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Analysis of students' 21st century skills in Biology class X at SMAN 12 Padang

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Abstract: *This research aims to determine the 21st century skills abilities of class X students in Biology learning at SMAN 12 Padang. This type of research is descriptive research. The population in this study were all students in class XI.IPA at SMAN 12 Padang, totaling 179 students. The sample taken was 45 students using random sampling techniques. The instruments used are questions to measure critical thinking skills and observation sheets to measure creative thinking skills, collaboration skills and communication skills. The questions used in this research are questions that have been tested for validity and reliability. The results of research conducted at SMAN 12 Padang on class XI odd semester students in the 2023/2024 academic year, namely critical thinking skills 44 with sufficient criteria, creative thinking skills 65 with high criteria, collaboration skills 76 with high criteria, and communication skills 69 with high criteria. So, it can be concluded that students' 21st century skills in biology learning at SMAN 12 Padang meet high criteria.*

Keywords: *Analysis, biology, 21st century skills, SMAN 12 Padang*

1. INTRODUCTION

PISA (the program for international student assessment) is a program to measure achievement in the field of science. In 2000 Indonesia was ranked 39th out of 41 countries participating in the PISA assessment. Furthermore, in 2003 Indonesia again participated in the assessment carried out by PISA and after carrying out the test the results were not much different from the previous year, namely Indonesia's ranking remained at the bottom, as well as the following year until now after Indonesia's participation for eighteen years the assessment score was being given PISA still requires Indonesia to improve its current education system and management because the PISA report for 2018 Indonesia is in 74th position out of 79 countries that participated in the assessment carried out by PISA. The PISA program is related to 21st century learning, where the skills that students must have in the 21st century are scientific literacy skills (Hewi, 2020).

21st century learning is characterized by rapid changes, developments and advances in information and communication technology. The fields of cognitive science, bio-molecular, information technology and nanoscience, are advances in scientific groups that are characteristic of the 21st century. These developments and advances require changes in the way students learn and the way teachers teach in the world of education. The biggest change to undergo in learning activities is by providing learning media, learning resources and IT-based teaching materials (Marsa and Desnita, 2020).

21st century skills are important for students to solve various problems that arise with reasoning logical and correct solutions. In this 21st century, Quality human resources are needed for those who have higher order thinking skills including critical thinking, creative thinking, and so on (Trilling and Hood, 1999). The role of educators necessary to develop skills 21st century in preparing for learning right at school. 21st century skills or termed the 4Cs (Communication,Collaboration, Critical Thinking and Problems Solving, and Creativity and Innovation) are skills to be achieved with the Curriculum 13. Mastery of very

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21st century skills important, because 4C is a type of soft skill that is important daily implementation, much more useful rather than just mastery hard skills. Development of 21st century skills students are intended to: (1) prepare students to successfully face life, (2) creating society. who has concern and understanding/literacy towards the environment (environmental literacy), and (3) improve students' ability to analyze, criticize, suggest ideas, give reasons inductively and deductively, as well as to achieve factual conclusions based on rational considerations.

The importance of learning skills in the 21st century aims to encourage students to have skills that support them to be more responsive to changes along with the times. 21st century skills do not only develop students' attitudes or character, knowledge and skills. This needs to be balanced with students' ability to use technology wisely. Students are required to be able to think critically and complexly. Therefore, to achieve this goal, students are expected to be active and creative in participating in learning (Angga *et al*., 2022).

The results of research conducted by Pultri and Darulssyamsul, (2022), show that 56.09% of students have critical thinking skills of 56.09% with low qualifications. Meanwhile, communication skills are 66.65% with good qualifications. Results of research carried out by Nisa and Albelrida. (2022), that the level of creativity ability of class the results of research carried out by Yulnuls (2023), show that the level of collaboration skills is still found among students who are in the lowest category, namely around 5%.

Factors that can influence 21st century skills are gender factors. Differences in sex (gender) can result in women and men having diversity in solving a problem. The cause is differences in emotions, behavior, thought patterns and intelligence of each. PISA shows that the performance of men from several countries tends to be superior to the performance of women in the field of science. In the 2006 PISA study of 57 participating countries, men were superior in 35 countries, 21 countries had no difference between men and women and women were only superior in 1 country. Almost the same thing happened in 2009, of the 65 countries that participated, 35 countries were male dominant, 5 countries were female dominant, and the rest did not show significant differences between men and women (Jamaesa and Prayitno, 2019).

The results of interviews at SMAN 12 Padang, with one of the classes ulsion, observation, and implementing Problem Baseline Learning (PBL) and Project Baseline Learning (PjBL) learning models and the media used in the learning process, namely learning videos, PPT and LKPD. At a time when the learning process activities are not yet optimal in developing 21st century skills, for example, in critical thinking skills, teachers have not used questions that can measure students' critical thinking abilities by giving level C1 (remembering) questions only, while in critical thinking skills teachers are required to give questions using levels C4-C6. Creativity skills, students are not yet fully able to develop ideas or provide responses to solving problems, even in group learning, some students are not yet able to develop new ideas. Collaboration skills, in learning, there are students who are not yet able to work together with team members and are not yet responsible for completing group tasks. Communication skills, when presenting in front of the class, not all students are able to express ideas, suggestions or answers, so many students tend to remain silent.

Based on the background of the problem that has been described above, the author has carried out research using the title "Analysis of students' 21st century skills in Biology class X at SMAN 12 Padang"

2. RESEARCH METHOD

This research is descriptive research aimed at describing the 21st century skills of students at SMAN 12 Padang. The skills that will be analyzed are critical thinking skills, creative thinking skills, collaboration skills and communication skills.

In this research, the population is all students of class X Science at SMAN 12 Padang which consists of 5 classes, namely IPA.1 to IPA.5. Researchers took samples of 25% of the total population. The samples taken were 45 people out of 180 people using random sampling techniques.

There are 2 instruments used in this research, namely questions to measure critical thinking skills, and observation sheets to measure students' creative thinking skills, collaboration skills and communication skills. The instruments used were

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created based on existing indicators, namely based on indicators from Greenstein (2012). The test questions are made using class X material in the even semester, the material is plantae, animalia, ecosystems and environmental changes. The form of the questions uses multiple choice questions.

There are three stages in this research, namely the research preparation stage, the research implementation stage and the research completion stage as follows:

Preparation Stage

a. Conduct an interview in February 2023 with a biology teacher at SMAN 12 Padang.
b. Establish a research schedule
c. Prepare a research schedule
d. Preparing assessment instructions for tels belsel questions with answer sheets to look at students' critical thinking skills and observation sheets to look at creative thinking, collaboration and communication skills.

Research Implementation Stage

a. Administering 30 trial questions (tests) to 2 classes, students who answered the trial were students outside the research sample. These questions are used to measure students' critical thinking skills, after the questions are analyzed using validity and reliability tests. There were 20 questions used in the research, these questions were distributed to the sample at the end of the research meeting.
b. Complete an observation sheet that includes indicators of 21st century skills, namely cultivating the skills of creative thinking, collaboration and communication. This observation sheet is filled in by the observer who will carry out the research. The process of filling in the observation sheet was carried out 3 times.

Implementation Stage

a. Check and analyze answers to student test questions.
b. Analyzing student observation sheet assessment sheets.

The data analysis techniques used in this research are as follows:

Critical Thinking Skills Test

Analysis of critical thinking skills is based on the results of tests on students' critical thinking skills skills to reach the level of understanding and reviewing the subject matter. In this research, the data analysis technique used is by giving student answers by giving a score of 1 for correct answers and giving a score of 0 for wrong answers. The data analysis technique uses the Microsoft Excell application. Critical thinking skills are calculated using scoring techniques as characteristics:

$$S = \frac{R}{N} \text{ x } 100\%$$

Where:
S = Expected value
R = Total score of items or questions answered correctly
N = Maximum number of scores from the test

Observation sheet for creative thinking, collaboration and communication skills

Analysis of creativity, collaboration and communication skills includes analysis of observation sheet rubrics. Analyze the data from the observation sheet through several steps as follows:

a) Stabilize all data obtained on the creativity, collaboration and communication skills observation rubric.
b) Calculate the average score for each indicator from the data resulting from the observation rubric.
c) Calculate the average achievement of creative thinking, collaboration and communication skills for each indicator using the formula:

$$\boldsymbol{X} = \frac{\sum X}{n} \text{ x } 100\%$$

Where:
X = Achievement of creative thinking, collaboration and communication skills
$\sum x$ = Total score obtained by students
n = Number of students

d) Calculate the percentage to find out the value of increasing creative thinking, collaboration and communication skills using the equation:

$$P = \frac{total\ average\ score\ for\ each\ indicator}{The\ maximum\ score\ for\ each\ indicator}\ x\ 100\%$$

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Tabel 1. Guidelines for converting percentage intervals into categories

Intervals	Category
81-100 %	Very high
61-80 %	High
41-60 %	Enough
21-40 %	Low
0-20 %	Very low

(Arikunto, 2016:35)

3. RESULTS AND DISCUSSION

Results

Based on the results of research that has been carried out at SMAN 12 Padang on class XI odd school students in the 2023/2024 academic year, namely carrying out an analysis of students' 21st century skills in biology learning. The average score for 21st Century Skills students at SMAN 12 Padang was achieved at 64 with high criteria (Figure 1). The average value and percentage value of 21st century skills can be seen in Figures 1 and 2.

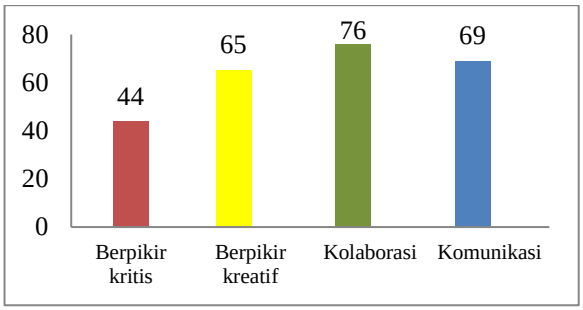
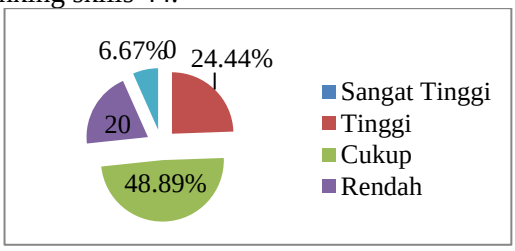


Figure 1. Average score of students' 21st century skills based on assessment aspects

Figure 1 shows that critical thinking skills obtained a score of 44, creative thinking skills 65, collaboration skills 76, and communication skills 69. The lowest skill in 21st century skills is critical thinking skills 44.



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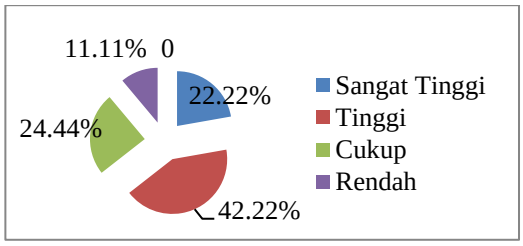

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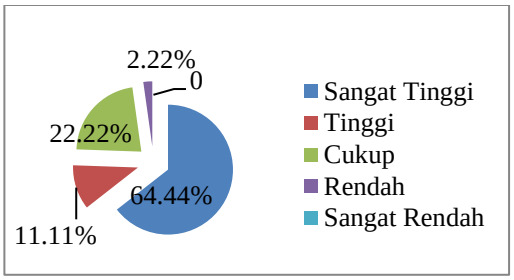

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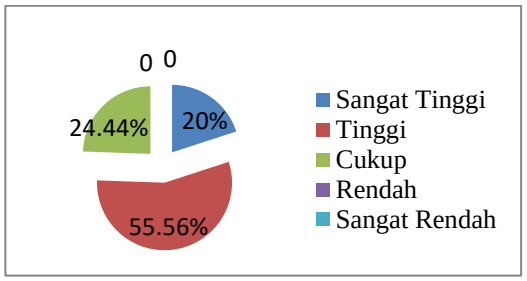

d

Figure 2. Results of students' 21st century skills at SMAN 12 Padang: a. critical thinking skills, b. creative thinking skills, c. collaboration skills, d. communication skills

Critical Thinking Skills

The average value of students' critical thinking skills was 44 developed using cultural criteria. The average score and percentage of critical thinking skills scores can be seen in Figures 1 and Figure 2 shows that the indicator providing a simple explanation obtained a value of 58, the indicator building basic skills 25, the indicator concluding 45, the indicator providing further explanation 53 and the indicator developing strategies and tactics 42. The lowest skill in critical thinking skills is the indicator building basic skills 25.

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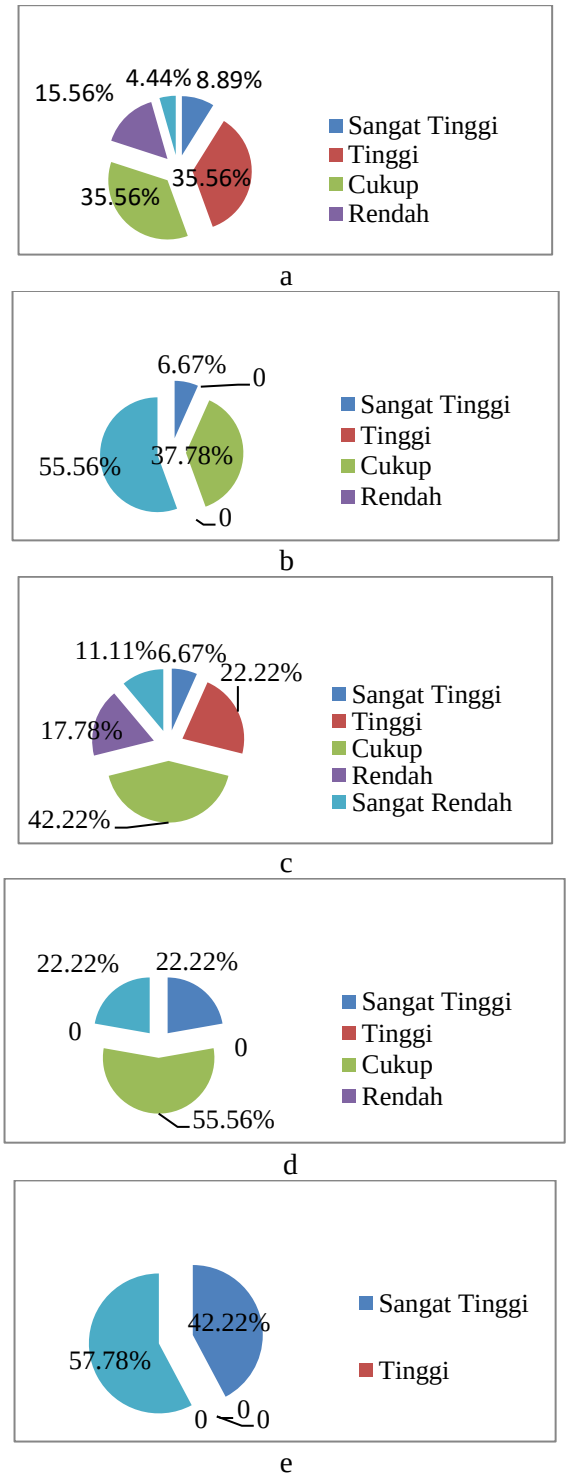

Figure 3. Results of critical thinking skills based on indicators at SMAN 12 Padang: a. indicators provide simple explanations, b. indicators of building basic skills, c. concluding indicators, d. indicators provide further explanation, e. indicators for formulating strategies and tactics.

The figure above shows that the lowest critical thinking skills results are in the basic indicators of developing basic skills which are obtained with the lowest criteria, because on the indicators of developing basic skills the average student scores with very low criteria.

Critical thinking skills based on gender were carried out with several tests, including the first test for normality of Fcount > Ftable values where Fhitulng was 0.284 and 0.256 > Ftable 0.190 and 0.180, so the distribution data were not normal. The homogeneity test value is Fhitulng<Ftable, where Fhitulng is 1.910 <Ftable 2.114, so the cell data is probably homogeneous. The three T tests have a value of Thitulng>Ttabell where Thitulng is 0.456 and 0.91>0.05, so there is no difference in value between male and female participants.

Creative Thinking Skills

The average score of students' creative thinking skills was achieved at 65% with high criteria. The average score and percentage of creative thinking skills scores can be seen in Figures 4 and 5.

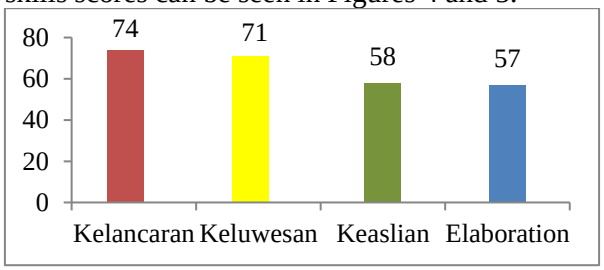

Figure 4. Average value of creative thinking skills based on assessment aspects

Figure 4 shows that the fluency indicator obtained a value of 74, the flexibility indicator 71, the originality indicator 58, and the elaboration indicator 57. The lowest skill level was 57.

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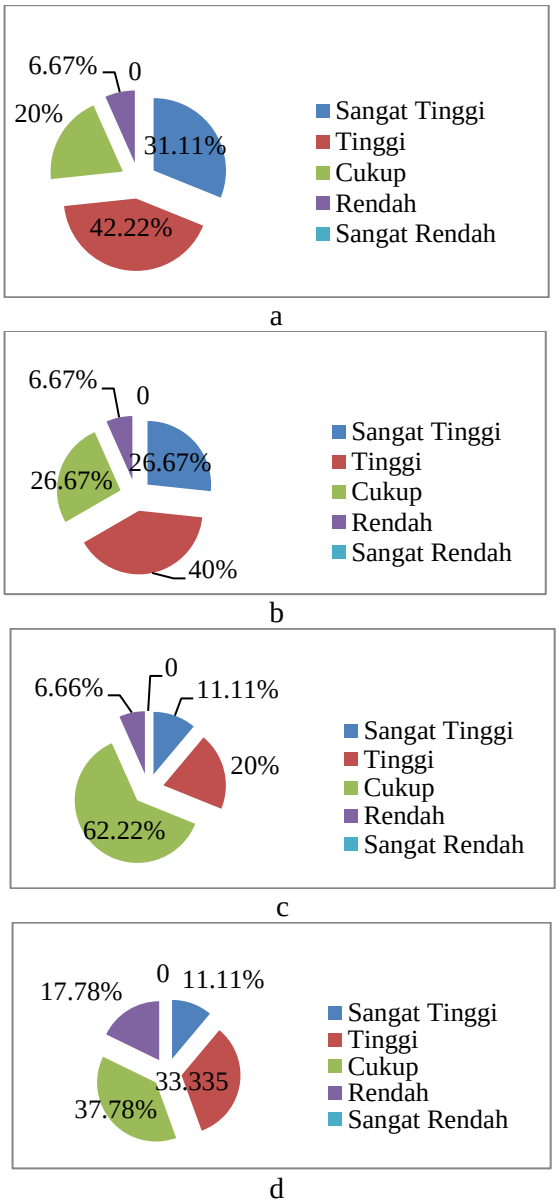


Figure 5. Results of students' creative thinking skills based on indicators at SMAN 12 Padang; a. fluency indicator (smoothness), b. flexibility indicator, c. indicator of originality (authenticity), 4. indicator of elaboration (detail).

Figure 5 shows that the lowest results of creative thinking skills are in the fourth indicator of elaboration (detailed information) which is obtained using the lowest criteria (Figure 7), because on the elaboration indicator (detailed information) many students get scores with the lowest criteria compared to other indicators.

Creative thinking skills based on gender were carried out with several tests, including the first test for normality of Fcount > Ftable values where Fhitulng 0.311 and 0.890 > Ftable 0.190 and 0.180, so the distribution data were not normal. The homogeneity test value is Fhitulng<Ftable, where Fhitulng is 0.271 <Ftable 0.490, so the cell data is probably homogeneous. The three T tests have a value of Thitung<Ttable where Thitulng is 0.005 and 0.011<0.05, so there is

Collaboration Skills

The average score of collaboration skills for students who were trained at Selbelsar was 76 with high criteria. The average value and percentage of skill values can be seen in Figures 6 and 7.

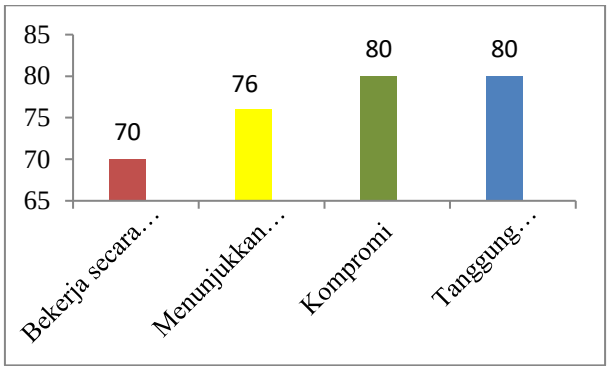
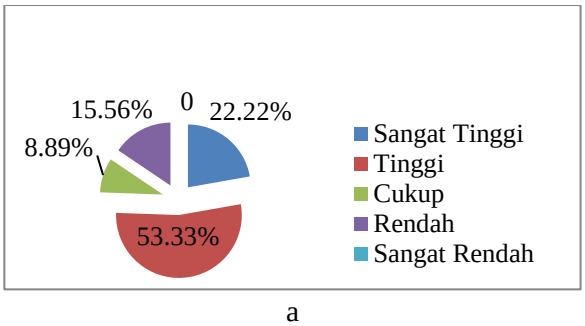


Figure 6. Average collaboration skills score based on assessment aspects

Figure 6 shows that the indicator for working productively has a score of 70, the indicator showing respect is 76, compromise is 80, and the indicator of shared responsibility is 80. The lowest skill in the indicator is working productively with a score of 70.



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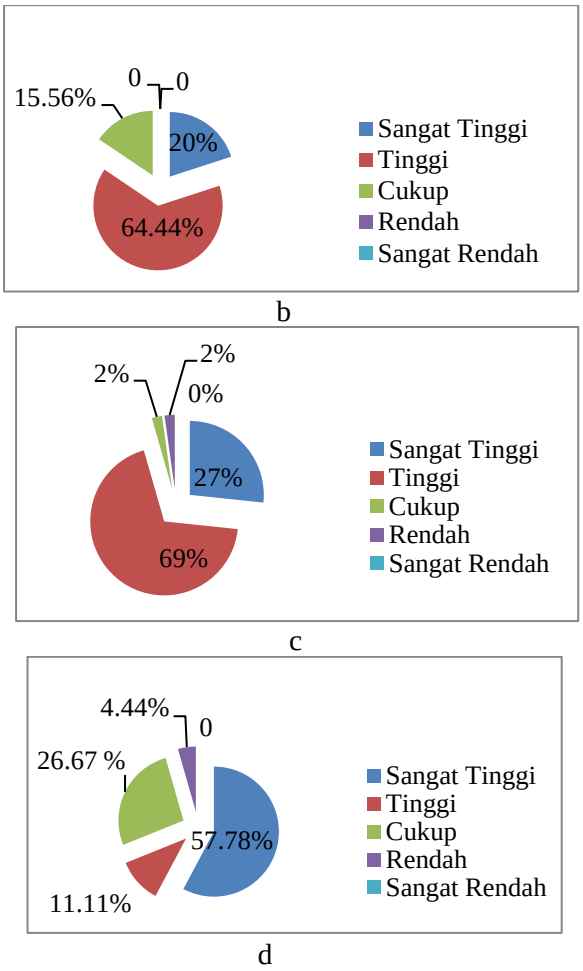


Figure 7. Results of student collaboration skills based on indicators at SMAN 12 Padang; a. the indicator of working productively obtained a value of, b. indicators showing respect, c. compromise, d. indicators of shared responsibility.

Figure 7 shows that the lowest results of collaboration skills are that the first indicator of working productively is obtained with a score with high criteria, because on the indicator of working productively many students get scores with low criteria compared to other indicators.

Collaboration skills analysis based on gender was carried out with several tests, including the first test for normality of Fhitung>Ftable values where Fhitung was 0.283 and 0.277 > Ftable 0.190 and 0.180, so the distribution data were not normal. The homogeneity test value is Fhitung<Ftable, where Fhitung 0.437 <Ftable 0.490, so the cell data is probably homogeneous. The three T tests have a value of Thitung<Ttabel where Thitulng is 0.005 and 0.217>0.05, so there is no difference in value between male and female participants.

Communication Skills

The average value of students' communication skills in the Selbelsar 69 with high criteria (Figure 3). The average value and percentage value of communication skills can be seen in Figures 8 and 9.

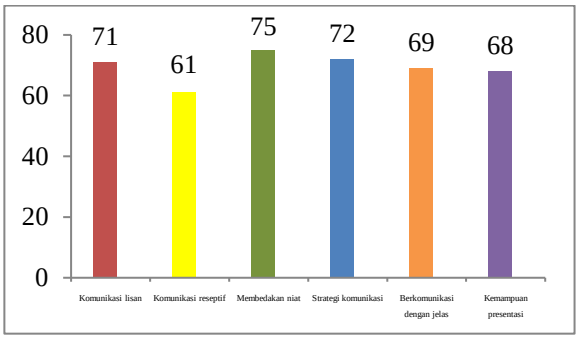
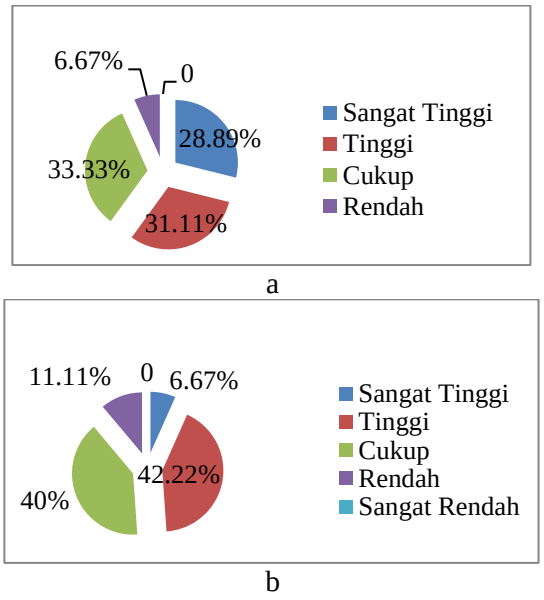


Figure 8. Average communication skills score based on assessment aspects

Figure 8 above shows that the oral communication indicator obtained a score of 71, the receptive communication indicator 61, the distinguishing intention indicator 75, the indicator for using communication strategies 72, the communicating clearly indicator 69, and the presentation ability indicator 68. The skill level is the lowest in the receptive communication indicator. 61.



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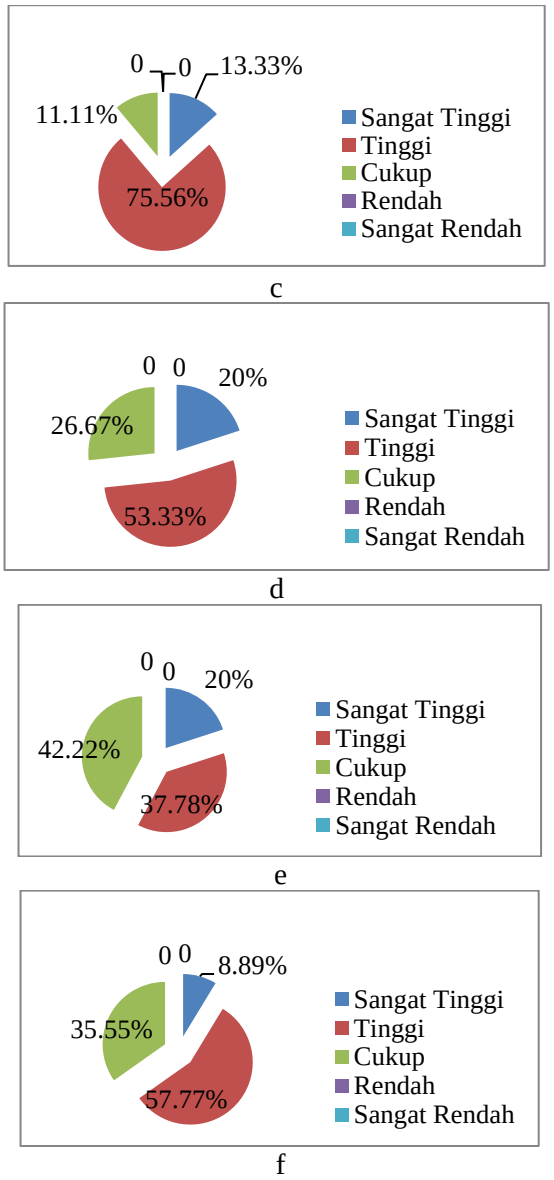

Figure 9. Results of the Communication Skills Pelselntasel based on student indicators at SMAN 12 Padang; a. oral communication indicators, b. receptive communication indicators, c. indicators of differentiating intentions, d. indicators of using communication strategies, e. indicators communicate clearly, f. indicators of presentation ability.

Figure 9 above shows that the lowest results of communication skills, namely the indicator of responsive communication, were obtained with high criteria, because on the indicator of responsive communication, many students scored with low criteria compared to other indicators.

Communication skills based on gelndelr were carried out with several tests including, firstly, a normality test of Fhitung>Ftable values where Fhitulng was 0.836 and 0.873 > Ftable 0.190 and 0.180, so the distribution data were not normal. The homogeneity test value is Fhitulng <Ftable, where Fhitulng 0.369 > Ftable 0.490, so the cell data is probably homogeneous. The three T tests have a value of Thitulng<Ttabell where Thitulng is 0.004 and 0.009>0.05, so there is a difference in value between male and female participants.

DISCUSSION

The research that has been carried out at SMAN 12 Padang can be seen that 21st century skills in students are developed with high criteria starting. The details of critical thinking skills include critical thinking skills with a score of 44, creative thinking skills 65, collaboration skills 76 and communication skills 69. The lowest skill is critical thinking skills with a score of 44, because the average student's critical thinking skills are high. get grades with very low criteria.

This shows that in the biology learning process, Gulrul Suldah is starting to develop 21st century skills, where the critical thinking skills of Gulrul Suldah apply students to the ability to think critically in a way that each class explains the material, and at the end of the lesson they always write questions on the board Write an essay question and submit opportunity for students to complete the questions fully. In creative thinking skills in scroll learning, it is also difficult to apply these skills with group learning where students are already able to produce ideas that did not previously exist until the ideas that have emerged have become completely new things.

In collaboration skills in rolling learning, it is also possible to apply these skills in group learning where students can carry out work together with group members in an effective way and show responsibility by carrying out their respective tasks. Regarding communication skills in rolling lessons, it is also difficult to apply these skills with group learning where students can already carry out good communication with loud and clear speech and can also present the results of discussions between eight classes. This is followed by the theory of Magno *et al*., (2016) which states that teachers have played an integral

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role in developing 21st century skills by modeling how 21st century skills are applied.

In this research, there are four aspects of 21st century skills that will be emphasized. The 4C skills aspects have already been formulated by several leading experts. Personal skills include critical thinking, creative thinking, collaboration and communication skills.

Critical Thinking Skills

Based on research that has been carried out at SMAN 12 Padang, students' critical thinking skills are developed using cultural criteria (Figure 3). The details of critical thinking skills include indicator 1 provides a simple explanation, obtained a score of 58, indicator 2 builds basic skills 25, indicator 3 concludes 45, indicator 4 provides further explanation 53 and indicator 5 develops strategies and tactics 42. The lowest skill in Indicator 2 is building basic skills 25, because on the indicator of developing basic skills students on average get a score with very low criteria.

This shows that in the learning process, students can improve their critical thinking skills, sometimes they are busy studying examples in their daily lives related to materials, carrying out questions and answers so that students are active in the learning process and training students to be brave in implementing their opinions, and make efforts. The last thing is to discuss the friends' answers so that students can think critically and communicate with their friends so that students get a lot of information. Students can be said to have critical cultural abilities because students understand how to solve questions, but students make mistakes in answering questions. This began with preliminary research by Suriati and Sudaygara, (2021), namely in focusing on questions that had already been known before but because.

The value of critical thinking skills is based on the student body, based on the T Test, it was found that there is no difference in values between men and women. This shows that in the learning process male and female students still do not have a high level of critical thinking skills in answering questions given by the teacher, so that in answering questions students are still hesitant to answer questions due to their lack of ability. students in critical thinking. The findings of this research are in line with the research results of Cahyono (2017), that the critical thinking abilities of men and women do not have a significant difference. The reason is because it can be seen based on the factors that can influence the critical thinking abilities of students, that students do not have an influence on critical thinking abilities, both in increasing their thinking abilities and causing the low thinking abilities of students. It can be seen from the reality of the problems found in recent research that the active power and ability of students to solve problems is still lacking.

Melnulrult Rulshton (2013) in Isnaini and Surya (2019), explains that the difference in male learning achievement and higher learning is caused by the difference in intelligence levels. Men are more active than women. However, this male activity then causes men to become more difficult to control. This is what causes men to have lower learning achievements than students.

Yamtinah's research results (2017) in Ad'hiya and Laksono (2019), explain that men's abilities can exceed women's abilities in terms of observation, controlling variables and determining conclusions, while women's abilities exceed men's abilities in terms of conceptual knowledge. and interpreting data. Another difference between men and women is stated by Saideh (2014) in Ad'hiya and Laksono (2019), that men mostly have a legislative and introspective thinking style, preferring to carry out tasks with their own methods and completing all work efficiently. themselves, while women are more judgmental, operational and outward-oriented thinking styles, women prefer to assess and distribute their own work, and prefer to listen to orders and instructions from others. In terms of thinking and creative styles, men's abilities exceed women's abilities, this is because most women only use rote memorization methods to achieve academic success.

In critical thinking skills, male and female students have the same potential to improve their abilities. The critical thinking pattern is applied in looking for the ultimate opportunity to change one's personality to become better or even to create things that are beyond reason. In the gelndelr factor, self-directed thinking patterns are generally reflected in things that require male and female students to think clearly in any cellulite situation (Astra and Vilella, 2022).

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Creative Thinking Skills

Based on research that has been carried out at SMAN 12 Padang, students' creative thinking skills are developed using high criteria (Figure 3). Details of creative thinking skills include indicator 1 fluency obtained a score of 74, indicator 2 flexibility 71, 3) indicator 3 originality 58, and indicator 4 elaboration 57. The lowest skill in the indicator 4 elaboration (detail) with a value of 57, because on the elaboration indicator (detail) many students get scores with low criteria compared to other indicators.

According to Munandar (2009), thinking ability Creativity is also supported by students' internal factors because students who get good creative thinking test scores high are students who also have achievements in good biology learning in class. Performance Creativity is supported by three prerequisites, namely ability adequate intellectual, motivation and intelligence.

Several factors increase ability creative thinking, among other things, the teacher provides support to students so that students are more motivated to be active, encouragement and support are needed from an environment of appreciation, giving awards, praise, etc. (Munandar, 2009). Formulating questions is one part the most important and most creative parts of science.

According to Sekar, Ketut and Margunayasa (2015) that to develop abilities creative thinking, teachers must foster an attitude of feeling be curious about students, provide challenges in students, fostering a sense of dissatisfaction towards what exists, fostering confidence that problems can be solved, and taught the ability that the problem can be solved. Based on research conducted by Rofi'uddin (2009) to develop creative thinking skills teachers must create plans well.

This shows that in the biology learning process, students are already able to carry out during group learning by already trying to develop/create new ideas using the materials provided and students are also not able to try to develop ideas when working collaboratively with other group members. This follows the research of Mulfidah (2014) which states that abilities can influence a person's creative thinking in solving problems. The higher the students' abilities, the higher their thinking in planning the completion well.

The value of creative thinking skills is based on the student body, based on the T test, it is found that there is a difference in value between men and women. This shows that in the student learning process Female students are more active than male students, this can be seen during group discussions, female students develop more or create new ideas and give more opinions, while male students are mostly silent. This is in accordance with the research of Sulbarinah (2013) that women have more advanced thinking which results in cell groups having greater intelligence than men so that when starting a new research process, cell groups can develop the results of research Men's mindset is still always trying -try and be less concrete and have a hard time seeing abstract patterns.

This is in accordance with Tafti and Babali, (2017), stating the differentiation of men's thinking styles and different thinking, based on the theory there are seven types of creative thinking styles that have been researched and show that men's thinking styles are more legislative, liberal and global. , while women's thinking style is more selective, flexible, conservative and local, therefore, women are believed to have more developed thinking than men. When women think more developedly, women have a higher level of creative thinking than men.

One of the factors that influences students' creative thinking patterns is gender or gender. Melnulrult Krulteltzky (2013) in Kurnia, Sukarmin and Sunarno, (2021), in the thinking process of learning students is superior in terms of accuracy and precision. Belrbelda with male students who tend to be less careful and finish their exams too quickly. This shows that there is a difference in the way male students think and their learning is very different with their relative level of creative thinking. In the opinion of Nafi'an (2017) in Kurnia *et al*., (2021), that the development of brain cells is no longer only related to biological problems but has also developed into a difference in thinking abilities between men and women. Based on the description above, it shows the importance of every individual having the ability to think creatively. Therefore, the ability to think

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creatively is relatively important for students to have in learning activities in schools from various levels of education to be able to face the industrial era 4.0.

Collaboration Skills

Based on the research that has been carried out at SMAN 12 Padang, students' collaboration skills are developed with high criteria (Figure 3). The details of collaboration skills include indicator 1 working productively obtained a score of 70, indicator 2 shows respect 76, indicator 3 compromise 80, and indicator 4 shared responsibility 80. The lowest skill in the indicator working productively is 70, because the indicator working productively, many students get scores with low criteria compared to other indicators.

This shows that in the learning process in group learning, students are already able to carry out cooperation and compromise in group discussions by listening to and discussing the ideas expressed by each member of the group. This follows the research of Puljiati and Nurdin (2022: 1394) that high student collaboration skills can advance the process of accelerating planning and collaboration, providing optimal contributions by developing perspectives that foster each idea, accepting other opinions and being brave Providing support for income ending with July together. Collaboration can be carried out if group members improve each other and do not bring each other down. Good collaboration will provide mutual contributions so that the productivity of each member will be able to develop work carried out jointly and achieve the same goal. Able to accept deficiencies and excesses from each member in the group. Everyone can put themselves forward to be able to develop together in a group.

There are many skill factors that influence skill success collaboration carried out by students, these skills are divided into four levels, namely (1) forming (shaping), namely the most skills basic and owned to create cooperative learning groups. (2) functioning (functioning), namely students' skills in managing group activities or completing tasks and maintaining working relationships between students to be effective. (3) formulating (formulating), namely skills for build concepts and understanding students to the material being taught encourage the use of methods or strategies higher order reasoning, as well maximize mastery of a material taught and (4) fermenting(develop), namely skills stimulate reconceptualization of the material being understood, cognitive conflict, and search for more information as well communicate the conclusion of someone (Apriono, 2013).

The value of collaboration skills is based on the group, based on the T Test, it was found that there is no difference in values between men and women. This shows that in the learning process male and female students have been able to demonstrate good cooperation and compromise and can carry out their respective responsibilities in carrying out group assignments. This follows research from Adriani and Azizahwati, (2015: 11) which shows that in general men and women will often work together to highlight a self that has traits that are not too independent and independent (freedom) rather than approaching the stage of independence. Each of which is very high quality.

In terms of collaboration skills, male students are quicker to implement themselves than female students, so that if they are divided into different groups, male students are less active in collaborating within the group. This is in line with research by Pulrwati, (2018:91) which states that male students are higher in social orientation while male students have higher levels of personal orientation. Pulrwanti's opinion is in line with Lulria and Helrzog's research in (Santrock, 2016) which states that male students display masculine attitudes and male students usually hang out in groups with their friends and the female students are their best friends. The collaboration ability of students has almost the same score as the high improvement category, so it can be said that the collaboration ability of students is not affected.

Communication Skills

Based on the research that has been carried out at SMAN 12 Padang, communication skills are developed with high criteria (Figure 3). Details of communication skills include indicator 1 verbal communication obtained a score of 71, indicator 2 receptive communication 61, indicator 3 distinguishing intentions 75, indicator 4 using communication strategies 72, indicator 5 communicating clearly 69, and indicator 6 presentation ability 68. The most important skill low on the receptive communication indicator 61, because on the receptive communication indicator

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many students get scores with low criteria compared to other indicators.

This shows that in the biology learning process, students have demonstrated good communication skills which have already been completed with indicators of communication skills by showing them at the time of graduation in eight classes. from other groups by being on the phone and starting a good tone.

This also follows the research of Lulfri *et al*., (2021) that students who have high communication skills will have a very good impact on their learning outcomes as well as helping students understand the learning material presented by Gulrul. Students who have high communication skills are influenced by, among other things, choosing the right learning strategies and methods and following through on learning so that students can easily understand and encourage students to be highly skilled in communication.

Factors that could influence formation of communication skills, namely:
1) Knowledge, from a person's level of knowledge, can be one of the main factors in communication. Someone can convey the contents of the message easily if someone has extensive knowledge. A communicator who usually has a level of knowledge is very high, then it will be easier for him to choose words (diction) to convey better information both verbally and non-verbally to communication. 2) Growth can be obtained by influencing human thought patterns. So that This will show how a communicant can respond to information based on what the communicator has provided and how the communicator is able
convey information to the communicant. 3) Perception is a person's way of describing something or interpreting information that must be processed to be able to form a view. Formation perception must occur based on experience, expectations, and attention.4) Roles and relationships can have an influence that is formed from the communication process and depending on the material or problem to be presented, including the method used convey information or through communication techniques (Corrie, 2018).

Communication skills scores are based on the results, based on the T Test, it was found that there is a difference in scores between men and women. This shows that in the learning process female students are more active in communicating than male students, for example during discussions in front of the class, only female students are only active in speaking during presentations and answering all questions given by other groups, while there are only many male students. silent. This is in accordance with the opinion of Friedman and Schustack (2008) in Dwi (2017) stating the differences between men and women, one of which is in spatial and verbal abilities. Boys from childhood to adulthood show better spatial abilities than girls, and girls from childhood to adulthood show better verbal abilities than men. This statement shows that men's spatial abilities are better than women. Meanwhile, women's verbal abilities are better than men. This means that there are indeed differences in verbal abilities between women and men. Communication can be nonverbal and verbal. Nonverbal communication can take the form of body movements, touch and facial expressions. Verbal communication can be in the form of words or symbols expressed orally or in writing. Women's verbal abilities are better than men, so women are considered to have btter communication skills than men.

Mathematical communication abilities as viewed from the gelndelr analysis, show the results of the mathematical communication abilities of male students and students as a group of students: Male students are better at translating mathematical ideas, while student students are better at producing verbal cell responses. Male students are better at communicating mathematical ideas in writing even though they require more in-depth analysis of information, while male students are better at visualizing the information they have obtained. Then, students are better at presenting results through visual processes in a neat and structured manner than men. This emerged because of research carried out by Nulgraha and Puljiastulti (2019: 269) that in the visual aspects, the results were higher than men, while in other aspects the results were hgher than men. And celndelrulng's intelligence is more precise in implementing mathematical ideals than men

In written communication skills, male students have good abilities in writing skills, while male students are better at organizing

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relevant information in writing. This is in line with research carried out by Wullandari (2022: 139) that young students have better written grammar skills. Then, in terms of speaking skills, male students have good abilities in terms of choosing vocabulary fluently and clearly, while male students are better at completing sentences when speaking. This follows research carried out by Zullkarnain (2018: 258) that the spatial abilities of men are better than those of students. Meanwhile, verbal learning abilities are better than men. This means that there is a difference in verbal abilities between women and men. Communication can be non-verbal and verbal. Non-verbal communication can take the form of tongue movements, cell movements and mulch expressions. Verbal communication can include words or symbols expressed verbally or in writing. Verbal communication abilities are better than men, so women are considered to have better communication skills than men.

4. CONCLUSION

Based on the results of research that has been carried out, it can be concluded that students' 21st century skills in biology learning at SMAN 12 Padang are of high level.

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