



The Development of Digital Textbook Using eXe Format to Elevate Learning Effectiveness in History Instruction at The Second Grade of Senior High School

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Abstract

This research is aimed at producing a digital textbook using eXe format (E-Learning XHTML Editor) in the History subject of the second grade of senior high school in a chapter focusing on “Dutch Military Aggression”. The textbook has been proven valid and feasible to be used in increasing students’ engagement in History learning. In addition, it aims to encourage students’ independent learning and help them reach minimum passing criteria (henceforth MPC), which implies the goal of improved learning effectiveness. The development of digital textbook using eXe formats applied the ASSURE development model proposed by Sharon Smaldino, et al. The digital textbook development consisted of six stages, namely (1) analyzing learners’ characteristics, (2) stating performance objectives, (3) selecting instructional methods, media, and materials, (4) utilizing the materials, (5) engaging learning in instruction, and (6) evaluating and revising. The results of data analysis have drawn several conclusions. First, the digital textbook has been proven effective to help satisfy students’ learning needs; 2). the digital textbook is proven an attractive learning resource for learning Indonesian History and therefore a valuable resource to increase student interest in learning Indonesian History; 3) the digital textbook aids in increasing the effectiveness of instruction on Indonesian History, and 4) The digital textbook can be one of the references to help students better learn Indonesian History.

Keywords: Digital Textbook, Learning Effectiveness, eXe, Senior High School

A. Introduction

Technology-assisted learning is seen as a demand in the era of the Industrial Revolution (IR 4.0). This has shifted the outlook of educational innovation (Shahroom and Hussin, 2018). Education 4.0 has called forth learning innovations that involve the use of information technology (Gulicheva, et al., 2017) because it is believed to provide wider opportunities for students to learn independently for better outcomes (Hariharasudan and Kot, 2018). By implication, technology can be used as a resource to cater for the educational demands in Industrial Revolution 4.0, as manifested in increased learning outcomes.

Law on teachers and lecturers number 14 of 2005 article 8 highlights various competencies essential for teachers. For teachers at the senior high school level, they need to develop the ability to develop learning resources as an important component to pedagogical and professional competence. In addition, the demands of the 2013 curriculum also require teachers to develop learning materials relevant to students’ characteristics and needs, one of which is textbook. The development of textbook has been acknowledged to empower students’ independent learning (Candy, Philip C., 2016).

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Textbook aims to help students learn independently (Depdikbud, 2018; Sejpal, K. (2013). In the same vein, Prastowo (2014) states that a textbook is a teaching material that is systematically developed with language features relevant to students' level of knowledge and performance, which therefore aims to increase the likelihood of their self-driven learning. Experts argue that the textbook represents a viable resource to encourage students to learn independently.

A textbook needs to satisfy a set of criteria before it is deemed relevant, which involves (1) self-instruction, (2) self-contained, (3) stand alone, (4) adaptive, and (5) user friendly, (Widodo, 2008:50). These criteria show that textbook as a teaching material need to be as effective in supporting both online and face-to-face learning, which depends much on textbook development. A good textbook writer views writing as the inherent medium for instruction.

The educational demands today have required students-centered learning and the integration of technology as to produce quality learning. Student-centered learning is an instructional approach in which students hold the authority to drive the content, activities, materials, and pace of learning (Froyd. J & Simpson. N, 2010; Schreurs, J., & Dumbraveanu, R., 2014). This approach places students in the center of learning process. Teachers provide opportunities for students to learn independently, in consideration of elevating learning effectiveness and efficiency. The advances in information technology have enabled teachers to harness technology as an information center for students, so they can improve their knowledge without consistent support from teachers. One strategy in so doing is changing the presentation of teaching materials, that is transforming printed textbook into a digital format (Ghavifekr, S., & Rosdy, W. A. W. 2015).

The learning materials in History document a series of past events. In studying History, students need to delve into facts which cannot be directly observed in class, in contrast to natural science which can be put under direct analysis in laboratory (Kochhar, 2008:14). Therefore, this implies the need to develop History learning materials that can project past events to students. One strategy to make that possible is through the development of digital textbook.

Generally, the teaching materials for students in Indonesian History subject are limited to worksheets and textbooks. This poses challenges to reaching maximum learning outcomes and satisfying MPC. Ideally the achievement of learning outcomes with respect to cognitive, affective and psychomotor domains should comply with MPC (Anderson, L. W., Krathwohl, D. R., Airasian, P. W., Cruikshank, K. A., Mayer, R. E., Pintrich, P. R., et al.; 2001). Regardless of different standards, that can only be achieved when students have comprehensive textbooks in their hand to keep up with the learning demands in the curriculum.

A preliminary study through questionnaires distributed to teachers at five senior high schools in Jember regency shows that 85% of teaching materials are only limited to worksheets and textbooks written by individual teachers or publishers. In addition, the findings also highlight minimum technology integration in History learning. The survey also highlights that 70% students have low interest in learning History. This is presumed to result from the lack of innovative learning resources. Students require learning resources beyond the conventional worksheets and textbooks. This signifies the urgency for innovation in History learning to make learning more engaging and fun, which can be made feasible through the use of technology.

In this scenario, this study underscores the urgency to develop quality and innovative digital textbook for students, which unfortunately have yet to receive sufficient emphasis in the current literatures. The authors aim to address this gapping void by conducting research and

development entitled "The Development of Digital Textbook Using eXe format in History Subject at The Second Grade of Senior High School to Elevate Learning Effectiveness".

Research Problems

Based on the abovementioned discussion, this study aims to address the following research problems. First, History learning material hardly engages students' interest, so this implies the need or a more attractive learning material. Second, teaching materials provided for the students are only in the form of worksheets and textbooks. Finally, teachers do not take advantage of the advances in information technology for elevating the students' experiences in learning History.

This study believes that developing digital textbook using eXe format, e-learning XHTML editor, can offer valuable solution to address these challenges in History instruction. This objective is guided by the following research questions.

To what extent is the digital textbook developed using eXe format considered valid to support History instruction on Dutch Military Aggression at the second grade of senior high school?

1. To what extent is the digital textbook considered attractive to support History instruction on Dutch Military Aggression at the second grade of senior high school?

Does the digital textbook improve the effectiveness of History instruction on Dutch Military Aggression at the second grade of senior high school?

Research Objective

This research aims to develop a digital textbook using eXe format (e-Learning XHTML editor) for History instruction on Dutch Military Aggression at the second grade of senior high school. The digital textbook is expected to increase students' interest and engagement in History instruction. In addition, this is intended to elevate students' self-regulation and learning autonomy as the drives to reaching MPC.

The Specifications of Digital Textbook

The digital textbook under development focuses on Dutch Military Aggression. The digital textbook is characterized by the following attributes: (1) images, (2) videos, (3) maps, (4) links to documents, and (5) interactive questions. This textbook contains the following components: (1) title, (2) introduction, (3) table of contents, (4) targeted competences, (5) learning objectives, (6) instructions for using the textbook, (7) material description, (8) summary, (9) comprehension questions, (10) feedback, (11) answer keys, (12) glossary, and (13) bibliography.

The Significance of Digital Textbook Development

This development is expected to produce the following benefits: (1) providing a learning resource for students to improve the quality of their History learning, (2) increasing students' engagement in History instruction, (3) elevating the effectiveness of History instruction, and (4) shedding lights on potential research gaps for future research.

Assumption and Research Limitation

1. Assumption

- a) Digital textbook in History instruction can be an alternative for teachers when preparing their instructional materials;
- b) The digital was developed using the ASSURE development model comprising of (1) analyzing learners' characteristics, (2) stating performance objectives, (3) selecting instructional methods, media, and materials, (4) utilizing the textbook, (5) engaging learning in instruction, and (6) evaluating and revising;
- c) The digital textbook was systematically arranged using the ASSURE model to help teachers and students achieve the expected learning goals.

2. Research Limitation

This research only deals with the following scope of inquiry and development:

- 1) The digital textbook for History instruction using eXe format was developed for the second grade of senior high school.
- 2) The digital textbook only focused on The First and Second Dutch Military Aggression.
- 3) The effectiveness of the digital textbook was only investigated through the pretest and posttest designs, without any control group.

Operational Definitions of Key Terms

The following are the terms used in the development of eXe format-based digital history teaching materials.

1. Development research is a process used to develop and validate educational products (Setyosari, 2012; Borg & Gall; 2007);
2. The digital textbook is a display of manuscripts in book format that is packaged electronically using a hard disk, disk, compact disk, or flash disk and operated using a computer (Sitepu, 2006);
3. eXe is an open source application that is used in designing web-based teaching materials without the need for mastering HTML (Warjana, 2009).

The ASSURE model is a development model oriented to the use of media and technology to reach specific learning processes and activities (Smaldino, 2005).

These operational definitions signify this research as a study geared to developing digital textbook using eXe format (e-learning XHTML editor).

B. Methods

This research applied research-and-development design. The purpose was develop effective and quality products for use at schools (Gay, 2012). Research and development (R&D) is the process of developing and validating educational products (Borg & Gall; 2007). Digital textbook is designed with eXe format (e-learning XHTML editor). The development of digital textbook using eXe formats followed the ASSURE model developed by Sharon Smaldino, et al (2005). The model involved six stages, namely (1) analyzing learners' characteristics, (2) stating performance objectives, (3) selecting instructional methods, media, and materials, (4) utilizing the textbook, (5) engaging learners in instruction, and (6) evaluating and revising. The digital textbook was specifically designed for students at the second grade of senior high school to study The Dutch Military Aggression in Indonesian History.

Research Procedure

The procedure was carried out using the ASSURE development model. There were six stages in the ASSURE model. In summary, the research procedure for developing a digital textbook is shown in the figure below.

Figure 1. ASSURE Model of Development Research (adapted from Sma Idino dkk, 2005)

Data Collection

The data collection techniques in this research consisted of the followings:

- (1) **Documentation** to record the activities performed in developing the digital textbook;
- (2) **Interviews** to collect information from teachers related to the characteristics of students;
- (3) **Questionnaire** to obtain data regarding the needs for teaching material, expert validation, and students' opinion on the attractiveness of digital textbook; and
- (4) **Tests** to obtain data on students' learning outcomes through pre-test and post-test.

Data Analysis

The data analysis in this study used qualitative analysis and quantitative analysis techniques. Qualitative analysis was carried out through interview, questionnaires and expert validation sheets.

1. Expert Validation

The validation by teaching experts, graphic design experts, and media experts was carried out using a questionnaire. The data analysis in this respect used the following formula.

Where:

- P : percentage
 Σx : total number of respondents' responses
 Σx_i : total ideal scores in one item
100 % : constant (Arikunto, 2008)

2. The Level of Attractiveness

The product trial data analysis technique was carried out to determine the level of attractiveness of the developed digital textbook. Data regarding the level of student interest obtained through a questionnaire and analyzed using the formula:

$$AL = \frac{\text{student scores}}{\text{max score}} \times 100\%$$

AL : attractiveness level of digital textbook

3. The Effectiveness of Digital Textbook

The data on digital textbook effectiveness were obtained through pre-test and post-test in History instruction using the digital textbook. The data were analyzed using the average formula. Hereunder is the formula for determining the effectiveness:

$$\bar{X} = \frac{\Sigma x}{N}$$

Where:

- \bar{x} : average
 Σx : total individual scores
 N : the number of individual scores (Setyosari, 2012)

The average scores in pre-test and post-test were used to measure the effectiveness of digital textbook in learning Indonesian History. This effectiveness was determined by using relative effectiveness formula, as stated below.

$$ER = \frac{MX_2 - MX_1}{\left(\frac{MX_2 + MX_1}{2}\right)} \times 100\%$$

Where:

- RE : relative effectiveness
 MX_1 : the average pre-test scores
 MX_2 : the average post-test scores (Masyhud, 2014)

C. Findings and Discussion

This section points out the development process, data presentation and analysis, and product revisions.

Development Process

The following is a chronology in developing the digital textbook through the ASSURE model (Smaldino et al, 2005).

1. Analyzing Learners' Characteristics

The analysis of learners' characteristics consists of general characteristics, learning styles, and initial abilities. The researchers conducted interviews with teachers and distributed questionnaires to students to obtain data on the characteristics of students in class XI IPS 3 at MAN 1 Jember.

The analysis results of general characteristics based on interviews showed that the students were aged 16-17 years with high and moderate socioeconomic status. This profile apparently implied strong desire for innovative learning processes with the aid of technology. As such, this might signify their preference for digital textbook for learning History. Their initial abilities were characterized by the background knowledge of Dutch Military Aggression which they acquired in junior high school. The analysis results of their learning styles based on the questionnaire showed that 82% of students had a visual learning style. Therefore, the digital textbook development also included pictures, maps and videos.

Based on the results of interviews with teachers and questionnaires given to and students, the researchers used eXe format mediated by computer for designing digital textbook. This format allowed the presentation of historical records or events through video and image. This was presumed to escalate students' engagement in History instruction and therefore improved the lesson effectiveness and efficiency.

2. Stating Performance Objective

The formulation of Indonesian History learning objectives was guided by Core Competencies and Basic Competencies related to Indonesian History. This stage aimed to formulate the basic competencies, learning indicators and learning objectives that must be achieved by students after the learning process mediated by digital textbook. The formulation of learning objectives and competencies was carried out using the ABCD (Audience, Behavior, Condition, and Degree) framework.

3. Selecting Methods, Media, and Materials

The third stage was to determine the methods, media and materials to be developed. The first step was to select methods. Discovery method guided the development of learning scenario in which the digital textbook would be used. The selected media to develop digital textbook was eXe format (e-learning XHTML editor) and computer to design and operate digital textbook. The selected materials were developed based on core competence (CC) and basic competence (BC) Curriculum 2013 for the second grade of senior high school, namely KD 3.11. The next part was analyzing the struggle of the Indonesian people to defend national independence from the Allies and the Netherlands. The material chosen was the sub-topic of Dutch Military Aggression.

4. Utilizing Materials

This stage consisted of several activities including (1) previewing the material, (2) preparing the materials, (3) preparing the environment, (4) preparing the learners (Smaldino, et al, 2005:61-63). The material review consisted of expert validation and user reviews. Expert validation was carried out on the first draft of digital textbook. This validation involved (1) content experts, (2) graphic design experts, and (3) media experts. The content expert did the first review, after which revisions were made. The researchers then involved graphic design experts and media experts to evaluate the product.

The next step was evaluating the digital textbook through the user review. This stage involved of two rounds. The first round only involved a teacher of Indonesian History, Mr. Yuriadi, S.Pd. He was assigned to teach the first and second grade. This first evaluation used an assessment sheet to find out the teacher's views on the product quality. The second round included 12 students in class XI IPS 3 as respondents.

The second round was aimed to review the digital textbook. In addition, it delved into the tools, environment, and materials needed to support the implementation of digital textbook.

5. Engaging Learners in Interaction

The fifth step is field tryout. The field trial involved 29 students of class XI IPS 3. At this stage, students independently learnt History using the digital textbook. The tryout used a questionnaire to find out the extent to which students rated the textbook quality. In addition, pre-test and post-test instruments were also used to determine the effectiveness of the digital textbook.

6. Evaluating and Revising

The last stage dealt with evaluating and revising the digital textbook. After going through several previous revision procedures, the researchers eventually managed to develop

good product. This stage was done through a summative evaluation by collecting objective data on the digital textbook.

The Presentation, Data Analysis, and Product Revision

This stage contains the presentation and analysis of data from the assessment results and responses from experts and product tryout. These experts include content experts in the field of study, design experts, and media experts. Meanwhile, product tryout consisted of small-scale tryout and field tryout.

1. Expert Validation

The expert validation consisted of three validations including the validation of content related to History instruction, design, and media.

a) Content Validation

The expert validation dealt with the coverage and depth of digital textbook in presenting the historical records of the Dutch Military Aggression. The validation results demonstrated a total score of 78%, meaning that the product developed had good quality. From this assessment, comments and suggestions from content experts were also obtained for improving the products. The overall feedbacks indicated the followings: (1) the use of grammar and punctuation were inaccurate in some parts, (2) the use of terms was in need for rechecking and revision, and (3) writing errors still occurred.

b) Design Validation

The digital textbook product was also assessed for product design. This was related to the textbook design adapted to the criteria of a good textbook and the target learning process. The analysis results marked an overall score of 80%, meaning that the product developed had good quality. From this assessment, comments and suggestions from design experts were also collected for improving the textbook. These were concerned with the following issues: (1) feedback was still not available, (2) the material presentation should be made in a chart model, (3) instructions for using textbooks were added to each learning activity, and (4) issues in written language were found.

c). Media Validation

This validation was related to the eXe format (E-learning XHTML Editor). The analysis results showed an overall score of 90%, indicating fine quality of the textbook. Comments from the media expert focused on the following areas: (1) providing a distance between images and text, and (2) increasing the video size.

The overall validation results concluded that the digital textbook was suitable for use in History instruction.

2. Product Tryout

Product tryout was carried out on users of the developed digital textbook. The development tryout was divided into two, namely user tryout and field tryout. Product tryout was conducted to determine the level of attractiveness and effectiveness of digital textbook.

a) Small-scale Tryout

This tryout was divided into two rounds where the first round involved one History teacher, while the second one was done by inviting students.

1) Round 1

The first tryout involved teachers of Indonesian History instruction in XI AND XII of MAN 1 Jember. The instruments for this tryout were questionnaire and comment sheets. The analysis results marked an overall score of 88%, indicating fine quality. The teacher highlighted the following areas for improvement: (1) writing errors, and (2) map components in each Dutch Military Aggression area.

2) Round 2

The second round involved 12 students of class XI IPS 3 at MAN 1 Jember. The tryout aimed to determine the level of students' interest and opinions about the digital textbook through the questionnaire. The tryout results demonstrated the book was very interesting, shown by overall score of 88.65%. The tryout participants highlighted the following areas for improvement: (1) the material description was too much so it was confusing, (2) the video needed to be reproduced, and (3) the use of language required revision.

b) Field Tryout

The field trial involved 29 students of class XI IPS 3 MAN 1 Jember as respondents. Field tryout were conducted to determine student responses to the developed textbook. This tryout investigated the attractiveness of digital textbook through questionnaire. The tryout results reported an overall score of 86.82%, which meant that the product was very attractive.

The tryout also aimed to investigate the effectiveness of digital textbook through pre-test and post-test. The scores from both tests were compared using the RE formula to determine the relative effectiveness of the product. The analysis results documented high level of effectiveness, as shown by the comparison between the score results below.

\bar{X} pretes	\bar{X} postes
93,137	93,103

Table 1. The Results of Pre-test and Post-test

The results reported relative effectiveness of 71,359%, which demonstrated high effectiveness. The comments and suggestions from the students highlighted to address the following issues: (1) writing errors and (2) the lack of details in glossary.

The results pointed out that the digital textbook was effective to facilitate the learning process. E-history textbooks had the advantages of being accessible via mobile phones, making it very useful and interesting for students. This was because students were able to access their History lesson anytime and anywhere. The e-textbook was also accompanied by instructional videos and even tests with a report of students' final score. In addition, e-textbook was effective to overcome the dependence on textbooks.

The digital textbook has been proven effective to reach the expected learning objectives. Effective learning is a combination of the arrangement of human elements, materials, facilities, equipment, and procedures directed at changing students' behavior in a way that can elevate their potential to achieve learning goals (Supardi, 2010, 2013). The success of achieving the learning objectives is evident of students increased engagement with History instruction. The textbook effectiveness can serve as a catalyst to increase

students' understanding of learning material. The digital textbook also contains materials relevant to the targeted learning objectives concerning the discussion on the Dutch Military Aggression, while encouraging students' autonomy. This autonomy is essential if students aim at competing in 21st century (Rifin, et al., 2019).

D. Conclusion

Conclusion

Based on the results of data analysis and discussion, the study has drawn the following conclusions.

1. The digital textbook has met the students' needs in the learning process;
2. The digital textbook is an interesting learning resource to support Indonesian History instruction;
3. The digital textbook has been proven valuable to elevate the effectiveness of Indonesian History instruction;
4. The digital textbook can serve as an authentic reference to enrich students' learning in Indonesian History.

Recommendation

Based on the responses from content experts, design experts, media experts, teachers, and students, the digital textbook has strengths and weaknesses. The strengths include (a) the digital textbook has complied with core competence and basic competence in the 2013 curriculum; (b) the digital textbook can be used as a learning resource for Indonesian History instruction; (c) the digital textbook can increase the students' interest in learning History, and (d) eXe format-based digital textbook can support history learning into effective learning; (e) the digital textbook is designed using eXe format (e-learning XHTML editor), which allows the integration of text, images, videos, maps, document links, and interactive comprehension questions that will make students interested in learning Indonesian History;

The weaknesses of this digital textbook are as follows: (a) the digital textbook has very little scope due to the focus on "Dutch Military Aggression"; (b) the digital textbook is developed using the eXe format (e-learning XHTML editor) which demands sophisticated technological resource; and (c) the sources for developing the material are still limited.

Based on the tryout results, the researchers document the following recommendations: (a) the learning process using digital textbook should integrate cooperative learning methods as required by the 2013 curriculum; (b) students are expected to be able to independently use digital textbook in the learning process; and (c) teachers are expected to create a more innovative learning atmosphere with the aid of various teaching materials, learning media, and varied learning methods.

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