Needs analysis of web-based earth and space science learning materials for high school students

A M Zulika*, W Liliawati, T R Ramalis, J A Utama and A Samsudin
Sekolah Pascasarjana Program Magister Pendidikan Fisika, Universitas Pendidikan Indonesia, Bandung, Indonesia.

*Corresponding author’s email : annidameliazulika@upi.edu

Abstract. The purpose of this study analyses needs of learning materials on Earth and Space Science for high school students. Earth and Space Science is one of the subjects taught in Physics. Often, the implementation of earth and space science learning is not conveyed and rarely available in other subject. The survey method has been utilized with questionnaires in three high schools around the Bandung zone. The number of respondents is 158 high school students and 3 high school teachers. The data has been obtained that earth and space science is more interesting if the learning materials was available. High school students often access the internet in term of collecting alternative learning resources beside teachers teaching. In conclusion, the researchers intend to develop web-based teaching materials for high school students. This web-based learning material for high school students has been developing.

1. Introduction
Earth and Space Sciences is the integration and synthesis of physics, biology, chemistry, oceanography, meteorology, geophysics, geology, astrophysics, and other sciences that study life and natural phenomena on earth and sky [1]. Earth and Space Science is one of physics subject in senior high school. Thus, Physics is one of the science subjects for students to learn in core educational phase from elementary until senior high school [2]. In physics studies in particular, the material of Earth and Space Sciences which is often discussed is about weather, celestial motion, global warming and the structure of the earth. The results of a preliminary study relating to Earth and Space Sciences on Physics teachers in secondary schools stated that Earth and Space Sciences had never been given in full in class. Earth and Space Sciences material tends to be theoretical and informative and there is no extensive reading material available to students. In fact, the presentation of Earth and Space Sciences material in schools often depends on the availability of textbooks as the main source of learning for students. Another obstacle is the consideration of relatively few national final exam questions for Earth and Space Sciences material in Physics so that Earth and Space Sciences material is often entrusted to Geography lessons. So, sometimes the subject in Earth and Space Science never given in full in class. Whereas Earth and Space Sciences material in Physics is as important as other subjects and even interrelated. In the material there are natural phenomena that often occur around us that can be observed and even predicted, so it is important for us to study it. So far in existing schools, the existence of teaching materials related to Earth and Space Sciences is still very minimal or rarely. This is certainly very influential on the quality of teaching and learning in the classroom. So, to increase the quality of teaching, we need to know about success in the learning process.
Success in the learning process is inseparable from three important elements, namely the curriculum, the learning model applied and the teaching materials used [3]. Learning process can use collaborative learning with systems that are designed primarily for students to enable and support cooperation at a distance via the internet during uniform activities, such as composition of texts, data analysis, and the other [4, 5]. Student learning occurs primarily through interactions with people (teachers and colleagues) and teaching materials (textbooks, workbooks, instructional software, web-based content, homework, projects, quizzes, and tests) [6]. Teaching materials have important interactions in the learning process. Teaching materials are an important part in the implementation of education. Through teaching materials teachers will be easier to carry out learning and students will be more helpful and easy to learn. In the learning process in the classroom, the role of the teacher is not only as a teacher but also as a source of information for students. One effort that we can be done to create the best learning for students is to use varied learning resources. Teaching materials play an important role in improving the quality of learning [7]. Teaching material is an important part in the implementation of education in schools. In the modern era like today, the development of information media is very rapid. The need for students to seek information becomes easier. One way to produce interesting teaching materials is to apply web-based learning materials. Web-based teaching materials can make it easier for students to find related subject matter because there are content in the form of text, images, video, sound, animation and others.

For using web-based teaching and learning materials, there are two aspects to enhance student learning. The first aspect is the availability of materials in the chosen field of study. The second aspect of using web-based teaching and learning materials concerns finding relevant materials and assessing their quality [8]. For this research, we want to analyse the needs of learning material for student. So, they can use it to increase the conception of the subject.

2. Methods

2.1 Participant

The samples of this study were 158 high school students and 3 teachers. They are from three high schools in around Bandung City Zone.

2.2 Instrument

To find out the need for web-based teaching materials, a survey is conducted for senior high school students and senior high school teachers. This identification is done by distributing questionnaires to students and teachers. In preparing the questionnaire, emphasis was placed on interest, constraints and teaching materials (specifically sourced from the internet) regarding Earth and Space Sciences material. The questionnaire used is semi-open, some require short answers but there are questions that reveal the reasons for respondent's answers. The number of statements in the student questionnaire was 25 questions, for a teacher questionnaire was 5 questions. Questionnaires were distributed to 3 high schools around the city of Bandung zone. The questionnaires were distributed from 14 August 2018 to 31 August 2018.

2.3 Research Design

Research conducted is a survey research. The purpose of this study was to analysis needs of web-based learning material for Physics learning on Earth and Space Science subject in senior high school students.

2.4 Data Analysis

Data analysis used in this study was descriptive statistics. The results of the questionnaire were processed by calculating the percentage of each question in the student questionnaire and the teacher.
3. Results and Discussion
To find out the analysis of Earth and Space Sciences learning in secondary schools, it was distributed and obtained the results of student questionnaires as many as 158 high school students. The distribution of student questionnaires had done with several questions such as the following:

Table 1. Questionnaire for students of senior high school.

| No | Questions                                                                 |
|----|---------------------------------------------------------------------------|
| 1  | Are you interested in studying the material of Earth and Space Science at school? |
| 2  | Where do you get knowledge about Earth and Space Science material at school? (may choose more than one) |
| 3  | Are sources from the internet the most important learning resource compared to textbooks? |
| 4  | What are the perceived obstacles in studying Earth and Space Science? (may choose more than one) |
| 5  | How often do you use a smartphone in a day? |
| 6  | Are learning resources with video visualization easier to understand than writing or drawing explanations? |
| 7  | What are your expectations / suggestions regarding learning for Earth and Space Science material so that it can be more interesting and have useful content? |

The data obtained in table 2 as follows:

Table 2. Answer for question number 1.

| Yes | No   | Blank |
|-----|------|-------|
| 45.57 % | 29.75 % | 24.68 % |

At the high school level, for problem number one was 45.57 % answered that they were interested in studying Earth and Space Sciences material at school, 29.75 % answered they were not interested. For question number one, there is student who not choose the answer. They choose blank or skip the question.

Table 3. Answer for question number 2.

| Textbook | Internet | Teacher's explanation in class | Blank or another answer |
|----------|----------|-------------------------------|-------------------------|
| 37.97 %  | 62.65 %  | 37.97 %                       | 10.76 %                 |

For problem number two, 37.97 % answered getting knowledge about it from textbooks at school, 62.65 % from the internet and 37.97 % from the teacher's explanation in class. There are 10.76 % students who answer with another or blank. They can choose answer more than one.

Table 4. Answer for question number 3.

| Yes | No | Blank |
|-----|----|-------|
| 60.76 % | 39.24 % | 0 % |
As many as 60.76% of students answered that internet sources were the main source of learning compared to textbooks, 39.24% answered they did not agree. In the question are provided reason for the question. The student didn’t answer the reason, just choose the answer.

Table 5. Answer for question number 4.

|   | A     | B     | C       | D       | E       |
|---|-------|-------|---------|---------|---------|
| % | 15.18 | 20.25 | 18.98   | 23.42   | 15.83   |

In problem number 4, for the constraints they felt in studying it, 15.18% because teachers were less interactive, 20.25% were constrained by less accurate learning resources, 18.98% because students were less involved in learning. For answer D is 23.42% thought learning was boring. There are 15.83% answered others or blank.

Table 6. Answer for question number 5.

|   | A    | B    | C   | D   | E   |
|---|------|------|-----|-----|-----|
| % | 55.06| 22.78| 3.16| 1.26| 6.33|

Table 7. Answer for question number 6.

|   | Yes | No   | Blank |
|---|-----|------|-------|
| % | 49.37| 47.47| 3.16  |

On the question of how often they use smartphones in a day, 55.06% answer very often, 22.78% often, 3.16% rarely, and 1.26% never. As many as 49.37% of students agreed that learning resources with video visualization were easier to understand than writing or drawing explanations, 47.47% answered no. The others is no answer the question. In the final question regarding suggestions and expectations in Earth and Space Sciences material learning to be more interesting and have useful content. Students answer that using illustration videos, practices and teaching methods that are not monotonous will be more interesting in studying it.

Data obtained from senior high school students shows their interest in studying Earth and Space Sciences materials, but there are obstacles in using accurate learning resources. Senior school students access the internet more often and use learning resources from the internet. They prefer the visualization of videos along with animated images to make it easier for them to understand it. Most high school students who suggest to use learning media that are varied and have good visualization so that it learning becomes more interesting. For data obtained from high school students also showed interest in studying it. The use of interesting learning media is also considered to be one that makes learning more interesting. In addition, they also suggested using illustrations or simple practicum videos to make learning not monotonous. For the teacher questionnaire, several questions are presented as follows:

Table 8. Questionnaire for teacher of middle high school.

| No | Question                                                                 |
|----|--------------------------------------------------------------------------|
| 1  | Which material is most interesting for you to teach students? (may choose more than one) |
| 2  | What factors are limitations or constraints in teaching material to students? (may choose more than one) |
No | Question
---|---
3 | What learning resources are used by teachers in teaching material in class? (may choose more than one)
4 | What learning resources are used by students in gaining understanding of that? (may choose more than one)
5 | Are these material learning resources from the internet in accordance with the curriculum?

In the questions above, the results obtained from high school teachers, for question number one answered 0% of the earth's structure, 0% weather, 33% of celestial bodies and 33% of global warming for the most interesting material to be taught to students. Factors that become obstacles in teaching Earth and Space Sciences materials were 0% because of the understanding of the subject matter of the teacher concerned, 67% because of books, 67% due to lack of teaching aids, 0% learning models and 0% because the learning media were the constraints. For questions about learning resources used by teachers, 33% of textbooks and 100% from the internet. For questions about whether the learning resources from the internet are in accordance with the current curriculum, 33% answer accordingly, 100% answer is less appropriate, and 0% are not appropriate.

The data obtained from secondary school teachers stated that the lack of teaching media such as textbooks and teaching aids made it difficult to deliver it. Teachers often use textbooks and internet learning resources as the main learning resources used in teaching. The availability of internet resources is considered to be in accordance with the current curriculum. However, for high school teachers, there are some sources from the internet that are not in accordance with the current curriculum.

Based on the data above, a web-based teaching material for secondary school students is arranged which is expected to help facilitate students and increase students' learning interest related to Earth and Space Sciences materials at school. The materials prepared are adjusted to the Basic Competencies contained in the 2013 Revised Curriculum.

4. Conclusions
Based on the results obtained, it was concluded that the needs analysis of web-based Earth and Space Sciences teaching materials is expected to be one source of learning for teachers and students. The result is obtained from the distribution of student and teacher questionnaires regarding the needs and constraints encountered in Earth and Space Sciences learning and teaching. In the web-based Earth and Space Science that we development, there is some text, video, simulation and other. The preparation of this web-based Earth and Space Sciences teaching material is adapted to the curriculum that applies in schools so that the content and contents in it are in accordance with the needs of students at the high school level.

5. References
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