

Technology Literacy Level of Vocational High School Students

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Abstract—The purpose of this study was to determine the level of technological literacy of Vocational High School students. Technology literacy is a way of thinking about how technology can become a tool that can be used as a problem-solving solution. Aspects that become the benchmark also scale of technological literacy used refer to the Standards for Technological Literacy consists of: (1) understanding of technological traits, (2) understanding of technology and society, (3) understanding of design or a design plan, (4) abilities and understanding in the world of technology, and (5) understanding and knowledge about the world of design. The results showed the level of technological literacy of Vocational High School students was 79.9% which was included in the high category. The level of technological literacy for each aspect is: (1) understanding of the technological characteristics of 79.6% including high state categories, (2) understanding of technology and society by 71.1% including in the high state category, (3) understanding of design or a model design of 79.8% is included in the high state category, (4) the abilities possessed in the world of technology are 88.6% including very high state categories, and (5) understanding of the design world is 80.6% including very high state in categories.

Keywords—*technology literacy; vocational student*

I. INTRODUCTION

Education, especially education in Vocational High Schools (SMK) is strongly influenced by technological developments. Technological developments are increasingly rapidly breaking through all aspects of human life. Technology was created to help humans carry out their daily activities. This can lead to a paradox. Like two sides of a coin, technology can be a catalyst or inhibitor in the process of developing human abilities. He becomes a catalyst if people understand and understand the mechanism, the way it works, to the functions of technology that they use. On the other hand, it becomes an inhibitor if humans who use it do not understand and understand the technology they use, or in other words only able to use it without understanding how it works, systems and mechanisms.

The essence of technology is: First, technology is related to ideas or thoughts that will never end, the existence of technology along with the cultural existence of mankind; Second, technology is a creation of humans, so it is not natural and artificial; Third, Technology is a set of thoughts, so technology can be limited or universal, depending on the analysis point of view; and Fourth, technology aims to

facilitate human endeavor (human endeavor), so that technology must be able to improve the performance of human abilities. Thus there are 3 (three) entities contained in the technology namely, Skill, Algorithm (thinking logic) and hardware.

Integrating technology in learning is a challenge for teachers. Productive integration model if the instructor can connect and compile optimally from the three main components namely subject matter, pedagogy and technology. For this reason, the technology component should be used proportionally and effectively to construct, improve the ability to think and solve problems so that students will be more active in the learning process [1].

The learning carried out must have an impact on students. The expected impact of this learning activity is technological literacy and environmental literacy of vocational students. Technology literacy is an important thing for students, because it will help students understand and apply technology concepts. The Colorado Department of Education defines technology literacy as the ability to properly select and use technology responsibly. Not only is technology needed in the arena of education and work, it also helps students learn to be better decision makers. Learning how to use technology allows students to access reliable and relevant information about their health, safety and achievement of life goals. Students must understand not only how and where to find information, but also how to distinguish whether sources can be relied upon or can be exhibited.

Technology literacy is the ability to use, manage, assess, and understand technology. Someone who understands technology literacy, in an increasingly sophisticated way that evolves over time, what technology is, how it is made, and how to shape society, and in turn is shaped by society [2]. Students will be able to hear stories about technology on television or read them in newspapers and evaluate information in smart stories, put information in context, and express opinions based on that information. A person who is technologically literate will be comfortable with technology and its purpose, not afraid nor too crazy about technology [3].

Understanding technology literacy is not just about one's skills using a technology application. Technology literacy is a way of thinking about how technology can become a tool that

can be used as a problem-solving solution. Thus when we use ICT in learning start from learning goals not from learning resources or learning tools. The teacher does not try to adjust the learning objectives with ICT tools. Use ICT to improve the learning process.

II. METHOD

The purpose of this study was to measure the level of Technology Literacy of Vocational High School students. To achieve the objectives of the research, the research method used is descriptive research method. To achieve the objectives of the research, the research method used is descriptive research method. The study was carried out in one of the SMKs in the City of Bandung and one SMKN in Garut Regency, West Java Province. The instrument used is the Technology Literacy Test. Data processing carried out is to make a description of the profile of the level of technological literacy of vocational students.

III. RESULT AND DISCUSSION

A. Literacy Technology

Technology literacy is the ability to use, understand, regulate, and assess an innovation that involves processes and knowledge to solve problems and expand one's abilities [2].

Technology literacy is an understanding of technology at a level that allows effective use in modern technology societies which consist of three main components, namely knowledge, ability and critical thinking, and decision making [4]. Technology literacy can be described as: (1) understanding of man-made works, (2) the relationship between science, environment, and technology, (3) the ability to use technology, especially in learning and teaching science and the ability to work, and (4) ability to evaluate and make decisions (3).

Based on the above definition, technology literacy can be defined as the ability that consists of aspects of science, critical thinking skills, and decision making in an effort to effectively utilize technology or innovation of human works, especially in the world of education. In short, technology literacy is defined as the ability to use, manage, assess, and understand technology.

Technology literacy is divided into several aspects, namely: (1) understanding of technological traits, (2) understanding of technology and society, (3) understanding of design or a model design, (4) capabilities in the world of technology, and (5) understanding of the world of design (5). Each aspect consists of several different competency standards. The following are competency standards that must be possessed in every aspect of technology literacy.

TABLE I. COMPETENCY STANDARDS OF TECHNOLOGY LITERACY [5]

| Aspect of technology literacy | Competency standards |
|---|--|
| understanding of technological traits | Knowledge of the characteristics and scope of technology Knowledge of core technology concepts Knowledge of the relationship between technology and other scientific fields |
| understanding of technology and society | Learning about the influence of social, economic and political life on technology Learning about the impact of technology on the environment Learning about the role of the community in the development and use of technology Learning about the influence of technology on history |
| understanding of design or a model design | Understanding about design attributes Understanding about engineering design Understanding about the role of problem solving, research and development, discovery and innovation, and experiments in solving a problem |
| capabilities in the world of technology | Ability to implement the design process Ability to use and maintain technology systems and products Ability to assess the impact of a technology system and product |
| understanding of the world of design | Choose and use medical technology Choose and use agricultural and biotechnology technologies Select and use technology in the field of energy and resources Choose and use information and communication technology Choose and use transportation technology Choose and use manufacturing technology Choose and use construction technology |

Technology literacy is important for students, especially vocational students. This is because vocational students are required to be individuals who are ready to work, ready to plunge into people's lives to apply the knowledge they have gained in school. The aspect of technological literacy required by vocational students in the world of technology is an aspect of ability that must be possessed in the world of technology. As described in the table, this aspect consists of several standards, namely: (1) the ability to implement the design process, (2) the ability to use and maintain technology systems or products, and (3) the ability to provide an assessment of the impacts caused by a technology product. Of the three standards, the ability that

is important to be owned by vocational students is the ability to implement the design process.

The ability to implement the design process consists of several indicators, among others:

- Identify the design problem to solve and decide whether to overcome it or not.
- Identify criteria and constraints and determine how this will affect the design process.

- Improve design using prototypes and modeling to ensure the quality, efficiency and productivity of the final product.
- Evaluate design solutions by using conceptual, physical, and mathematical models at various intervals of the design process to examine the right design and to record areas where repairs are needed.
- Develop and produce products or systems using the design process.
- Evaluating the final solution and communicating observations, the process and results of the entire design process using verbal, graphic, qualitative, virtual, and written methods in addition to the three-dimensional model.

Based on the theory developed, then the instrument is made in the form of technology literacy tests. The results of the technology literacy test for vocational students for each aspect are listed in the following table 2.

TABLE II. TECHNOLOGY LITERACY LEVEL OF VOCATIONAL STUDENTS

| No | Aspect of technology literacy | Level of technology literacy | Category |
|----------------|---|------------------------------|-------------|
| 1 | understanding of technological traits | 79,6% | High |
| 2 | understanding of technology and society | 71,1% | High |
| 3 | understanding of design or a model design | 79,8% | High |
| 4 | capabilities in the world of technology | 88,6% | Very High |
| 5 | understanding of the world of design | 80,6% | Very High |
| Average | | 79,9 % | High |

Based on the table above, the average technology literacy skills of Vocational High School students are 79.9% which are in the high category. This is possible because the subjects of this study are vocational students in the Technology and Engineering expertise program. In learning they always come into contact with technology products. Learning activities for most groups of productive lessons are carried out by directly practicing students in accordance with their skills.

The highest aspect of technological literacy is the ability possessed in the world of technology which is 88.6% which is included in the very high category, this is possible because vocational students of the Technology and Engineering expertise program in learning activities are always in contact with technology products. While the lowest aspect of technological literacy is an understanding of technology and society, namely 71.1% which is included in the high category. The literacy aspect is the lowest, because students are still less related to the application of technology in society.

B. Growing Technology Literacy through Learning

Constructivism learning theory holds that media is used as something that gives students the possibility to actively construct knowledge. Media can be distinguished from

technology (mechanics, electronics, physical forms), symbolic systems (numerical characters, objects, images, sounds) and the means used (radio, video, computers, books) [6]. One of the learning media is ICT. Integrating ICT into learning aims to improve teaching competencies in teaching and improving the learning quality of students. One of the lessons that integrates ICT is Technology Pedagogy Content Knowledge (TPCK).

The basic concept of TPCK emphasizes the relationship between subject matter, technology and pedagogy. The interaction between the three components has the strength and attractiveness to foster active learning that is focused on students. This can also be interpreted as a form of shifting learning that was originally centered on the teacher shifting to students [7]. The relationship between the constituent components of TPCK is shown in Figure 1.

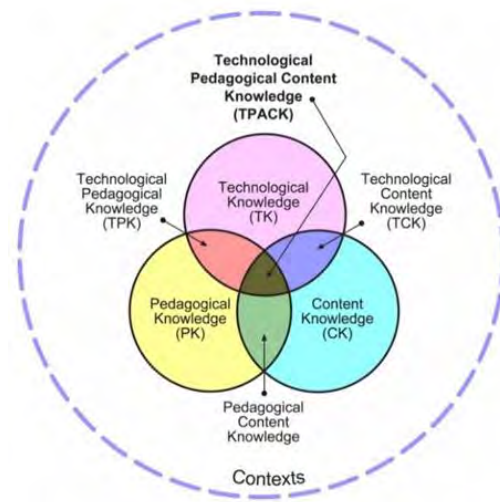


Fig. 1. TPCK component.

The concept of TPCK consists of: (1) Contents of Knowledge (CK) is knowledge of the material to be studied; (2) Pedagogy Knowledge (PK) describes in depth related to the theory and practice of teaching and learning, namely the objectives, processes, methods and strategies of learning, and assessment; (3) Technology Knowledge (TK) is the basics of technology that can be used to support learning, such as software utilization, animation programs, virtual laboratories [8].

TPCK summarizes a series in which integrated technological mastery capabilities cannot be separated from each other from its constituent components, namely material (C), pedagogy (P) and technology (T). TPCK requires the occurrence of multiple interactions and a combination of components, namely subject matter, pedagogy and unique and synergistic technology based on Information and Communication Technology (ICT) [9].

The application of the TPCK framework is also in line with the theory of knowledge acquisition. Knowledge acquisition, changes in attitude and skills, can occur due to interactions between new experiences and experiences that have been experienced before. Bruner argues that there are three main

levels of learning mode, namely direct experience, drawing experience and abstract experience [10].

ICT development allows the use of the functions of various learning media by using a device called multimedia, which is able to convey information and learning material in the form of text, images, sound, animation, film, and even interaction. Computers are one of the multimedia tools, because computers are able to present information and learning material in all forms, even with real-life computers that take a long time or are very expensive and contain risks that can be simulated with a computer (e.g. chemical reaction processes, the impact of a nuclear explosion, travel solar system, etc.). Through multimedia, abstract concepts can be presented more clearly in the learning process to make it easier for students to understand them.

IV. CONCLUSION

Technology literacy can be interpreted as an ability that consists of aspects of science, critical thinking skills, and decision making in an effort to effectively utilize human technology / innovation, especially in the world of education. Important technology literacy is owned by students. This is because vocational students are required to be individuals who are ready to work, ready to plunge into people's lives to apply the knowledge they have acquired at school.

The level of technological literacy of vocational students in the Technology and Engineering expertise program is included in the high category. The level of technological literacy in sequence is the ability possessed in the world of technology, understanding of the world of design, understanding of a

design or a model design, understanding of technological traits, and understanding of technology and society.

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