

## **The Development of Encyclopedia as Chemistry Learning Source for Senior High School Students**

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### **Abstract**

This research aimed to develop The Better Energy Encyclopedia for Indonesia (BEEI) as a chemistry learning source for senior high school students and to determine the quality of the encyclopedia according to assessment of five chemistry teachers as reviewer based on quality criteria (standard) of non-text books include content/material, presentation, language and images, and graphics expediency. This research used model of procedural development including of five stages, they are planning, organizing, implementation, product assessment, and data analysis. The developed encyclopedia contains 15 chapters of renewable energy and non-renewable energy. The initial product was reviewed by three peer reviewers, a media expert, and a teaching materials expert. The final product was assessed by five reviewers of senior high school teachers from different school. Assessment was done by using research instrument sheet consisting 34 items statements.

The result of this development research was the Better Energy Encyclopedia for Indonesia. This product obtained an average final score ( $\bar{X}$ ) of 149.20. According to the assessment result by five reviewers, this final product quality of encyclopedia obtained the excellent category. Thus, the Better Energy Encyclopedia for Indonesia is worthy of being used as a chemistry learning source for senior high school students.

**Keywords:** development, encyclopedia, energy, learning source.

### **Introduction**

Education has important rule for the advance of nation (Ritz, 2009). In the other words, the quality of human resource can be seen through education quality of the nation (Kapita and Irawan, 2015). A survey that was done by Trends in International Mathematics and science study (TIMSS) in 2011 reported that the range score that were reached by them were 386 in the lower level behind Singapore, Korea, Jepang, Malaysia, and Thailand. The result decreased than the reach of range score TIMSS in the year of 2007 which got 397 (Mullis et al., 2012).

The other result study of International Institute for Management Development (IIMD) put Indonesia in the low rank from 49 countries in the field of Competitiveness Index(CI) that become one of indicator about the low quality of education in Indonesia (Mularsih, 2010). Based on the result, many efforts were done by the government to increase the education quality, for example like changing the curriculum to be more ideal, increasing the education

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quality through certification and education decentralization (Nasir, 2009). Besides that, the Government did standardization (accreditation) to the worthiness of every unit education for holding quality education, supplying teaching resource that had good quality based on standard of content and repairing the facility to effort the education.

The next problem that worsened the holding education is the distribution of supporting facilitation to all Indonesian's students region that has not facilitated yet (Widianantari, 2008). That's why the students tend to use printed media as learning resource. Allen (Daryanto, 2010:18) clustering teaching research into nine that were visual, film, television, 3D object, recording, lesson programed, demonstration, spoken presentation, and printed media (Hong and Lin-Siegler,2011). Printed media can be newspaper, magazine, supplement book, lesson book and also encyclopedia.

World Bank reported in 1989 showed, that in Indonesia the students level possession of book and another facilities had positive correlation with their study achievement (Markhamah et al., 2006). This research shows that textbooks is very important to improve the learning achievements in the education process (Efendi, 2009). The report result was strengthen by Wijayanti (2011) said that students motivation to read textbook is the important factor to reach achievement or a better result study.

The education holding process has relationship with the activity of study. Boo and Hoh (2001) explained that the activity of study involves a sequence of mental operations that result in constructions of meaning for experiences and the subsequent storage of those meanings in the long-term memory of the learner. The optimal study should be supported by study resource that makes students interested. Moreover, the resource study not only about basic material, but also should be ranged perfectly to get students interesting to achieve study achievement.

Learning achievement often indicates to problems learning of students in understanding material. One of the problems is that student's low motivation to comprehend learning process. Motivation has important rule to attain successful learning (Kusni, 2012). Successful learning can be achieved if there are many books facility. One of the factors that influence student's interest and motivation to study chemistry subject is the book cover that is not interesting (Taradipa et al., 2013). The book cover that is not interesting makes students bored and do not interest to study. Moreover, the thick books make students lose their interesting to read. The books which are able to increase students motivation to study is the

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books which have interesting cover and use appropriate language and suitable with the age of students (Saadah, 2012).

Based on the explanation above, we need a printed media which help students to comprehend chemistry concept easily and interestingly. One of potential printed media which is able to improve student's interesting and reading motivation is encyclopedia. This encyclopedia development is expected to overcome the weaknesses of learning source at this time, especially in presenting content and performing.

## **Research Methodology**

This research method is the research of procedural developing, this is descriptive research, it shows some steps that should be followed to produce a product. This research use 4-D modification model that is developed by Thiagarajan, Semmel and Semmel (1974), include steps define, design, and develop. Step procedure that is: 1) research and information collection (need assessment), 2) design encyclopedia (blue print), 3) arrange an encyclopedia content and appearance, consult to lecture, product preview by 3 peer reviewer, and media and content expert, 4) encyclopedia quality assessment by five chemistry teacher SHS as reviewer by using Likert instruments (Widoyoko, 2012: 104). Chemistry teachers who do research encyclopedia assessment includes chemistry teacher from SMAN 10 Yogyakarta, SMAN 1 Depok, MAN 1 Yogyakarta, MAN 3 Yogyakarta, and SMA Kolese De Britto.

The assessment quality product is done by using assessment instrument about encyclopedia quality which refers to content properness component, presentation, language and images, and graphics. Instrument is adopted from the enrichment of knowledge manual book (Depdiknas, 2007: 73). This component assessment is decided and explained into 34 items statements which are excellent, good, adequate, bad, and worse category.

## **Result and Discussion**

The last product in this research development is The Better Energy Encyclopedia for Indonesia (BEEI) which is printed colorfully by using art paper 100 gram B5 (18,3 x 25, 7) cm<sup>2</sup> for 98 pages. Quality of encyclopedia based on the results of an assessment of five reviewers (senior high school chemistry teachers) considered content, presentation, language and images, and graphics expediency obtained an average score of 149.20. Based on the analysis of data, the encyclopedia obtained excellent category in which 87.76% of ideal

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percentage. The details of the quality of each component of encyclopedia's assessment is presented in Table 1.

Based on assessor result and data analysis, content properness component or encyclopedia got excellent category by the range score 31.20 from the maximum range score 35.00. It showed that the encyclopedia content or material can enrich and increase knowledge about the renewable resource energy and resource energy that cannot be used anymore. Moreover, Encyclopedia that was showed was appropriate based on the fact.

Table 1. Quality of Each Component of Encyclopedia

Components	Score	$\Sigma$ Items	Category
Content	31.20	7	Excellent
Presentation	52.20	12	Excellent
Language & Images	44.80	10	Excellent
Graphics	21.00	5	Excellent

Content properness presentation of encyclopedia got excellent category by getting range score 52.20 from the maximum score 60.00. It showed that material that was presented in encyclopedia was familiar for the readers completed with picture illustration and message, so that, the material presentation would be more fun.

Language properness component and encyclopedia images got excellent category by getting range score 44.80 from the maximum range score 60.00. It showed that language and images presentation in encyclopedia used picture media and gave picture explanation clearly and completely.

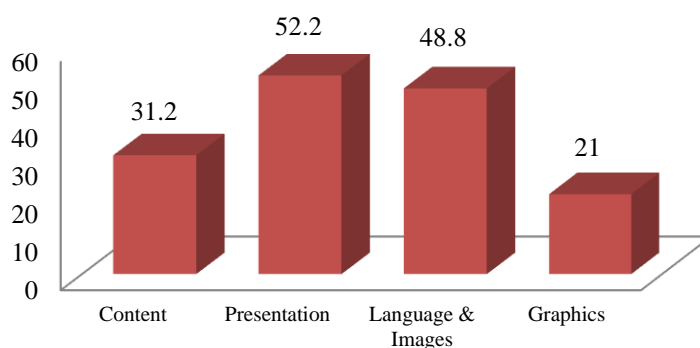


Fig.1. The Range Score of Encyclopedia Properness Component

Graphic properness component of encyclopedia got excellent category by the range score 21.00 from the maximum score 25.00. It showed that encyclopedia graphic had interesting colour, picture, illustration and also encyclopedia title that showed encyclopedia content. The

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comparison range score from all component of encyclopedia result assessment is presented in Fig. 1.

## Conclusion

The result of this research development is the better encyclopedia energy arrangement for Indonesia as research study of chemistry for senior high school students based on reviewer assessment (5 Senior High School of Chemistry teachers). The Encyclopedia quality is excellent with the range score 149.20. That is why, The Better Energy Encyclopedia for Indonesia (BEEI) is appropriate to be used as chemistry resource study of senior high school students.

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