DEVELOPMENT OF INTERACTIVE WEB-BASED E-MODULE ON THE SOLAR SYSTEM MATERIALS IN SCIENCE SUBJECT

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Article Info	Abstract
	This research was designed to develop a solar system E-Modul module for 6th grade elementary school students in science subjects. This research uses a 4D model consisting of 4 steps: Define Design, Development, and Dissemination. The subject of this research was 6th grade students of SD Negeri Saruni 1 Pandeglang. The experts conduct validation in the field of materials and media. Product trial is conducted on students. The data from this trial were collected through observation. The data analysis corresponds to the expectations of learning media products assessed through analysis of the average validity. The feasibility of the solar system e-module material in science subjects is 85% with good enough qualifications, and the feasibility of the material in the e-module is 75% with good qualifications. Based on student assessments of e-module learning on solar system material of science subject obtained an average score of 96% with good qualifications. Based on the data, the teaching materials developed have a high level of validity. The overall validity assessment of this research found that this online learning media has a good level of validity, which means that it can be used as students' teaching material. **Keywords**: Media Development; e-modul; Solar System

A. Introduction

According to Rusman et al. (2012), learning media is one type of communication technology that can be used by teachers for learning purposes; learning media is a physical means to deliver the subject materials. Media can be used as a form of communication through print, and listening through hardware technology.

Today's technology is known as the technology that uses a systematic approach, namely the development and application of methodological processes based on laws or rules to facilitate learning.

Science is one of the subjects that should learn by students at the elementary school level. Science learning is a science that learns about all events around us.

Science learning is urgent to learn because science learning provides opportunities for students to think critically. According to Eviani (2014:3), science learning has three prioritized aspects, process, attitudes, and products. Through science learning, students are expected to be able to develop and understand science concepts that can be applied in their lives. Through science learning, students are encouraged to develop their curiosity about all learning activities. In the science learning process of elementary school, various problems occur in the field. The problems found are not a few students are less motivated in learning.

From this, it will affect the learning achievement of students who scores below the Minimum Completeness Criteria. Students also feel bored when the learning process is only teacher-centered. Teachers have not used the media effectively in the learning process.

The development of science and technology in the globalization era can no longer be unstoppable. This requires us to be able to adapt to the various advances that exist. The easiest example to find today is the use of the internet which allows people from all over the world to communicate, therefore the mastery of technology is necessary

considering that currently, the world community has entered the 4.0 era, that technology cannot be separated from human life. Everyone has to change to keep creativity alive. If people do not change, creativity will die. What is meant by learning with online electronic media is convenient and easy to access. Online media requires an internet connection. Fully online learning usually includes face-to-face time and all content provided online. (Almaghaslah, et.al, 2018).

In Indonesia, online learning has been widely applied in various schools and universities. The introduction, association, and discussion of this method have embellished activities in various academic circles. Training has also been frequently conducted so online learning implementation is increasingly happening in various educational institutions. Public and private universities have also used this method experimentally. The development of online learning is a breakthrough in the education world. Online learning is packaged to be more attractive so it can develop and

motivate students to understand the material presented.

Internet access allows learning through various sources, opens new perspectives on learning, learning independently, and of course more economical. Online learning allows students to revise and save the material presented and has the concept of continuous access to useful material to help students face exams (Almaghaslah et al., 2018). According to Rusman et al. (2012), learning media is a physical means to deliver the subject materials to students that can be used by teachers for learning purposes. Learning media is a way of communicating with others using print and electronic media.

The research conducted by Dwi Rahma (2018) the title "Energy Material E-Module Development and Its Changes with a Scientific Approach in 4th grade Elementary School" focuses on finding good learning resources, methods, and models, so learning can be said to be successful and help students understand and enjoy the class

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interaction. Learning resources consist of all data, people, or objects used to help students learn more effectively. There are many types of learning resources, including books, articles, websites, and videos. Learning resources include messages, people, materials, techniques, and the environment.

The formulation of the problem in this research are 1) What are the steps for developing a science e-module for 6th grade students of SD Negeri Saruni 1?; 2) How is the feasibility of a science e-module for 6th grade students of SD Negeri Saruni 1?

B. Research Methodology

The R&D research can be carried out with various development models. This research was adapted from the 4D model. This 4D model is used in development research that produces online learning products of science subjects e-module for 6th grade students. The research was conducted at SD Negeri Saruni 1. The research locations were selected based on the problems and needs found by researchers in science learning. The subjects of this research were 30 students in 6th grade at SD Negeri Saruni 1.

The steps for implementing this model are Define, Design, Development, and Dissemination. At the define stage, the development

requirements are determined. This definition is used to analyze development needs, product development according to these needs, and the use of feasible development models. Design refers to creating something visually appealing. At the design stage, the researcher has created an initial concept of the product. This stage helps to create teaching materials that reflect the results of curriculum analysis and teaching materials. At the development stage, there are two activities, namely validating or assessing the product design feasibility and the trial activity of product design on the target subject. During this trial, we sought user

feedback about the model. The test results are used for product improvement. After being repaired, it is retested until effective. The last stage is dissemination. At this point, there are three activities to complete:

validation testing, packaging, and diffusion adaptation. After the validation test is complete, the next stage of development will be packaging and diffusion adaptation.

C. Result and Discussion

Based on the research on the development of e-module in science subjects that has been carried out, the results of the research and discussion are obtained according to each stage of 4D development Define, Design, Development, and Disseminate.

The results showed that there were problems occurred in the science learning process at SD Negeri Saruni 1 Pandeglang. Information was obtained based on the interview results with teachers and students. The problem found is that quite a lot of students are less motivated to learn. The lower a student's score, the less likely he is to achieve the Minimum Completeness Criteria standard in his studies. Students feel bored by following the teacher-centered learning process. It can make it

difficult for them to retain the learned information. Teachers do not effectively use the media in teaching.

The need to develop teaching materials that are easy to use, effective, attractive, and educative is one way to improve students' ability to understand a concept. Making the online learning media in the form of the science e-module in solar system material at SD Negeri Saruni 1 Pandeglang. The storyboard contains explanations related to the interactive web-based e-module.

The next stage is developing the science e-module of the solar system material at SD Negeri Saruni 1 Pandeglang. The development steps can be seen in the following description.

1) Media preparation in creating e-module by using applications in

the form of Microsoft Word and flip builder applications as media to create e-module and publishing the interactive web-based e-module on the solar system material of science subjects.

2) The validation stage is to find out whether the product developed is feasible to be tested in the field. The first validation is done by giving the validation questionnaires to material and media experts. The validation questionnaire consists of several assessment indicators and a score column based on a Likert scale. The recapitulation of the validation results is processed to get the average score and percentage of each expert. This validation result obtained input for revision according to the experts' assessments. The product was declared valid by two experts. Next are responses and assessments by the science teacher at SD Negeri Saruni 1 Pandeglang.

3) After all of the revisions are completed, the final product is a

web-based interactive e-module for science subjects, packaged in the online form on an interactive web and given a cover according to the contents of the solar system material.
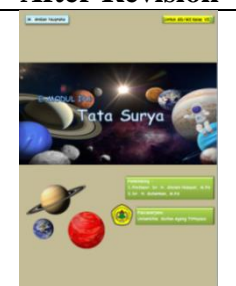
Table 1
Product Validation Results

Material Experts	Media Experts
Indicators of achievement of competence (IPK) and learning objectives have not reached basic competence (KD), and the module has not achieved the basic competence (KD) objectives (KD), so it is necessary to add activities to facilitate KD 3 and the e-module discussion is adjusted more.	The e-module cover ornaments are not appropriate and tend to not contrast with the fonts, so the fonts are changed to be more consistent, e-modules usage tutorials should be added with redaction of the designation of the solar system material, and e-module learning activities should include exercises, assignments, summaries, and tests formative.

After revising the product according to the experts' input, it was found that according to media and material experts the developed product was stated as good, this can be seen from various aspects that had been determined. The results of the product revision are as follows.

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Table 2
Product Revision

Before Revision	After Revision

One way to help students learn more about the solar system is to provide them with attractive resources. The developed media is ready to be implemented and used as a product that can be used in the State Elementary Schools in the cities/districts in the province of Banten.

Based on data analysis conducted by material and media experts, the results are shown in Table 3 below.

Table 3
Media and Material Experts
Validation Score

No	Expert Teams	Score	Criteria
1.	Media Experts	85%	Very Good
2.	Material Experts	75%	Good

Based on Table 3 above, the media experts' assessment score is 85% with very good criteria, and the material experts' assessment score is 75% with good criteria.

Based on the obtained data analysis from the science teacher, the developed interactive web-based e-module of science subjects obtained an average total score of 88%, which can be said as valid and feasible to be used as a learning resource.

4D research and development models usually involve researching to find potential findings related to the product under development. Develop a product based on the findings of previous preliminary research. After the field test, the product was revised based on the weaknesses found in the test (Hanafi, 2017:138). This research was conducted to develop an e-module to help students learn science. Science

learning in schools should provide opportunities to explore students' natural curiosity. It will help students to improve their thinking skills. Teachers should be innovative and creative while still paying attention to the aspects of students' mental and psychosocial development at school.

The high percentage of e-module feasibility is because e-module can arouse students' learning enthusiasm. The findings of this research are in line with the results of research by Nindy Feriyanti, which showed that the feasibility test of material experts was 4.61 and 92.2%, linguists 4.4 and 88.33%, media experts were 4.03 and 80.7%, and the field test 83.52%. So the average score obtained is 4.34 and 86.18% with the "feasible" category.

D. Conclusion

Based on the results of research and development of interactive web-based e-module of science subjects, the researchers can conclude that:

1) The development of an interactive web-based science e-module for 6th-grade students of SD Negeri Saruni 1 using the 4D development model. The results of all stages of 4D research and development are the product of an interactive web-based science e-module of solar system materials made by the researcher feasible to use in the learning process.

2) The quality of interactive web-based science e-module teaching materials of the solar system materials in terms of various aspects according to the validity tests carried out by material and media experts, as well as student assessments, the overall learning media is good and feasible to use in the e-learning process of interactive web-based science module of solar system materials.

Based on the results of the research and the conclusions obtained in this research, it is suggested the following things:

1. For students, teaching materials in the form of interactive web-based e-modules can facilitate students

understanding the solar system material in science subjects.

2. For teachers, the product "interactive web-based science e-module of solar system materials for 6th-grade elementary school students" can be used as teaching material for learning media to

explain solar system material effectively and efficiently.

3. The researchers who are interested in developing this e-module media can continue and redevelop this e-module media with other materials according to their needs.

References

Abin Syamsuddin Makmun. 2009. *Psikologi Kependidikan*. Bandung: Remaja Rosdakarya.

Azhar Arsyad. 2008. *Media Pembelajaran*. Jakarta: Rajawali Pres.

Arikunto, Suharsimi. 2012. *Dasar-dasar Evaluasi Pendidikan.* Jakarta: BumiAksara.

Branch, R. M. (2010). *Instructional Design: The ADDIE Approach.* USA: Springer.

Cecep dan Bambang. 2011. *Pendekatan Kontruktivitas Dalam Proses Pembelajaran.* Jakarta:Rineka Cipta

Endang Mulyataningsih. 2013. *Metode Penelitian Terapan Bidang Pendidikan*. Bandung: Alfabeta

Ishak Abdulhak & Deni darmawan.2013. *Teknologi Pendidikan*.Bandung: PT Remaja Rosdakarya.

Ratna Yudhawati dan Danny Haryanto. 2011. *Teori-Teoi Dasar Psikologi Pendidikan*. Jakarta: Prestasi.

PustakaryaRusman, dkk. 2012. *Pembelajaran Berbasis Teknologi Informasidan Komunikasi*. Jakarta: Rajawali Pers.

Sanjaya, W.2010:204. *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan.*, Jakarta: Kencana.

Sugiyono. 2012. *Metode Penelitian Pendidikan Pendekatan Kualitatif, Kuantitatif dan R&D.* Bandung: Alfabeta.

Susanto, A. 2013. *Teori Belajar & Pembelajaran di Sekolah Dasar.* Jakarta: Prenadamedia Group.

Susilana, R & Riyana. 2009. *Media Pembelajaran. Hakikat, Pengembangan, Pemanfaatan, Penilaian.* Bandung : Wahana Prima.

Sutopo, Hadi. 2016. *Pengembangan Media Pembelajaran dan Sumber Belajar.*Serang: Universitas Sultan Ageng Tirtayasa.

Darmawan, A., & Kemdikbud, P. (2013). *Pengaruh Pendekatan Online Learning Menggunakan Portal Rumah Belajar Terhadap Hasil Belajar Ipa The Effect Of Blended Learning Approach By* Nugraha, Hidayat & Suherman

Utilizing "Rumah Belajar" Portal On The Learning Outcomes Of. *17*(September), 292–306.

Deshwal, P., Trivedi, A., & Himanshi, H. L. N. (2017). Online Learning Experience Scale Validation and Its Impact on Learners' Satisfaction. *Procedia Computer Science*, *112*, 2455–2462.

Garrison, D. R., & Kanuka, H. (2004). Online learning: Uncovering its transformative potential in higher education. *Internet and Higher Education*, *7*(2), 95–105.

Herwanto. 2013. Pengaruh *Online Learning* terhadap penguasaan konsep dan penalaran fisika [eserta didik kelas X SMA Negeri 1 Batu. Malang: Universitas Malang.

Ikhsan. 2014. Rancang Bangun *E-Learning* Berbasis *WEB* Pada Pelajaran Produktif Kelas X Teknologi Pengolahan Hasil Pertanian.

Irawan. 2018. Pengembangan *E-Learning* Dalam Peningkatan Pemahaman Lagu Pada Pembelajaran Bahasa Inggris.

Muammar. 2017. Pengembangan *E-Learning* Berbasis *WEB* Di Jurusan Pendidikan Biologi UIN Raden Intan Lampung.

Mujiyanto, 2012. Pengaruh *Online Learning* terhadap Pemahaman konsep ditinjau dari penalaran formal siswa kelas X SMA Negeri 1 Balikpapan. Tesis.

Pamungkas, A, S. 2017. Pengembangan Bahan Ajar Berbasis Literasi pada Materi Bilangan Bagi Mahasiswa Calon Guru SD. Jurnal Pendidikan Dasar (JPSD) Untirta, Vol 3 No.2 September 2017, 228-240.

Hendriyani, M. 2016. Alam adalah sekolah dan bermain adalah proses. Jurnal pendidikan sekolah dasar (JPSD) Untirta, Volume 2 No 1. 2016. 210-215.

Nurhasanah, A. 2016. Penggunaan Metode Simulasi dalam Pembelajaran Keterampilan Literasi Informasi IPS bagi Mahasiswa PGSD. *Jurnal Pendidikan Dasar (JPSD) Untirta*, 2(1): 87-95.