

The level of creativity of vocational school students in 21st century learning

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Abstract—Problem formulation in this study, the author tries to answer in a way 1) To find out how the level of creative thinking of Vocational students in the 21st century the author will answer it by using the national examination results analysis data, doing a level analysis of creative thinking and doing tests, 2) To find out how 21st century learning authors will try to find data in the form of relevant research results, 3) To find out how to improve creative thinking will see from the perspective of the model or method of learning based on the results of previous research. The findings in this study 1) the level of students' creative thinking skills are still relatively low 2) 21st century learning is learning that emphasizes the development of creative thinking skills. 3) the effort that can be done as a teacher to improve creative thinking skills is through the use of learning models that can improve individual abilities, independence and the concept of constructivism.

Keywords—creative thinking; item analysis; national exam results; 21st century learning

I. INTRODUCTION

Mapping the challenges and opportunities of industry 4.0 to prevent various impacts on people's lives, one of which is the problem of unemployment. Unemployment is still a challenge and even tends to be a threat. The Central Bureau of Statistics (BPS) released, the number of unemployed people in Indonesia in February 2018 reached 6.87 million people. In addition, Indonesia still has big homework. Because, the open unemployment rate is the highest according to education, namely the population with the last education level of Vocational High School (SMK) which is 8.92%. Meanwhile, unemployed people with lower elementary school level reached 2.67%, junior high school (SMP) 5.18%, university 6.31%, senior high school (SMA) 7.19%, and diploma I-III of 7.92% (Sakernas). Indonesia needs to prepare a generation of innovators to process the abundant diversity of natural resources into valuable goods / services products, and create millions of new jobs. Pragmatically, vocational education must be able to prepare graduates who are ready to work professionally and / or capable of entrepreneurship to move the nation's development towards a just, prosperous, and prosperous society. Graduates of various educational institutions will be a workforce ready to enter the labor market to support the development process and at the same time fulfill their life and life needs. Industry challenges and opportunities

4.0 encourage innovation and creation of vocational education. The government needs to review the relevance of vocational education and employment to respond to changes, challenges, and opportunities in the industrial era 4.0 while taking into account humanities. The challenge of vocational education is increasingly complex with industry 4.0. Vocational education is also directed at increasing the independence of individuals in entrepreneurship in accordance with their competencies [1].

Preparation of several competencies must be done because vocational education is secondary education that prepares students primarily to work in certain fields and prepare graduates who are able and willing to work in accordance with their fields of expertise. To face the challenges of the industrial revolution 4.0 Quality education is needed and according to the development of the 21st century.

Entering the 21st century today, Indonesian education is faced with a number of challenges and opportunities, which are certainly different from previous times. In order to anticipate and adapt to the various demands and dynamics of change that are currently and will continue in the 21st century, the Indonesian nation must further hone the skills needed to deal with every revolution in education in the 21st century [2].

In line with the principles of the learning revolution, the learning process should be based on the pillars: active learning, creative learning, effective learning, and joyful learning. Learning must also be based on four pillars of education according to UNESCO (United Nations Education, Scientific, and Cultural Organization), namely: learning to know, learning to do, learning to be, and learning how to live together [3].

Creativity is the ability to give new ideas and apply them in problem solving including both aptitude traits such as fluency, flexibility, and originality in thought, as well as non aptitude characteristics, such as curiosity, likes to ask questions and always wants to find new experiences [4]. Creativity is the ability to combine, solve or answer problems, and reflect the operational capabilities of creative children [5]. According to Lindren Creative thinking is to provide various possibilities of answers or problem solving based on the information provided and trigger many ideas on a problem [6].

Based on the explanation above, the research title is "the level of creative thinking of vocational high school students in Bandung in 21st century learning". The research objectives to

be achieved are 1) What is the level of creative thinking of Vocational students in the 21st century, 2) How is the concept of learning in the 21st century, 3) How to improve students' creative thinking.

II. THEORETICAL REVIEW

The theory underlying the development of creativity can be distinguished into three [5], namely: 1) Psychoanalytic Theory pioneered by Freud Sigmund, Ernt Kris and Carl Jung, 2) Humanistic Theory pioneered by Maslow and Rogers, 3) Cziksentmihalyi's theory. According to Presseisen thinking skills can be grouped into two groups, namely: basic thinking skills and complex thinking skills or high-level thinking skills (higher order thinking). While according to Novak the basic thinking process is a picture of the rational thinking process that contains a set of mental processes from the simple to the complex [7].

According to Martinis Creative thinking skills are individual skills in using their thinking processes to produce new, constructive ideas based on racial concepts and principles and perceptions, and individual instincts. Torrance suggests four characteristics of creative thinking, namely [4]:

- Think fluently (fluency), namely the ability to create a myriad of ideas.
- Flexible thinking (flexibility / flexibility), which describes the ability of an individual to see a problem instantly from various perspectives.
- Original thinking (originality), is a category of originality refers to the uniqueness of any response given. originality is intended by an unusual, unique and rare response.
- Detailed thinking (elaboration) is the ability to decipher a particular object. Elaboration is a bridge that must be passed by someone to consume the "creative" idea to the community.

The characteristic of the 21st century according to the Ministry of Education and Culture is the availability of information anywhere and anytime (information), the implementation of machine use (computing), being able to reach all routine work (automation) and can be done anywhere and everywhere (communication). during the last 20 years there has been a shift in the development of education towards ICT as one of the 21st century education management strategies which include institutional governance and human resources, this century requires a transformation of education as a whole so that the quality of teachers can advance knowledge, training, student equity and student achievement [8].

The characteristics of the 21st century are the increasing interaction between citizens of the world both directly and indirectly, the increasing amount of information available and obtainable, the broadening of intellectual horizons, the emergence of a stream of openness and democratization in both politics and economics. increasing concern for the need to maintain the balance of the world, increasing awareness of economic interdependence, and blurring the boundaries of

certain cultural sovereignty because of the unstoppable information [9].

Furthermore, Hidyat explained the educational needs of the 21st century according to Patrick Slattery in his book entitled "Curriculum Development in The Postmodern" namely education based on the following concepts:

- Education must be directed at social change, community empowerment, liberation of mind, body and spirit (referring to the concept developed by Dorothy)
- Education must be based on 7 main things (referring to the concept developed by Thich Nhat Hanh}, which is not bound to theory, ideology, and religion; don't think narrowly that the knowledge that is owned is the most effective; others either with power, threats, propaganda or education, care for others, do not maintain hatred and anger, do not lose identity, do not work in places that destroy humans and nature.
- The learning context, curriculum development and research are applied as opportunities to connect students with the universe (referring to the concept developed by David Ort)
- Making teachers feel prosperous in learning activities (referring to the concept developed by Dietrich Bonhoeffer)
- Education that implements the vision of 21th century.

21th century readiness is a readiness in welcoming the 21st century. UNESCO has made 4 (four) pillars of education to welcome the 21st century, namely:

- Learning to how (learning to know)
- Learning to do (learning to do)
- Learning to be (learning to actualize yourself as an independent individual with personality)
- Learning to live together (learning to live together)

Education that builds competency "partnership 21st Century Learning" is a 21st century learning framework that requires students to have the skills, knowledge, and abilities in the fields of technology, media and information, learning skills, innovation, life skills and the competence of "partnership 21st Century Learning" refers to the 21st century education format carried by Hermawan, namely [10]:

- Cyber (e-learning) where learning is done by optimizing usage
- Open and distance learning where 21st century learning can be done with a distance learning model, unlimited and carried out by utilizing information and communication technology assistance
- Quantum Learning, which is applying learning methods that are adapted to the way it works
- Cooperative Learning, which is learning that uses groups as an effort to foster collaboration between

- Society Technology Science, an interdisciplinary concept that is applied to integrate problems in science, technology and society.
- Accelerated Learning, which is developing the ability to absorb and understand information quickly so that it can improve learning skills more effectively.

III. METHOD

The research method used is the documentation study method. To answer the problem statement in this study, the author tries to find data that can support the answer to the problem statement. 1) To find out how the creative thinking level of Vocational students in the 21st century the author will answer it by using the national examination results analysis data and then do a creative level analysis with creative thinking test results data using indicators of creative thinking according to Torrance, 2) To find out how the concept 21st century learning authors will try to find data in the form of relevant research results, 3) To find out how to improve creative thinking students will see the viewpoint of the model or learning method that can be used to increase creative thinking, data to be obtained based on research results beforehand.

The population in this study were all vocational students participating in the National Examination in the 2018/2019 school year. The sampling technique that will be used in this study is purposive sampling technique. Purposive sampling is also known as sampling consideration. Purposive sampling is a sampling technique used by researchers if researchers have certain considerations in sampling or determining samples for specific purposes. The samples in this study were all Medikacom Vocational School students participating in the National Examination in the 2018/2019 school year in West Java.

IV. RESULT

A. The Level of Creative Thinking of Vocational Students

To find out the level of creative thinking of students, the researcher first conducts an analysis of the results of the national examination of vocational students in West Java, then analyzes the level / type of questions used based on Bloom's Taxonomy, then surveys the sample using a test instrument to measure the level of creative thinking based on Torrance's creative thinking indicators [4]. First, the results of the national examination results in West Java can be seen in the following table 1:

TABLE I. 2017 NATIONAL EXAM RESULTS [11]

Information	Subject				Participant	Average
	Indonesian	English	Math	Vocational		
SMK	63,51	53,66	45,37	77,83	247733	60,09

Based on the table above, it can be seen that the average national examination results taken from the values of Indonesian, English, Mathematics, and Vocational grades of 60.99 based on these results are still below the KKM in general, which is 75.00. So that it can be concluded that the results of the national exam for students at the SMK level are

still low and must be improved. To find out the level of creative thinking needs to be analyzed on the national exam questions, because the questions that can be used to measure the level of creative thinking are those that are in the C5-C6 category according to reject the Bloom taxonomy. The following are the results of the national exam question analysis:

TABLE II. RESULTS OF ANALYSIS OF 2017 NATIONAL EXAM QUESTIONS

Cognitive process	C1	C2	C3	C4	C5	C6
Total	12	18	8	7	5	-

Based on the results of item analysis, it can be seen that from 50 national exam questions, the level of questions with the C5-C6 category is only 5 questions, meaning that the questions can measure the students' creative thinking level is only 10%, and this is a very small amount and unfortunate because it does not interpret the level of creative thinking of students.

The next step carried out by the researcher was to measure the level of creative thinking of students using the Torrance creative thinking test at Medikacom Vocational School as a sampel in this study. The following are the results of analytic tests on students in the Medikacom Vocational Participants:

TABLE III. ACHIEVEMENT INDICATORS CREATIVE THINKING ABILITY CLASS X SMK MEDIKACOM BANDUNG IN THE ACADEMIC YEAR 2017-2018

Class	Total students	Indicator of Creative Thinking Ability (%)			
		Flexible	Fluency	Original	Elaborasi
XI AK A	36	41,75	40,80	32,77	38,33
XI AK B	36	41,80	39,33	34,50	35,20
XI AK C	36	40,87	35,67	34,50	31,23
XI AK D	36	41,75	40,80	32,77	38,33
Average		41,47	38,36	33,92	34,92

Processing data in the table above is the result of the number of students answering correctly on each item in question divided by the number of students multiplied by 100%. Each indicator of creative thinking shows that the average ability of students in creative thinking is still below 50%. This shows that the level of creative thinking is still low.

B. The Concept of 21st Century Learning

P21 (Partnership for 21st Century Learning) develops a learning framework in the 21st century that requires students to have the skills, knowledge and abilities in the fields of technology, media and information, learning and innovation skills and life and career skills. This framework also explains the skills, knowledge and skills that must be mastered so that students can succeed in their lives and work.

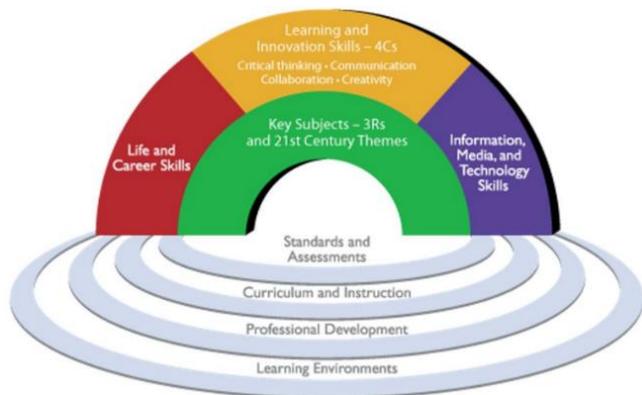


Fig. 1. Core subject 21st century skills.

The content of 21st century learning must always adjust to changes including in the industrial era 4.0. The content of learning is expected to be able to fulfill 21st century skills (21st century skills); 1) learning and innovation skills include mastering diverse knowledge and skills, learning and innovation, critical thinking and problem solving, communication and collaboration, and creativity and innovation, 2) digital literacy skills including information literacy, media literacy, and ICT literacy, 3) career and life skills include flexibility and adaptability, initiative, social and cultural interaction, productivity and accountability, and leadership and responsibility [12].

In line with this, the Ministry of Education and Culture formulated that the 21st century learning paradigm emphasizes the ability of students to find out from various sources, formulate problems, analytical thinking and collaboration and collaborate in solving problems [13]. As for the explanation of the 21st century learning framework, one of them is Critical Thinking and Problem-Solving Skills, capable of thinking critically, laterally and systemically, especially in the context of problem solving in order to have the ability to create and renew (Creativity and Innovation Skills), able to develop their creativity to produce innovative breakthroughs.

TABLE IV. LEARNING AND INNOVATION SKILLS

21st Century Skills	Description
Learning and Innovation Skills	Critical thinking and problem solving. Communication and collaboration Creativity and innovation

Today's learning patterns require the activeness and creativity of students processing data or information provided by the teacher during the teaching and learning process so that there is meaningful construction of knowledge. Therefore, it takes the ability to think [14]. In the learning process it is necessary to develop thinking skills which are a mental activity to acquire knowledge, based on the process of thinking can be grouped into basic thinking and complex thinking, complex thinking processes called high-level thinking include four types, namely problem solving, decision making, critical thinking and creative thinking [15].

C. How to Improve Students' Creative Thinking

Weak ability of high-level thinking students can be caused by several factors, one of which is the learning process carried out. Learning must involve students actively and facilitate students to be able to use high-level thinking skills. Besides that, it has become an obligation for teachers to be able to design learning that is interactive, inspiring, fun, challenging, and motivating students to actively participate in accordance with Permendiknas No. 41 of 2007 concerning Process Standards [16].

TABLE V. INSTRUCTIONAL METHODS BY DISCIPLINE [17]

	Business Business Source Premier	Education ERIC Ebsco	Medicine	Psychology
Cooperative Learning	1	6.599	84	1.384
Project Learning	0	113	4	13
Case method	214	713	82	184
Inquiry Based Learning	0	56	15	12
Problem Based Learning	39	958	1.671	344

Learning to the industrial revolution 4.0 period has a striking difference, while the changes are as follows: first, a paradigm shift in educational practice. During the industrial revolution 4.0 learning changed to project-based learning (project based) and problems (problem based), inquiry (inquiry) and design (design), and finding (discovery). Teachers need to design learning that is able to generate the potential of students to use their thinking skills to solve problems. One of the factors that determine the quality of education is the implementation of learning that is designed systematically according to the principles of effective learning. The teacher does not have to always convey the material, but the teacher must stimulate students' thinking with questions that are full of inquiry, provoke reasoning, and provide instructions that stimulate students to conclude. This method is called building knowledge itself (coconstructivism).

To improve the ability to think creatively, the learning process used is a meaningful learning process (joyful learning) where the learning process must be focused on constructing knowledge. As revealed by Anderson that [18]:

"A focus on meaningful learning is consistent with the view of learning construction, in which students seek to make sense of their experiences. In constructivist learning, students engage in active cognitive processing, paying attention to coherent representation, and mentally organizing incoming information with existing knowledge".

To answer the challenges of 21st century education where one of the learning activities must be able to improve students' creative thinking skills. The Indonesian government through the Ministry of Education and Culture has issued rules related to the recommendations of learning models that can be used in the 2013 curriculum which are then expected to improve students' creative thinking skills. According to the Minister of Education and Culture no. 103 of 2014 the 2013 curriculum recommended three learning models, namely: 1) Problem

based Learning, Discovery Learning and Based Learning Projects.

V. CONCLUSION

Based on the results of the research that has been done, it can be concluded that: 1) the level of students' creative thinking ability is still relatively low, this is evidenced from the results of tests conducted and the results of national examination analysis where the level of national examination results is still low and the questions used are still relatively little to be used as a measure of creative thinking ability, because the questions that should be used to measure creative thinking skills are C5-C6 questions. 2) 21st century learning is learning that emphasizes the development of critical and creative thinking skills so that teachers need good mastery of critical and creative thinking skills. 3) the effort that can be done as a teacher to improve creative thinking skills is through the use of learning models that can improve individual abilities, independence and the concept of constructivism. If made more specifically, the learning model that becomes a recommendation is Cooperative Learning, Project Learning, Case method, Inquiry Based Learning, Problem Based Learning, Discovery Learning.

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