



Assessment of 4C Softskills Characteristics in Learning Productive Graphic Design Subject for Vocational School

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Abstract

The number unemployment of productive working age from Vocational High Schools (SMK) is in the top rank of 9.27% of 131.55 million people in the workforce. This happens because learning process focuses on teaching hard skills and ignores soft skills so that it causes the low absorption of graduates in the world of work. At the moment the quality of the learning assessment instrument in Vocational Schools is still considered to be invalid so that it has not been able to evaluate aspects that are evaluated in full in relation to soft skills. This study aims to develop 4C assessment instruments in productive learning of graphic design. Research and Development methods are applied in this research to produce assessment products in the form of tests and non-tests. This research produces an assessment instrument in the form of a test used to measure the cognitive domain (knowledge) while the non-test / performance (performance test) is used to measure the affective domain (attitude) and psychomotor (skills). The instrument has: (1) A validity level of 95%; (2) Effectiveness 81%; (3) Consistency level of 0.62; and (4) Reliability Level 0.875. This assessment instrument can be used by teachers in productive learning graphic design so that it can help in the assessment process.

INTRODUCTION

The industrial revolution 4.0 is also known as the digital revolution and the era of technological disruption. The era of technological disruption is a process of automation and connectivity in an area of industrial movement. The development of technology in question has an impact on the world of education, namely how human ability is in using technology (Thai & M. A Le, 2017). The impact of the 4.0 industrial revolution in education, especially on vocational education according to Yahya (2018), shows that the number of unemployed people who came from vocational high schools was ranked 9.27% of 131.55 million people in the workforce. Suprpto (2018) the increasing number of job seekers graduating from vocational schools is caused by the incompatibility between the competencies of graduates and industrial needs. According to Samsudi (2016) the cause of the many graduated students from SMK is in fact, many graduates prefer to look for work rather than become entrepreneurs.

The high number of unemployment graduated from vocational high school is caused by the learning system that is still focuses on teaching hard skills, and ignores evaluations related to soft skills so that it is one of the causes of the low absorption of graduates in the world of work. From the eight national education standards one of which is related to the standard of education assessment in this case related to the assessment of the learning outcomes of students, it seems that there has not been a lot of comprehensive studies, especially relating to the evaluation of assessment used by teachers. According to Sudana (2015), The strategy in developing softskills proficiency can be reach through four stages, namely: (1) self-talent development, (2) environmental adaptation, (3) involvement in organizations and (4) social mental development.

The learning system in SMK needs a change, especially in the aspect of assessment. According to Yahya (2018) that the right learning system to respond to the challenges and opportunities of the 4.0 industrial revolution in vocational education is the twenty-first century learning system. Twenty-first century learning leads to Learning and Innovations Skills (LIS-5C) competencies which include: (1) Creativity; (2) Critical Thinking; (3) Communication; (4) Collaboration; and (5) Celebration (Putu, 2017).

The concept of twenty-first century LIS-5C learning on celebration characteristics is still in the process of assessment. Characteristics of the twenty-first century learning system according to Arifin, (2017); Prihadi, (2017); Pannen (2017); and Zubaidah (2017) namely 4C characteristics: (1) Communication; (2) Collaboration; (3) Technical Thinking and Problem Solving; and (4) Creativity and Innovation. There are two points of difference between LIS-5C and 4C.

Prihadi, (2017) 4C skills support twenty-first century learning systems. This ability is evidenced by the success of students in reading maps, delineating aerial photographs, and determining the direction of evacuation when floods occur. According to Bamalli (2013) Twenty-first century learning has the concept that students have sufficient thinking skills and knowledge so they can develop life skills in their careers. Hakkinen (2016) Twenty-first century learning requires several approaches in the process and learning activities such as the inquiry learning approach that focuses on aspects of collaboration or cooperation, social learning and the use of Communication Information Technology (ICT) as a supporting tool. Bell (2016) skills relevant to twenty-first century learning include the realm of ways of thinking consisting of aspects of creativity, critical thinking, problem solving and decision making. Zarobe (2015) Content-Based Instruction (CBI) learning model of learning has the same relevance to the twenty-first century system. Abdurrohman (2016) learning station learning with metaphorical thinking is effective in interpreting, analyzing, evaluating, and solving problems with precise, detailed and clear steps. According to Zubaidah, (2017) the need for studies or research to develop a variety of curricula, approaches, models, strategies, methods, assessments and all related matters, which are effective in preparing students' competencies and skills towards the twenty-first century.

Because of the ineffectiveness of developing assessment instruments to measure soft skills, especially on the 4C characteristics of productive lessons in vocational students, so that it needs research to develop these assessment instruments. So the purpose of this research is to develop an assessment instrument to measure soft skills especially on the characteristics of 4C productive subjects of graphic design. The intended assessment instrument can be used by educators in this case the teacher in measuring soft skills of vocational students at the time of Teaching and Learning Activities (KBM).

METHOD

This research is included to R & D research. Research and Development is a research method used to produce certain products and assess the effectiveness of these products ", (Sugiyono, 2014). The research and development design used was the 4-D (Four-D Models) S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel (1974) models. The 4D development model (Four-D Models) consists of 4 main stages, namely: Define, Design, Develop and Disseminate. The design of the 4-D (Four D Models) model development research is shown in Figure 1.

1. Define Stage

Define stage learning evaluation is a stage to look for information in the field related to the learning system, strategy and evaluation models used in SMK. The information obtained will be taken into consideration to develop an assessment of 4C characteristics. In addition, this information is also used as information on the factual conditions of the application of existing assessments at SMK.

2. Design Stage

Design stage is the stage of the results of the definition stage used as a basis in compiling or determining the form, format, indicators and grids in making the development of 4C characteristic assessment instruments. The results of the instrument development will be the basis for making test and non-test measuring instruments. This measuring instrument will be used to measure the cognitive, affective, and psychomotor domains of students. The development of a ready-made evaluation instrument will be measured by the level of validity using a measuring instrument in which there is a scale, a screening system and instructions. Furthermore, a limited sample is tested and taken into account.

3. Develop Stage

Develop stage this is the stage of testing the validity of the results of the development of the instrument and its measuring instruments. The test was carried out by several experts in the field of educational evaluation instruments. Then after being declared feasible by the examiner, the next step is to do a trial with a limited sample and measurement.

4. Disseminate stage

Disseminate stage it is the application stage of the results of the development of the instrument and its measuring instruments which have been declared valid by the examiner and are ready to be applied to the Project Based Learning (PjBL) model. The results of the application will be measured next to determine the effectiveness of the use of the results of the development of the instrument and its measuring instruments.

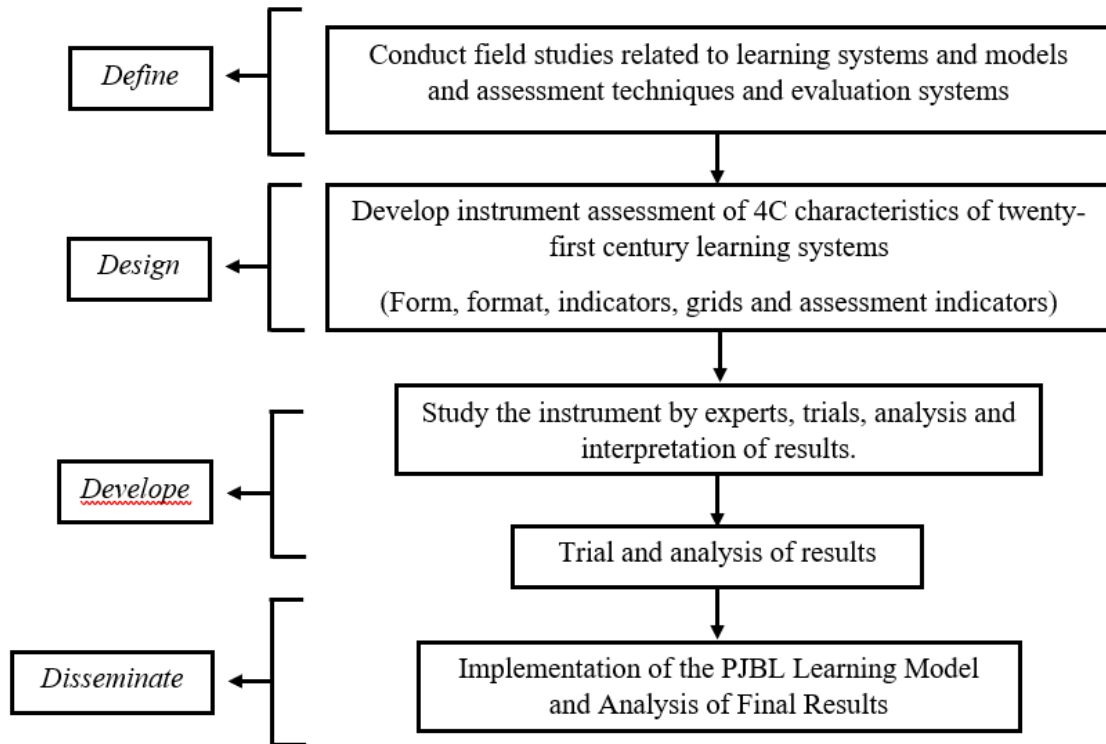


Figure 1. 4-D Model Development Research Design Diagram.

Sources of data used are the primary data obtained through observation, interviews, and documentation to research. This research was conducted at the level of education in Software Engineering Skills Competency (RPL) of Tenth Class of Graphic Design Basic Subjects at SMK Ibu Kartini Semarang in 2018-2019 with a total of 57 respondents.

The validity, reliability, and effectivity test non-test measure instruments using the expert validity test (expert judgment), kappa coefficient test from Cohen to analyze the reliability of the instrument (Azzahari et al, 2017) while to analyze the level of effectiveness is based on student achievement in completing the entire 4C characteristic assessment process . The test instrument uses a test of difficulty analysis, distinguishing power, and deception on each item and analysis of test reliability.

RESULTS AND DISCUSSION

The product that has been developed is in the form of an assessment to measure the characteristics of 4C in the form of tests and non-tests. The assessment instruments developed are applied to measure the cognitive, affective and psychomotor domains. Measurement in the form of tests is used to measure cognitive domains (knowledge) while to measure affective domains (attitudes) and psychomotor (skills) using non-test instruments in the form of performance tests (performance tests). Assessment is applied to the PjBL model. The results of the development can be seen in table 1.

Table 1. Factual Conditions of 21st Century Learning System Instruments

Fact	Ideal	Development
The test instrument still uses questions based on cognitive levels C1 (knowledge), C2 (understanding) and C3 (application).	Questions should use a little cognitive level C4 (analysis), C5 (evaluation) and C6 (creation) or Higher Order Thinking Skills (HOTS) based	Apply cognitive level based questions C4 (analysis), C5 (evaluation) and C6 (creation) or Higher Order Thinking Skills (HOTS) based.

Non-test instruments are still generally only assessing preparation, work process and work results, work attitude and time. There are no detailed indicators that lead to the characteristics of 4C	Non-test instruments should aim at the 4C characteristics (creativity, critical thinking, communication, and collaboration) on each characteristic having clear indicators. Non-test instruments based on affective level A1 (receiving), A2 (responding), A3 (assessing), A4 (processing) and A5 (experiencing) and psychomotor level P1 (imitating) P2 (manipulating) P3 (experience) and P4 (articulation) .	Implementing the performance test instrument based on 4C characteristics (creativity, critical thinking, communication, and collaboration) based on the affective level A1 (receiving), A2 (responding), A3 (assessing), A4 (processing) and A5 (living) and psychomotor level P1 (imitating) P2 (manipulating) P3 (experience) and P4 (articulation) .
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The assessment of the test is in the form of multiple choice questions based on HOTS (Higher Order Thinking Skill) questions while the non-test assessment takes the form of a performance test with a rating format in the form of a check-list using a Likert scale. The instrument developed can measure the aspects of 4C characteristics which include: (1) Communication; (2) Collaboration; (3) Technical Thinking and Problem Solving; and (4) Creativity and Innovation.

The 4C characteristic assessment products developed have gone through several tests, both test and non-test instruments. Non-test instrument (performance test) has a validity level of 95%. The validity level is based on three validators from Vocational School teacher representatives in productive subjects. Average of results for all three validators:

Validator 1 :

$$P \text{ average} = \frac{95 \% + 92.5 \% + 97.5 \%}{3} = 95 \%$$

Based on the kappa coefficient test, it is stated that the valuation product is consistent for measurements based on the average calculation as follows:

$$k \text{ average} = \left(\frac{k1 + k2 + k3}{3} \right) = \left(\frac{0.74 + 0.62 + 0.5}{3} \right) = \frac{1.86}{3} = 0.62$$

Based on the effectiveness test stated that the valuation product is declared effective by 81% for measurement based on the following calculation:

$$PK(x) = \frac{46}{57} \times 100\% = 81 \%$$

The 4C characteristic assessment product is in the form of a test, after testing the questions on a limited sample, the level of difficulty of the items obtained from the total number of questions 32 items, there are a number of difficult questions are 4 items, 14 items are medium and 14 items are medium. Based on the analysis of the power difference test on the test items that out of the total 32 questions, there are 27 valid items and 5 invalid questions.

Based on the analysis of the deception power test on the test items that out of a total of 32 items, there are 31 items that have good deception while 1 item has a poor deception. Based on the analysis of the reliability level of the test items contained in the test instrument in the form of multiple choice questions based on HOTS declared reliable, because it has a reliability of $0.875 > 0.3$. These results are based on the calculation process as follows:

$$St^2 = \frac{7959}{29} - \left| \frac{451}{29} \right|^2 = 32.59$$

$$KR - 20 = \frac{27}{26} \cdot \left(1 - \frac{5.1}{2 \cdot 32.59} \right) = 0.875$$

After the assessment instrument is declared valid and reliable, then, it is applied to the PjBL Model. The results of the application of the instrument can be seen in figure 2 4C Competency Distribution Graph.

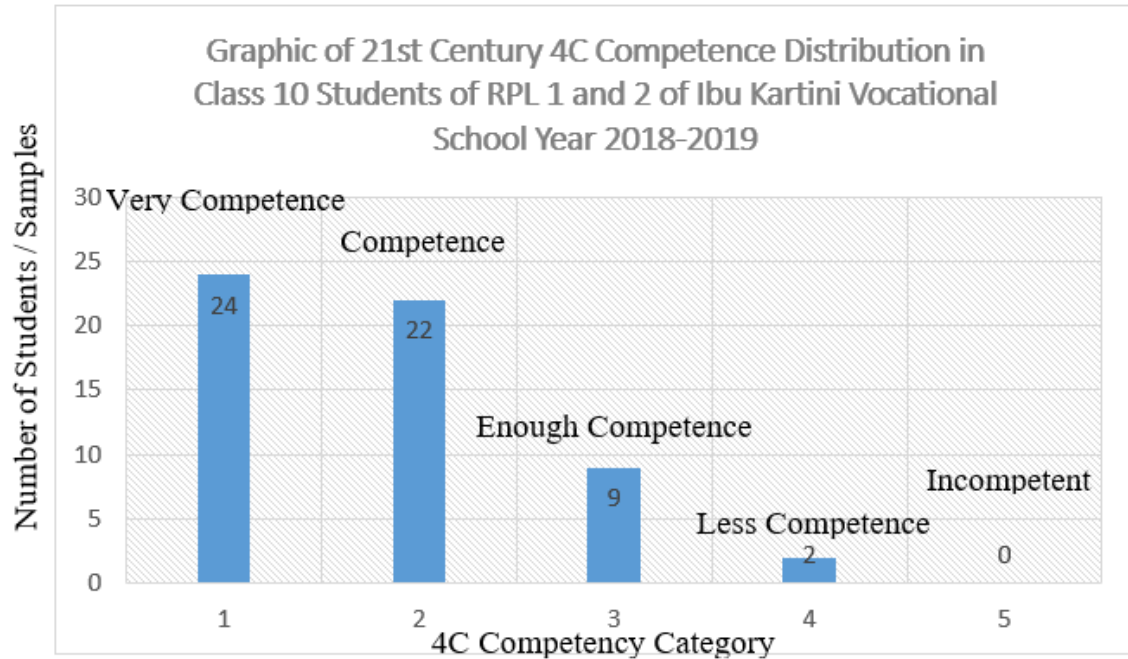


Figure 2. Graph of Competency Distribution of 4C Twenty One Century Learning Systems

Based on the graphic picture 2, students who are categorized as less competent are caused because in terms of cognitive, affective and psychomotor aspects have poor competence. While students who are categorized as quite competent are caused in terms of cognitive aspects of having poor competence and in terms of affective and psychomotor having good competence. Students who are categorized as competent and very competent in terms of cognitive, affective and psychomotor aspects have good competence. Cognitive, affective and psychomotor assessments were obtained from HOTS-based multiple choice test results while non-test assessments were in the form of performance tests with check-list format using a Likert scale. Both forms of assessment are applied to the PjBL model. Students who are categorized as competent and very competent from 4C characteristics have good and very good aspects. However, students who are categorized as sufficient and less competent have only a few of the aspects of the 4C characteristics.

The indicators to measure each of the aspects of 4C characteristics in Vocational Learning in Basic Graphic Design subject are as follow:

1. Communication

Communication skills include skills in conveying thoughts clearly and persuasively orally and in writing, the ability to express opinions with clear sentences, convey commands clearly, and can motivate others through speaking skills (Zubaidah, 2017). The indicators for assessing aspects of communication are as follow:

- Have the attitude to be able to listen and respect the opinions of others.
- Have a confident attitude in communicating and expressing their ideas.
- Have an honest attitude and responsibility for ideas or ideas that have been put forward.
- Able to express ideas or ideas that are owned in public.
- Able to use spoken and written language that is appropriate to the content of the person they are talking with or who is invited to communicate.
- Able to communicate using logical and structured thought flow.
- Being able to communicate is not limited to only one language, but with multi-languages.

2. Collaboration

Team collaboration can be developed through experience in school, between schools, and outside school. Students can work together collaboratively on authentic project-based assignments and develop their skills through peer tutoring in groups (Zubaidah, 2017). The indicators to assess aspects of cooperation are as follow:

- Able to have the ability to cooperate or coordinate group members.
- Able to adapt to various roles and responsibilities and work productively with others.
- Able to have empathy and respect different perspectives of others in working in groups.
- Able to compromise with other members in the group for the achievement of predetermined goals.
- Able to do the principles of cooperation in group activities.
- Able to apply the concept of cooperation in group activities.
- Able to do collaboration between groups.
- Able to analyze the ability of cooperation within him to become a leader in the group.

3. Critical Thinking and Problem Solving

This skill is fundamental in learning in the twenty-first century. Critical thinking skills include the ability to access, analyze, synthesize information that can be learned, trained and mastered (Zubaidah, 2017). Critical thinking skills also describe other skills such as communication and information skills, as well as the ability to examine, analyze, interpret, and evaluate evidence. The indicators to assess aspects of critical thinking and problem solving are as follow:

- Able to have a critical attitude in seeing the conditions around.
- Able to have a sensitive attitude / respect for the conditions around.
- Able to have independent character in solving a problem around.
- Able to have a confident and optimistic character in responding to the conditions around.
- Able to use various types of reasoning / reasoning.
- Able to make judgments and determine decisions effectively in processing data and using arguments.
- Able to test results and establish connections between information and arguments.
- Able to process and interpret information obtained through initial conclusions and test it through the best analysis.
- Able to make solutions to various problems both in general ways and in their own way.
- Able to use the capabilities they have to try to solve problems.
- Able to arrange and express, analyze, and solve a problem.

4. Creativity and Innovation

Achieving professional and personal success requires innovative skills and a passion for creativity. Creativity and innovation will further develop if students have the opportunity to think divergent (Zubaidah, 2017). Students must be triggered to think outside of existing habits, involve new ways of thinking, get opportunities to convey new ideas and solutions, ask unusual questions, and try to put forward alleged answers. The indicators to assess aspects of creativity and innovation, are as follows:

- Able to be open and responsive to new and different perspectives.
- Able to have an attitude of confidence in conveying new ideas to others.
- Able to have a responsible attitude for new ideas submitted to others.
- Being able to express creative ideas conceptually and practically.
- Able to have the ability to develop, implement, and convey new ideas orally or in writing.
- Able to use concepts or knowledge in new and different situations, both in related subjects, between subjects, and in contextual issues.
- Able to use failure as a vehicle for learning.
- Able to have the ability to create novelty based on the initial knowledge possessed.
- Able to adapt to new situations and contribute

CONCLUSION

The factual conditions in Vocational Schools related to the assessments used by test instruments still use questions based on C1 (knowledge), C2 (understanding) and C3 (application) cognitive level and non-test instruments are still generally only assessing preparation, work processes and results, work attitude and time . There are no detailed indicators that lead to the assessment of 4C characteristics. The development of 4C assessment tools in teaching productive Vocational Schools leads to the application of cognitive level-based questions C4 (analysis), C5 (evaluation) and C6 (creation) or HOTS-based and the creation of performance test instruments based on affective levels A1 (receiving), A2 (responding), A3 (assessing), A4 (processing) and A5 (living) and psychomotor level P1 (imitating) P2 (manipulating) P3 (experience) and P4 (articulation).

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