Entering 21st century skills: teacher and junior high school student’s perspective about science learning media’ scope

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Abstract. School systems and educators face challenges to prepare student with 21st Century Skill. Teachers that equipped with innovated teaching models, media and learning tools also play a crucial role in helping students fulfilled 21st century skills. The main purpose of this study is gathering student’s perspective in science learning media. This study is a descriptive research that was done in September – November 2019. The subject of this study are science teacher and Junior High School student (grade 7, 8 and 9) in private Junior High School in Salatiga. The result showed that most student know about learning media. For student, learning media help them to understand the science matter especially for some difficult matter such as classification of living things, human digestive system, and human skeletal and muscular system. Students need learning media as a whole package of science education. Visual and audio visual media are the form of learning media that still used in science learning. Specifically, student expect that multimedia can be used in some science matter.

1. Introduction

Nowadays, school systems and educators face challenges to prepare student with 21st Century Skill. In order to require the competencies of 21st Century skill, students must be able to adapt with collaboration, networking, real-world problems. According to [1], students are equipped with communication and reasoning skill through 21st century education. Supportive learning environment is an important thing for the success of 21st century education. Specifically, science education play important role in preparing students with those skills.

There must be some challenges in preparing science education for school management and staff. Innovation in learning and pedagogical approaches encourage students to improve 21st century competencies [2]. Students can in teams, pose problems, and make connections to real-world scenarios. Teachers that equipped with innovated teaching models, media and learning tools also play a crucial role in helping students fulfilled 21st century skills. A research showed that learning media and technology such as mobile phones enhance effectiveness in teaching and learning [3]. Otherwise, teacher can use learning experience [4].
The main purpose of this study is gathering student’s perspective in science learning media. The result of this study can be used to make some learning media that fit with student’s expectation. Innovation in learning media can be the real result of this study.

2. Methodology
This study is a descriptive research that was done in September – November 2019. The subject of this study are science teacher and 88 Junior High School student (grade 7, 8 and 9) in private Junior High School in Salatiga. Student is the main target of this study because they are the center of the science learning, beside of teacher must competence in using science learning for success science learning.

First step of this study is literature review. Gathering all supported literature about science learning media. After that, preliminary study was done by interviewing Science teacher about the perspective and needs of science learning media. The summary of this preliminary study was a foundation in arranging questionnaire for students. The instrument of this study is questionnaire and interview with science teacher. The questionnaire consists of question about science learning media. The concept of questionnaire are adapted and modified from [5]. There are two parts of question: personal data, science learning media (function, type, expectation and concepts). The core of this study is gathering data and other supporting information. Data collected by spreading questionnaire to students and doing interview with science teacher to get depth analysis. All gathered data and information are analyzed qualitatively to get conclusion about science learning media scope.

3. Result and Discussion
The main objective of this study is to gather student’s perception about learning media scope. There are four parts of student’s perception: (1) purpose of learning media; (2) type of learning media; (3) expectation of learning media; (4) subject matter that need learning media. Before going to the main parts perception about learning media, students were asked whether they knew about science learning media.
Figure 2. Knowing science learning media.

Based on figure 2, most students knew about science learning media (91.70%). This fact was confirmed by the interviews results with teachers. Students are familiar with the term of learning media. There is a science learning media laboratory, where students can do science practice. Student must be able doing science practice by science learning media (for example, microscope, charts, props, simple physics and chemical experiment tools).

Students must be introduced to 21st Century Skill. Skill or standard in framework of 21st Century Skill that listed under tools for working are information literacy, media literacy and ICT literacy [1]. Students must be prepared to possess 21st Century Skill. Through this simple study, it was known that most of Junior High School student know about learning media for the beginning and teacher must move to student-centered learning by using learning media. For example, teacher can teach science by using real-life case study and hands-on learning to motivate student in discussion. Student can learning by exploring. This type of learning can trigger active learning and motivation in solving problem or doing simple research at laboratory [6].

Besides knowing science learning media, students must know the function of science learning media. Based on qualitative analysis, there are five main functions of science learning according student’s perspective. In figure 3, those functions are (1) understanding matter; (2) delivering matter; (3) achieving lesson’s objective; (4) giving matter information; (5) stimulating lesson. Most students (68.39%) answered that understanding matter as the purpose of science learning media. Based on science teacher’s interview, science teachers are using science learning media in order to explain some abstract science concepts. So that, student can understanding matter easily and enjoying science lesson.

Figure 3. Function of learning media
Science learning media are needed to deliver matter in science learning (53.89%), especially for delivering matter in some concepts that need practice. In teacher’s explanation for example, (1) students need to practice how to use measuring equipment in “scale and measurement” concept; (2) digestive system’s three dimension props is needed to explain “human digestive system” concepts; (3) teachers need video about human skeleton to demonstrate muscle movement more real. For some student, seeing videos and figures about some science concepts is a pleasure itself. So, science learning media can be used to stimulating lesson (9.33%).

Nowadays, science teacher must be able using learning media especially in technological term or technology transformation. How technology acts on education and how education can best act on technology are supporting each other [7]. Technology must be used to help student understanding matter without forgetting social activities (hands-on, cooperative learning and laboratory activities). Teacher can use images or photos to bring real world or environment into classroom in order to delivering lesson, assessing learning and correcting misconceptions [3].

In student’s perspective, there are six types of science learning media that commonly used in science lesson in Junior High School. Those types are: (1) chart/picture (68.91%); (2) visual media (67.88%); (3) video (55.44%); (4) multimedia (23.83%); (5) audio/voice record (10.36%); (6) television (5.70%). Simple learning media such as chart/picture are still used to explain cell concept to see inside of a cell (plant or animal) that can be an alternative of not using electronic device and limited availability of microscopes. According to interview, teacher explained that science learning media is used to subject matter application such as addictive and additive matter that presented in video.

Multimedia, the other type of science learning media that commonly used in science lesson. Science teacher stated that the multimedia availability is still limited. Some biology concepts such as organ system in human need multimedia in order to present movement and the alive of the organ. Students have difficulties to imagine the works of the system organ.

In student’s perspective, they have their own type of learning media’s expectation (figure 5). Based on result, student expected science learning media in the type of video (54.92%); props (46.11%); multimedia (39.38%); audio (16.06%). This expectation based on limited media availability in school. However, most of science concepts are unite with practicum and also according to basic competency sills that must be fulfilled. In temperature, heat and expansion’s matter, student must be able to use thermometer.
In the other hand, students expected the use of video in science lesson. This perspective is in line with the teacher’s opinion. Additive and addictive matter can be shown in the video that exposed the negative effect of using illegal drugs in nervous system damage. In this new education era, there must be an interactive teaching between teacher and student. Avoiding one-way teaching, teacher can use multimedia, props, video, and audio as learning media.

As an innovation in learning, teachers use whiteboard as their learning media. [8] was doing research about interactive whiteboard (IWB), which create interactive learning activities. As we can see in figure 4, student still choose chart/picture as learning media. Interactive whiteboard offer new opportunities for teacher in expressing their ideas verbally and also using graphical and other representations. Teachers adopted multimodal tools in technically and pedagogically ways [8].

In junior high school, students must be introduced to natural environment and phenomenon in nature. But sometimes, not every schools have a natural environment in surrounding and have opportunity in doing field trip. Students still need visual media to fulfill the objective of science lesson. The relationship between learning outcomes and student preference in virtual environment [9]. In their study, virtual environment was brought to classroom and relate it to learning outcome including student’s visual and imagination about natural environment. The purpose of scientific data (flora and fauna populations, temperature change) visualization is to provide access to relevant ecosystem locally and globally [10]. Throughout this scientific data, students could be able to visualize, compare, manipulate, and annotate data within the ecosystem.

For some situation, television still can be used as learning media. Open learning in television as an effort to overcome educational constrains (time and location) especially for school with limited educational resource (laboratory and media) [11]. Television is the solution for distance learning and demonstrating simple experiment. The other type of learning media is video-recording. In their study, it was revealed that video can examine actual sequences of action and speech/talk in detail [12]. For example, a video of science experiment can explain step by step in doing experiment. Students can rewind the video if they miss some steps in the experiment. The purpose of video is that teachers can examine talk and action of the experiment in detail. The other purpose is to improve student’s curiosity in doing the same experiment as in the video.

Nowadays, mobile devices use are relevant in learning in order to get information. There are many application in mobile phone that can be used wisely, for example weather forecast, it was revealed that unrelated content could distract student concentration [13]. Teachers must supervise student in student learning using mobile phone, so that student use it properly, for example in recording sound (audio), photo and even video.

Entering 21st Century Skill, multimedia are needed in science learning. Audio, visual, audio visual and also simulation are components in multimedia. Validated multimedia can reducing duplication of
spoken information and misconception. Through multimedia, teacher can learn to prepare good image/photo, audio, video and trivia for student. Teacher must provide enough time to make a narration for multimedia or even make multimedia by their own. According Multimedia with meaningful phrases expressing main ideas (in explanatory text) is the best instructional format for students [14].

Regarding student’s perspective, nine science concepts require learning media in 7th grade. Most of these concept need tools to represent concept, such as (1) substance characteristic; (2) scale and measurement; (3) temperature, heat and expansion. These answer (figure 6) based on perspective of 9th, 8th and 7th grade student. As we can see from competencies expected from 2013 Curriculum, student must have skills in using practicum tools because the concepts in 7th grade are basics for the next grade. Meanwhile, video and multimedia are needed to help teacher explain the biology concept such as life organization system, interaction of living things and ecosystem.

In 7th grade, students are introduced to nature by conducting experiment in open space through characteristic and classification of living things concept. Teacher explained that students like observing nature. About 60.62% student choose substance characteristics as a concepts that need learning media especially laboratory tools. In student’s perspective, science could be fun with more practical lesson or practicum.

In recent curriculum, the science concepts given in 8th grade are the most science concepts in Junior High School. In student’s perspective, eleven science concepts require learning media or laboratory tools in 8th grade. Most of these concept need props or video to represent concept, such as (1) human digestive; (2) simple mechanical in daily life; (3) object and living things in the surrounding environment. These answer (figure 6) based on perspective of 9th, 8th and 7th grade student. As we can see from 2013 Curriculum, the concepts in 7th grade are basics for the next grade and most of 8th grade science learning are biology concept and some physics concept. In order to fulfill the competency, video and multimedia are needed to help teacher explain the biology concept such as human digestive system (66.67%). On the other hand, experiment kits are needed to help teacher explain physics concept such as simple mechanical in daily life (61.90%).

In 8th grade, students are introduced to physics by conducting experiment in using Kit through simple mechanical in daily life concept, vibration, waves, sound and light and optical devices. Teacher explained that students are introduced with some organ system in human body. About 59.05% student choose object and the living things in surrounding environment as a concepts that need learning media. In student’s perspective, science could be fun with more interactive multimedia or practicum.

Most of the science concepts in 9th grade consist of complex biology and physics concepts. In student’s perspective, seven science concepts require learning media or laboratory tools in 9th grade.
Most of these concepts need props or video to represent the concept, such as (1) human skeleton and muscles (90.57%); (2) electricity sources, circuits and transmissions; (3) magnetism; (4) inheritance. Students answer’s based on their perspective (figure. 6). In recent Curriculum, the concepts in 9th grade are more complex than the concepts in 7th and 8th grade. Besides laboratory tools and props, video and multimedia are also needed to help teachers explain the biology concept such as human excretion system (67.92%). Experiment kits are needed to help teachers explain physics concepts such as magnetism (71.70%) and electricity (86.79%).

In 9th grade, students are prepared to analytical thinking using multimedia, video or Kit through human organ system. Students are introduced to biotechnology through some video and experiments or projects. About 84.91% student choose inheritance as a concepts that need learning media. In student’s perspective, science could be fun with more interactive multimedia or practicum.

Science should be more than just teaching concept [15]. It should be linked with natural environment, social environment, student’s daily life, perspective and interest. This statement relevant to student’s perspective in figure 6, which learning media is needed on “classification of living things” concept in 7th grade. Teacher must change culture in science learning and allow student learning outside class, doing observation and experiment in nature or laboratory.

As mention before, student can do experiment based on video in the way explaining experiment instruction or even recording activities in experiment. In order to have 21st century skill, students learn to communicate the method and result of science experiment. Groups of student made short videos of experiment about heat pumps themselves and gave explanation of what happened during the experiments by giving a presentation [12]. In 9th grade, students are learning science through project or simple experiment because science concepts are more complex than concepts in 7th grade and 8th grade. Cognitive skills (situational analysis, theoretical application, problem solving), interpersonal skills and responsibility (team work, planning ability), communication and information technology are the target of simple research or experiment in science learning [16]

5. Conclusion

In general, the purposes of science learning media in student’s perspective are helping students in understanding matter and delivering matter. Visual and audio visual media are the form of learning media that still used in science learning. Specifically, student expect that multimedia can be used in some science concepts. In order to equip student with 21st Century Skill, teachers and stakeholders must do innovation in creating and providing learning media in science learning.

5. References

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