

Validity of Interactive Learning Multimedia on Biology Learning Material of Coordination System for Grade XII Senior High School Students

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Abstract - Biology learning is expected to be a mean to learn self, environment and advance development prospects in daily lives. Beside that, it can serve biological objects from molecules level to individual level, even to ecosystem level and life in universe. Therefore, it needs to optimize learning media to help students learn Biology besides the use of books or teachers' explanation. Purpose of the research was to explain interactive multimedia validity, practicality and effectivity about Biology learning material for grade XI Senior High School students. This research was a developmental research by using Plomp design. The model is consisted of three phases, which are preliminary research phase, development or prototype phase, and assessment phase. Instruments of data collection were validity sheets, practicality sheet by teachers and students, observation sheets, and objective test. Techniques of data analysis were Kolmogorov Smirnov test to normality test, Levene test to homogeneity test and T-test to hypothesis test. The finding showed that multimedia got score of 81%, which is in very valid criteria. The result of teacher's practicality test was 90.60% and students' practicality test was 89.21%. It means multimedia is in very practical category. The result of multimedia effectivity test in cognitive, affective and psychomotor competences showed that the developed multimedia was in very effective criteria. In addition, students' cognitive, affective and psychomotor competences used interactive multimedia were better than students' competences which did not use interactive multimedia.

Keywords - Validity; Interactive Multimedia; Learning.

I. INTRODUCTION

Curriculum is a mean in education implementation. All learning process will be guided by designed curriculum. Curriculum in Indonesia develops time by time. It will be examined, analyzed and reviewed according to science and technology development and society changes. One of applied curriculum nowadays is 2013 Curriculum. It is the curriculum which demands all subjects contribute to students' cognitive, affective and psychomotor competences making in order to be active and optimize students' intelligence and interest in every subject.

One subject in Senior High School is Biology. It is a branch of natural science which has important role to science and technology development. Many Biology

principles are implemented in technology development so that they give easiness for human lives.

Because of the importance of Biology for life, it needs to do an effort to increase Biology education quality. The efforts are curriculum improvement, implementation of various teaching methods and strategies, and improvement of learning facilities, especially learning media.

The use of media in Biology learning must be a center attention of teachers because it is a facility to fasten in reaching learning objectives. By assistance of media, learning process will be done easily and its objectives can be reached optimally. Therefore, a teacher is demanded to be able to create learning media in order to support and

motivate students in learning so that communication can run well between teacher and students in learning process.

Based on the result of interview with Biology teacher in grade XI SMAN 1 Pariangan, it is known that Biology learning process has been suitable with determined curriculum. Teacher delivered learning materials suitable with syllabus of Biology in grade XI, but the use of learning media in classroom has not been optimal yet. Teacher used media, like books or power point presentation to deliver learning materials, so that students felt bored and difficult in drawing conclusion from learning process. Waers (2015) stated that in order to make learning process becomes more meaningful for students, teacher needs to find and implement ways to help students rearrange new knowledge into students' previous thinking framework and to make thinking framework in order to arrange new knowledge. Multimedia helps students to relate different concepts to show their relation each other. This method can be used in various subjects. One of them is in Biology subject in Senior High School.

To know whether developed multimedia has been appropriate or not, the development of interactive multimedia needs to pass some tests. One of the tests is validity test. Validity is an integrative evaluative test to know what enlarges empirical proof and theoretical reasons which support conclusion compatibility and action based on scores or other measuring methods. In other word, validity is to measure what should be measured (Thompson, 2013). The validity test is done to know the validity of instrument used. The instrument is valid if it can measure what is needed and reveals data from variables accurately. Based on that fact above, it was needed to do validation towards interactive multimedia in learning Biology.

II. REVIEW OF RELATED LITERATURES

A. Validity

Trianto (2010) stated that valid means assessment process gives accurate information about the developed learning materials. Messick (1989) defined validity as an integrated evaluative assessment about to what extends empirical proof and theoretical reasons support compatibility of conclusion and action based on test score or way of assessment.

According to National Education Standardization Agency (BSNP) (2008), Indicators used to state that whether the product is valid or not are as follows:

1) Content Aspects

Content aspects include compatibility of Core Competence (KI) and Basic Competence (KD), compatibility of student development, compatibility of learning material needs, substance validity of learning materials, benefit to increase insights and compatibility of moral and social values.

2) Linguistic Aspects

Linguistic Aspects include readability, clear information, compatibility to right and correct Indonesian rules, and using of effective and efficient language.

3) Presentation Aspects

Presentation Aspects include the clear of indicators, presentation orders, motivation, attraction and interaction (stimuli and response giving).

4) Graphic Aspects

Graphic Aspects include the use of font, font size, layout, pictures, and design.

B. Interactive Multimedia

Multimedia is combination of texts, arts, sounds, pictures, animations and videos delivered through computer or manipulated in digital and able to be conveyed or controlled interactively. Multimedia involves media synchronization in producing rich media output and set in some parts which are related by hypermedia (Theng, 2014).

Multimedia means combination of texts and image documents. The development of image document technology is equipped with the use of fax, which converts documents with coding which saves information (Sutopo, 2003). Meanwhile, in Telemetry of BBMK 2010 UKM NEO module, multimedia is the development of static graphic design.

Multimedia is combination of some media, played by links to provide users to interact and do navigation. According to Suryanto (2003), multimedia consists of some components, which are:

1. Texts
2. Sound
3. Image
4. Video
5. Animation

C. Macromedia director

Program director is improvement of previous program director (version 8) by adding facility of interaction ability in 3 dimension (3D) object which can be imported from famous 3D software, such as 3DS Max, light ware, etc, and some edition function of Lingo as director language programming (Marfuatun, 2012).

Director is a software created by macromedia (like *flash* and *dream weaver*), usually used to interactive, educative and presentative CD making. It has good scripting language, called Lingo which permits interaction between external files and Windows API, used to make interface graphic and application prototypes, as well as in CD and DVD. It can also be used to make interactive games with additional graphics and films. It supports many formats, such as different *bitmap*, *audio*, *video* (Suyoto, 2005).

III. RESEARCH METHOD

This research was a developmental research or design research. The developmental research is an effort to develop and produce a product in forms of materials, media, or learning strategies used to overcome problems in the classroom and not to test theories.

The development of interactive multimedia used Plomp model. This model consists of three phases, which are preliminary research phase, development or prototype phase, and assessment phase (Plomp, 2013). In the preliminary research phase, problems and needs analysis, curriculum analysis, and multimedia analysis are done to get description about developing products. Next, in the development or prototype phase, prototype I, Prototype II, prototype III, and prototype IV are done. In the assessment phase, test is done in the real classroom.

In the development or prototype phase, validity test was done in prototype II by assessing it to some experts. It was done by three experts of each fields. Then, the result was used to revise it so that the interactive multimedia has fulfilled the users' needs and be able to applied in the real classroom.

The experts' validity instruments used in this research was as follow:

THE RESULT OF INTERACTIVE MULTIMEDIA VALIDITY ANALYSIS ON BIOLOGY MATERIALS IN SENIOR HIGH SCHOOL GRADE XI

A. CONTENT ASPECTS

No	Assessed Aspects	Scores			
		1	2	3	4
		VDA	DA	A	VA
1.	CONTENT ASPECTS				
1.	a. Learning materials is suitable with indicators.				
2.	b. Difficult concepts are visualized in form of animation.				
3.	c. Multimedia is created appropriate with students' characteristics.				
4.	d. Concept validity in interactive multimedia is accurate.				
5.	e. Interactive multimedia contains essential concepts of coordination materials.				

B. LINGUISTIC ASPECTS

No	Assessed Aspects	Scores			
		1	2	3	4
		VDA	DA	A	VA
2.	LINGUISTIC ASPECTS				
1.	a. Interactive learning multimedia uses right and correct indonesian				

	rules.				
2.	b. Interactive learning multimedia uses clear sentence arrangements.				
3.	c. Interactive learning multimedia uses appropriate vocabularies.				

C. PRESENTATION ASPECTS

No	Assessed Aspects	Scores			
		1	2	3	4
		VDA	DA	A	VA
3.	PRESENTATION ASPECTS				
1.	a. Materials presentation in multimedia is in correct orders.				
2.	b. Multimedia is interactive				
3.	c. Multimedia can increase students interest and motivation in learning.				
4.	d. Multimedia has complete information.				

D. GRAPHIC ASPECTS

No	Assessed Aspects	Scores			
		1	2	3	4
		VDA	DA	A	VA
4.	GRAPHIC ASPECTS				
1.	a. It uses readable fonts.				
2.	b. It uses readable font				

	size.				
3.	c. Compatibility of multimedia color combination uses.				
4.	d. Pictures and photos are appropriate.				
5.	e. Animation is appropriate in delivering learning materials.				
6.	f. Sound is clear.				
7	g. Music instruments are appropriate with students' characteristics as users.				
8	h. The created multimedia is technically appropriate.				
9	i. Users' manuals are appropriate.				

Data collected in this research were the results of interactive multimedia validity. It was in form of likert scales 1-4 with rules as follow.

- a. Very Agree (VA) with score 4
- b. Agree (A) with score 3
- c. Disagree (DA) with score 2
- d. Very disagree (VDA) with score 1

After that, the result of scoring is tabulated and calculated its percentage by using this formula:

$$\text{Validity Score} = \frac{\text{Obtained score}}{\text{Maximum score}} \times 100\%$$

Based on the validity score obtained, it is determined the assessment criteria of interactive multimedia validity as in table 1 below.

Table 1. Criteria of Validity Level

Score (%)	Categories
0-20	Very Invalid
21-40	Invalid
41-60	Valid Enough
61-80	Valid
81-100	Very Valid

Modified from Riduwan (2009: 89)

IV. FINDING AND DISCUSSION

Validity of interactive multimedia is based on experts' validity instrument items based on multimedia arrangement stages, so interactive multimedia in Biology materials was created. Next, it was validated by some experts. The interactive multimedia validity includes content aspects, linguistic aspect, presentation aspect and graphic aspects. In addition, validators in this research were Dr. Darmansyah, ST, M.Pd as technologist, Dr. Abdurrahman, M.Pd as linguist, Dr. Ramadhan Sumarmin, M.Si as material expert and Prof. Dr. Lufri, M.S as research instrument expert.

The result of interactive multimedia validity is as follow:

A. CONTENT ASPECTS

Indicators	Validator score				Average	%	Description
	1	2	4	5			
Content Aspects							
1.	4		3	3	3.13	78.33	Valid
2.	4		3	3			
3.	3		3	3			
4.	3		3	3			
5.	3		3	3			

B. LINGUISTIC ASPECTS

Indicators	Validator score				Average	%	Description
	1	2	4	5			
Linguistic Aspects							
1.	3	4	3	3	3.33	83.33	Very Valid
2.	3	3	3	4			
3.	3	4	3	4			

C. PRESENTATION ASPECTS

Indicators	Validator score				Average	%	Description
	1	2	4	5			
Presentation Aspects							
1.	3		3	4	3.24	81.14	Very Valid
2.	3		3	3			
3.	3		3	4			
4.	3		3	4			

D. GRAPHIC ASPECTS

Indicators	Validator score				Average	%	Description
	1	2	4	5			
Graphic Aspects							
1.	3		3	4	3.18	80	Valid
2.	3		3	3			
3.	3		3	4			
4.	3		3	4			
5.	3		3	3			
6.	3		3	4			
7.	3		3	4			
8.	3		3	3			
9.	3		3	3			

Interactive multimedia validity was obtained from validity result by using experts' validity sheets, including material compatibility. Score of content aspect validity was 78.33% with valid criteria. It means that learning process by using interactive multimedia has been appropriate with Core Competence (KI) and Basic Competence (KD), appropriate with students' development, appropriate with learning material needs, substance validity of learning materials, benefit to increase the insight, and compatibility with moral and social values.

Next, score of linguistic aspects validity was 83.33 % with very valid criteria. It means that language selection in multimedia has used right and correct Indonesian language and not ambiguous, clear and readable fonts and font size, language used has been effective and efficient.

In addition, score of presentation aspect validity was 81.24 % with very valid criteria. It means that the presented pictures and their description in interactive multimedia has been appropriate with materials, color composition has also been appropriate, multimedia layout design is simple and interesting, interactive multimedia has given stimulus and

response to students, and information in interactive multimedia is complete.

Furthermore, score of graphic aspects validity was 80% with valid criteria. It means that the use of fonts, font size, layout, illustration, pictures and design in interactive multimedia are also appropriate.

Overall, the average score of interactive multimedia validity was 81% with very valid criteria. So, it can be concluded that interactive multimedia on coordination system learning material can be used as media to encourage students' activeness in learning, support exploration activities, encourage students to work together in groups and improve students' learning competence in cognitive, affective and psychomotor domains.

V. CONCLUSION

Based on finding and discussion of the research, media in learning material of coordination system is successfully created in form of interactive multimedia. It can be used as innovation in learning by taking it into needed aspects to support learning activities. The developed interactive multimedia has valid validity in content and graphic aspects and very valid validity in linguistic and presentation aspects. In conclusion, interactive validity can be used to help students achieve the basic competence to increase students' learning competences in learning process.

REFERENCES

- [1] Marfuatun. 2012. "Pengembangan Media Pembelajaran Berbasis Program Director MX pada Pembelajaran Topik Kimia Inti dan Radiokimia". *Vol. 1. No. 2.* Hal 257-259.
- [2] Messick, S. (1989). *Validity*. In R. L. Linn (Ed.), *Educational measurement* (3rd ed., pp. 13-103). New York: Macmillan.
- [3] Plomp, T. 2013. *Education Design Research dalam Education Design Research: An Introduction*. Enschede: Netherlands Institute for Curriculum Development.
- [4] Riduwan. 2009. *Belajar Mudah Penelitian untuk Guru, Karyawan, dan Peneliti Pemula*. Bandung: Alfabeta.
- [5] Sutopo, A. H. 2003. *Multimedia Interaktif*. Yogyakarta: Graha Ilmu.
- [6] Sutoyo and Sunardi, Y. 2005. *Buku Latihan Multimedia dan Aplikasinya dengan Macromedia Director*. Jakarta: Gramedia.
- [7] Suyanto, M. 2003, *Multimedia Alat untuk Meningkatkan Keunggulan Bersaing*, Yogyakarta: Andi Offset
- [8] Theng, F. 2014. "Interactive Multimedia Learning Innovating Classroom Education in A Malaysian University". *The Turkish Online Journal of Educational Technology*.
- [9] Thompson, N. A. 2013. "Reliability & Validity." : 1-4.
- [10] Trianto. 2010. *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta: Kencana Predana Media Grup.
- [11] Tim UKM Neo Telemetri. 2010. *Modul BBMK 2010 UMK Neo Telemetri*. Universitas Andalas
- [12] Waers, M. P. 2015. *Concept Maps as a way to Improve Understanding and Organization of Concepts within a Subject*. The Faculty of the Patton College of Education and Human Services: Ohio University.
- [13] Yusuf, A. M. 2007. *Metodologi Penelitian*. Padang: UNP Press.