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ANNIBUKU: INTERACTIVE E-BOOK TO MEASURE PROBLEM-SOLVING ABILITY IN THE DIGITAL ERA

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Abstract: Problem-solving abilities are one of the most important abilities for a person to have at this time, especially those that can be used to solve mathematical problems related to everyday life. Interactive teaching materials are essential to build these problem-solving skills. E-books are the main learning medium in today's digital era. Annibuku is one of the E-books for all subjects that can be uploaded onto digital applications via mobile phones and PCs. The purpose of this study is to describe how Annibuku can measure students' problem-solving abilities in mathematics and students' responses to the use of Annibuku EBooks. The research method used is an analysis of the Annibuku E-book literature study and direct observation to determine the student responses to using Annibuku in mathematics. The research subjects in this study were 30 students in the tenth grade at SKB Cimahi City. The result of this research is that the problem presentation in Annibuku EBooks is interactive and can hone students' mathematical problem-solving skills.

Keywords: *Electronic Books, Mathematical Problem Solving, Interactive Learning*

INTRODUCTION

The purpose of learning, of course, is to achieve an ability that someone wants and that can be useful for everyday life. The ability to solve problems in the current era is certainly a person's main ability to be able to continue to adapt along with the changing times. Solving the problem studied here is the ability to solve mathematical problems. In mathematics, the term "problem solving" refers to the tasks given to students to improve their mathematical understanding and ability. Cai & Leister (Albay, 2019) mention that problem solving can help students develop their mathematical concept understanding, connection, and communication skills. Meanwhile, Bayat & Tarmizi (2010) state that problem solving can improve students' cognitive abilities. Problem solving is also known to be part of the mathematics curriculum, which is considered very important because, through the experience gained by students, they are judged to be able to use the knowledge and skills they already have to be applied in problem solving (Nopela, 2021).

Students' problem-solving abilities in learning, of course, must be supported by existing learning facilities and media. One of the characteristics of good learning media to build problem-solving skills is interactive media and teaching materials. It is very important to develop interactive teaching materials that are good for use in classroom learning or can be made independently without a teacher or tutor (Artista, 2018). Currently, we have entered the digital era, where all of our activities are highly dependent on digital devices. One of the activities that have been using digital devices a lot is activities in the learning process in the classroom. There are so many digital platforms and applications that can make it easier to become a source and learning tool. One's main medium for learning is books. Therefore, we need an electronic textbook or e-book that contains activities on concepts that are in accordance with today's learning objectives and stimulate these abilities (Mella et al.,

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2022). Activities in the E-book based on problem solving will be filled with real problems that are adapted to Polya's problem solving steps (in Nugraha et al., 2022).

Many electronic books, or E-Books, have been made and are an example of information technology that has a function to benefit the students in learning (Hariawan & Sakti, 2021). E-Books are made to make it easier for readers and learners to get reading resources on their respective digital devices. PCs and some cellular phones can also be used to read e-books (Liana et al., 2021). Making an interactive E-Book entails several steps, including (1) setting goals; (2) preparing interactive E-Book content and materials; (3) online services and websites for preparing interactive E-Books; (4) ebook creators and editors for building interactive ebooks; and (5) publishing and distributing interactive eBooks (Ulty, 2020). Annibuku is a digital platform in the form of a collection of electronic books on subjects from elementary school, junior high school, and high school. Annibuku can also be uploaded on their respective cell phones and PCs so that it can make it easier for students to access and get books as reading resources for them to study. Based on the explanation above, the researcher really wants to know how Annibuku can measure students' problem-solving abilities in mathematics subjects. Besides that, researchers also want to know firsthand how students respond to Annibuku's E-Book.

METHOD

This research method is an analysis of literature studies on Annibuku's E-Book in the tenth grade Mathematics subject. The researchers examine the content of Annibuku's book in relation to the components contained in the book, the content of mathematics material, and the interactivity of the E-Book in developing students' problem-solving abilities. After collecting and analyzing the literature study, the researchers also observe directly the tenth graders at SKB Cimahi City as many as 30 people to figure out directly the conditions of using the Annibuku E-Book as well as student responses to the Annibuku E-Book by using a questionnaire survey technique via Google forms.

RESULTS & DISCUSSION

The author here analyses the literature study of Annibuku's electronic book on the tenth grade mathematics subject. Annibuku can be found through its website, namely annibuku.com, or can be downloaded individually on mobile devices. Here's what the Annibuku app looks like on the Android App Store and on its website:

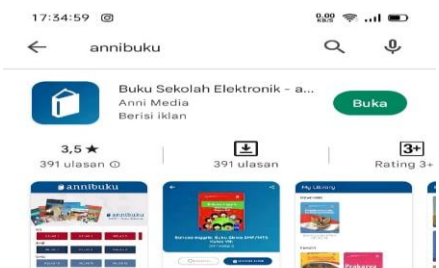

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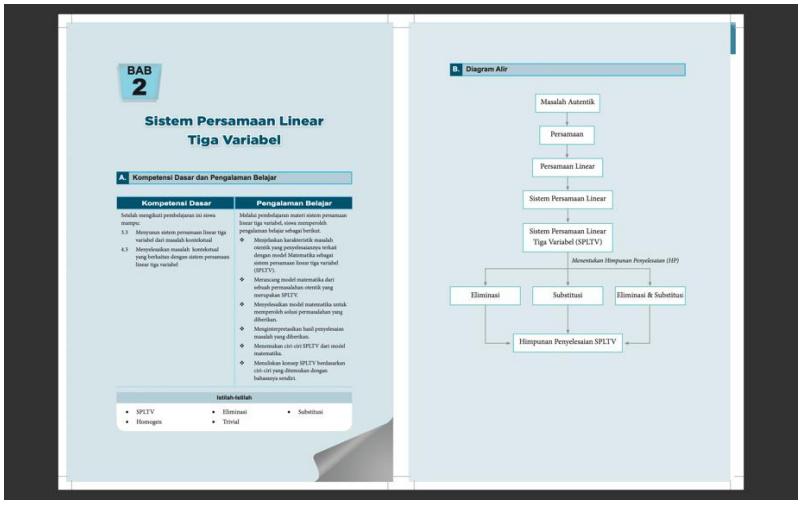
Figure 1. Annibuku Application Display on Android and PC

After that, the author analysed the contents of the book in the form of components of Annibuku in the tenth grade mathematics subject. According to Majid (2009), there are six components in teaching materials, namely: (1) Learning Instructions (Students/Educators); (2) Competence to be achieved; (3) Supporting Information; (4) Exercises; (5) Work Instructions; and (6) Evaluation. Based on observations, Annibuku has fulfilled the six components, although the study instructions and work instructions are still not clearly attached to the tenth grade mathematics subject. The following is an example in Annibuku for tenth grade mathematics, especially on systems of linear equations and inequalities:



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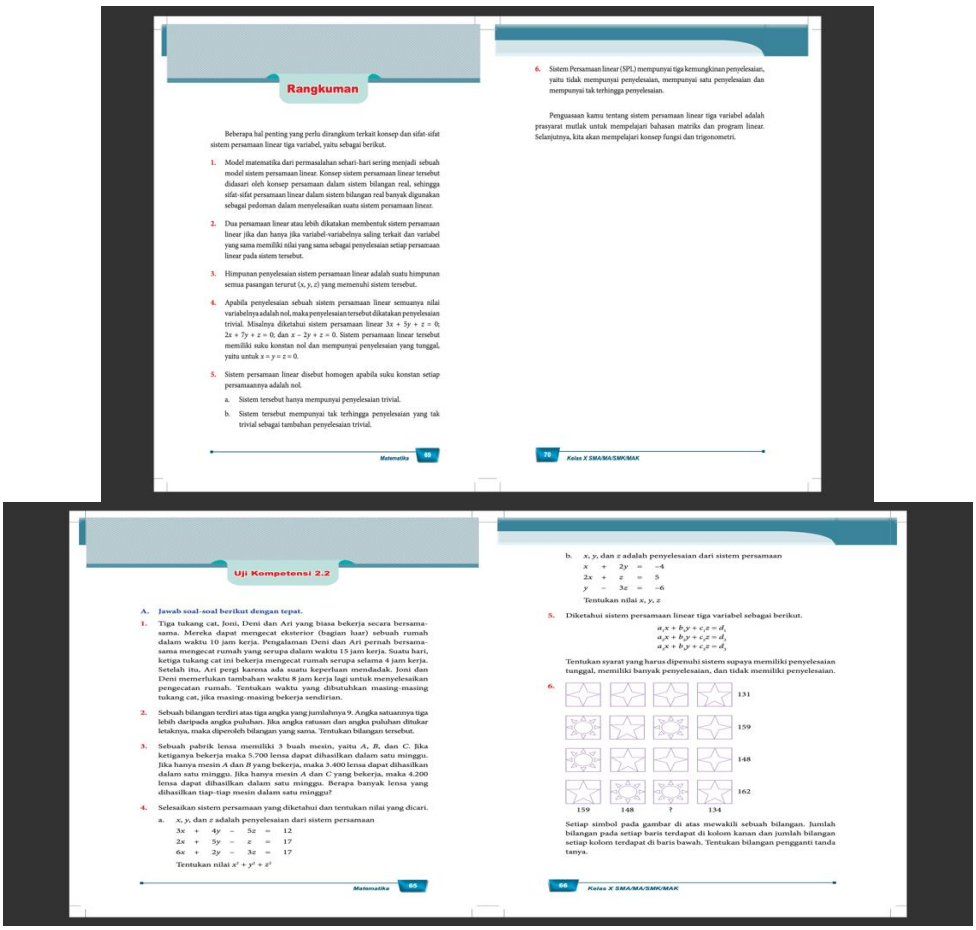

Figure 2. An example of the display of study instructions, competencies achieved, exercises, and evaluations in Annibuku

The author reviews the components of the teaching materials in the Annibuku E-Book in terms of the content contained in it, especially on the system of equations and linear inequalities. The presentation of the material in this e-book is very problem-solving based, where every concept development of the material in it begins with a contextual problem, and there are questions that can build students' ability to solve the problem. Solving the problems described is done step by step clearly, so that students can comprehend the problem first, followed by planning, solving problems according to plan, and re-evaluating the answers that have been done. This is in accordance with the problem solving steps based on Polya, namely: (1) understanding the problem; (2) developing a strategy or plan for the settlement; (3) resolving the problem according to the plan made; and (4) re-examine the answers (Sutarto, 2014). However, in Annibuku, the process of re-examining answers is not very clear and is only about strengthening solutions in solving problems. Meanwhile, the advantage of Annibuku's e-book is that there are challenges that can hone mathematical thinking at a higher level. The following is an example of how Annibuku displays its problem-solving-based material**:**

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C. Materi Pembelajaran

2.1 Menyusun dan Menemukan Konsep Sistem Persamaan Linear Tiga Variabel

Persamaan dan sistem persamaan linear dua variabel sudah kamu pelajari saat duduk di SMP. Saat ini kita akan perdalam kajian, pemahaman, dan jangkauan pemikiran tentang konsep sistem persamaan linear dari apa yang kamu sudah pelajari sebelumnya. Pola pikir dan cara belajar yang dituntut dalam mempelajari materi ini adalah upayamu untuk menemukan ide-ide, berpikir kritis dan kreatif dalam mencari strategi penyelesaian masalah dan mengungkapkannya, serta berdiskusi dengan teman, mengajukan pertanyaan kepada guru dan teman kelompok.

Banyak permasalahan dalam kehidupan nyata yang menyatu dengan fakta dan lingkungan budaya kita terkait dengan sistem persamaan linear. Permasalahan-permasalahan tersebut akan menjadi bahan inspirasi menyusun model-model matematika yang ditemukan dari proses penyelesaiannya. Model matematika tersebut, akan dijadikan bahan abstraksi untuk membangun konsep sistem persamaan linear dan konsep sistem persamaan linear tiga variabel.

Masalah 2.1

Cermatilah masalah berikut!

Petani di Daerah Tapanuli (Sumatera Utara)

Mata pencaharian rakyat di Daerah Tapanuli pada umumnya bekerja sebagai petani padi dan palawija, karyawan perkebunan sawit, karet, dan cokelat. Walaupun ada juga yang bekerja sebagai pedagang (khususnya yang tinggal di daerah wisata Danau Toba).

Namun sekarang, ada permasalahan yang dihadapi para petani padi di Kecamatan Porsea Kabupaten Toba Samosir. Hal ini terkait pemakaian pupuk yang harganya cukup mahal. Contoh permasalahannya adalah sebagai berikut.

Matematika 43

Gambar 2.1 Persawahan padi

Pak Panjaitan memiliki dua hektar sawah yang ditanami padi dan sudah saatnya diberi pupuk. Ada tiga (3) jenis pupuk yang harus disediakan, yaitu Urea, SS, TSP. Ketiga jenis pupuk inilah yang harus digunakan para petani agar hasil panen padi maksimal. Harga tiap-tiap karung pupuk berturut-turut adalah Rp75.000,00; Rp120.000,00; dan Rp150.000,00. Pak Panjaitan membutuhkan sebanyak 40 karung untuk sawah yang ditanami padi.

Pemakaian pupuk Urea 2 kali banyaknya dari pupuk SS. Sementara dana yang disediakan Pak Panjaitan untuk membeli pupuk adalah Rp4.020.000,00. Berapa karung untuk setiap jenis pupuk yang harus dibeli Pak Panjaitan?

Menurut kamu, kira-kira apa tujuan masalah ini dipecahkan? Strategi apa yang dapat digunakan untuk menyelesaikan masalah tersebut? Jika kamu mengalami kesulitan silakan berdiskusi dengan teman atau bertanya kepada guru. Sebagai arahan/petunjuk pengerjaan masalah, ikuti pertanyaan-pertanyaan berikut.

1) Bagaimana kamu menggunakan variabel untuk menyatakan banyak pupuk yang digunakan untuk setiap jenisnya dan hubungan pemakaian antarjenis pupuk?
2) Bagaimana kamu menggunakan variabel untuk menyatakan hubungan harga setiap jenis pupuk dengan dana yang tersedia?

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nilai estetika yang cukup tinggi. Pak Wayan memiliki keterampilan memahat patung yang diwarisi dari kakeknya. Ia selalu bekerja dengan dibantu dua anaknya, yaitu I Gede dan Putu yang sedang duduk di bangku sekolah SMK Jurusan Teknik Bangunan. Berbagai hasil ukirannya dapat dilihat dan dibeli di daerah wisata, terutama di daerah wisata Bali.

Gambar 2.2 Ukiran, patung, dan ornamen

Suatu ketika Pak Wayan mendapat pesanan untuk membuat 3 ukiran patung dan 1 ornamen rumah dari seorang turis asal Belanda dengan batas waktu pembuatan diberikan selama 5 hari. Pak Wayan dan Putu dapat menyelesaikan pesanan di atas dalam waktu 7 hari. Jika Pak Wayan bekerja bersama I Gede, mereka dapat menyelesaikan pesanan dalam waktu 6 hari. Karena Putu dan I Gede bekerja setelah pulang sekolah, mereka berdua membutuhkan waktu 8 hari untuk menyelesaikan pesanan ukiran tersebut. Dapatkah pesanan ukiran diselesaikan/terpenuhi, jika Pak Wayan dibantu kedua anaknya dengan batas waktu yang diberikan?

Sebelum kamu menyelesaikan masalah, koordinasi pengetahuan dan keterampilan yang sudah kamu miliki untuk menemukan aturan-aturan, hubungan-hubungan dan struktur-struktur yang belum diketahui. Dalam menyelesaikan masalah di atas, langkah-langkah penyelesaiannya dapat dilihat dalam beberapa pertanyaan berikut.

Matematika 47

1) Bagaimana kamu menentukan kecepatan Pak Wayan, Putu, dan I Gede bekerja menyelesaikan satu jenis pesanan ukiran tersebut?
2) Dapatkah kamu menentukan hubungan tiap-tiap kecepatan untuk menyelesaikan pekerjaan dalam bentuk persamaan?
3) Apa yang kamu temukan dari hubungan-hubungan tersebut? Adakah kaitannya dengan pengetahuan yang kamu miliki dengan melakukan manipulasi aljabar?
4) Adakah variabel yang harus kamu tentukan nilainya? Bagaimana caranya, apakah prinsip analogi (cara yang mirip) dapat digunakan ketika kamu menentukan nilai variabel pada sistem persamaan dua variabel?
5) Bagaimana hubungan antara konsep jarak dan kecepatan dalam menentukan lama waktu yang digunakan untuk menyelesaikan suatu pekerjaan?
6) Adakah jawaban permasalahan yang kamu temukan?

Alternatif Penyelesaian

Diketahui: Pesanan pembuatan ukiran patung dan ornamen rumah dengan batas waktu 5 hari.
Waktu yang dibutuhkan membuat patung dan ornamen adalah
Pak Wayan dan Putu selama 7 hari
Pak Wayan dan I Gede selama 6 hari
Putu dan I Gede selama 8 hari
Misalkan: Waktu yang dibutuhkan (satuan hari) Pak Wayan adalah x
Waktu yang dibutuhkan (satuan hari) Putu adalah y
Waktu yang dibutuhkan (satuan hari) I Gede adalah z
Berarti waktu yang diperlukan Pak Wayan, Putu, dan I Gede untuk menyelesaikan satu set pesanan, masing-masing adalah $\frac{1}{x}$, $\frac{1}{y}$, dan $\frac{1}{z}$.

48 Kelas X SMA/MA/SMK/MAK

Figure 3. Display of contextual problems on Annibuku

The author then makes direct observations to determine student responses to the use of Annibuku E-Book application in learning mathematics at the tenth grade SKB Cimahi City. Based on the results of observations and surveys that have been carried out, students respond to the use of Annibuku's E-Book in mathematics as a very practical step, and it makes them motivated to solve the math problems available in the electronic book. Based on the results of a survey via Google form, about 86.67% of the 30 students feel challenged to work on the questions contained in the Annibuku. Their responses are more confident, and they feel helped by the existence of electronic books that can be accessed on their respective mobile phone applications. The following is a photo of the field observation activity using Annibuku at SKB Cimahi City:

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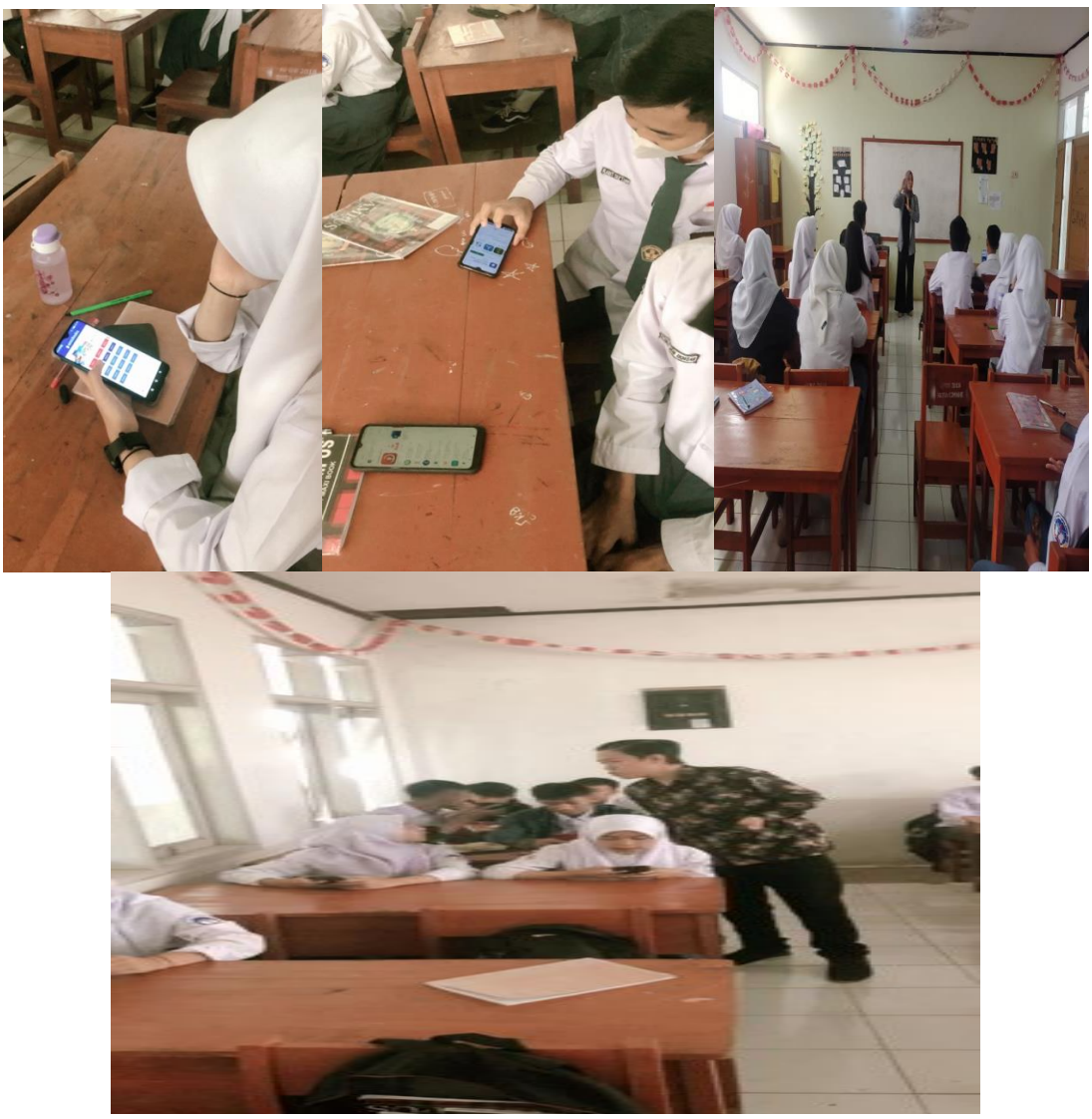

Figure 4. Photos of Observation Activities on the Use of Annibuku at SKB Cimahi

Based on the observation experience that has been done, Annibuku's E-Book is very effective in being used as a teaching material in the classroom. Practical use also facilitates the learning process to take place well. The obstacles found are only related to the technical condition of the internet package and the cell phone memory owned by each student, but this is only experienced by a few students and could be solved by deleting some data and buying a quota package again to support internet use.

CONCLUSION

The conclusion obtained from the results of the analysis of studies and direct observations by the author is that the Annibuku E-Book is an interactive and problem-solving-based electronic teaching material. It can support the improvement of problem-solving skills, especially students' mathematical problem solving. Student responses to the use of Annibuku's E-Book also strongly agree to make them motivated in solving the available math problems and help them in finding ways to solve math problems.

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