Identification Ways Of Working Of Students' High School Pekanbaru In Chemistry Learning

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Abstract: The background of this research is the absence of an assessment of communication and collaboration skills of students in overall chemistry learning when learning shifts from home to face-to-face limited during the pandemic. This study aims to show the value of the working skills of high school students in learning chemistry in Pekanbaru. The research subjects involved were 379 students from high school in Pekanbaru. This research is survey research that uses a quantitative descriptive approach. Data collection methods used are questionnaires and interviews. The instruments used are self-assessment, peer assessment, and interview guidelines. The data analysis technique used quantitative analysis. The results showed that the average value of working skills (communication and collaboration) in chemistry learning in Pekanbaru had the same value. This value is 62% which is classified as a strong category. The implications of this research are expected to be useful as teacher quality in core competencies KI-2 and KI-4 in chemistry learning during the pandemic. In addition, this research needs to be carried out to identify students' communication and collaboration skills so that they can be used as reflective material for teachers to design learning that directs students to have communication and collaboration skills that are very much needed in today's 21st century.

Keywords: communication, collaboration, ways of working

In the 21st century, skills that can improve students' abilities in learning are communication and collaboration. This skill is one of four 21st-century skill categories: a way of thinking, a way of working, tools for working, and skills for living in the world. Communication and collaboration skills are included in the ways of working. Ways of working are essential in the 21st century, including communication and collaboration (Zubaidah, 2018). Erdogan (2019) revealed, "Communication and collaboration skills enable students to interact competently and respectfully with others, especially across cultural, in diverse and multinational workplaces and communities in our global and digital era."

According to a survey conducted by the Ministry of National Education Curriculum Center, 80% of the soft skill mindset and 20% of technical skills (hard skills) are the keys to a person's success (Dewiyani, 2011 in Iriani, 2017). Furthermore, the results of a survey conducted by (Wijaya, Sudjimat & Nyoto, 2016) showed that communication and collaboration rank 2nd with an average value of 3.77, where these skills are included in the order of 21st-century competencies according to the business

world/world industry with very much required qualification information. This makes communication and collaboration skills very valuable and must be possessed by students as a challenge in facing success in the 21st - century.

The curriculum recommends that assessments focus on cognitive aspects and include affective and psychomotor aspects (Dewi et al., 2013 in Maulina, Slamet & Indriayu, 2018). The affective element is an attitude or social factor that students own. In the core competencies, there is an attitude assessment, namely KI-1 (spiritual competence) and KI-2 (social competence) (Kurniawan, 2020). Communication and collaboration skills are included in KI-2, which is social competence. It is supported (Chalkiadaki, 2018) that communication and collaboration are included in social skills. In addition, based on Permendikbud No. 37 of 2018, communication and collaboration are included in core competencies (KI-2), namely social competencies and (KI-4), which are skills competencies.

Besides that, based on Permendikbud No. 20 of 2016, one of the criteria for graduate competency standards are skilled in which there are

communicative and collaborative skills. Such as research conducted by (Rios et al., 2020) is based on direct communication from employers to prospective employees through job advertisements; the results obtained are that communication and collaboration skills are in high demand by employers, with particular emphasis on oral and written partner communication.

According to (Zakaria, 2021), competent communication and collaboration skills must be integrated into the learning process in the classroom according to the themes in the 2013 curriculum. Thus, communication and collaboration become skills that must appear in learning to achieve social competence in its implementation. This is, of course, following what was expressed by (Kozma in Robert, 2016); "recommendations are provided by 21st-century skills so that we can change our curriculum, teaching, assessment, use of technology, and school organization to prepare students better to be productive, creative workers and citizens in the global society and economy of the 21st-century". The learning process must develop students' competencies and ensure they can live and walk in 21st-century society (Azhary, 2021).

The results of the Analysis of the Quick Survey of Learning from Home During the COVID-19 Prevention Period by the Ministry of Education and Culture showed that the obstacle experienced by most teachers was that it was difficult to observe student progress 68.2%. Meanwhile, 28.1% of teachers conduct quantitative assessments of students during the learning period from home. The high level of difficulty in observing student development and the low level of quantitative assessment make researchers want to know the development of students, especially communication and collaboration skills in chemistry learning during the pandemic, using quantitative assessment. According to (Budiantoro, 2021), the need for skills assessment is based on the importance of knowing the strengths and weaknesses of students, monitoring their learning progress and predicting the next plan related to the achievement of these skills. This also applies to students.

Based on interviews conducted with chemistry subject teachers at Pekanbaru 1 Public High School, communication and collaboration skills were assessed during the teaching and learning process at Google Meet by looking at student activity. Meanwhile, at SMA Negeri 16 Pekanbaru, communication and collaboration skills in chemistry learning have been evaluated during daily tests and exams. However, an overall assessment of chemistry learning during the pandemic has yet to be carried out.

From the interviews and information on the importance of communication and collaboration skills as the key to students' success in facing the 21st-century, this research is essential to obtain the assessment results of students' communication and collaboration skills, especially during learning during the pandemic. Therefore, the researcher wanted to conduct an "Identification of Ways of Working High School Students in Chemistry Learning in Pekanbaru". This research is essential to identify students' communication and collaboration skills as early as possible so that they become material for teacher reflection to design enjoyable learning that directs students to have communication and collaboration skills that are much needed in the 21st century.

Preliminary studies conducted by researchers in 2 schools to seek information about students' communication and collaboration skills show that evaluation related to these skills has not been carried out as a whole (separately), which is limited to limited online and face-to-face learning as seen from the activeness of students in learning. Therefore, the results of this study can be used as a form of teacher evaluation of students and supporting data on the core competencies KI-2 (social attitudes) and KI-4 (skills competencies) in chemistry learning during a pandemic.

METHOD

This study uses a quantitative approach. The application of a quantitative approach in this research includes an analysis of students' communication and collaboration skills with statistical calculations presented in graphic form. The researcher uses one type of descriptive research, namely the survey method. The variables in this study are communication skills and collaboration skills. Data analysis of these two variables is measured independently (separately). The indicators and grids of communication and collaboration skills are as follows.

Table 1. Indicator Research Instrument (Redhana, 2019; Zubaidah, 2018)

Component	Indicator	Grid
Communication	Verbal Communication	Communication was excellent, clarity, speed, volume, and articulation were strong indicators, and communication skills grid
	Receptive communication: listening, viewing, and reading	Distinguishing facts from opinion, recognizing a message's intent (meaning), summarizing or summarizing the main ideas, and identifying reasons from a particular point of view
	Differentiate meaning	Identify and interpret clear messages and draw a logical conclusion
	Using a communication strategy	Produce clear, accurate, and reflective communications
	Communicate clearly for a purpose.	Understand the purpose of the information conveyed and present it properly
	Communication using technology	Communicate with good words using various existing media and technology and assess their impact
	Communicate in different environments	Communicate effectively in different environments, both places, ages, and backgrounds
Collaboration	Productive work	Use all time efficiently to stay focused on a task and not procrastinate on a job that must be completed
	Show respect	Have respect for other members, listen to other member's opinions, and discuss shared ideas
	Compromise	Work flexibly to achieve common goals
	Have taste	Take responsibility in collaborative work and appreciate the contribution of each member

The evaluation was carried out using a Likert scale (Riduwan, 2018). The score used in this assessment is if the statement is favorable, then 4 for the highest score and 1 for the lowest score, while 1 for the highest score and 4 for the lowest score if the statement is unfavorable.

The location of this research is SMA N 1 Pekanbaru, SMA N 2 Pekanbaru, SMA N 9 Pekanbaru, SMA N 10 Pekanbaru, SMA N 14 Pekanbaru, SMA N 15 Pekanbaru. The sample of this research is the students of class XI Mipa totaling 379 people from six schools. The sampling technique was carried out by purposive sampling based on the learning period of the students who experienced online learning, namely because during distance learning, students who experienced online learning were in class XI when they first entered chool (grade X), had experienced online learning. Data analysis was carried out using quantitative analysis techniques.

The research data were analyzed using descriptive statistics and inferential statistics. The statistical analysis used was the relative percentage and central tendency in the mean (mean score). Descriptive statistics were used to describe the assessment data of communication and collaboration skills in chemistry learning during a pandemic. The interpretation of the score refers to (1) using a scoring formula (Sutanto et al., 2021) as follows:

$$\text{Score} = \frac{total\ score\ obtained}{maximum\ score} \times 100\%$$

The results of communication and collaboration skills are interpreted according to the criteria of Riduwan (2018). The table of communication and collaboration skills criteria can be seen as presented in Table 2 below.

Table 2. Category of Communication and Collaboration Skills Score (Riduwan, 2018)

Percentage Range (%)	Category
0-20	Very Weak
21-40	Weak
41-60	Enough
61-80	Strong
81-100	Very Strong

The presentation of the data is displayed in the form of tables and bar graphs. Inferential statistical analysis was used to determine the relationship between the variables of communication skills (X) and student collaboration (Y) in chemistry learning during the pandemic.

The data analysis technique used is the product-moment correlation test (rxy) at a significance level of 5% (α =0.05), with the formulation of statistical hypotheses, namely H0: (There is no relationship between communication and collaborative skills in chemistry learning during a pandemic) and H1: (There is a relationship between communication and collaborative skills in chemistry learning during a pandemic).

If the analysis results are significant or the p-value of the correlation test is less than 0.05, then H0 is rejected, and H1 is accepted or vice versa. Conversion is used to determine the interpretation of the correlation index value between the X and Y variables, which refers to Muliadi's research (2020), as presented in Table 3 below.

Table 3. Correlation Coefficient Interpretation (Muliadi, 2020)

Correlation Coefficient (r)	Interpretation
0.00 – 0.199	Correlation very weak or very low
0.20 – 0.399	Correlation weak or low
0.40 – 0.599	Correlation fair or enough
0.60 – 0.799	Correlation strong or high
0.80 – 1.00	Correlation very strong or very high

RESULTS AND DISCUSSION

Results

This study indicates that the description of student communication and collaboration assessment data in chemistry learning during the pandemic is presented in percentages (see Table 4 and Table 5).

**Table 4. Communication Scores of Students**

Schools	Communication		Mean	Criteria
	Self	Peer		
SMA N 1	66%	65%	65,5%	Strong
SMA N 2	64%	61%	62,5%	Strong
SMA N 9	65%	60%	62,5%	Strong
SMA N 10	60%	59%	59,5%	Enough
SMA N 14	62%	62%	62%	Strong
SMA N 15	60%	63%	61,5%	Strong
Mean	62,8%	61,6%	62,2%	Strong

Table 5. Collaboration Scores of Students

Schools	Collaboration		Mean	Criteria
	Self	Peer		
SMA N 1	63%	70%	66,5%	Strong
SMA N 2	64%	70%	67%	Strong
SMA N 9	65%	60%	56,5%	Enough
SMA N 10	56%	57%	57,5%	Enough
SMA N 14	58%	57%	66%	Strong
SMA N 15	64%	68%	59,5%	Enough
Mean	60,1%	64,1%	62,1%	Strong

Based on Table 1 and Table 2, students' average communication and collaboration in 6 Pekanbaru high schools are 62.2% and 62.1%, respectively, in the strong category.

The description of student communication and collaboration assessment data in chemistry learning during the pandemic is emphasized in a histogram in Figure 1 below.
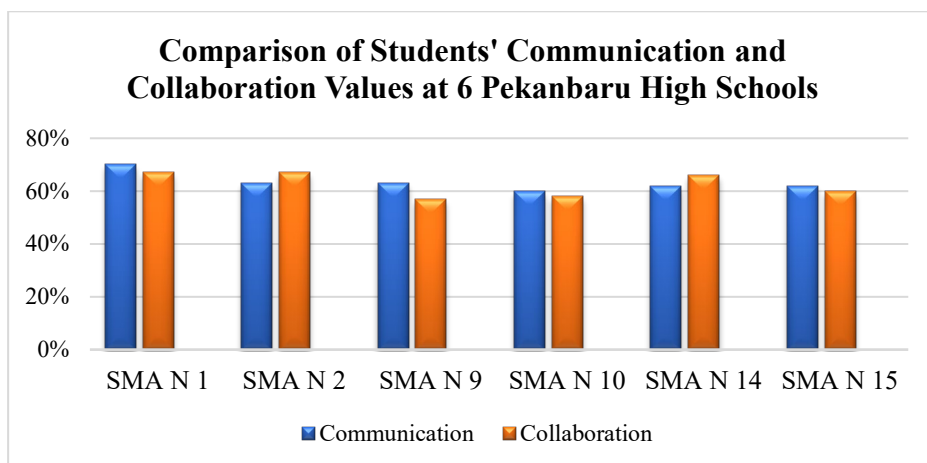
Figure 1.   The Value of Student Communication and Collaboration at 6 Pekanbaru High Schools

While in Figure 1. can be seen the comparison of communication and collaboration of each school starting from SMA N 1 at 65.5% and 66.5%, SMA N 2 at 62.5% and 67%, SMA N 9 at 62.5 % and 56.5%, SMA N 10 at 59.5% and 57.5%, SMA N 14 at 62% and 66%, and SMA N 15 at 61.5% and 59.5%, respectively.

Assessment of students' communication and collaboration skills in chemistry education were analyzed using the product-moment correlation test

to determine the relationship between communication skills and deep collaboration chemistry learning during a pandemic. The product-moment correlation test results (rxy) on communication and collaboration relationships in chemistry learning are presented in Table 6 below.

Table 6. Correlation Test Product-Moment (rxy)

Variance	Correlation Coefficient	N	Sig. (2-tailed)
Communication - Collaboration	0.463	379	0.000

Based on Table 6 above, it is known that the correlation coefficient value of 0.463 with a significance value of 0.000 is smaller than the alpha test value of 0.05 (<0.05). So H0 is rejected, and H1 is accepted, which means a positive and significant relationship between communication and collaborative skills in chemistry learning during the pandemic. The correlation coefficient value is 0.463, which means the relationship is enough.

Discussion

Data acquisition of communication and collaboration skills of SMA Negeri 1 Pekanbaru student are 65,5% and 66,5%, and SMA Negeri 2 Pekanbaru is 62,5% and 67%, both of which belong to the strong category. According to interviews with chemistry teachers, students during limited face-to-face learning did not hesitate. They were diligent in asking questions regarding the online material when face-to-face was limited, and when given group assignments, students cooperated and took responsibility for doing it. This is what makes student communication and collaboration classified in the strong category. In line with the research, Fitriah, Yulianto & Asmarani (2020) revealed that being brave and diligent in asking questions is one of the communication skills in the learning process that is very important to be able to understand the information and messages given by the teacher when experiencing difficulties in both the material and the learning process. In addition, Sutanto et al., (2021) revealed a collaborative interaction in completing a given task/project, including discussing, collaborating, and being responsible in groups. So that the skills of being brave and diligent in asking questions and the existence of collaborative interactions can affect student communication to be good if applied by students themselves while studying.

Communication and collaboration of students of SMA Negeri 9 Pekanbaru, respectively, amounted to 62,5% belonging to the strong category and 56,5% belonging to the sufficient category and SMA Negeri 10 Pekanbaru respectively by 59,5% and 57,5% which both belonged to the sufficient category. According to the results of interviews that student communication is not good. Hence, the teacher motivates students before starting learning. Then students are allowed to try to explain the material learned at home to other friends when face-to-face learning is limited, in addition to when providing learning materials or videos and assignments at home. Google Classroom students need to look more active; no one asks about the material and projects. Thus, this affects the skills of students classified in the sufficient category. This research aligns with Nurdin, Amaliah, and Nurhalisah (2022) that the obstacles to courageous learning through GCR are the many assignments the teacher gives and the absence of interaction between the teacher and students. In addition, in line with Marfuah's research (2017), the skills to express ideas, listen to others, and give good responses and students must also be motivated are skills to hone communication so that they get good communication. Furthermore, this study contradicts research conducted by Arum, Mukhtar & Na'imah (2022) that the learning process through GCR can facilitate communication and collaboration, so it affects the value of these skills to be high.

Meanwhile, due to time constraints, the low level of collaboration is influenced by learning that leads to collaboration, such as group discussions during the pandemic occasionally being carried out. In addition, when face-to-face is limited to one class, it is divided into two sessions, making the number of students small so that students do not know and talk to each other. All the students answered when the teacher asked about the material that needed to be understood. Similar to communication, the collaboration between students could be better because students need to learn from each other better, so they are not used to discussing, so student collaboration does not appear. This is in line with the research of Sutanto et al. (2021) that the low cooperation of students is reflected in the learning of students who tend to be individualistic, lack of tolerance between students, and the value of students' togetherness tends to be low.

The student's communication and collaboration at SMA Negeri 14 Pekanbaru, respectively 62% and 66%, belong to the strong category. Meanwhile, for SMA Negeri 15

Pekanbaru, each 62% belonged to the strong category, and 60% belonged to the sufficient category. Based on interviews with chemistry teachers in limited face-to-face learning, many are inversely proportional, ranging from students looking active, diligent in asking questions, learning above average, and others. Student collaboration is seen from the skills to work together, classifying students' cognitive abilities into high, medium, and low, which are then selected for good skills, good practicum, and others. In addition, only a few students have good communication; when asked to ask questions related to material that is not understood, it is always the same students who ask. This is also not much different from online learning; when the teacher provides learning materials in the WhatsApp group, no students ask questions, so the teacher does not know whether the students have understood. This is what makes communication and collaboration of students in the sufficient category.

Similar to the research described by Iswari, Setiawan & Huda (2022) that when learning online, students are less active in learning, less focused on listening to the material explained, some students experience financial, and others. Therefore, the limited face-to-face communication and collaboration skills are much above the average, affecting the questionnaire results, which show mastery in the strong category. Furthermore, the research of Sajjaddyah, Elfrida & Nursamsu (2021) shows that during a learning pandemic, it is difficult to discuss or ask questions with students, explain material using learning media, and students need more attention or focus on learning. And Ivada et al. (2021) research shows that obstacles during online learning include materials and assignments that are always given through group classes on WhatsApp.

The relationship between students' communication skills and collaboration in chemistry learning results from a correlation coefficient of 0.463 with a significance value of 0.000 which is smaller than the alpha test score of 0.05 (<0.05), which means a positive and significant relationship between communication and collaborative skills in chemistry learning during the pandemic. This research is similar to research conducted by Amrito, Rohman, Dharmawan, & Sari (2023) and by Supiyati, Halqi, & Rasidi 2022 with the same characteristics of the respondents, where there is a positive relationship between students' communication and collaboration skills in learning chemistry during Pandemic. In addition to knowing the level of students' communication and collaboration skills, this research also explains the relationship between students' communication and collaboration skills in chemistry learning during the pandemic. Communication and collaboration are built from interaction in learning. Learning interactions are created from communication and cooperation between fellow students and teachers so that communication and collaboration activities become a unified process in learning interactions (Supiyati, Halqi, & Rasidi, 2022). Communication will be successful if there is good cooperation between the parties sending the information (students/teachers) and the recipients (students) (Iswari, 2021).

CONCLUSION

Based on the research stages starting from collecting, processing, and analyzing data that has been carried out, it can be concluded that the average value of the ways of working (communication and collaboration) skills of high school students in chemistry learning in Pekanbaru is equal to 62% which is classified as a strong category. There is a positive and significant relationship between students' communication and collaboration skills in chemistry learning during the COVID-19 pandemic, with a significant value of 0.000 which is smaller than the alpha test value of 0.05 (<0.05). The relationship between communication and correlation in chemistry learning is in the moderate category, with a correlation coefficient of 0.463.

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