Development of an electronic book epub 3.0 as a learning resource for blended learning IPA Terpadu

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Abstract. The purpose of this study was to produce an electronic book on IPA Terpadu competency and find out the quality of the product as a learning resource for blended learning. An electronic book consisting of text, images, and video, readable on computers or other electronic devices. The development of this ebook consists of 3 stages: planning, design, and develop. Testing electronic book on various devices with different operating systems on mobile operating systems (android) and personal computers (Windows). The results of the study show that: (1) the developed product is an electronic book format epub 3.0 on IPA Terpadu, (2) the results of field test show that the developed product has a good quality, results with an average of 85% (very satisfied)

1. Introduction
Effective learning can be achieved by optimizing all components of learning including goals, students, teachers, learning materials and media, strategies, learning resources, and evaluation of learning. Science learning in Indonesia aims to obtain basic competencies in science and technology and cultivate scientific thinking critically, creatively and independently [1]. The use of information and communication technology has a positive impact because with the development of information and communication technology the world of education began to show significant changes [2,3].

The use of information technology in learning is known as e-Learning. E-learning refers to learning to use electronic device services. One form of presentation of learning material in digital or electronic format is an e-book. Electronic book as a form of presentation (digital) learning materials that can be accessed using electronic media such as smartphones, tablets, and computers. Epub book supportive functions can be embedded in the textual contents such as pictures, videos, referential links, guided readings, automatic repetitions [4,5]. Furthermore, the branch is friendly and supports different operating system platforms various devices with Android, Windows, Mac, and BlackBerry platform [6,7].

Use of electronic book (epub) as teaching material is expected to facilitate the independence of learning along with the use of smartphones among students is increasing. Research related to the use of digital books states that learning using epub based books provides satisfaction for students [8]. The participants indicated that the iBook significant difference in the achievement of students, provided a
new way of learning, and also motivated them to learn, made learning more exciting, increased their attention toward instruction, was more efficient, and increased their interest in the class [9].

Blended learning is part of e-learning that utilizes information technology media to create optimal learning programs for students. Blended learning is a blend between face-to-face learning and e-learning [10]. Blended learning refers to an integration of a face-to-face classroom section with an appropriate use of technology [11,12]. Blended learning is a formal education program in which a student learns at least part of learning through elearning with several elements of student control over time, place, and face-to-face meetings [13]. Learning IPA Terpadu must also include dimensions attitude, process, product, application and creativity. Students are expected to have holistic science in dealing with life's problems contextually everyday through integrated science learning [14]. The purpose of this study was to produce an electronic book on IPA Terpadu competency and find out the quality of the product as a learning resource for blended learning.

2. Methods
The product to be produced is an elektronic book epub 3.0 application. This application can be used as learning materials IPA Terpadu used in blended learning. In this study the authors will use 3 stages of development: planning, design, and develop.

![Figure 1: Stages of developing electronic books epub 3.0.](image)

2.1. Planning phase
The planning phase is the initial stage of research. Collecting information to find problems using interview, observation, and questionnaire instruments. Next collect software requirements to make products based on objectives. It is justified to state that requirements engineering is a critical success factor in a system development [15]. The development of this product is done to produce electronic books that will be applied to learning, the formulation of learning objectives is carried out at this stage.

2.2. Design phase
At this stage, determine activities that determine the design of the product display, develop key material ideas, and make flowcharts.

2.3. Develop phase
This development phase includes the activity write the program code, make a graph, producing media, and alpha testing.

3. Results and discussion

3.1. Planning phase
The process of developing an electronic book starts with the planning stage which starts with a needs analysis. The purpose of analyzing requirements is to determine what type of software or system will be produced and manage the results of the eistation of the requirements to produce a document specification of the overall content requirements according to what the user wants.
3.1.1. Needs analysis. Based on the results of interviews with teachers mentioned that the Integrated Science learning outcomes are very low because students do not have independent learning materials. Researchers also distributed questionnaires to 276 for students whose purpose was to find out the needs or expectations associated with the desired learning program and the results of 96% of students agreed on making electronic books.

3.1.2. Formulate instructional goal. The electronic book produced contains learning materials that will be implemented in learning to achieve learning objectives. The next step, the formulation of learning objectives includes Kompetensi Inti (KI), Kompetensi Dasar (KD) and indicators on IPA Terpadu subjects based on the curriculum 2013. Kompetensi Inti dan Dasar contain statements about the behaviors expected of students after participating in learning. Researchers classify general and specific learning goals on cognitive and psychomotor aspects.

| Cognitive aspects | Psychomotor aspects | Sub aspect |
|-------------------|---------------------|------------|
| Knowledge         | Basic Process Skills| Observing  |
|                   |                     | Comparing  |
|                   |                     | Classifying|
|                   |                     | Measuring  |
|                   |                     | Communicating|
| Comprehension     | Intermediate Process Skills | Make Conclusions |
|                   |                     | Predict    |
| Application       | Advanced Process Skills | Formulating A Hypothesis |
|                   |                     | Define and Control Variables |
| Analysis          |                     |            |
| Synthesis         |                     |            |
| Evaluate          |                     |            |

3.1.3. Media selection. The media needed to design electronic modules include hardware including computers with specifications for the intel core i3 processor 3.00 GHz, 4 GB RAM, Windows 7 Operating System. The software consists of Adobe indesign, adobe photoshop, Microsoft publisher, Microsoft word, vlc, HTML 5, adobe premier pro, and readium.

3.2. Design phase
Product making is done at this stage by building product prototypes, determining material composition or ideas, and making flowcharts.

3.2.1. Determine the product display design. At this stage a prototype of the electronic book epub 3.0 was made and the student worksheet as a whole consisted of visual, audio, video, animation, and hypertext or hyperlink material that contained material that referred to the learning objectives that had been formulated.

3.2.2. Developing the main material idea. Developing the main idea of the material is done by first choosing and selecting the material used and making the material description which refers to the outline of the content that has been made previously. Then determine the strategy and design of learning, and determine material experts and media experts involved in the development.

3.2.3. Make a flowchart and storyboard. Flowcharts are used to show the structure and sequence of the project, while the storyboard shows details of what will be displayed on the product. Flowcharts and storyboards, useful for designers to analyze program components and sequences for understanding information delivery.
3.3. Develop phase
At this stage, developing electronic book epub 3.0 products in accordance with the stages of planning and design.

3.3.1. Write down the program code. The developer designs the product to be a product that fits the design and planning stages into an electronic book IPA Terpadu. The author will design a program by entering the programming language, editing (audio, visual, text, animation).

3.3.2. Producing media. Producing media related to the development of elements of the media such as audio, visual, hypertext, and video. Images and other media elements (video, animation, sound, and hypertext) are integrated in electronic books into multimedia elements using adobe indesign applications. Furthermore, this electronic book was export to epub 3.0 format.
3.3.3. Field test. The last stage in this development is a field test in the development of this field test involving students of senior high school using a questionnaire instrument. The distribution of questionnaires aims to determine student responses about student satisfaction, students were asked to express their opinions with the Likert scale. So, they have checked “1” if they strongly disagree, “2” if they disagree, “3” if they have no clear opinion, “4” if they agree and “5” if strongly agree with the given statement. Before it is given to students, electronic book eBook 3.0 testing is carried out on several devices with different operating systems. The following table shows the results of electronic book epub 3.0 testing on various devices.

| Device/Operating System | Support Available |
|-------------------------|-------------------|
| Smartphone              |                   |
| android 5.0 & 5.1 lollipop | yes              |
| android 6.0 marshmallow     | yes              |
| android 7.0 & 7.1 nougat      | yes              |
| android 8.0 & 8.1 oreo       | yes              |
| android 9.0 pie             | yes              |
| PC/Notebook               |                   |
| windows 7                 | yes              |
| windows 8                 | yes              |
| windows 10                | yes              |
Table 3. Student statements and responses for epub 3.0.

| Statement                                                                 | Number of responses for: |
|--------------------------------------------------------------------------|--------------------------|
|                                                                          | 1 | 2 | 3 | 4 | 5 |
| I liked the learning activities performed in this epub 3.0                | 0 | 0 | 12| 19| 127|
| Epub 3.0 give me opportunity to read and learn more                      | 1 | 1 | 18| 25| 113|
| With electronic book epub 3.0 the information is obtained by more than one way | 0 | 2 | 9 | 47| 100|
| Electronic book epub 3.0 gives us deeper information of the subject      | 3 | 11| 25| 26| 93 |
| My devices (smartphone and pc) help me in learning                      | 4 | 11| 17| 78| 48 |
| How to learn blended learning using epub 3.0 is good                     | 5 | 3 | 3 | 39| 108|
| Blended learning using epub 3.0 can provide knowledge rather than learning in the classroom | 2 | 2 | 0 | 59| 95 |
| I find blended learning using epub 3.0 challenging                       | 10| 14| 9 | 41| 84 |
| Blended learning using epub 3.0 contributes to unlimited learning time   | 0 | 0 | 1 | 15| 142|
| Blended learning contributes to a place of learning without limits       | 1 | 0 | 3 | 21| 133|
| The material in the mixed learning platform is well organized            | 7 | 2 | 16| 66| 67 |
| With epub 3.0 you can control how fast or slow you move through lessons  | 0 | 6 | 0 | 12| 140|
| Total Respondents: 158                                                  |                          |
| Average 85 %                                                            |                          |

Based on table 3, results show that student satisfaction with the use epub 3.0 IPA Terpadu on blended obtained results with an average of 85% (very satisfied). According to students' responses to statement one, most of them like blended learning using electronic book epub 3.0. Furthermore, the high response of students strongly agrees on statements that blended learning has provided students learning opportunities without being limited by place and time. This is a very positive thing about the right to learn students can get access to learning in accordance with the learning objectives. Statement regarding student learning progress can be facilitated by blended learning, students can adapt according to their ability to fast or slow understand the material.

4. Conclusion

Based on the description of the stages of product development in the research results, the following conclusions can be drawn:

- Development of electronic book epub 3.0 through 3 stages; (1) planning phase to gather information about needs and problems that occur in the field; (2) the design phase is the stage of making a product prototype about the epub 3.0 electronic book that was developed based on the findings in the planning phase; (3) the develop phase is developing the electronic book epub 3.0 products in accordance with the stages of planning and design. Then a field trial is conducted.

- Results show that student satisfaction with the use epub 3.0 IPA Terpadu on blended obtained results with an average of 85% (very satisfied).
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