Analysis of interactive media development of VIII grade integrated science with simple machine themes on human muscular and skeleton system using connected types integrated 21st century learning

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Abstract. Along with the development of information and communication technology in the 21st century, it is expected that there will be a change in the way of delivery in the integrated science learning process. One of the characteristics of 21st century learning is the function of the teacher as a facilitator for students and the presence of multi-directional interactions using various contextual learning resources including the use of ICT. But often the teacher becomes the centre of the learning and there is no use of technology that allows multi-way interaction. The research that will be done supports 21st century learning, which focuses on the use of information technology by developing interactive media. The research method used is qualitative descriptive research method using a preliminary study in the form of material analysis to determine the need in developing interactive media. This research was done in class VIII Kampar 1 junior high school. The purpose of this study was to find out the analysis of student and analysis of the interactive media development grade VIII integrated science with simple machine themes on human muscular and skeleton system using connected types integrated 21st century learning. From the result of research on student analysis and learning media, it was concluded that students have a high interest in integrated science learning and the ability to use ICT is quite high. Development of learning media needs to be done so that the quality of content from the media can support the quality of learning so that integrated science learning goals can be achieved well.

1. Introduction  
The function and purpose of national education are to develop capabilities, design character and dignified nation civilization in order to educate the life of the nation, trying to develop the potential of students to become human beings who believe and fear God Almighty, noble, healthy, knowledgeable, capable, creative, independent, and become an approved citizen and responsible [1]. In line with the goals and functions of national education, education in Indonesia cannot be separated from current development. So that national education also demands 21st century skill.  
The 21st century education is education that integrates skills, knowledge, skills, and attitudes, as well as mastery of ICT. The 21st century is a century based on science and technology, so it demands the human resources of a country to master various forms of skills, including critical thinking skills.
and problem solving from various increasing problems. In the other words, various skills in the frame of science and technology need to be mastered by human resources, namely students.

The rapid development technology information and communication in 21st century also have an impact on the development of education in Indonesia. So that it is also known as 21st century learning. 21st century learning is learning that integrates literacy skills, knowledge skills, skills attitudes, and mastery of technology [1]. 21st century learning prepares skills that are in accordance with the demands of work in the future. These skills are in the form of skills needed in 21st century are (1) life and career skills, (2) learning and innovation skills, and (3) information media and technology skills. A very large change in national education occurred in the 21st century, including the application of digital media and technology called superhighway information [2]. One of the subjects in the 2013 Junior High School curriculum that requires 21st century learning skills is integrated science.

The essence of integrated science is a scientific process and scientific attitude. Integrated science is also a systematic collection of theories, its application in general is limited to natural phenomena, born and developed through scientific methods such as observation and experimentation and demands scientific attitudes such as curiosity, openness, honesty, and so on [3]. The purpose of integrated science learning is to improve the efficiency and effectiveness of learning, increase the interest and motivation of students, and some competencies can be achieved at once.

Integrated science learning in schools tends to study integrated science by memorizing concepts, theories, and laws. So that integrated science learning as a scientific process and scientific attitude are not touched in learning. Students only study science in the lowest knowledge domain low other thinking skill (LOTS) while 21st century learning demands high other thinking skill (HOTS). Therefore, learning methods are needed that can prepare students to be literate in science and technology, able to think, critically, creatively, and be able to argue correctly. However, they still hope that science learning in schools can be presented in an interesting, efficient, and effective manner [4]. Science learning in schools should use the theme of learning and using the learning model. One of them uses the connected type. The type that is connected integrates the concepts, skills, or abilities of an ongoing process in one subject or other subject-matters in one field of study so that learning becomes more meaningful and effective. Integration in connected patterns can help students develop concepts continuously [5].

To achieve the characteristics of 21st century learning, educators are expected to be able to develop effective learning resources in accordance with the demands of the 2013 curriculum. Characteristics of 21st century learning can be achieved if the teachers are able to develop effective learning resources in accordance with the demands of the 2013 curriculum. Learning resources are developed according to student characteristics so that there is a relationship between students and learning resources [6]. Learning media is one of utilizing technology 21st century. Learning media is a messenger technology used in learning and physical means to deliver learning material [7]. Media can be divided into two categories, namely instructional aids and instructional media. Learnings aids is tools to help teachers in clarifying theory to be delivered. For example, photos, maps, posters, charts, flip charts, models of actual objects and arrive at the learning environment. While learning media in the form of films, modules, slides, audio, and programs [8].

The uses of learning media in the learning process can arouse new desires and interests, motivation and stimulation of learning activities, and bring psychological influences to students. Learning media will greatly help the active learning process and deliver messages and content of the lesson [9]. In addition, learning media in the form of images, videos, and audio will increase the interest and motivation of students and also help improve student’s understanding of learning material. The benefits of learning media in the learning process for students are, 1) learning will attract the attention of students so that it can foster interest and motivation to learn, 2) learning material will be more clearly defined so that it is easily understood by students, 3) the method of teaching will be more varied, not merely verbal communication through the words spoken by teacher [10].

Learning media that can increase the activity of students should have control to the content and interaction between media users and media applications. This is called interactive media. The use of
interactive media in the form one-way communication, two directions, and many directions take place between educators and students. Educators deliver learning material and students provide responses to the material [11].

Based on the study of literature has been discussed. As a solution to develop learning media in the form of media interactive then used a connected type. The media is developed with regard to the characteristics of students and analysis of media use. So that learning’s goals can be achieved properly. Thus, this study investigates the characteristics of students and the use of media in developing media with a simple plane theme in the muscle system and human using connected type integrated 21st century learning.

2. Research Methods
This study uses a qualitative descriptive research method. Qualitative research is used to examine the condition of natural objects, where the researcher is a key instrument, the technique of collecting data by triangulation, analysis of data is inductive or qualitative research emphasize meaning rather than generalization [12]. This research relates to conditions, points of view, attitudes, processes, perceived influence, or developing trends [13].

The subjects in this study were eight grade student of Kampar 1 junior high school. This research was conducted to look at student characteristics and the use of learning media. Data collection is done by providing questionnaires to students and teachers. The assessment on the questionnaire uses likert scale. Likert scale is used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena [12]. The scale used in the statement is accompanied by agree to disagree answer, always until it never depends on the measurement objectives.

3. Result and Discussion
The results of the research obtained from the analysis of the research using the instruments develop are:

3.1 Analysis of Students
Instrument characteristics of students contain response from students to integrated science learning integrated with 21st century learning.

![Figure 1. Analysis of the characteristics of students](image-url)

Before learning begins there are 3 types of characteristics or conditions that exist in students that need to be considered by teacher that are: 1) Characteristics or conditions relating to students’ initial abilities for example, intellectual ability, thinking ability, and others. 2) Characteristics or circumstances of students regarding their background and social status. 3) Characteristics or circumstances of students with regard to personality differences such as attitudes, feelings, interests,
etc [14]. Figure 1 shows the percentage analysis of the characteristics of students. The condition or initial ability of Grade VIII students of Kampar 1 Junior High School was shown with 73.33% in the form of student’s initial abilities towards integrated science and student's understanding of problems solving. Student background is shown with a value of 68.75% in the form of students’ ability to use and operate technology/ICT. Student’s interest was shown by 81.25% in the form of fun in integrated science learning, curiosity in learning, and motivation of students. The interpretation of the graph above is that students have the initial ability and background of ICT usage that is quite good for integrated science learning while having a good interest in learning.

Can also be explained further the analysis of students in accordance with Figure 2, namely the analysis of students.

![Figure 2. Analysis of students](image)

The results of the analysis of students as a whole on average students have good integrated science learning motivation that is 78.75%. The diverse learning styles of students consist of visual, audio, and kinesthetic learning styles. The percentage diversity is 75% based on 21st century learning characteristic that must pay attention to the character of each individual student. With the diversity of learning styles of students the use of instructional media is very suitable for use in learning and helps students to understand integrated science materials properly. The percentage attitude is 77.21%, knowledge is 73.06%, and skill is 70.69%. The ability of student’s attitudes, knowledge and skills on average in the category is quite good. Then to increase the percentage of student competencies using connected type learning can be one solution. In integrated learning connected type students are expected to be able to connect ideas in the material of study. Students are also expected to study, conceptualize, and improve ideas continuously. Thus, integrated learning of connected type can increase student’s understanding and creativity.

### 3.2 Analysis of Learning Media

Learning media is one of the learning tools for students participating in influencing learning outcomes. Media can both increase students interest and motivation integrated science learning. The use of media makes integrated science learning more meaningful. With the use of learning media, it is expected that learning objectives can be achieved properly. The types of learning media that are often used by teachers are images, videos, and presentation media. This is not accordance with 21st century learning. One of its characteristics is the learning mechanism must have multi-direction interaction using various contextual learning resources in accordance with learning materials including the use of ICT. Analysis of the use of instructional media in schools can be seen in Figure 3.
Figure 3. Analysis of learning media

The result of the analysis of learning media in schools on average is still in a fairly good category. The value of the Indicator of learning quality is 75% while the quality of the content and technical quality are 64.58% and 62.5% respectively. This is because the media that is used has not fully contained content that is suitable for the purpose of learning and media usage that is less varied. The media used by the teacher must be integrated 21st century learning, namely student-centered learning, the use of media that is multi-directional or interactive so as to increase the active role of students in learning.

4. Conclusion
From the results of this research on student analysis and learning media analysis it was concluded that students have a high interest in integrated science learning and the ability to use ICT is quite high. This is the basic capital to expect 21st century integrated learning. Development of learning media needs to be done so that the quality of content from the media can support the quality of learning so that integrated science learning goals can be achieved well.

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