

## Training on the Use of 21 Century-4C Skill Assessment on Critical Thinking, Creativity, Communication, and Collaboration in Project-Based Learning for Teachers

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### ABSTRACT

Training on the use of 21 century-4C Skill Assessment on Critical Thinking, Creativity, Communication, Collaboration in project-based learning for teachers at SMKN 1 Gunung Sahilan, Kampar, Riau was carried out based on some problems. The problems identified by the Lancang Kuning University Postgraduate School service team were teachers' lack of knowledge and experience on how to design PjBL and use assessments related to 21st century-4C skill in project-based learning. Based on the explanation above, the solutions are needed in the form of training to overcome teacher problems. In this case, the community service team facilitates training to the teachers so that they can carry out assessments of projects in student learning following the 21st-4C century skills assessment rubric scale. This activity was carried out May 22, 2024 at SMKN 1 Gunung Sahilan, Kampar Regency using the lecture method along with a project assessment simulation using the 21st century-4C skills assessment rubric. From the simulation results of using the 4C skills assessment rubric, the service team identified that the teachers of SMKN 1 Gunung Sahilan (1) were able to use the 21/4C century skills assessment rubric in assessing project-based student learning outcomes, and (2) were able to design a variety of PjBL in accordance with the subject in their classes. Finally, the service team concluded that the training activity on the use of 21-4C century competency assessment covering Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning at SMKN 1 Gunung Sahilan could provide knowledge, understanding and ability to participants to use the 21st century skills assessment rubric and design a variety of PjBL.



## 1. INTRODUCTION

Project-Based Learning (PJBL) is an active student-centered learning that focuses on collaborating with classmates through in-depth discussions to create solutions to problems found in the real world that are oriented towards products or learning outcomes. PJBL is an effective and fun way to develop deeper student competencies necessary for 21st century educational success in college, career, and civic life (Buck Institute for Education, n.d.). This PJBL is especially suitable for learning in classes with lots of practical activities and project assignments, such as those in vocational high schools or *Sekolah Menengah Kejuruan* (SMK). At the same time, PJBL was able to promote the development of 4C (Critical thinking, Creativity, Communication, Collaboration). Various strategies and assessment rubrics based on the 4Cs of 21st century skills have been used in PJBL assessments. However, Greenstein's (2012) rubric is one of the 21st century skills assessment rubrics that is equipped to measure the 4C dimensions and their sub-dimensions according to assessment needs. This new alternative assessment can help teachers easily implement PJBL and 21st century skills, as they are a very important part of the project-based learning awareness process.

Assessment rubrics are an important tool for teachers to assess student performance in Project Based Learning (Devi & Rahayu, 2021). Grading criteria and descriptions of performance levels are usually included in rubrics, that assist in determining what qualities should be assessed and assessing the quality of students' work (Casebolt & Zhang, 2020). Brooke, Culclasure, Kyle, Longest, Troy, & Terry's (2019) research seeks to



better understand how PjBL is implemented in schools and to explore the impact of PjBL on schools, teachers, and students. Findings did not reveal consistent significant differences in the performance of demographically matched PjBL and non-PjBL students in academic and behavioral outcomes. However, PjBL students performed better on the social-emotional skills inventory. Additionally, although the challenges of implementing PjBL are apparent, students' and educators' perceptions of the impact and possibilities of PjBL are quite positive. Consequently, assessment rubrics can be used in PjBL to provide a structured framework for evaluating student work and improving learning outcomes.

As an important step in determining the use of a PJBL assessment rubric, teachers must actually focus on the assessment criteria so that they can better measure PJBL learning based on the demands of students' mastery of 21st century skill competencies. Rubrics, which provide clear assessment standards and allow students to assess themselves, are thought to improve student learning and self-regulation (Mrangu, 2022). There are various assessment methods for carrying out formative assessments. For example, the use of self-reflection sheets, friend/group reflection, collaborative assessment (teacher-student), open and closed surveys, checklists and journals. PJBL can be a difficult assessment experience for new teachers and ultimately they tend to use formative assessments which sometimes cannot measure PJBL learning outcomes as a whole. Formative assessments place a lot of value on the final presentation alone.

A study by Van den Bergh et al. (2006) found that many educators/teachers use different methods in assessing a PJBL program and it is very different from one teacher to another, causing discomfort in the reliability of the assessment itself. Students do not like it if in some groups, all students are given the same grade while in other groups the grades are different and individual. PJBL has been evaluated with various assessment methods that are in line with educational goals, and teaching principles from relevant and authentic learning environments (Greenstein, 2012). This is further supported by Mergendoller stating "but there is one more element that needs to be added to formative assessment and feedback (Partnership for 21st Century Skills).

The holistic 21st century criteria-based PJBL assessment rubric is a type of formative assessment. Greenstein (2012) outlined rubric criteria based on 21st Century Skills and their sub-skills that can be used for PJBL. The rubric can be broken down into a scale of four levels of proficiency from (1) beginner; (2) basic; (3) proficient; (4) advanced level in achieving PJBL-based learning. This is in line with the results and indicators for achieving several levels based on each 4C dimension/criteria. For example, the "critical thinking" skill has sub-skills including: evaluating, analyzing, and synthesizing various views. This rubric has been adapted to the needs of students on their PJBL projects.

The respective 4C criteria have also been adapted and simplified for assessing students in PJBL projects and adjusted according to class proficiency level and program objectives. This rubric is easy to use as a formative assessment in the PJBL process. First, students can assess their current level and analyze their initial level. Over several class periods, students will be motivated to increase their proficiency level and strive to advance to the next upper level. Again, teachers can also work with students and evaluate and encourage them to move up to the next rubric level. This self-awareness is an important reflection for students because they can acknowledge the importance of the 4Cs and recognize them as separate from skill development.

Based on information obtained from the principal of SMKN 1 Gunung Sahilan school, Kampar district, there are some problems faced by teachers in carrying out assessments in PJBL-based learning. Teachers do not have a PJBL assessment rubric related to 21st century-4C skill competencies. Meanwhile, this assessment rubric is very important for measuring student learning outcomes in vocational high schools considering that there are many practice assignments given on a project basis relate to various aspects of assessment starting from assessing the development of critical thinking, creativity, communication and collaboration. Based on the explanation above, efforts are needed in the form of training to overcome teacher problems in partner schools. In this case, the activity that needs carried out is to provide training to teachers to understand and improve their abilities in conducting 21-4C century skills assessments in project-based learning. So, the community service team of Master of Pedagogy, Universitas Lancang Kuning is interested and considers it necessary to carry out training activities at SMKN 1 Gunung Sahilan.

## 2. LITERATURE REVIEW

Numerous scholars, including Brodie & Gibbings (2009) and López, Archilla, and Quintana (2020),



stress the significance of individual assessment in PjBL; López, et al. provide instructions and rubrics for doing so, and Brodie & Gibbins stress the significance of constructive criticism and consistency in the creation of rubrics. Both Sawamura (2010) and Szarka & Brestenská (2012) emphasize the significance of evaluating PjBL processes and products; Sawamura offers an annotated bibliography of assessment strategies in PjBL, particularly in language learning contexts, and Szarka & Brestenska suggest authentic assessment methods. The study concludes that thorough, well-thought-out rubrics are necessary for evaluating team and individual performance as well as taking PBL processes and products into account.

Studies have shown that using rubrics to assess 4C skills in Project-based Learning (PjBL) can lead to positive outcomes. Muchson (2023) discovered that PjBL helped improve 21st century 4C skills, with high project scores and competency values. Yujobo (1970) stressed the importance of using alternative assessment strategies like rubrics for the 4Cs in PjBL, especially in English as a foreign language classrooms. Somphol (2022) also found that PjBL activities can enhance secondary school students' 4Cs skills, with a majority of students meeting the 70% criteria for each skill. Azmi (2023) highlighted the need for improvement in high school students' 4C skills and suggested creating a PjBL model physics learning assessment tool to address this. Overall, these studies demonstrate the potential of rubrics in assessing and improving 4C skills in PjBL.

### 3. METHOD

This training activity was carry out on May 22, 2024 in a state vocational high school or *Sekolah Menengah Kejuruan Negeri 1* (SMKN 1) Gunung Sahilan, Kampar, Riau, Indonesia. The community service team consists of 4 lecturers and 2 students of Master of Pedagogy, Graduate School of Universitas Lancang Kuning, Riau, Indonesia. The training were implemented based on the following activities:

1. The community service team carry out the analysis stage in the form of field observation and interview with the Principal and teachers of SMKN 1 Gunung Sahilan, Kampar, Riau, Indonesia.
2. The community service team identify the school teachers' problems pertaining to assessing 4C skills in PjBL.
3. The lecture method was used to provide participants with an understanding of the theme of service which is tailored to the needs of partners, namely Training on the Use of 21st Century Competency Assessment-4C Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning for Teachers at SMKN 1 Gunung Sahilan. The lecture method in this training was attempted not to carry out protracted theoretical discussions and places more emphasis on case examples and their solutions. The presentation of training material was followed by a question-answer session and discussion.
4. The discussion method was selected to provide more opportunities for participants to discuss, question, underline, provide input, and/or deepen the material being discussed.
5. The group or individual tutorial method was chosen to complete the understanding of training on the use of 21-4C Century Competency Assessment Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning which has been lectured and discussed by applying it directly, namely by conducting simulations using rubric for assessing 21st century skills on a learning project that has been completed by students.
6. The service team provides revisions and suggestions for assessment simulation activities that have been practiced by the teachers. The approach in this method is "learning by doing" with assistance from the service team.

### 4. RESULT AND DISCUSSION

The training activity on the use of 21-4C century competency assessment Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning for Teachers at SMKN 1 Gunung Sahilan in Kampar Regency were carried out in several stages. The first activity was the service team carried out observation and interview with the Principal and teachers about their experiences using the 21st Century Competency assessment rubric-4C covering Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning while teaching in the classrooms. After that, The community service team identifies the problems in terms of using 4C skills assessment in PjBL and try to find out solutions. Finally, the service team decided to carry out training on how teachers at SMKN 1 Gunung Sahilan could use 21st century competency-based assessment rubrics.



On Wednesday, May 22, 2024, the Master of Pedagogy service team carried out a training from 8-12 a.m., attended by 40 teachers at SMKN 1 Gunung Sahilan. Before training session, the first presenter (Dr. Marwa, M.A) gave a diagnostic test consisting of 3 questions about the teacher's experience in using the 21/4C century competency-based assessment rubric (Communication, Creativity, Critical Thinking, Collaboration) to participants. The time given to answer diagnostic test questions was 10 minutes. The 3 questions are as follows:

1. What do you know about the 21st century or 4C skills assessment rubric?
2. Have you ever used the 21st century/4C skills assessment rubric in your class?
3. What do you know about the components you include in the assessment rubric for each 4C competency?

The aim of giving this diagnostic test was to find out participants' understanding regarding the topic of training in the use of 21st-4C century competency assessment Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning for Teachers at SMKN 1 Gunung Sahilan in Kampar Regency. The teachers were divided into 6 groups. The results of this test can be seen in table 1.

Table 1. Diagnostic Test Results for Training Participants in Using the 21 Century /4C Competency Assessment

Teacher Group	1. What do you know about the 21st century or 4C skills assessment rubric?	2. Have you ever used the 21st century/4C skills assessment rubric in your class?	2. What do you know about the components you include in the assessment rubric for each 4C competency?
Group 1	Lack of understanding about the 4C rubric	Never	Lack of understanding about the 4C rubric
Group 2	Lack of understanding about the 4C rubric	Never	Lack of understanding about the 4C rubric
Group 3	Lack of understanding about the 4C rubric	Never	Lack of understanding about the 4C rubric
Group 4	Lack of understanding about the 4C rubric	Never	Lack of understanding about the 4C rubric
Group 5	Lack of understanding about the 4C rubric	Never	Lack of understanding about the 4C rubric
Group 6	Lack of understanding about the 4C rubric	Never	Lack of understanding about the 4C rubric

From table 1 it can be seen that the participants who were divided into 6 groups answered the diagnostic test question number 1 "What do you know about the 21st century or 4C skills assessment rubric?" With similar answers "lack of understanding about the 4C rubric". Question number 2 "Have you ever used the 21st century/4C skills assessment rubric in your class? and answered by 6 groups as a whole "Never". Question number 3 "What do you know about the components that you include in the assessment rubric for each 4C competency?" was answered by 6 groups in the same way, namely "lack of understanding about the 4C rubric". Based on the answers of the 6 groups on the diagnostic test, the community service team concluded that the training participants had minimal knowledge about the use of 21st century competency assessments in PjBL assessments.

The community service team carried out the next activity, namely delivering material on the use of the 4C skills assessment rubric starting at 8.30-10.30 a.m. In this session Dr. Marwa, M.A. presented material (ppt) regarding: (1) development of 21/4C century skills in the classroom, (2) various PjBL-based activities in the classroom for vocational school students, and (3) 21/4C Century Skills Competency Assessment (Critical Thinking, Creativity, Communication, Collaboration). Furthermore, the trainer used the lecture method to provide the participants with an understanding of (1) developing 21/4C century skills in the classroom which includes important components; critical thinking: critical thinking, communication: communication, collaboration: collaboration, creativity: creativity, digital literacy: digital literacy, adaptability: ability to adapt, leadership: leadership, and global awareness: global awareness.



Figure 1. Material delivery by the trainers

The second training material includes: (2) various PjBL-based activities in class for vocational school students. Examples of the first PjBL are *information technology projects* including a) mobile application development: students can design and develop useful mobile applications, for example applications for time management or educational applications; b) school website: students can create or update a school website with features that support school activities, such as student and teacher information portals. Examples of PjBL on *engineering projects* include a) robotics: designing and building robots for competitions or as tools in industry; b) machine prototype: make a prototype of a simple machine that can be used for certain purposes, for example an automatic peanut skin peeling machine. Examples of PjBL on *business and management projects* can be carried out in a) business simulations: setting up a fictitious company and running its operations, including marketing, finance and production; b) entrepreneurship: developing products or services that can be sold to the public, such as handicraft or culinary products. The service team also provided other examples of PjBL on *mechanical and automotive projects*.

Next, the community service team provided material on the 4C competency assessment rubric explaining material on 21st century competency assessment/4C skills (critical thinking, creativity, communication, collaboration) in the PjBL assessment. Material "Communication" The communication rubric includes the ability to convey and receive messages clearly and effectively. Indicators include the ability to speak and write clearly, listen actively, and use communication technology appropriately. Students who have good communication skills can participate in discussions, give convincing presentations, and write well-structured reports or essays.

Material for the "Creativity" rubric Creativity includes the ability to generate new and innovative ideas and find unconventional solutions to existing problems. Indicators include the ability to think out-of-the-box, make unusual connections between different concepts, and develop original projects or products. Creative students are able to develop works of art, technical solutions, or innovative business concepts.

"Critical Thinking" rubric material: Critical thinking relates to the ability to analyze information in depth, evaluate arguments, and make decisions based on available evidence. Critical thinking indicators include the ability to identify problems, collect and evaluate evidence, and make logical and structured arguments. Students with critical thinking skills are able to solve complex problems and make informed decisions.

Material for the "Collaboration" rubric: Collaboration is related to the ability to work effectively and harmoniously in a team to achieve common goals. Indicators of collaboration include the ability to contribute to group tasks, respect others' perspectives, and resolve conflicts constructively. Collaborative students are able to work in various roles on a team, support other members, and achieve better results through cooperation. These four skills are very important in preparing students to face the increasingly complex challenges of the world of work and social life in the 21st century. By assessing and developing the 4C skills, teachers can help students become individuals who are more adaptive, innovative, and able to work effectively in various contexts.



Figure 2. PKM Team and Training Participants

At 10 a.m., participants started a simulation activity using the 21/4C century competency assessment rubric which had been given in accordance with the learning projects in the subjects they taught in class by evaluating the project from PjBL and providing an assessment based on the components and rubric scores. In this activity, SMKN 1 Gunung Sahilan teachers were able to use the 4C assessment rubric. The results of this training can be reflected in what was revealed by Mrangu (2022) that rubrics which provide clear assessment standards and allow students to assess themselves, are considered to be able to improve learning and develop students' personal potential. After evaluating training activities on the use of 21st century competency assessment-4C Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning, the service team summarized the results in table 2.

Table 2. Results of training on the use of 21st-4C century competency assessment Critical Thinking, Creativity, Communication, Collaboration in PjBL

Teacher Group	Ability of using the 4C skills assessment rubric	Ability of designing PjBL in subjects
Group 1	√	√
Group 2	√	√
Group 3	√	√
Group 4	√	√
Group 5	√	√
Group 6	√	√

From table 2 it can be seen that each teacher participating in the training used the 21st-4C century competency assessment Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning. After examining the simulation results of using the 4C skills assessment rubric, the service team identified that the teachers at SMKN 1 Gunung Sahilan (1) were able to use the 21/4C century skills assessment rubric in assessing project-based learning outcomes, and (2) were able to design a variety of PjBL in accordance with with the subject in each class. The results of the training activity on using the 4C skills assessment rubric are in line with the results of research by Brooke, Culclasure, Kyle, Longest, Troy, & Terry (2019) which seeks to better understand how PjBL is implemented in schools and to explore the impact of PjBL on schools, teachers and students. As a result of training activities on the use of 21st century or 4C skills assessment rubrics for vocational school teachers, it is recommended that teachers continue to integrate 4C skills in every aspect of learning. They need to regularly hold workshops or discussions between teachers to share experiences and best practices in implementing this rubric. Additionally, it is important to actively involve students in the assessment process so that they understand the criteria used and are motivated to



develop their skills. Support from schools, including the provision of resources and follow-up training, is also crucial to ensuring the sustainability and effectiveness of this program. In this way, teachers can continue to improve the quality of education and prepare students to succeed in the dynamic and complex environment of the future.

## 5. CONCLUSIONS

From activities with the topic of training on the use of 21-4C century competency assessments covering Critical Thinking, Creativity, Communication, Collaboration in Project-Based Learning, the community service team of Master Pedagogy, Universitas Lancang Kuning concluded that this training activity could provide knowledge, participants' understanding and ability to use 21st century skills assessment rubrics and design a variety of PjBL. Training on the use of 21st century or 4C skills assessment rubrics for vocational school teachers is a strategic step in improving the quality of education. By focusing on critical thinking, creativity, communication and collaboration skills, this training helps teachers adopt evaluation methods that are more comprehensive and relevant to the needs of modern industry. Through understanding and applying this rubric, teachers can more effectively measure and develop student abilities that are essential for success in the digital and globalization era. Finally, this activity does not only improves teachers' professional competence, but also prepares students to face future challenges better.

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