Description of Students' Learning and Innovation Skills in Global Warming Learnin Class X SMA Penggerak

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A B S T R A C T

The 21st century is known as the century of knowledge that experiences rapid changes, to deal with it a skill is needed. One of the 21st century skills is learning and innovation skills or known as 4Cs, namely Communication, Collaboration, Critical Thinking and Problem-Solving, Creativity and Innovation. Students' 4Cs skills are highly demanded during the learning process, so it is important to assess students' 4Cs skills. Global warming is one of the chemistry subject matter in the penggerak school curriculum. This type of research is descriptive research with a qualitative approach. The study aims to describe the 4C skills of students in class XE7 SMA Negeri 2 padang with a total of 30 students. This study used an observation sheet. The results showed that overall the communication skills of students in class XE7 SMA Negeri 2 Padang were on average classified in the incompetent category (55% of students), students' collaboration skills were classified in the competent category (42% of students), students' critical thinking and problem-solving skills were classified in the incompetent category (40% of students), and creativity and innovation skills were classified in the incompetent category (88% of students).

1. Introduction

The 21st century is known as the century of knowledge which is experiencing rapid changes. These changes occur in all aspects of life. Changes in the 21st century, to deal with it, require a skill, one of which is learning and innovation skills or known as 4Cs, namely communication, collaboration, critical thinking, and problem-solving, creativity and innovation (Aliftika, Purwanto, & Utari, 2019). First, communication skills are skills in conveying ideas clearly orally and in writing and can motivate others through speaking ability (Septikasari & Frasandy, 2018). Second, collaboration skills, which is the ability to work together, respect each other, and take responsibility for what each other has

achieved (Susanti dalam Yusliani, 2019). Third, critical thinking skills are high-level thinking skills, not just memorizing, but also being able to manipulate the material learned when solving problems (Marlina & Jayanti, 2019). And fourth, creativity and innovation are the ability to develop, implement, communicate, and respond openly to new ideas (Marlina & Jayanti, 2019). However, students' 4C skills are still relatively low in learning, one of which is chemistry. This is evidenced by research conducted by Khoirunnisa and Sabekti (2020) that the critical thinking skills of X and XI grade students from several high schools in Tanjungpinang City on chemical bonding meters are included in the low category.

Education is one of the effective channels to be used in preparing human resources to produce skills in accordance with the demands of the 21st century (Khair.dkk, 2021). In achieving this goal, Indonesian education has a vision of realizing an advanced Indonesia that is sovereign, independent, and has a personality through the creation of Pancasila students who are critically reasoning, creative, independent, faithful, devoted to God Almighty, and have noble character, cooperation, and global diversity (Kemendikbud, 2021). Therefore, to realize the vision of Indonesian education and achieve the goals of Indonesian education, the government has designed the quality of Indonesian education and evaluated and developed the curriculum.

A penggerak school curriculum is one that is a catalyst for realizing this vision of Indonesian education. Penggerak school is a program to encourage the transformation process of educational units in improving student learning outcomes in the aspects of cognitive and non-cognitive competencies to achieve the Pancasila learner profile (Kemendikbud, 2021).

The penggerak school curriculum is developed by teachers together by adjusting the level of ability and needs of students, to achieve a learning outcome. There are two elements that become learning outcomes based on the demands of the Penggerak school curriculum, namely chemical understanding and process skills. The learning outcome of the first element is chemical understanding, one of which is being able to apply chemical concepts in environmental management including explaining the phenomenon of global warming. Based on this, global warming is one of the chemistry subject matters in the penggerak school curriculum. The learning outcomes of the second element, namely process skills, include: a) Observing processes, b) Questioning and predicting, c) Planning and conducting investigations, d) Processing, analyzing data and information, e) Evaluating and reflecting, f) Communicating results (Kemendikbud, 2021).

The learning outcomes in the above process skills are closely related to students' 4C skills. The above, it can be said that students' 4C skills are highly demanded during the learning process. Based on the analysis of interviews with 5 chemistry teachers in 2 penggerak schools, 80% said they knew the 4C skills and 20% said they did not know the 4C skills. However, after being asked further, 20% who answered correctly what the 4C skills were, 60% who answered incorrectly and 20% did not know the 4C skills. Based on the analysis of the teacher interview, it can be concluded that the teacher's understanding of students' 4C skills is still

lacking. Therefore, with the demands of the penggerak school curriculum, teachers are required to be able to design and implement learning that can achieve learning objectives and outcomes as well as 4C skills.

The existence of the penggerak curriculum demands on the learning outcomes of process activities that really demand students' 4C skills, therefore the assessment of students' 4C skills is important to do. Based on the analysis of interviews with 5 chemistry teachers in 2 penggerak schools, 60% of teachers said they had assessed students' 4C skills and 40% of teachers said they had not assessed students' 4C skills. However, teachers assessed students' 4C skills only by estimating whether students were critical or not, not assessing students' 4C skills with assessment instruments and assessment rubrics. Based on the results of the interview analysis, it can be concluded that teachers have not assessed students' 4C skills using assessment instruments and rubrics.

Based on the problems described above, it is necessary to assess students' 4C skills by conducting observations using an observation sheet assessment instrument to determine the level of students' 4C skills.

2.   Methodology

The type of research used in this study is descriptive research with a qualitative approach. The population in this study were all students of class X.E even semester in the 2021/2022 academic year at SMAN 2 Padang which consisted of 10 classes. The sample in this study were 30 students of class XE.7. The sampling technique was purposive sampling technique. This study uses non-test instruments in the form of observation sheets developed by Purnawirawan, et al (2019). The data analysis technique used is the technique according to Miles and Huberman.

3.   Results and Discussion

Communication Skills

Students' communication skills are categorized into 4 categories, namely very competent (SK), competent (K), less competent (KK) and incompetent (TK). The communication skills of students in class X E.7 SMAN 2 Padang can be seen in Figure 1.
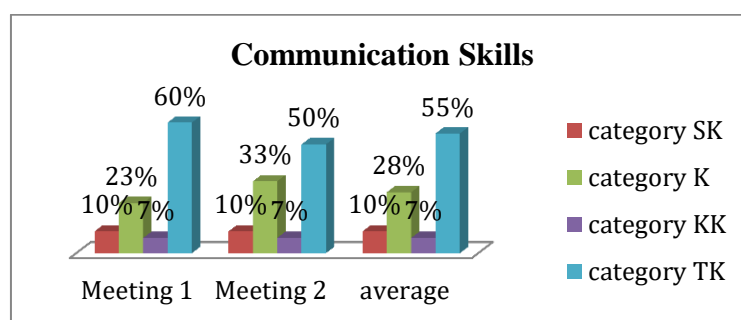
Figure 1. Diagram of Students' Communication Skills

Based on the results of student percentages at meeting 1 and meeting 2 above, analyzed in detail, the pattern of increase in student communication skills can be seen. The pattern of increase in students' communication skills during the two learning meetings can be seen in Table 1.

Table 1. The Pattern of Increase in Students' Communication Skills

Communication Skills		
Pattern	**Number of Students**	**%**
Increased	9	30%
Decrease	4	13%
Remained	17	57%

The pattern of increase in students' communication skills when viewed in Table 1. shows that the average student communication skills did not increase or remained, namely 17 students (57%) out of 30 students. Students whose communication skills improved based on observations during learning because at meeting 1 students did not communicate at all in expressing opinions, answering teacher questions, discussing in groups, or presenting in front of the class. However, at meeting 2 students have started to communicate by presenting in front of the class, and some students are asked by the teacher to respond to the presentation of the group presenting. And vice versa for students whose communication skills decrease. Based on the description above, it can be concluded that students' communication skills can improve because there is coercion and encouragement from the teacher to communicate to make presentations in front of the class and respond to different opinions.

Overall, the communication skills of students in class XE7 SMA Negeri 2 Padang based on Figure 1. the average student communication skills are classified in the incompetent category (55% of students). In line with research conducted by Ariani and Sari (2019) with the title analysis of the level of student communication skills at SMA Plus Negeri 7 Bengkulu City also shows that the communication skills of SMA Plus Negeri 7 Bengkulu City students tend to be classified in the low category.

The low number of students whose communication skills are very competent or competent is based on observations found by researchers during the two meetings, the teacher has stimulated students by asking several questions, but most students

do not respond to the teacher's questions. Furthermore, most students did not communicate the exchange of ideas while working in groups, and during presentations most students did not listen to groups performing in front of the class and students did not provide rebuttals, criticism or questions to the presentation group. According to Fitriah, ddk (2020) the low communication skills of students because most students feel afraid and find it difficult to express their opinions when learning is taking place. Some students are uncomfortable when they have to do group discussion learning because students cannot create close and open communication between friends (Wati.dkk, 2019)

Collaboration Skills

The collaboration skills of students of class X E.7 SMAN 2 Padang based on the analysis results are shown in Figure 2.
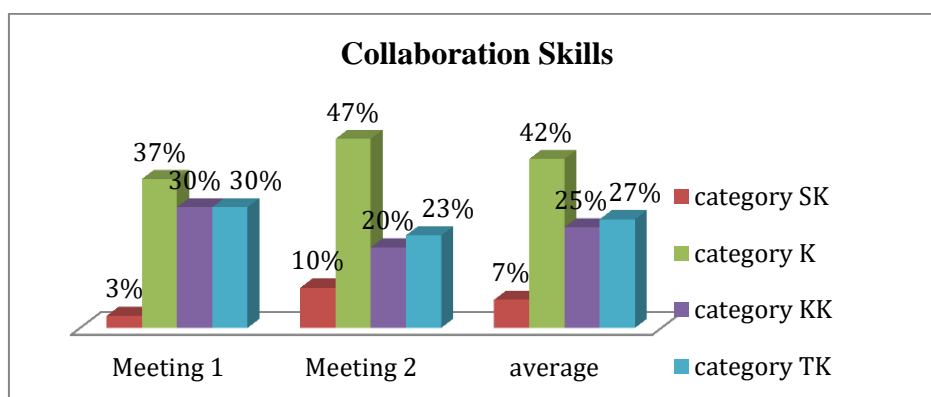

Figure 2. Diagram of student collaboration skills

Based on the results of student percentages at meeting 1 and meeting 2 above, analyzed in detail, the pattern of increase in student collaboration skills can be seen. The pattern of increase in students' collaboration skills during the two learning meetings can be seen in Table 2.

Table 2. The Pattern of Increase in Students' Collaboration Skills

Collaboration Skills		
Pattern	**Number of Students**	**%**
Increased	10	33%
Decrease	3	10%
Remained	17	57%

The pattern of increase in students' collaboration skills when viewed in Table 2. shows that the average student collaboration skills did not increase or remained at 17 students (57%) out of 30 students. Students whose collaboration skills increased based on observations during learning because at meeting 1 students were less active and did not participate fairly in group work, but at meeting 2 students had begun to participate fairly in group work, so that students' collaboration skills increased. And vice versa for students whose collaboration skills decreased.

Overall the collaboration skills of students in class XE7 SMA Negeri 2 Padang based on Figure 2. the average student collaboration skills are classified in the competent category (42% of students). In line with the results of research conducted by Nuriyani, et al (2020) with the title of student collaboration skills in the field of reaction rate material at SMA Islam Bawari Pontianak also showed that the overall student skills of class XI SMA Islam Bawari Pontianak were skillful with a percentage of 71.8%.

Based on the observations found by researchers during two meetings, most students in each group have divided the tasks in working on LKPD well, although there are still some students who are less focused and take part in the group or are less coordinated. In addition, most students have established togetherness to work on LKPD in their groups, although there is still less compactness between group members.

Critical Thinking and Problem-Solving Skills

Critical thinking and problem-solving skills of students of class X E.7 SMAN 2 Padang based on the analysis results are shown in Figure 3.
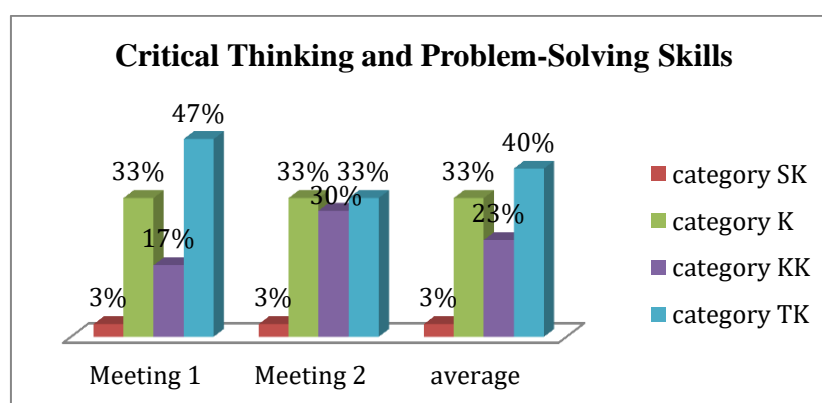

Figure 3. Diagram of Students' Critical Thinking and Problem-Solving Skills

Based on the results of student percentages at meeting 1 and meeting 2 above, analyzed in detail, the pattern of increase in students' critical thinking and problem-solving skills can be seen. The pattern of increase in students' critical thinking and problem-solving skills during the two learning meetings can be seen in Table 3.

Table 3. The Pattern of Increase in Students' Critical Thinking and Problem-Solving Skills

Critical Thinking and Problem-Solving Skills		
Pattern	**Number of Students**	**%**
Increased	6	20%
Decrease	1	3%
Remained	23	77%

The pattern of increase in students' critical thinking and problem-solving skills when viewed in Table 3, shows that the average critical thinking and problem-solving skills of students did not increase or remained, namely 23 students (77%) out of 30 students. Students whose critical thinking and problem-solving skills improved based on observations during learning, at meeting 1 students were not active in class, when the teacher asked several questions, students were not able to respond to the teacher and give their opinions. In addition, students were less active during group discussions, and when there were group presentations students did not provide comments, questions, and suggestions. However, at meeting 2 students have begun to be active in class, students are able to answer teacher questions, argue and begin to play an active role during group discussions, so that students' critical thinking and problem-solving skills increase. And vice versa for students whose critical thinking and problem-solving skills decreased.

Overall, the critical thinking and problem-solving skills of students in class XE7 SMA Negeri 2 Padang based on Figure 3. the average critical thinking and problem-solving skills of students are classified in the incompetent category (40% of students). In line with the results of research conducted by Khoirunnisa and Sabekti (2020) with the title profile of students' critical thinking skills on chemical bonding material also shows that the average critical thinking skills of students in Tanjungpinang city on chemical bonding material are in the low category.

The low number of students who have critical thinking and problem-solving skills is very competent or competent, based on the observations found by researchers during the two meetings, the teacher has conditioned learning to stimulate students' critical thinking, the teacher has asked several questions at the beginning of learning, and the teacher has grouped students to be able to discuss solving problems by answering the student worksheet (LKPD), but when the teacher asks several questions about the current global heating problem at the beginning of learning, the average student is not active in answering the teacher's questions, most students are just silent and even some students do not listen and do not focus on learning. In addition, when there are students who have an opinion, most students only listen and do not provide other responses if their opinions are different, and during discussions to solve problems by answering student worksheets (LKPD) only a few students are active and take part in doing it. According to Irham et al (in Suriyanti, 2021) students have not been trained to analyze a problem and the facts found so that as a result the productivity obtained by students at the school is very little.

Creativity and Innovation Skills

The creativity and innovation skills of students of class X E.7 SMAN 2 Padang based on the analysis results are shown in Figure 4.
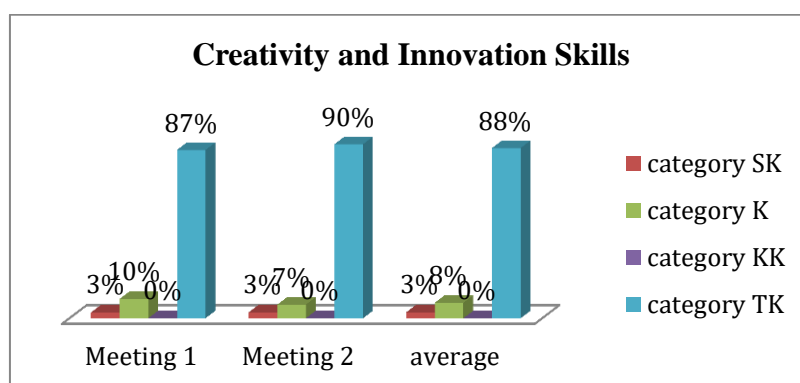
Figure 4. Diagram of Creativity and Innovation Skills of Class Students

Based on the results of student percentages at meeting 1 and meeting 2 above, analyzed in detail, the pattern of increase in students' creativity and innovation skills can be seen. The pattern of increase in students' creativity and innovation skills during the two learning meetings can be seen in Table 4.

Table 4. Pattern of Increase in Students' Creativity and Innovation Skills

Creativity and Innovation Skills		
Pattern	Number of Students	%
Increased	1	3%
Decrease	2	7%
Remained	27	90%

The pattern of increase in students' creativity and innovation skills when viewed in Table 4, shows that the average students' creativity and innovation skills did not increase or remained, namely 27 students (90%) out of 30 students. Students whose creativity and innovation skills increase based on observations during learning, at meeting 1 students have not been active in conveying new ideas or ideas during class discussions and group discussions in working on LKPD. However, at meeting 2 students have begun to actively convey new ideas or ideas during class discussions and group discussions in working on LKPD, so that student creativity and innovation have increased. And vice versa for students whose creativity and innovation skills decrease.

Overall, the creativity and innovation skills of students in class XE7 of SMA Negeri 2 Padang based on Figure 4. the average student creativity and innovation skills are classified in the incompetent category (88% of students). In line with the results of research conducted by Putri and Alberida (2022) with the title of creative thinking skills of class X students in the 2021/2022 school year at SMAN 1 Pariaman, it also shows the results that students' creative thinking skills are in the very low category.

The low number of students who have very competent or competent creativity and innovation skills based on observations found by researchers during the learning process, the teacher has conditioned learning for students to train creative thinking and innovation with group discussions working on LKPD, and there is a class

discussion by asking several questions and discussion in conveying group results that have been made, but practical learning does not exist. Based on observations, the average student is not active during learning, most students do not convey new ideas or ideas, no respond or respond to other people's different opinions. In addition, most students in their groups are not active and do not take part in providing creative ideas or new ideas in group discussions working on LKPD, According to Tayuda and Siswanto (2020), the low ability of students to explore knowledge and limited reasoning power which has an impact on the low creative thinking skills of students in solving problems.

Students' 4C Skills Linkage Pattern

The results of the analysis of students' 4C skills obtained there is a pattern of relationship between aspects of 4C skills in the two learning meetings. The pattern of students' 4C skills linkage can be seen in the following description:
a.   Communication skills with students' critical thinking and problem-solving
The pattern of the relationship between students' critical thinking and problem-solving skills in the two learning meetings can be seen in Table 5.

Table 5. Patterns of Communication Skills Linkage with Students' Critical Thinking and Problem-Solving

Meeting 1				Meeting 2				
Commu nication	Critical thinking and problem-solving	Amo unt	%	Commun ication	Critical thinking and problem-solving	Amo unt	%	Aver age
SK/K	SK/K	10	33%	SK/K	SK/K	9	30%	32%
SK/K	KK/TK	0	0%	SK/K	KK/TK	4	13%	7%
KK/TK	SK/K	1	3%	KK/TK	SK/K	2	7%	5%
KK/TK	KK/TK	19	63%	KK/TK	KK/TK	15	50%	57%

Based on Table 5, it is known that most students (57% of students) have communication and critical thinking skills (KK/TK), and 32% of students have communication and critical thinking skills (SK/K). Only a small proportion of students, 7%, have communication skills (SK/K) but critical thinking and problem-solving skills (KK/TK) and 5% of students have communication skills (KK/TK) but critical thinking and problem-solving skills (SK/K). Based on this pattern, it can be concluded that, most students who have competent communication skills then their critical thinking and problem-solving skills are also competent, or vice versa.

In line with the results of research conducted by Noor and Ranti (2019) that there is a relationship between critical thinking skills and student communication skills. Critical thinking skills and communication skills are two things that cannot be separated. Students' communication skills are largely determined by a person's ability to analyze situations, draw conclusions, and make the best decisions. Someone who has good communication skills is determined by good analyzing skills as well.

b. Communication skills with student collaboration

The pattern of the relationship between communication skills and student collaboration in the two learning meetings can be seen in Table 6.

Table 6. Pattern of Communication Skill Linkage with Student Collaboration

Meeting 1				Meeting 2				Average
Communication	Collaboration	Amount	%	Communication	Collaboration	Amount	%	
SK/K	SK/K	10	33%	SK/K	SK/K	13	43%	38%
SK/K	KK/TK	0	0%	SK/K	KK/TK	0	0%	0%
KK/TK	SK/K	2	7%	KK/TK	SK/K	4	13%	10%
KK/TK	KK/TK	18	60%	KK/TK	KK/TK	13	43%	52%

Based on Table 6, it is known that most (52% of students) have communication and collaboration skills (KK/TK), 38% of students have communication and collaboration skills (SK/K) and only a small number of students (10% of students) who have communication skills (KK/TK) but have collaboration skills (SK/K) and no students (0% of students) who have communication skills (SK/K) but have collaboration skills (KK/TK). Based on this pattern, it can be concluded that, most students who have competent communication skills then their collaboration skills are also competent or vice versa.

c. Communication skills with student creativity and innovation

The pattern of the relationship between communication skills and student creativity and innovation in the two learning meetings can be seen in Table 7.

Table 7. Patterns of Communication Skill Linkages with Student Creativity and Innovation

Meeting 1				Meeting 2				Average
Communication	Creativity and innovation	Amount	%	Communication	Creativity and innovation	Amount	%	
SK/K	SK/K	4	13%	SK/K	SK/K	3	10%	12%
SK/K	KK/TK	6	20%	SK/K	KK/TK	10	33%	27%
KK/TK	SK/K	0	0%	KK/TK	SK/K	0	0%	0%
KK/TK	KK/TK	20	67%	KK/TK	KK/TK	17	57%	62%

Based on Table 7, it is known that most (62% of students) have communication skills and creativity and innovation (K/KK), 12% of students have communication skills and creativity and innovation (SK/K), 27% of students who have communication skills (SK/K) but have creativity and innovation skills (KK/TK) and no students (0%) who have communication skills (KK/TK) but have creativity and innovation skills (SK/K). Based on this pattern, it is concluded that students who have competent communication skills do not necessarily have competent creativity and innovation skills as well and most students who have

incompetent communication skills have incompetent creativity and innovation skills as well.

d. Critical thinking and problem-solving skills with student creativity and innovation

The pattern of the relationship between critical thinking and problem-solving skills with student creativity and innovation in the two learning meetings can be seen in Table 8.

Table 8. Patterns Linking Critical Thinking and Problem-Solving with Student Creativity and Innovation

Meeting 1				Meeting 2				
Critical thinking and problem-solving	Creativity and innovation	Amount	%	Critical thinking and problem-solving	Creativity and innovation	Amount	%	Average
SK/K	SK/K	4	13%	SK/K	SK/K	3	10%	12%
SK/K	KK/TK	7	23%	SK/K	KK/TK	8	27%	25%
KK/TK	SK/K	0	0%	KK/TK	SK/K	0	0%	0%
KK/TK	KK/TK	19	63%	KK/TK	KK/TK	19	63%	63%

Based on Table 8, it is known that most (63% of students) have critical thinking and problem-solving skills and creativity and innovation (KK/TK), 12% of students have critical thinking and problem-solving skills and creativity and innovation (SK/K) and 25% of students who have critical thinking and problem-solving skills (SK/K) but have creativity and innovation skills (KK/TK) and no students (0%) who have critical thinking and problem-solving skills (KK/TK) but have creativity and innovation skills (SK/K).

Based on this pattern, it is concluded that students who have competent critical thinking and problem-solving skills do not necessarily have competent creativity and innovation skills as well and most students who have incompetent critical thinking and problem-solving skills have incompetent creativity and innovation skills as well. It can be said that students who are critical are not necessarily creative, while students who are creative are also critical. The same thing according to Guntur.et al (2020) that based on the level of Bloom's revised taxonomy, creative thinking skills are above critical thinking skills.

e. Collaboration skills with students' critical thinking and problem-solving

The pattern of the relationship between collaboration skills and students' critical thinking and problem-solving can be seen in Table 9.

Table 9. Patterns of Collaboration Linkage with Students' Critical Thinking and
Problem-Solving

	Meeting 1				Meeting 2			
Collabo ration	Critical thinking and problem-solving	Am oun t	%	Collabo ration	Critical thinking and problem-solving	Am oun t	%	Ave rage
SK/K	SK/K	10	33%	SK/K	SK/K	9	30%	32%
SK/K	KK/TK	2	7%	SK/K	KK/TK	8	27%	17%
KK/TK	SK/K	1	3%	KK/TK	SK/K	2	7%	5%
KK/TK	KK/TK	17	57%	KK/TK	KK/TK	11	37%	47%

Based on Table 9, it is known that most (47% of students) have collaboration skills and critical thinking and problem-solving (KK/TK), 32% of students have collaboration skills and critical thinking and problem-solving (SK/K). Only a small proportion of students (17% of students) have collaboration skills (SK/K) but have critical thinking and problem-solving skills (KK/TK), and 5% of students have collaboration skills (KK/TK) but have critical thinking and problem-solving skills (SK/K). Based on this pattern, it can be concluded that some students who have competent collaboration skills also have competent critical thinking and problem-solving skills, or vice versa.

f.   Collaboration skills with student creativity and innovation

The pattern of the relationship between collaboration skills and student creativity and innovation in the two learning meetings can be seen in Table 10.

Table 10. Patterns Linking Collaboration with Student Creativity and Innovation

	Meeting 1				Meeting 2			
Collabor ation	Creativit y and innovatio n	Amo unt	%	Collabor ation	Creativit y and innovatio n	Amo unt	%	Aver age
SK/K	SK/K	4	13%	SK/K	SK/K	3	10%	12%
SK/K	KK/TK	8	27%	SK/K	KK/TK	13	43%	35%
KK/TK	SK/K	0	0%	KK/TK	SK/K	0	0%	0%
KK/TK	KK/TK	18	60%	KK/TK	KK/TK	14	47%	53%

Based on Table 10, it is known that most (53% of students) have collaboration skills and creativity and innovation (KK/TK), 12% of students have collaboration skills and creativity and innovation (SK/K), 35% of students who have collaboration skills (SK/K) but have creativity and innovation skills (KK/TK), and no students (0% of students) who have collaboration skills (KK/TK) but have creativity and innovation skills (SK/K). Based on this pattern, it is concluded that students who have competent collaboration skills do not necessarily have competent creativity and innovation skills as well and most students who have incompetent collaboration skills have incompetent creativity and innovation skills as well.

4. Conclusion

Based on the results of the research, data analysis and discussion, the researcher concludes that overall the communication skills of students in class XE7 SMA Negeri 2 Padang on average belong to the incompetent category, students' collaboration skills belong to the competent category, students' critical thinking and problem-solving skills belong to the incompetent category, and creativity and innovation skills belong to the incompetent category. Students' communication skills can improve if there is coercion and encouragement from the teacher to communicate by presenting in front of the class and responding to different opinions. There is a relationship between students' 4C skills.

Acknowledgement

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