



UNDER THE ERA OF DIGITAL BOOKS: COMBINING DIGITAL BOOKS AND SCIENTIFIC APPROACHES FOR LEARNING ACHIEVEMENT

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ABSTRACT

Since 1947 Indonesia has changed its curriculum as much as 10 times. Curriculum is a set system of plans and arrangements regarding the content and learning materials, as well as the means used as a guideline for the use of teaching and learning activities. Curriculum in Indonesia continues to change due to public discontent with the improvements needed in the Indonesian education system and the development of the times. The times impact the advancement of technology, where students already know and understand the uses of technology. In this era, technology should be utilized by teachers to provide tools or school materials, especially in biology education. A technology that has been used appropriately by the researchers is the use of digital books that can be easily downloaded from the Internet or Play Store. Based on observation, many students have an Android phone and laptop, and they can learn the materials using the benefits of technology. Digital books have more values than conventional books, because the digital books can contain additional contents such as videos, animations, images and audio, where the blend of them can better help students to visualize an object in the lesson material that could not directly observed in the learning process. Digital books have been created by using three file formats, named *PDF*, *SWF* and *JPG*. Biology material deals with the study of nature, and living things. The scientific approaches that students can use in their learning are: making observations, asking questions, gathering information, making associations, and reaching an attractive conclusion. The scientific approach invites students to learn through their natural surroundings. This study was aimed at developing digital books or flip books (FB).

Keywords: digital book, scientific approaches, study result

INTRODUCTION

Textbooks are an important component in learning. Availability of relevant textbooks would greatly assist the process of teaching and learning in schools. According to Priyanto (2012), textbooks can support the creation of student centered learning (SCL), where the paradigm of learning in school is directed more to students as the subject of learning, and teachers as a learning facilitator. Electronic school books (BSE) is one of textbooks that is now widely used by many schools in Indonesia. BSE has purchased copyrights from the Ministry of Education which include text books of various subjects, ranging from elementary schools through high schools, and published them in a digital format that can be printed (Kemendikbud, 2008). The advantages of BSE is that it can be easily downloaded from the Ministry of Education's official site, the suitability of the content of the curriculum, the

information is up to date, the language is easy to understand, and it passes the test of the assessment of the National Education Standards (BSNP) as a textbook for use in learning (Sudibyo, 2008). But in use, BSE is packaged in the form of an e-book that may not have more value than the printed books (Sundari, 2012). BSE is able to display interactive simulations by combining video, animation, audio and images. The combination is expected to help students to visualize objects in the lesson material that cannot be presented directly during the learning process.

Based on interviews with teachers of Grade XI SMA Negeri 1 Jakenan in 20-23 April 2015, it was found that students have difficulty in materials dealing with cells. This material is learned by high school biology students Grade XI in odd semester. The difficulty in learning is because most of the characteristics of the material itself are

difficult to find in a direct and tangible way. Cells also have a very small size, so observing its structure in detail, and the physiological mechanisms, as well as the unusual structure and function of cell organelles, requires electron microscopes which are expensive. None of the schools in Indonesia is equipped with such a microscope.

The data of evaluation results of students in the academic year 2014/2015 show that 50% of students have not reached minimum passing grade (KKM). Data of student's mastery and biology examination results 2012 in the national level in the cell material was 69.02% (Balitbang Kemendikbud, 2012) and in 2013 was 60.04% (Balitbang Kemendikbud, 2013). This shows that the ± 30%-40% of students were not able to master optimally the cell materials. Even the condition became worse from 2012 to 2013.

Based on observations conducted on 22 April 2015, facilities and infrastructures that support biology learning at SMA N 1 Jakenan is sufficient: as there is a projector available in every classroom and computer lab. Utilization of computer-based multimedia can enhance students' understanding of the material in the study (Mayer & Moreno: 2000). Therefore, all teachers SMA N 1 Jakenan were required to prepare PowerPoint (PPT) media to teach. Results of interviews with teachers of biology class XI on 21 April 2015 showed that BSE was used by teachers as a reference for teaching learning, and teachers sometimes display it directly in digital form to teach in the classroom. However, the drawbacks faced are that the pictures in the book was not able to successfully visualize the concepts, and students found it difficult to understand (Sundari, 2012). Flip Book (FB) is a media that is used as a tool for

teachers to deliver lessons that are packaged in an electronic book like BSE. If BSE is a combination of text and images alone, then FB combine texts, animations, videos, images, and audio. Another advantage of FB is that the evaluation questions for students can be directly sent to the students. Display of the results is provided. Based on the reasoning description above, a Flip Book (FB) of the cell material was developed.

METHODS

This study was conducted at SMA (Senior High School) 1 Jakenan Pati. The samples used in this research were 20 students of XI IPA 1. Research design used Research and Development (R&D) model, to produce and test the products. Sugiyono (2012) stated that the R&D model was a research model that was used to produce a certain product and test whether the product was valid and reliable. Research steps were consisted of five major steps, such as identifying potential and problems, collecting data, designing a product, validating and revisioning, and finishing a final product.

RESULT AND DISSCUSION

Potential and Problems of a product

The identified potentials and problems were grounded on observations and interviews with students and teachers in SMA N 1 Jakenan. of the indentified potential and problems were presented in the Table 1.

Table 1. Identified Problems and Potentials

No.	Identified Aspects	Problems and Potentials
1.	Learning Facilities	- LCD projectors were readily available in each classroom and computer lab.
2.	Learning Media	- Teachers developed slide presentations of BSE material.
3.	The chalenges of teachers and students	- Teachers had troubles in making audio-visual presentation slides (a mix of images, animation, and video). - The learning achievement of student evaluations of the cell material had not yet reached KKM.
4.	Identified difficulties of the subject matter	- Cell material required clear visualization and accurate depiction to describe events and processes that are abstract.

Table 1 underlined problems of potential of a school in the context of the use of digital technology. This condition is fundamentally similar to many school across Central Java and or Indonesia. Some schools can buy an excellent learning facilities, but many school teachers are

not familiar with them. There is something hidden that can not be solved instantly. In other words, teachers and

school students need to be well-trained first, in order to be familiar and ready for using it. Leggett and Persichitte

(1998) proposed that teachers who integrated technology into instruction typically encountered five barriers: (1) time (lack of time to prepare relevant curricula and teaching materials as well as lack of time to promote technology literacy), (2) professionalism (lack of sufficient technology skills as well as lack of opportunities and access to relevant training), (3) access (lack of computer hard- or software and network equipment), (4) resources (lack of experts to assist teachers in applying technology as well as insufficient purchasing, upgrading, or maintenance of equipment), (5)

support (lack of leadership and support from school administrations). Even Tsai (2015) said that technology as a tool for teaching and technology as a learning activator. Then, teachers do not have enough knowledge of technology, so they are not well-prepared. Teachers with strong knowledge could be teachers with low motivation, because they do not want to use technology because of its complexity. Last but not least is the support, as long as there is no big support from community, teachers are incapable of making innovation through the use of high technology.

Devices needed

Based on the identification of potential and problems that have been found, a next stage of study (collecting devices) was conducted. The data collected to develop Flip Book (FB) cell material in high school in

the form of software, hardware, and a learning device (Table 2).

Table 2. Devices

No.	Device type	Data Collection
1.	Software	- Adobe Photoshop, Adobe Flash, Adobe Audition, SWF Kit Pro, and Smart Install Maker.
2.	Hardware	- Personal Computer (PC) dengan spesifikasi RAM 1GB, Processor Intel Dual Core 2.0 GHz, Hardisk 160 GB, Windows 7, microphone, and speaker active.
3.	Tools for teaching	- Biologi Syllabus for SMA, data audio-visual as animations and video (source: youtube.com and learn.genetic.utah.edu), as well as data collected in the form of textbooks for high school biology class XII, BSE SMK class X, Campbell biology books, as well as <i>Illustrated Britannica Science Library</i> .

Table 2 indicated there were some major devices required for the development of a final product (FB). Information of technical software, hardware and curricular materials were presented.

The product design stage is the most important stage in the development of a Flip Book (FB). After collecting the necessary data, researchers began developing products based on the design. The steps of product design and development of an FB consist of the design of media content and instructional design. The results of the product design stage can be seen in the Table 3.

Results of Stage Design Products

Table 3. Product Design

No.	Type of Design	Result
1.	Design of media content	- Create a map of the cell material competence appropriate high school biology syllabus, making the outlines of media contents, create media texts, and formulate an action script in Adobe Flash.
2.	Design of learning	- Make use of FB learning lesson plans that are tailored to the syllabus. - Create a validation of assessment instruments in the form of validator media and material.

Design Validation

The design validation was undertaken by the material validator and media, This result completed by an analysis of the validation performed by a media validator was used as the basis for revising the FB improvement. This is a description of the results of the design validation phase.

Assessment of Media Validator

The media validator gave a total score of 38 with a percentage of 95% (very decent criteria). Improvements suggested by the validator to book Digital Interactive media, as well as improvements made, can be seen in Table 4.

Table 4. The Assessment by Media Validator

Question	Scores
A. Aspect of Software Engineering	
Compatibility (learning media can be installed/run on different hardware and software)	4
Reliability (the program can run well)	4
Reusability (easy to use and simple in operation)	4
Maintainable (can be maintained / managed with ease)	4
B. Aspects of Audio Visual Communication	
In the following creative ideas pouring ideas	4
Visual (layout design, colour)	3
Audio (narration, sound effects, back sound, music)	3
Media moves (animations, video / movie)	4
Layout interactive (navigation icons)	4
Interactivity	4
Total	38
Percentage	95%
Criteria	Very Good

Table 5. Advice by The Media Validator and The Improvement

No. Suggestions by the media validator.	Repair
1. FB compatibility fix	Autorun add a script command to run the software automatically
2. Suggested lowering the specification requirements of the user's computer.	Lowering the requirements of the computer specifications in the dialog license agreement.
3. Lowering the requirements of the computer specifications in the dialog license agreement	Enlarging images to be seen clearly.
4. Adding bibliography flip button	Adding bibliography flip button that makes references appear when the flip button is clicked in the middle making it easier to search for the words wanted.
5. Maximizing the use of remaining areas in placing video and animation.	Maximizing the area used by leaving the video in place and maximizing the size of the video and animation on the page area available for animation.

Assessment by the Material Validator

The material validator gave a total score of 33 with a percentage of 82.5% (very good). Improvements

suggested by the material validator for the Flip Book (FB) as well as the improvements made can be seen in Table 6.

Table 6. Advice by The Material Validator and The Improvements

No. Suggestions by material validator	Repair
1. Improve sentence which are inappropriate and inefficient.	Fixing typos in sentences and repairing the quality of images. Adding an editorial on the KD (basic competence) to fit the specified indicators.
2. Accuracy improvement concepts to fit indicator	Replace the contents of chapters and sub-chapters into
3. Replacing the chapter on the content material	alphabetical order (A, B, C, D). book or Flip Book (FB) with the scientific approach, through the steps of Research and Development (R&D)

CONCLUSION

Based on the results and explanations above, it can be concluded that the process of developing a digital

could be finally conducted to help grade XI students learn about cells.

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