research analyzes the student's initial perceptions of their scientific collaboration and communication skills in physics class XI MIPA 1 at MAN 1 Siak.

Research Method

The data collection technique used in this study was a survey using a questionnaire via *Google Form*. Data on Student's scientific collaboration and communication skills

Jurnal Paedagogy:
Jurnal Penelitian dan Pengembangan Pendidikan
https://e-journal.undikma.ac.id/index.php/pedagogy/index
Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

perceptions were analyzed using descriptive statistics with a qualitative and quantitative aproach (Zikmund,2013). This research carried out at Madrasah Aliyah Negeri 1 Siak, class XI MIPA 1. The time of research is in November 2022. The subjects in this study were 25 students of class XI MIPA 1 with details of 7 male students and 18 female students. There are two variables in this study, namely collaboration skills and scientific communication skills.

The instrument used in this study was a Student Perception Questionnaire on Scientific Collaboration and Communication Skills. This questionnaire was created using Google Forms. The research subjects were given 20 open-ended questions, 11 regarding collaboration and nine about scientific communication skills. The data collection technique used in this research was a survey. In this technique, the data to be obtained were the initial perception of the students of MAN 1 Siak regarding their scientific collaboration and communication skills. The questionnaire used has indicators adopted from Miria Yasmina (2020), as shown in Table 1, to obtain information about Student's initial perceptions of their scientific collaboration and communication skills.

Table 1. Indicators and Research Question Items

Indicator	Question
Collaboration	1. Do you like studying physics in groups? 2. Do studying in groups make children understand the subject matter better? 3. You accept to enter into a group that has been determined by the teacher. 4. You like learning that involves collaboration (cooperation) between students to complete a physics project. 5. You feel happy if given the opportunity to try, analyze, find and solve a problem in learning by himself. 6. You are always given the opportunity to give group presentations in physics lessons. 7. You like to express opinions and ideas during discussions. 8. You enthusiastically searched for answers Correct while doing the experiment 9. You respects the opinions of groups that differ from you. 10. You actively participated in group discussions. 11. You often studied in groups compared to studying individually.
Scientific communication	1. Do you record practicum result data every time he does practicum with teachers and friends? 2. Do you record practicum result data into the table every practicum? 3. Do you make a graph of the practicum result data every time he does the practicum? 4. If a graphic is presented, you can understand the meaning of the graph. 5. According to you, writing the practicum result data into the table... 6. According to you, describing the graph of the practicum result… 7. According to you, should teachers teach their students "how to read measurement data during practicum?" 8. According to you, should teachers teach their students "how to write data into tables?" 9. According to you, after each practicum is it necessary for each group to present the results of their practicum?

Jurnal Paedagogy:
Jurnal Penelitian dan Pengembangan Pendidikan
https://e-journal.undikma.ac.id/index.php/pedagogy/index
Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

The data in this study were then analyzed using descriptive statistics with a qualitative and quantitative approach. The data analysis technique used a Likert scale of four categories: always (constantly done) = 4, often (sometimes, but more often done) = 3, rarely = 2, and never = 1. The score for each question item was then averaged, and the decision results can be determined in Table 2.

Table 2. Category of Scientific Collaboration and Communication Skills

No	Average score	Category
1	>3.25 - 4	Very high
2	>2.5 - ≤ 3.25	High
3	>1.75 - ≤ 2.5	Low
4	1 - ≤ 1.75	Very low

Results and Discussion

Based on research data on the perceptions of collaboration and scientific communication skills of students using a questionnaire distributed to students of class XI MIPA 1 MAN 1 Siak, the initial perceptions of each item in the questionnaire statement were obtained in Table 3.

Table 3. The Average Score of the Scientific Collaboration and Communication Skills Perception Questionnaire

No	Rated aspect	Average	Category
1	Do you like studying physics in groups?	2,28	low
2	Do studying in groups make children understand the subject matter better?	1,84	low
3	You accept to enter into a group that has been determined by the teacher.	2,32	low
4	You like learning that involves collaboration (cooperation) between students to complete a physics project.	2,24	low
5	You feel happy if given the opportunity to try, analyze, find and solve a problem in learning by himself.	2,2	low
6	You are always given the opportunity to give group presentations in physics lessons.	2,24	low
7	You like to express opinions and ideas during discussions.	2,12	low
8	You enthusiastically searched for answers Correct when doing the experiment .	2,2	low
9	You respects the opinions of groups that differ from you.	2,2	low
10	You actively participated in group discussions.	2,04	low
11	You often studied in groups compared to studying individually.	1,88	low
12	Do you record practicum result data every time he does practicum with teachers and friends?	1,96	low
13	Do you record practicum result data into the table every practicum?	1,92	low
14	Do you make a graph of the practicum result data every time he does the practicum?	1,88	low

Jurnal Paedagogy:
Jurnal Penelitian dan Pengembangan Pendidikan
https://e-journal.undikma.ac.id/index.php/pedagogy/index
Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

No	Rated aspect	Average	Category
15	If a graphic is presented, you can understand the meaning of the graph.	1,84	low
16	According to you, writing the practicum result data into the table is difficult.	1,76	low
17	According to you, describing the graph of the practicum results difficult.	2,08	low
18	According to you, should teachers teach their students "how to read measurement data during practicum?"	1,96	low
19	According to you, should teachers teach their students "how to write data into tables?"	1,88	low
20	According to you, after each practicum is it necessary for each group to present the results of their practicum?	2,04	low

Each of the statement items above is then grouped based on the indicators in Table 1, in order to obtain data on the perception category of Student's scientific collaboration and communication skills (Table 4).

Table 4. Perception Category of Student's Scientific Collaboration and Communication Skills

No	Indicator	Average	Category
1	Collaboration	2,1 3	Low
2	Scientific communication	1,92	Low

The average value of student perceptions for collaboration indicators is 2.13 in the low category, while the average value for scientific communication indicators is also 1.92 in the low category. The percentage of Student's perceptions regarding their scientific collaboration and communication skills is presented in Figure 1 and Figure 2.

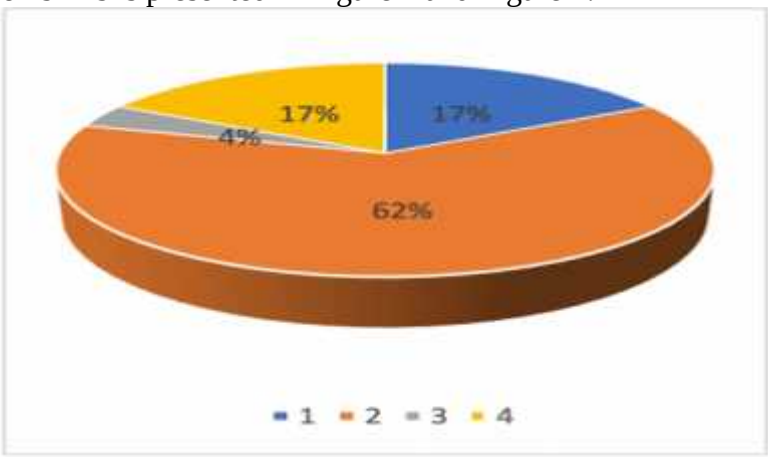

Figure 1. Student Perceptions of Collaboration Skills

Students' initial perceptions of collaboration skills were dominated by the low category, namely 62%, then very low 17%, very high 17%, and high 4%. Students are generally not used to learning and working effectively in groups. According to Cerelia Cerelia (2021) collaboration skills were not developed during the pandemic. It is one of the causes of low student collaboration skills. During the transitional period between the pandemic and the Covid-19 endemic, learning activities in schools/madrasas began to apply a limited Face-to-Face Meeting (PTM) pattern. Students can study face-to-face with teachers in

Jurnal Paedagogy:
Jurnal Penelitian dan Pengembangan Pendidikan
https://e-journal.undikma.ac.id/index.php/pedagogy/index
Email: paedagogy@undikma.ac.id

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

classrooms at limited numbers and times. Students' scientific collaboration and communication skills were not optimized during the endemic.

Collaboration skills must be trained in students. Good collaboration skills will positively impact Student's cognitive, affective, and psychomotor abilities. Some of the advantages obtained through collaborative learning include higher learning achievement, deeper student understanding, more enjoyable learning, development of leadership skills, increasing positive attitudes, inclusive learning, the feeling of belonging to each other, and development of future skills (Suryani, 2022).

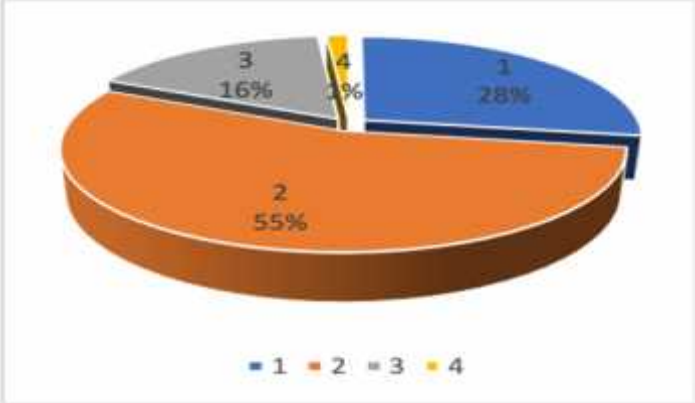

Figure 2. Student's Perceptions of Scientific Communication Skills

Students' initial perception of scientific communication skills is dominated in the low category of 55%, then very low 28%, high 16%, and very high 1%. According to Rustaman (2005) scientific communication includes the ability of students in terms of providing or describing empirical data on the results of experiments or observations with graphs or tables, or diagrams, compile and deliver reports systematically, describe the results of an experiment or study, read graphs or tables or diagrams, and discuss the results of the activities of a problem or study. The average student is less able to describe and read empirical data from experiments or observations with graphs, tables, or diagrams. The low level of student collaboration skills also impacts the ability to systematically discuss and submit reports on the results of their scientific work.

The essential materials in the emergency curriculum taught during the pandemic barely touched the reality of scientific communication skills. Students were used to doing their assignments individually in their homes. Collaboration skills were not developed during the pandemic (Cerelia et al., 2021). It is the same with the research results on student collaboration and scientific communication skills, which are still low.

Conclusion

Based on the research and analysis of the initial perception data of Student's collaboration and scientific communication skills, it can be concluded that Student's collaboration and scientific communication skills belong to the low category. It is due to students not being used to learning in groups in class due to the online learning process for approximately two years in a row. The impact of lack of training in student collaboration skills results in low scientific communication skills. That is because the essential material taught in the emergency curriculum during the pandemic barely touched the realm of scientific communication skills. The research results can be used as a reference by other researchers to improve Student's scientific collaboration and communication skills in their schools.

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

Recommendation

Based on the results and conclusions of this study, it can be recommended to carry out further research, such as classroom action research on aspects of students' collaboration and scientific communication skills, as well as research on the development of media and learning models.

References

Cerelia, J. J. (2021). *Learning Loss Akibat Pembelajaran Jarak Jauh Selama Pandemi Covid-19 di Indonesia.* Seminar Nasional Statistik X, 1. http://semnas.statistics.unpad.ac.id/wp-content/uploads/erf_uploads/2021/11/Learning-Loss-Akibat-Pembelajaran-Jarak-Jauh-Selama-Pandemi-Covid-19-di-Indonesia.pdf

Conny Semiawan. (1985). *Pendekatan Keterampilan Proses, Bagaimana Mengaktifkan Siswa dalam Belajar*. Jakarta: Gramedia.

Dimyati dan Mudjiono. (2006). *Belajar dan Pembelajaran*. Jakarta: Rineka Cipta.

Donnelly, R., dan H.A. Patrinos. 2021. *Learning loss during Covid-19: An early systematic review*. Prospects, 0123456789. https://doi.org/10.1007/s11125-021-09582-6

Erdianto, Kristian. (2018). Komnas HAM Catat 4 Kondisi Darurat Pendidikan sIndonesia

Friend, M. dan L. Cook. 2010. *Interactions: Collaboration skills for school professionals* (6th Ed.).

Gardner, H. K. (2020). *Implementing a Smart Collaboration Strategy , Part 1 : Building the Case for Change*. *June*, 1–17.

Greenstein, L. M. (2012). *Assessing 21st Century Skills: A Guide to Evaluating Mastery and Authentic Learning*. Corwin Press.

Kemdikbud. (2017). *Implementasi Pengembangan Kecakapan Abad 21 dalam Perencanaan Pelaksanaan Pembelajaran (RPP).* Jakarta: Direktorat Jendral Pendidikan Dasar dan Menengah Kementerian Pendidikan dan Kebudayaan.

Lestari,dkk. (2021). *Hybrid learning on problem-solving abiities in physics learning: A literature review*. IOP Conference Series: Earth and Environmental Science, *1796*(1). https://doi.org/10.1088/1742-6596/1796/1/012021

Mak, M. H. C. (2021). *Children's Motivation to Learn at Home During the COVID-19 Pandemic: Insights From Indian Parents*. Frontiers in Education, *6*(July 2020), 1–7. https://doi.org/10.3389/feduc.2021.744686

Mulyasa. (2015). Menjadi Guru Profersional Menciptakan Pembelajaran Kreatif Dan Menyenangkan. Bandung: PT Remaja Rosdakarya.

Rustaman, Nuryani Y. (2005). *Strategi Belajar Mengajar Biologi*. Malang: Universitas Negeri Malang.

Peraturan menteri pendidikan dan kebudayaan Republik Indonesia nomor 20 tahun 2016 tentang kurikulum 2013 Sekolah Menengah Atas/Madrasah Aliyah.

Reni, S.A, Henry Praherdiono, Yerry Soepriyanto. (2021). Peningkatan Keterampilan kolaborasi Desain Menggunakan Model Kooperatif Tipe STAD secara Online. Jurnal Kajian Teknologi Pendidikan. Vol 4 No (3) Agustus (2021): 233-328

Saripudin. 2015. *The Development of the 21St Century Learning Model Using Web 2.0 Technology*. Jurnal Teknodik, *19*(April), 1–11.

Slater, L. (2004). *Collaboration: A framework for school improvement*. International Electronic Journal for Leadership in Learning, *8*, 1–13.

Slameto. (2008). *Belajar dan Faktor-faktor yang Mempengaruhi*. Jakarta: Rineka Cipta.

Vol. 10 No. 2 : April 2023
E-ISSN: 2722-4627
pp. 468-475

Sudjana, N. (1995). *Penilaian Proses Hasil Belajar*. Bandung: Remaja Rosda Karya.

Susanto, Ahmad. (2014). Teori Belajar & Pembelajaran di Sekolah Dasar. Jakarta: Kencana Prenadamedia Group.

Trilling, B., dan Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times.* San Francisco, CA: John Wiley & Sons.

Widoyoko, Eko Putro S, Evaluasi Program Pembelajaran (Panduan Praktis Bagi Pendidik dan Calon Pendidik), Yogyakarta: Pustaka Pelajar, (2009).

Woolfolk, A. (2007). *Educational psychology*. 10th Edition, Allyn and Bacon, Boston.

Yasmina, M. (2020). *Pemanfaatan Laboratorium Fisika di SMP Negeri 2 Labuhan Haji Barat.* Banda Aceh: UIN Ar-Raniry.

Zickmund, W. G. (1997). *Bussiness Research Methods. Five Edition.* New York: The Dryden Press Hartcourt Brace College Publisher.

Zubaidah, S. (2016). *Keterampilan Abad ke-21: Keterampilan yang diajarkan melalui Pembelajaran*. Seminar Nasional Pendidikan dengan Tema "Isu-isu strategis pembelajaran MIPA Abad. Vol. 21 (10): 1-7

Zulirfan, Iksan, Z. H., dan Meerah, T. S. M. (2017). *Pengembangan Instrumen Tes Keterampilan Proses Sains Bagi Siswa Smp Sederajat*. Jurnal Pendidikan, 18–24.

Zulirfan, Z., dkk. (2018). *Science Process Skills and Attitudes toward Science of Lower Secondary Students of Merbau Island: A Preliminary Study on the Development of Maritime Based Contextual Science Learning Media*. Journal of Educational Sciences, *2*(2), 90. https://doi.org/10.31258/jes.2.2.p.90-99

