DEVELOPMENT OF MULTIMEDIA WEB-BASED PHYSICS LEARNING TOOLS TO STRENGTHEN STUDENTS' CHARACTERS

Isa Akhlis✉ and Nila Prasetya Aryani

Physics Education Department, Universitas Negeri Semarang, Indonesia

Article Info	Abstract
	This research intended to obtain an initial description of students and environment on peace-loving, environmental caring, learning methods, learning materials, and learning media applied in Physics lesson at a high school; moreover, to examine the validity of high school physic learning materials and multimedia web-based physics learning tools in strengthening the students' characters. The data collection methods employed were (1) documentation, to get the prior data of high school physic materials; (2) observation, to collect the data of students' initial characters; (3) questionnaire, to obtain the data of learning method, teaching materials, and learning media adopted in the learning process; and (4) validation, to test the developed learning tools' validity. The results showed that generally, the students have possessed the character of peace-loving, while they rarely owned the environmental caring. In addition, the developed learning tools achieved a good assessment and were declared valid.

✉Corresponding author:
Isa Akhlis
Physics Education Department, Universitas Negeri Semarang, Indonesia
E-mail: isa.akhlis@gmail.com

INTRODUCTION

Character education at schools intends to cultivate good habits towards students so that they will be accustomed to behaving appropriately in accordance with the prevailing values. Khusniati (2012: 204 – 210) stated that an integration of character education could be realized in either preparation, implementation, or evaluation stage. The integration of character education in science learning could be developed through the selection of a learning model, learning media, and assessment model, which also depends on the learning materials. The science learning models having a respectable huge impact on students' character development are cooperative, contextual, problem-based, problem-solving, and inquiry model (Sadia, 2013).

The character education should be supported by learning tools corresponding to the objectives. Hence, integrating the values into learning tools is one of the solutions (Akhlis & Dewi, 2013). the first stage to develop the character-based learning tools is analyzing students' initial condition and learning environment. The obtained data are the basis for developing multimedia web-based physics learning tools.

According to Priyantini et al. (2015), character learning tools are greatly important to shape positive characters of students. The interaction between students and character learning tools will lead to the alteration of their characters. The emerging values which related to learning materials will also make a more meaningful learning. (Anggela, 2013).

Multimedia has brought a dynamic learning process (Waryanto, 2008). It is undeniable that multimedia gives a favorable impression in communication and education since it integrates texts, graphs, animations, audios, and videos. Stood on those reasons, it is possible to say that multimedia is appropriate to explore both positive and negative impacts of physics-related knowledge in strengthening students' characters. In line with this, Arsyad (2002: 21) stated that the benefits of learning media are: (1) attractive learning; (2) interactive learning, by applying the learning theories and psychological principles in the form of students; participation, feedbacks, and knowledge; (3) increasing learning quality, only if the learning media are communicative, specific, and clear; and (4) students' positive attitudes towards what they have learned and learning process.

Based on the above description, the formulated research problem was; how to develop the multimedia web-based physics learning tools to strengthen students' characters? This study aimed at producing the physics learning tools comprising the values of peace-loving and environmental caring for a physics lesson in high schools.

METHODS

This research adopted the Four-D Model proposed by Thiagarajan consisting of Define, Design, Develop, and Disseminate. The four stages comprise the analysis of base-end, students, assignments, concepts, learning objective formulation, test standard preparation, media selection, teaching materials format selection, initial drafting, expert judgment, revision, and development trial.

The research subject was the multimedia web-based physics learning tools, while the research sample was X graders of Madrasah Aliyah Ma 'ahid Kudus academic year 2016/2017. The research instruments include observation sheets to get the initial data of the students' characters and questionnaires to collect the validity data of the developed learning tools.

RESULTS AND DISCUSSION

1. The Prior Analysis of Peace-loving Character

Mainly, the students have understood the essence of character education, and almost all of them have lived up to the peace-loving character. This was depicted through their displeasure of brawl while in fact, they have never been involved in it. Instead, they participated in school extracurricular which tightens their brotherhood. This is parallel with Handayani et al. (2016) who explained that character education is possibly implemented through students' participation in positive school activities.

Teachers' role is greatly important in creating a conducive learning environment. The observation results indicated that almost all teachers have attention to the students' characters. They were not reluctant to remind the students when they violated the school rules. Some of the teachers also actively escorted the extracurricular activities. This is in line with Elhesmi et al. (2013) who stated that a teacher has a very salient role in cultivating the peace-loving character to his/her students. This value is necessarily applied

especially in religious diversity in the form of tolerance to create world peace (Chaer, 2016).

2. The Prior Analysis of Environmental Caring

Most students in MA Ma'ahid Kudus have understood the importance of environmental caring. There were also efforts from schools to involve the students in environmental caring activities. However, most students were not consistent with this character. Some often threw litter and did not care about the schoolyard.

The school has tried to instill the character of environmental caring to the students, for instance, through the construction of a school park where its maintenance involved the students. This could foster them to look after the surrounding environment; also, to make them understood the danger of natural resource exploitation such as deforestation, dynamite fishing, and so on. These unwise actions towards nature would result in a decrease in the environment quality (Setiyani, 2013).

Furthermore, the school has also instilled the character of environmental love for students through community service activities in the school environment. However, this activity has not either been scheduled well of done frequently yet encouraged the environmental hygiene.

There were several aspects in the implementation of environmental loving education consisting of policy, curriculum, participatory activities and management of environmentally friendly supporting facilities. These aspects served to familiarize the students and school community to always love the environment.

3. The Analysis of Learning Sources

The learning sources used by the teacher and students were mostly textbooks and worksheets (LKS). Supporting learning resources made by the teacher such as LKS WERE very necessary to get the desired learning outcomes. There were not many LKS that placed the students as investigators due to it materials presentation which unable to stimulate the curiosity of students. The employed LKS covered a lot of materials and questions so that it did not help the students to learn new materials. To avoid mistakes in the preparation of new concepts by students, the teacher must provide intensive guidance. Starting from the fact that the teacher-student ratio was 1:30, it would consume a lot of time so that there might be no classical completeness. In other words, only a small percentage of students could achieve completeness. For this reason, there should be an LKS that includes prerequisite materials as an individual project facility that must be done before learning begins (home assignments).

4. Analisis Media pembelajaran The Analysis of Learning Media

The mostly-used media were in the form of power points created by the teacher in the classroom. Through this activity, the teacher did not place the students as investigators. In the learning process, such media would make students passive in the concept discovery and limit their space in determining the scope of knowledge they learned. Observations required by the 2013 curriculum were only conducted by the students without interaction. In addition, both the source and the media lacked the issue of character values, which should be integrated in learning. Character education applications in learning tools have been seen in the existing syllabus and lesson plans. However, there has been no correlation between character education in learning tools and media. This identified that the character education was limited to black-and-white.

Overall, the existing learning tools have not applied character education. This might lead to the less appreciative and less empathetic students with others, even they tended to make groups in schools. According to Piaget (Hidayat, 2004) social transmission affects human intellectual abilities, while Vygotsky (Hidayat, 2004) elucidated that the additive process in increasing knowledge is carried out in interaction with the environment so that the low socialization ability of students has an impact on their low intellectual ability. The character learning tools could have a positive influence on students' characters (Izzati, 2013).

5. The Validation Results of the Developed Learning Tools

The output of this research was learning tools including lesson plans, Textbooks, Learning Videos, and learning web for Work and Energy materials for X grade high school students. The lesson plans contained steps for learning the Work and Energy materials. The learning was conducted in 3 meetings where the integrated learning activities used both printed teaching materials and learning videos were accessed on the web. The learning also aimed at developing the environmental caring and peace-loving.

The validation results found that the learning tools produced in this study were in the good category, and applicable in the learning process. The validator also stated that teaching materials were sufficient to help the students' activities in learning. Character learning tools could have a positive influence on the students' character (Izzati, 2013). The assessment results of the learning tools appear in Table 1.

Table 1. The Assessment Results of the Learning Tools

No.	The Responded Aspects	Response
1	The validators' assessment towards the learning tools and test instrument	
	a. Learning multimedia	Good
	b. Syllabus	Good
	c. Lesson Plans	Good
	d. Independent Worksheets	Good
	e. Learning Website	Good
	f. Test Instrument	Good
2	Teacher's opinion on learning tools and test instruments on the teaching-learning process	
	a. Learning multimedia	Very good
	b. Syllabus	Very good
	c. Lesson Plans	Very good
	d. Independent worksheets	Very good
	e. Learning Website	Very good
	f. Test Instrument	Very good

The validators pointed out some disturbing printing errors. Moreover, the validators also suggested to make the online teaching materials more attractive to motivate the students. The validators also stated that teaching materials were useful to build the students' characters yet remained to depend on the teacher's skills in learning.

CONCLUSION

Through the analysis of students and the environment, it revealed that the application of character education in school life was low as the existing tools did not provide opportunities for the students to develop their character. The multimedia web-based physics learning tools were developed to obtain good assessment and were suitable for use.

REFERENCES

Akhlis, I., & Dewi, N. R. (2014). Pengembangan Perangkat Pembelajaran Science Berorientasi Cultural Deviance Solution Berbasis Inkuiri Menggunakan ICT untuk Mengembangkan Karakter Peserta Didik. *Jurnal Pendidikan IPA Indonesia*, *3*(1).

Anggela, M. (2013). Pengembangan Buku Ajar Bermuatan Nilai-nilai Karakter Pada Materi Usaha dan Momentum untuk Pembelajaran Fisika Siswa Kelas XI SMA. *Pillar of Physics Education*, *1*(1).

Arsyad, A. (2002). Media Pembelajaran. Jakarta: PT. Raja Grafindo Persada.

Chaer, M. T. (2017). Islam dan Pendidikan Cinta Damai. *ISTAWA*, *2*(1), 73-94.

Handayani, N., & Indartono, S. (2016). The Implementation of Multicultural Character Education. In *ICEBESS 2016 Proceeding: International Conference on Ethics of Business, Economics, and Social Science. Available online also at: http://eprints. uny. ac. id/41853/1/41% 20Nurlaili% 20Handayani. pdf [accessed in Bandung, Indonesia: October 28, 2017]*.

Hidayat, M. A. (2004). *Bahan Penelitian Matematika " Teori-teori Belajar Matematika"*. Jakarta: Departemen Pendidikan Nasional.

Izzati, N., Hindarto, N., & Pamelasari, S. D. (2013). Pengembangan Modul Tematik dan Inovatif Berkarakter pada Tema Pencemaran Lingkungan untuk Siswa Kelas VII SMP. *Jurnal Pendidikan IPA Indonesia*, *2*(2).

Karwati, E. (2010). Pelestarian dan Pengembangan Budaya Melalui Manajemen Pendidikan. *Jurnal Ilmiah Kopertis IV: Wawasan Tridharma*, (1).

Miranita. (2012). Pendidikan Karakter melalui Pembelajaran IPA. *Jurnal Pendidikan IPA Indonesia*, 1(2): 204-210.

Sadia, W. (2013). Model pendidikan karakter terintegrasi pembelajaran sains. *JPI (Jurnal*

Pendidikan Indonesia), *2*(2).

Setiyani, N. (2013). Pendidikan Karakter Peduli Lingkungan Melalui Program "Green Environment" Di SMP Alam Ar-Ridho". (Doctoral dissertation, Universitas Negeri Semarang).

Waryanto, N. H. (2008). Multimedia interaktif dalam pembelajaran. *Skripsi). FMIPA Universitas Yogyakarta*.