4Cs Analysis of 21st Century Skills-Based School Areas

Ahmad Khoiri¹, Evalina², Nur Komariah³, Rahayu Tri Utami⁴, Vip Paramarta⁵, Siswandi⁶, Janudin⁷, and Denok Sunarsi⁸*

¹Department of Physics Education, Universitas Sains Al Qur’an, Central Java, Indonesia,
², ⁴, ⁶Politeknik LP3I Jakarta, Indonesia,
³Universitas Islam Indragiri, Indonesia,
⁵Pascasarjana Universitas Sangga Buana Bandung Indonesia.
⁷, ⁸Universitas Pamulang, Banten, Indonesia

*denoksunarsi@unpam.ac.id

Abstract. The study aimed to analyze 4Cs (Critical thinking, Creativity, Communication, and Collaboration) 21st Century Skills which were based on the student's school environment different from concepts of science. Types of quantitative research with data collection methods in the form of observations, tests, questionnaires, and documentation. Based on comparative t-test analysis results in significant no differences in critical thinking (C1), that creativity (C2) and Communication (C3) higher than middle and rural areas, while teamwork and collaboration (C4) Rural area students are higher than the urban and middle area. This shows the culture of the surrounding environment that affects students' 4c skills. Interestingly, the lifestyle patterns of the Rural Area and Urban Area greatly affect student collaboration in the learning process. the habit of mutual assistance, scolding greetings, and getting to know each other is more entrenched in the Rural Area.

Keyword: 4Cs of Century 21st Skills and School Areas.

1. Introduction

The 4C expertise is part of the fundamental expertise recommended by a team of experts in the New World of Work in the 21st Century (L.W, 2007; Mulford, 2008; Pacific Policy Research Center, 2010). 4C’s expertise as a solution to global challenges through critical thinking in contributing new ideas as creative individuals, able to solve real problems, and able to work together and collaborate in teams. The fact is not the case, students are not able and ready to face globalization, based on the results of preliminary observations stating student success in learning is indicated through the understanding of concepts only, the exploration of skills is still rarely found. It is expected that students who are 21 years old have not been met. Furthermore, student backgrounds have an important role in activities and learning patterns that can support successful learning. Student backgrounds make unique contributions to study habits (A. Khoiri, Kahar, & Indrawati, 2018). The 21st Century has seen major social, economic, political, and cultural transformations. The current role of teacher mentoring as one of the development strategies that are in line with the demands of 21st century professional and school teachers (Beare, 2001; Hargreaves, A. & Fullan, 2000; Hargreaves, 1997). The research objective is to learn the 4C skills needed by students and students can learn the 4C skills of students based on the school area of the Urban Area, Central Region, and Rural Areas.
2. Methods
The population for the trial category 1 Urban Area is SMA A, Category 2 Middle Area is SMA B and Category 3 Rural Area is SMA C with the aim of the research sample to analyze 4C skills based on different school backgrounds, so the purposive sampling technique used in research (Budiyono, 2015, 2017). The study was divided into two classes, namely the experimental class using science teaching materials with guided inquiry learning, while the control class as a comparison using teaching materials that were available in schools and conventional learning. The population was carried out in Wonosobo Regency, Central Java Province, Indonesia. The data collection method uses the Collaboration (C3) sheet during the learning process. Tests for understanding concepts for critical thinking (C1) and Communication (C4), and Questionnaire creativity (C2). After the data is collected, the analysis of differences in school samples based on Urban Area, Middle Area and Rural Area uses t-test. The conversion of ratings to a scale of four is presented in Table 1.

Table 1. Scale Conversion of 4 (four) 21st Century 4C Skills Assessments (Reference Criteria Criteria)

| Range of scores | Category       |
|-----------------|----------------|
| X ≥ 63          | Very good      |
| 63 > x ≥ 52,5   | Good           |
| 52,5 > x ≥ 41   | Enough         |
| X < 41          | Less           |

3. Results
The implementation of learning was observed by two observers (observer) namely science teacher (Observer 1) and peers (Observer 2). Observer provides an assessment on the observation sheet provided based on all observed activities. The RPP implementation assessment sheet is the syntax of Guided Inquiry. The results of a summary of the learning feasibility assessment are shown in Table 3.

Table 2. Results of the Assessment of the Implementation of Guided Inquiry Learning

| No | The Learning  | Jumlah soal | Score       | Test 1 O1 | O2 | Test 2 O1 | O2 |
|----|---------------|-------------|-------------|-----------|----|-----------|----|
| 1  | Initial Activity | 4 item     | 3           | 4         | 4  | 4         |    |
| 2  | Core activities | 12 item    | 11          | 12        | 12 | 11        |    |
| 3  | Closing activities | 3 item    | 2           | 3         | 3  | 3         |    |
| 4  | Rating         | 2 item     | 2           | 2         | 2  | 2         |    |
| Summary |           | 21         | 18          | 21        | 21 | 20        |    |

Percentage of results: 20: 21 x 100% = 95%

Note:
O1 : Observer 1
O2 : Observer 2
The data generated in Table 3 is converted to a scale of four presented in table 4.

Table 3. Conversion Assessment of the Execution of Lesson Plan

| Range of scores | Category       |
|-----------------|----------------|
| X ≥ 21          | Very good      |
| 21 > x ≥ 10,5   | Good           |
| 10,5 > x ≥ 7    | Enough         |
| X < 7           | Less           |
Trial 1 was done well and trial 2 was done very well. Less optimal implementation of trial 1 can be seen from the step of presenting the results of activities and ways students find science concepts. The observer assesses that the teacher is not maximally directing and guiding students to present the results of the experimental activities, the students' guided inquiry is not very visible. Whereas guided inquiry can be facilitated by problem confrontation, which is strengthened that the level of inquiry shows an average Discovery Learning skill of 65.46%, Interactive Demonstration of 62.35%, Inquiry lesson of 51.82% (Susilowati, Sajidan, & Ramli, 2018). The Lesson Inquiry has the lowest level because students are interested in proving a concept, conducting investigations is still lacking (Wenning & Khan, 2011). Then corrected in trial 2, so that the learning component can be carried out by the teacher with a maximum with an average percentage of evaluating the feasibility of the trial by 95%.

![Figure 1. Trial of Students' 4C Skills](image)

Figure 1 as a student learning activity in a trial by growing 4C Century 21st Skills Critical Thinking (C1), Creativity (C2), Collaboration (C3), and Communication (C4). The actual score obtained by students is the average score of the two methods of observation presented in Table 5.

| No | Skills Code | Range of scores | Category |
|----|-------------|----------------|----------|
| 1  | C1 dan C3   | X ≥ 60         | Very good|
|    |             | 60 > x ≥ 50    | Good     |
|    |             | 50 > x ≥ 40    | Enough   |
|    |             | X < 40         | Less     |
|    |             | X ≥ 75         | Very good|
| 2  | C2 dan C4   | 75 > x ≥ 62,5  | Good     |
|    |             | 62,5 > x ≥ 49  | Enough   |
|    |             | X < 49         | Less     |

The 4C skill component criteria in C1 consist of 20 questions, C2, C3, and C4 consist of 15 questions, each of which has different interval criteria. The results of the breakdown of 4C skills growth achievements are presented in Table 6.

| 4C Skills | Percentage |
|-----------|------------|
| C1        | 64%        |
| C2        | 75%        |
| C3        | 79%        |
| C4        | 70%        |

Table 6 states that student learning creativity is in a good category, with 75% of students developing ideas based on guided inquiry activities by utilizing the local environment as a learning resource. The results of the ability of critical thinking and problem solving reached 64% showed results that were not optimal, but the purpose of the first trial to know the feasibility of learning. The students' communication skills are still low in asking questions and issuing ideas, so there is a further revision to prepare for 2. Student responses are students' responses to teaching materials used in science learning, then data is
generated from the response questionnaire given after the implementation of inquiry learning. To find out whether students' responses are positive or negative. For more details, researchers present Table 7 about the results of students' responses to teaching science concepts.

### Table 6. Convert Actual Student Response Scores

| Subject (UC) | Actual score | Percentage (%) | Category       |
|--------------|--------------|----------------|----------------|
| UC 1         | 13           | 86             | Very Respond   |
| UC 2         | 12           | 80             | Respond        |
| UC 3         | 10           | 67             | Respond        |
| UC 4         | 14           | 93             | Very Respond   |
| UC 5         | 9            | 60             | Simply Respond |
| UC 6         | 10           | 67             | Respond        |
| UC 7         | 11           | 73             | Respond        |
| UC 8         | 11           | 73             | Very Respond   |
| UC 9         | 14           | 93             | Very Respond   |
| UC 10        | 15           | 100            | Very Respond   |
| UC 11        | 12           | 80             | Respond        |
| UC 12        | 12           | 80             | Respond        |
| **Average**  | **12**       | **79%**        | **Respond**    |

In the learning process, only teaching materials are used as a form of implementation of science learning. Answer criteria yes or no in determining the statement about the problem that 78% of students respond strongly, students feel interested and happy about learning science that utilizes the local environment as a learning resource that is strengthened by research (Atmojo, 2012; A Khoiri & Haryanto, 2018; Ahmad Khoiri, Syifa, & Mubin, 2018; Martati, Suryaningtyas, & Hariyadi, 2019; Parmin, Sajidan, Ashadi, & Sutikno, 2015). Rural Area in learning introduces the potential or excellence of the local environment itself. The test results of learning outcomes before they are applied to trials Scale 1 and 2 are used to determine the level of difficulty, different power, validity, and reliability of the test. The results of the test questions can be presented in Table 8.

### Table 7. Trial Results Learning Problem Test Results

| Result                  | Item | Actual Score | Criteria |
|-------------------------|------|--------------|----------|
| Degree of difficulty    | 7    | -            | Easy     |
|                         | 21   | -            | Medium   |
|                         | 2    | -            | Hard     |
|                         | 9    | -            | Ugly     |
| Different power         | 7    | -            | Enough   |
|                         | 7    | -            | Good     |
|                         | 7    | -            | Very Good|
| Validity Test           | 18   | -            | Valid    |
|                         | 13   | -            | Invalid  |
| Reliability Test        | 30   | 0.83         | High Reliability |

After knowing the criteria for the test results of learning outcomes, in Trials 1 and 2 used 20 questions consisting of 18 questions with valid criteria and 2 invalid questions revised and refined. Student learning outcomes were obtained from the test questions after learning in the Limited Scale trial was completed, although all students received learning treatment, those 12 students were identified. Mastery learning outcomes by 85% that the teaching materials developed are effective, easy to, and attract students' attention, even though they have not reached 100% completeness. After getting advice and input from students and observers in trial 1, the product developed is improved and will be used later in
trial 2. Data obtained from the results of trial 2 are the implementation of learning through lesson plans at each meeting, 4C student skills profile, results in Student responses to the use of local environmental orientation science teaching materials, and student learning outcomes after being given learning treatment are presented in figures 2.

- Work (W)

\[ W = p\Delta V = p(V_2 - V_1) \]  
(1)

- Heat (Q)

\[ Q = mc\Delta T \]  
(2)

- Proses Adiabatik

\[ p_1V_1 = p_2V_2 \]  
(3)

Figure 2. Application of Science concepts in developing 4C Skill

Based on Figure 2, the effort is a measure of energy transferred from the system to the environment or vice versa. When we stir the Purwaceng (Local Typical Coffee) drink in a glass in figures 2a and 2b. If we view water in a glass as a system, it means that work is done on the system. The ability to think critically is presented in the form of activities that are the source of problems and then resolved. The results of the study are strengthened by the skills of learning and innovation that can be done with critical thinking skills (Ahmad Khoiri, 2018). Students’ critical thinking is shown in Figures 2c and 2d about opaque production activities to consider the extent of opaque before and after frying. The concept of expansion or increase in the area after being given the heat. Next figure 2e and 2f about the Adiabatic thermodynamic process in the thermos work system. Figures 2a, 2c, and 2e show student learning activities that can foster 4C skills. The 4C skills grown in the experimental and control class through guided inquiry learning were analyzed using a t test to determine whether or not there were differences in 4C skills in the Urban Area, Middle Area, and Rural Area school areas presented in Table 9

| 4C | n₁ | n₂ | Dk= n₁+n₂− 2 | Uji t | Taraf sig. | criteria | Summary |
|----|----|----|---------|-------|----------|----------|--------|
|    |    |    |         | tₘᵦt | tₘₐb    |          |        |
| C1 | 37 | 40 | 75       | 1.87  | 1.992   | 5%       | H1 rejected, tₘᵦt < tₘₐb (1.89 <1.992) | no different |
| C2 | 37 | 40 | 75       | 3.61  | 1.992   | 5%       | H1 accepted, tₘᵦt > tₘₐb (3.78>1.992) | different |
| C3 | 37 | 40 | 75       | 4.23  | 1.992   | 5%       | H1 accepted, tₘᵦt > tₘₐb (4.21>1.992) | different |
| C4 | 37 | 40 | 75       | 3.58  | 1.992   | 5%       | H1 accepted, tₘᵦt > tₘₐb (3.51>1.992) | different |
Table 9 shows Critical thinking (C1) as a form of thinking in activities in solving environmental problems in the concept of science there is no significant difference between the experimental class and the control class, it is assumed by researchers that problem solving cannot be influenced by students' backgrounds, because the idea of problem-solving is very complex depends on the different habits of thinking of each individual, so it is difficult to distinguish and will foster critical thinking.

Collaboration (C4) is grown through the results of discussions and division of tasks with group members. Mutual respect allows arguing with friends and can collaborate theories owned by each individual (Byers, 2010; Harskamp, E., and Ding, 2006). Furthermore, collaboration and collaboration with real-life that exists in society through the concept of science is effective in building that is built through creative ideas (Byers, 2010).

4C skills there is a range of differences in the results of the greatest ability is the ability of student communication, shows the implementation of science teaching materials developed have a good contribution to growing 4C skills. Based on the results of the study on three trial samples 2 can be presented in figure 3.

![Figure 3. Student 4C Skill Results](image)

Figure 3 states the 4C skills profile differs in each sample school area. C1, C2, and C3 Urban Area samples are higher than the Middle Area and Rural Area. An interesting result is the collaboration and collaboration (C4) of the Rural Area sample is higher than the Urban Area sample which is strengthened by the results of the study (A Khoiri & Haryanto, 2018).

4. DISCUSSION

4Cs analysis based on research results experiences several 21st-century skills gaps based on different school areas. Samples are taken based on students' sensitivity in responding to increasingly sophisticated globalization, where the role of students in overcoming global problems starts with the fulfillment of 4C skills.

4.1. Critical Thinking (C1)
Critical thinking of students is indicated through problem-solving students Urban Area, Middle Area, and Rural Area there are no significant differences. Therefore there is still much research that needs to be developed and acted upon. (A. Khoiri et al., 2018) that school backgrounds influence differences in the 21st-century skills of students. 3) students' problem-solving abilities are not influenced by one's background or life but realistic thinking habits depend on the problems faced by someone.

4.2. Creativity (C2)
Student creativity is not based on school background, but creativity is built on the ability to produce new and appropriate ideas (Anwar, Aness, Khizar, Naseer, & Muhammad, 2012; Diki, 2014; Tendrita, Mahanal, & Zubaidah, 2016), so that the goal of science education is achieved to adapt to different conditions, think flexibly, be creative, think critically, respect the community and be tolerant of ideas (Ogawa, 1986; Okwara & Upu, 2017). Furthermore, creative thinking skills are an important part of learning skills (A. Khoiri et al., 2019; A. Khoiri & Sunarno, 2019; Türkmen, 2015) which are cognitive activities in finding solutions to solve problems (Malik, Nuraeni, Samsudin, & Sutarno, 2019), as well as finding ideas to solve these problems (Silaban & Utari, 2015; Sumarta, 2017; Supriyadi, Haeruddin, & Nurjannah, 2016).

4.3. Communication (C3)

Communication skills in learning become the main factor to appreciate the ability of ideas possessed by conveying verbally through the presentation of students' findings is required to communicate well. the fact that student communication has a major contribution to the results of figure 3 research even though students in rural areas are smaller than the middle and urban areas. Urban areas have more dominant communication skills with identical millennial lifestyle habits and better communication technology training. Evidenced by the results of the 4C communication skills dominate the highest among the other 3C.

4.4. Collaboration (C4)

Effective communication through group presentations and discussions to work together and collaborate with technology. The science concepts learned are easily accepted and understood by students because direct learning in real-life student applications, so that the learning outcomes of the experimental group are higher than in the control class (Grose & Grose, 2014). Some of the researchers' assumptions are as follows: 1) Most students in Urban Area schools have information changes more quickly when compared to the Rural Area, so that students' habits in using IT more and practice in different creations. Internet access is easier to get in the Urban Area area, many internet cafes, signals are easier to get and the center of the crowd. The environmental background strongly supports the learning process in schools; 2) Most students in the Rural Area prioritize cooperation so that the habit of cooperation can be easily explored because they are already accustomed to their environment.

Analysis of 4C skills students have significant differences. Activities in the form of student activity sheets through guided inquiry approaches are trained to come up with creative ideas but have not been able to utilize critical thinking skills significantly as evidenced by the absence of differences between sample categories.

Furthermore, the positive response of science teaching materials by 79% on learning outcomes and 4C skills. Differences in learning outcomes using t-test related variants because the number of samples $n_1 = n_2$ and homogeneous variance, $d_k = n_1 + n_2 - 2 = 75$, the significance level of 5% then $t_{\text{tab}}$ is greater than $t_{\text{hit}}$ (2.43 > 1.99) then $H_1$ accepted means that there are differences in learning outcomes between the experimental class and the control class.

Based on the results of the study there are important recommendations for the advancement of education in Indonesia, in general, to deal with the era of modernization in the 21st century, 4C skills are needed among other important skills such as technology literacy and carrier and life. The concept of education that looks at student demographics is needed to bridge the development of 21st-century skills holistically, respecting cultural and racial-ethnic groups, so that policymakers need to manage education to prepare 21st-century professionals who are professional in all aspects of life such as social, cultural and economic through education based on the local cultural environment, upholding the nation's character and maintaining scientific performance through 4C skills.
5. CONCLUSION

21st Century 4C skills students there is no difference in critical thinking skills (C1) between village and city school, then creativity (C2) and Communication (C3) Urban Area students are higher than Middle Area and Rural Area students, but on the other hand collaboration skills (C4) Rural Area students are higher than Urban Area and Middle Area students. Interestingly, the lifestyle patterns of the Rural Area and Urban Area greatly affect student collaboration in the learning process, the habit of mutual assistance, scolding greetings, and getting to know each other is more entrenched in the Rural Area. So that the practical ability to find creative solutions with collaboration and collaboration between teams is greatly influenced by school backgrounds that affect students 'learning habits, but not in solving problems through critical ideas that are influenced by school backgrounds but are more dominant in students' thinking activities in conducting habits think scientifically and contextually.

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