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Developing an Interactive E-Book on Statistics Based on a Realistic Mathematical Approach Assisted by The SIPDA Learning Management System

Prihatin Ningsih Sagala, Eri Widyastuti
State University of Medan, Jl. Willem Iskandar Ps. V Medan, North Sumatera, Indonesia
Email: widyaoke@gmail.com

Abstract

The government policy in March 2020 regarding the application of online learning has significant changes in the learning process on campus. One of them is by changing teaching materials from textbooks to e-books, which is a must as a form of adjustment related to campus conditions that implement full online learning using LMS SIPDA. Some of the features available in the e-books include instructions for using e-books, concept maps, can be integrated with YouTube links, googleform links, audio explanations of learning objectives for each chapter, lecturer presentation videos, student assignment links, and student evaluation links. All of these features make e-books interesting and interactive. The objectives of this study are: (1) Producing an interactive e-book on basics statistics based on Realistic Mathematics assisted by the SIPDA LMS developed by using a valid and practical Kvisoft Flipbook Maker (2) To determine the effectiveness of the e-book Basics of Statistics in improving student problem-solving abilities. This type of research is Research and Development with the ADDIE development model, namely analysis, design, development, implementation, and evaluation. E-book development using the Kvisoft Flipbook Maker Application. The results of the e-book development at the needs analysis stage showed that 85% of students needed integrated learning media. SIPDA integrated e-books can increase student attendance and activities by 60%. At the product design stage, the e-book in the form of a word file is converted into a PDF file and then developed using Kvisoft Flipbook Maker by adding videos, images, and other files. The e-book is validated with a validity rate of 92% by material experts and 89% by media experts. The value of practicality is seen from two things, namely: (1) Questionnaire for responses from media experts and two practitioner lecturers, it was found that the e-book developed could be applied in the good category (3.92) and met the practical criteria (80%) used in the online learning era. (2) The student response questionnaire in a small group of 10 people obtained the category Good (3.96) and very practical (85%). The percentage of student response questionnaire results at the implementation stage of the SIPDA class showed a positive response of 87.6%. The effectiveness aspect is seen from the average individual learning completeness of 71.42 with classical completeness criteria obtained by 91. And the N-Gain score was 0.71 in high category.

Keywords : Interactive E-book, LMS SIPDA, Online Learning

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INTRODUCTION

The Covid-19 pandemic in Indonesia has an impact on the world of education, the central and regional governments have issued a policy of dismissing all educational institutions. This is done as an effort to prevent transmission of the virus. The impact of online learning is divided into (a) Positive impact that we can get the material easily and learn to evaluate our own learning at home. We can lying down, eating, joking with family, and we should following government advice by implementing social distancing and staying at home/boarding house, we can study eitheroutdoor or indoor, besides that, we can study freely without the time limit that set for each course on campus, so that it is easier for us to understand the material presented by the lecturer. We can adjust our study hours without being pegged to the course schedule. Of course, adjusted to the time span that has been determined. And (b) Negative impact that many people misuse online learning time or don't take advantage of online learning, mostly they open Instagram, playing online games during online learning. They open the E-learning only for absence, not for reading material or studying.If there is no guidance by experts, many students do not learn optimally. Perhaps there is only one goal that the student wants to achieve, such as absences. If they are already fill the attendance list, then there is no effort to seek online learning. The lack of self-study intention can have an impact on material that is not understood by students. Then, when they take exams, students are left behind and do not understand the material.

Apart from the positive and negative impacts, another impact is that by replacing teaching materials from textbooks into e-books is a must as a form of adjustment related to campus conditions that implement full online learning using LMS SIPDA as a result of the effect of the Covid-19 Virus is Distance Learning or Work From Home (WFH) by Online. As a response to obedience to the Government, namely, Stay at Home and Physical Distancing. Learning *Online* is learning to use the Internet network accessibility, connectivity, flexibility, and ability to memun- culkan various types of learning interactions (Firman, 2020). Learning *Online* is learning using technology as a medium of teaching and learning process occurs remotely. Interaction between teachers and students can be in the form of video calls, voice notes, voice calls or the use of other media that can facilitate the learning process. Currently, in the implementation of *online* learning students are required to be able to learn independently so that learning tools are needed that are in accordance with these conditions (Rahayu, 2020). The result by Musthofa showed that online lecturing system has positive contribution for pushing the quality disparity of universities in Indonesia. The indications such as 1) Minimize the limitation of access to higher education that have a certain quality. 2) Cut-off the limitation of facilities that had been cosidered as one of obstacles of the lower quality of higher education. 3) Eliminate the limitation of understanding to certain material. 4) Online lecturing system gives wide access to educational resources, especially in reputable universities (Musthofa, 2019).

APJII (Association of Indonesian Internet Service Providers) has announced the results of the 2016 Indonesian Internet User Statistics survey, the number of Internet users in Indonesia in 2016 was 132.7 million users or around 51.5% of Indonesia's total population of 256.2 million. In 2018 it reached 64.8% of the total population of Indonesia. Internet users consisted of various groups, ages and from various fields of knowledge including education. And a CNN Indonesia survey said the increase in traffic for individual users in April 2020 to 11 million people. Google Classroom users increased by more than 5404 percent. The increase in users of online conference applications such as Zoom in March 2020 was 257,853 users. Likewise, other applications namely Skype, Hangouts meet, Cisco Webex and others have also experienced an increase in users.

Mathematics is a concept in everyday activities that is modeled using language and mathematical logic that must be solved with mathematical properties and rules, concluded

and also interpreted (Marom, 2018). While PMRI is an appropriate learning approach for students to learn mathematics. The PMRI concept explains that in learning mathematics students must be active and students must build mathematical ideas independently, in the learning process the teacher only acts as a facilitator. PMRI is a learning theory that starts from real things that have been experienced and is close to students in emphasizing process skills in learning, arguing, discussing and collaborating with classmates so that they can find their own meaning from learning and ultimately use mathematics is to solve problems both individually and in groups (Zulkardi et al., 2010). The learning device developed in this study is a learning device with a Realistic Mathematics Learning Approach (PMR). Ahmad provides recommendations that (1) The resulting learning tools still need to be tested in other schools with various conditions in order to obtain truly quality learning tools. (2) It is necessary to develop realistic mathematics learning tools for other topics so that realistic mathematics learning tools are richer and varied (Ahmad, 2017). And one of the learning tools that will be developed is an e-module assisted by Kvisoft Flipbook Maker. Learning materials in the form of interactive e-modules will increase student interaction with lecturers.

The use of interactive multimedia with a contextual approach is better than using conventional learning methods in problem solving, referring to the N-Gain data test with the right-hand test and the results of posttest learning completeness in the experimental class and the control class. The conclusion is that students' problemsolving skills using interactive multimedia with a contextual approach are better than using conventional learning in problem solving (Buchori, 2019). Student satisfaction in online learning materials will be very influential in improving student learning out comes this is because students who get material goodwill feel comfortable and will study online material to the fullest. So that satisfaction with online learning will make students enthusiastic to participate in online media learning and will get results maximum in learning (Akbar, 2021). The module development with the RME approach assisted by Flipbook Maker shows that the final data hypothesis test results obtained t_{count} = 2,500 and t_{table} = 1,667. Then $t_{count} > t_{table}$, so Ho is rejected. This means that student learning outcomes using e-modules with a realistic mathematics learning approach assisted by flipbook makers are better than student learning outcomes using conventional learning (Safitri, 2017).

Kvisoft Flipbook Maker

This interactive teaching materials will be developed with the Kvisoft Flipbook Maker application as the main application, and several supporting applications for creating text, animated videos, images, and sound/ music.The Kvisoft Flipbook Maker app is a professional software that converts pdf to back and forth flash books that has become popular in recent years. This software can create HTML5 and flash back and forth books from all types of files: pdf, image, Word, Power Points, Excel and others. This app can enrich digital books using an awesome animation of alternating flash pages. Kvisoft Flipbook Maker provides many pre-set templates for creating attractive retro books.

Figure 1. Kvisoft Flipbook Maker Template from the Aplication

This realistic 3D alternating book can be presented on a variety of devices such as computers, Macs, iPhones, iPads, iPods, Androids and other mobile devices that cover both computer and mobile device audiences. This application is classified as mobile learning or learning that is flexible with time and place. Mobile learning is a type of learning media that is easy to carry everywhere and can be used according to the user's wants as long as there are adequate gadgets (Handayani, 2016).Kvisoft Flipbook Maker has a page editing function that allows adding images, video, hyperlinks, audio, and more multimedia objects to the output of the flipping sheet. This application provides a professional way to integrate hyperlinks, video, images, sound, and clipart objects, as well as an interface (interface) such as an opened book.

Figure 2. Kvisoft Flipbook Maker interface from the Aplication

Moving pages can be done by dragging the page like our fingers are turning a book page, and simultaneously with the draging process of real folded pages such as paper being bent. Apart from dragging, moving pages can be done using the navigation buttons provided. This application is equipped with various features of zoom, word search, bookmark, thumbnail and table of contents, besides that it can provide background music.

RESEARCH METHOD

This type of research is research and development. Research and development is a process or steps to develop a new product or improve an existing product, which can be justified (Sukmadinata, 2017).

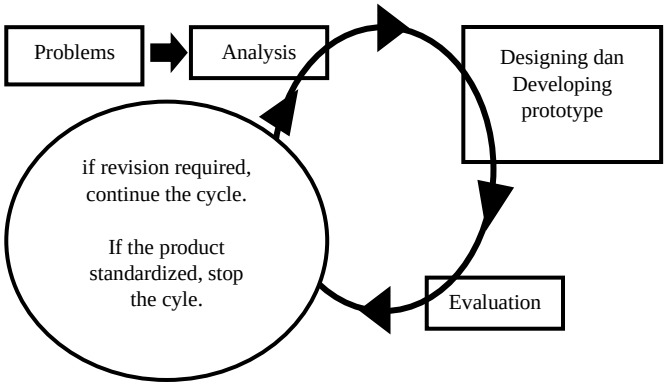


Figure 3. Repetitive cycles in development research (Sani, 2018)

The development model used as the basis for this research is the ADDIE development model. This model, as the name implies, consists of five main phases, namely (A)nalysis, (D)esign, (D)evelopment, (I)mplementation, and (E)valuation (see in Figure 3 & 4). Using this model, the researcher will develop an interactive e-book product using the Kvisoft Flipbook Maker application in the form of a digital book based on the Realistic Mathematics Education Approach (PMRI) assisted by LMS SIPDA to improve students' mathematical problem solving skills. The subject are students in the Indonesian Language Study Program, FBS Unimed SIPDA A Class and SIPDA B class in 2018, totaling 49 people.

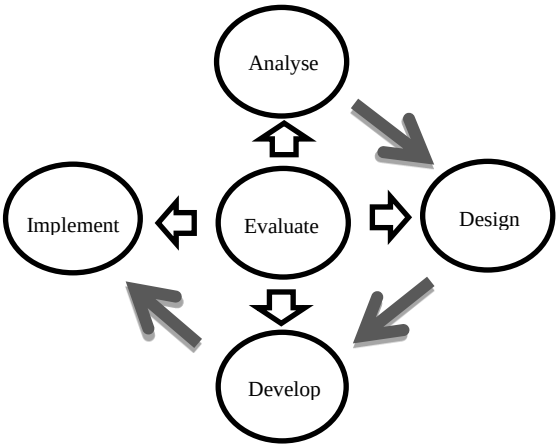


Figure 4. Chart of the ADDIE model with modifications (Sani, 2018)

RESULTS AND DISCUSSION

The development carried out in this study resulted in an e-book using the Kvisoft Flip book Maker in the Basic Statistics course.

Needs Analysis Results

At the stage of student needs analysis in April 2020, the average percentage of student attendance to online lectures on Basic Statistics courses by using Whatsapp Group and via zoom meetings was 78.77%. This means that around 21.23% of students experience difficulties in online lectures. This is caused by the rapid change of learning conditions from offline to online. Students cannot fully attend the lecture schedule because they are helping their parents in the field, in the market selling vegetables, even the interaction on Whatsapp group is also minimal due to the lack of an internet. So an interactive e-book is needed so

that the time that given by the lecturer can be effective for students to have the right time to access learning if they already connect with the internet .

Based on UTS results online with Formapps. It was found that 29.82% of students' problem-solving abilities to exam questions were obtained. And 70.17% were successful in the UTS. So it can be concluded that the problem-solving ability that has not met classical completeness is> 75%. A follow-up survey of research subjects in September 2020 found that 85% of students need integrated learning media. The integrated e-book of LMS SIPDA is a solution in increasing student attendance and activity by. The increase in attendance and student response from 78.77% to 92%.

Design Stage Results

At this stage, the researcher determines the learning outcomes of the subjects per module, followed by designing student materials and exercises, designing digital book designs in the form of layouts, designing One Semester Learning Plans (RPS), compiling media & material expert validation instruments, and lecturer and student response instructions. , as well as arranging the pretest and posttest question instruments.

a. Initial Book Design in Microsoft Word file The e-book is arranged according to the module according to the material in the RPS. The e-book design is as Figure 5.

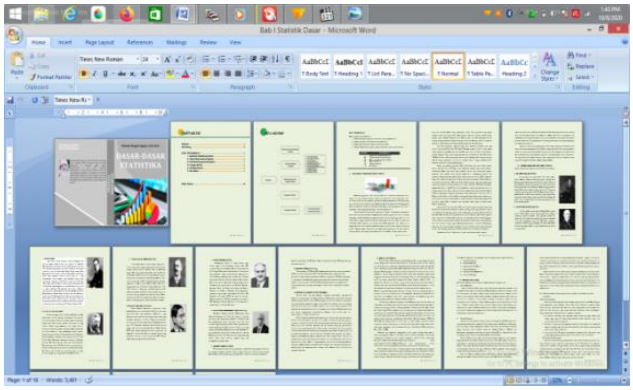


Figure 5. Display of the E-book in word

b. Book design in PDF format (Figure 6)

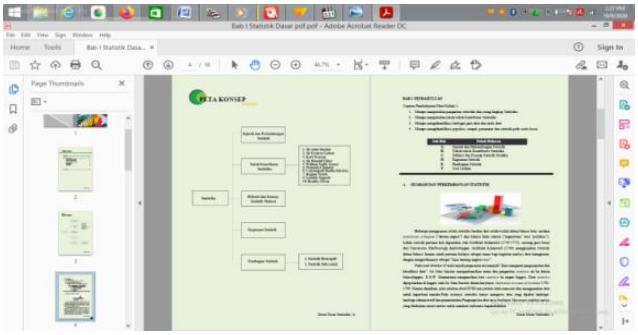


Figure 6. Display of the E-book in PdF

Results of the Development Stage

a. E-book developed by using Kvisoft Flipbook Maker Pro, as shown Figure 7.

Figure 7. Initial view of the e-book cover using Kvisoft Flipbook Maker

b. The e-book was developed based on PMRI's five characters(Sembiring,2010), namely:
   1. Phenomenological exploration, meaning that realistic mathematics education emphasizes the importance of exploring everyday life problems. Informal knowledge obtained from everyday life can be used as contextual problems to be developed into formal mathematical concepts. The e-book presents data related to the spread of Covid-19 cases, presents data using graphs and tables to find out trends in the distribution of positive patients, trends in recovery rates, trends in deaths due to the impact of Covid-19. In addition to Covid-19 patient data, the problems in the e-book also discuss the habits of the people who are going viral. For example, presenting data on wild flower lovers who are expensive. Excessive celebrity behavior when promoting products when endorsed by certain products.
   2. Using Models and Symbols for Progressive Mathematization, explains that the development of students' informal learning into formal mathematical concepts is a gradual process. This process can be supported by the use of mathematical models and symbols that are used for generalization and abstraction of mathematical concepts.
   3. Using Students Own Construction, this character explains that realistic mathematics learning is student-centered learning so that students are encouraged to be more active and creative in developing ideas and strategies that will later be used as a basis for learning.
   4. Interactivity, meaning that students are involved interactively in explaining and providing reasons for solving contextual problems, asking for alternative problem solving, and reflecting on the solutions to the problem. The interactions that occur between students, between students and teachers, discussion, cooperation, and evaluation are important elements in the learning process.
   5. Intertwinement, The mathematical solutions that arise in solving realistic problems lead to intertwinement between parts of the material in mathematics. the ability to link structures and concepts used to solve real-life problems.

c. The validation results of material experts and media experts, obtained for the level of validity of e-book products obtained 94.08% and 88.1%.

Table 1. Percentage of results of material expert validation

No	Aspect Assesment	Percentage Early (%)	Percentage After Revision
1	Presentation	88,33%	98,33%
2	Contents	81%	92%
3	Interactivity	82%	93%
4	Technology	80%	93%
Average		82,83%	94,08%

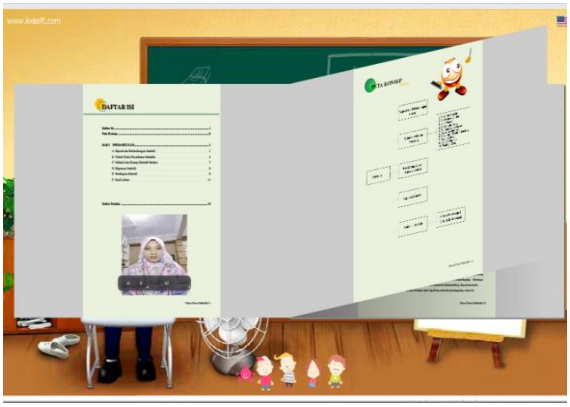
Based on the Table 1, the average initial assessment of material expert validation was 82.83%, increasing to 94.08%. With a very good category.

Table 2. Percentage of validation results from media experts

No	Aspect Assesment	Percentage Early (%)	Percentage After Revision
1	Visual Appearance	80%	98,33%
2	Contents	76,67%	92%
3	Physical Criteria	80%	93%
4	Interactivity	80%	93%
5	Easy to Use	93,3%	93%
	Average	82%	88,1%

Based on the Table 2, the average initial assessment of media expert validation was 82%, increasing to 88.1%. With a very good category.

d. Product Revision E-book Basics of Research Statistics (Figure 8).



Suggestion :
1.The visual appearance of the book is enlarged even more. To make it easier to read.
2. The contents of the Book are too dense, so that they are given free space to be covered with other items.
3.Executable program when download the interactive e-book. Need strong and stabil internet access.

Figure 8. E-book Revision Notes

e. The value of practicality is seen from two things, namely:
(1) Questionnaire responses from two practitioner lecturers, it was found that the e-book developed could be applied in the Good category (3.0) and met the very practical criteria (80%) used in the era of online learning. Questionnaire for student responses in small groups.

f. Obtained category Good (3.0) and very practical (85%).

g. The results of the responses to the practicality response questionnaire (Figure 9).

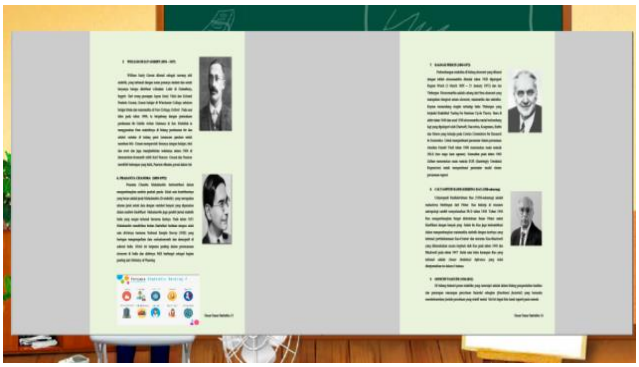


Figure 9. Response Notes to the E-book

4. Implementation Stage Results

The implementation stage in the trial class was carried out in two SIPDA classes. Namely the Indonesian Literature class A 2018 and B 2018, totaling 49 people. Evaluation questions were given as many as 5 questions for the pretest and 5 questions for the postest. The average pretest score of students when given an e-book in the form of a PDF file was 71.42. Product implementation in the trial class was carried out in the second week of October 2020. The average posttest score of students when given an e-book interactive was 91. And the N-Gain score was 0.71 in high category. E-book interactivefollowed by the Trial stage for 4 other Googleclassroom classes as a comparison.

Discussion

An interactive e-book that is integrated with other learning media such as videos, images, swf produces a large file size. The interactive e-book developed by kvisoft Flipbook maker in mobile version which can be accessed via Smartphone is much more effective to make students easier to access the e-books anytime and anywhere.

Apart from quantitative data, in developing Interactive e-book, field problems are presented in qualitative data to find out the obstacles faced. So that, alternative solutions are found to solve the problems in Trial class. Eventually it becomes an evaluation before being tested in a wider online class.

CONCLUSION

Based on the research conducted, the following conclusions can be drawn that the E-book Product Basics of Research Statistics was developed using the Kvisoft Flipbook Maker. The development is carried out with the first stage, namely a needs analysis, then a product design is carried out by making a cover using Corel Draw, creating a concept of book material in the form of modules for each meeting using Microsoft Office Word which is then converted into PDF format. Furthermore, it combines covers, materials, images, audio and video using the Kvisoft Flipbook Maker application so that it becomes an electronic module (e-module). The e-module will be combined into an e-book Fundamentals of Statistics. This e-module can be created and developed offline. The features in this e-module are in the form of material in the form of text, images, audio, video and evaluation which are displayed in an attractive and interactive way into a single learning media.

E-book Assessment Basics of Statistics Research was developed using the Kvisoft Flipbook Maker according to material expert validators and media experts very well with the percentage of their respective assessments after revision was 91.08%according to material experts and 88.1% according to media experts. Having gone through the initial validation test phase, there were several suggestions from the validator, all of which were very helpful in improving the product so that it obtained excellent results for use in Basic Statistics courses.

The practicality response questionnaire is seen from two things: (1) Questionnaire responses from media experts and two practitioner lecturers, it was found that the e-book developed could be applied in the Good category (3.0) and met the very practical criteria (80%) used in the era of online learning. (2) The student response questionnaire in the small group obtained categories of Good (3.0) and very practical (85%) at 88.1% and 88.03%. The implementation stage in the trial class was carried out in two SIPDA classes. The average pretest score of students when given an e-book in the form of a PDF file was 71.42. The average posttest score of students when given an e-book interactive was 91. And the N-Gain score was 0.71 in high category.

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