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The Future of Education: *Kastem*-Enabled Interactive E-Books Unveiled

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ABSTRACT
This research aims to design an interactive e-book containing Kastem and its development guide. Kastem acronyms for character, science, technology, engineering, and mathematics. The research design used is ADDIE at the analysis and design stages. The population consisted of all elementary school students in Bengkulu City in grades 1, 2, and 3. The research sample was conducted by purposive random sampling of as many as 820 students. Data collection using questionnaires, interviews, and tests. Data analysis was done descriptively. The results of the design of the interactive booklet containing Kastem and its guide have the characteristics of an interesting, familiar, concrete, specific theme. They are equipped with guiding questions or trigger questions at the beginning of the sub-chapter, as well as combining elements of student character and six media types.

INTRODUCTION

The development of an interactive e-book containing *Kastem* was carried out to make a great jump in the quality of education to enhance excellent students and graduates. Graduate students are expected to be competent, think critically, creatively, and innovatively, communicate, cooperate, and have character. Graduates with such competencies are following the needs of human resources in the 21st century to face the challenges of the economy, society, and globalization in work and daily life (Saavedra & Opfer, 2012). The current school curriculum in Indonesia emphasizes learning-oriented higher-order thinking skills and character strengthening (Ariyana et al., 2018). To achieve the curriculum goal, the teacher has a very large role. Teachers can contribute collaboratively and effectively to developing school curricula to organize materials, textbooks, and learning content. Teacher involvement in the curriculum development process is important to align curriculum content with the needs of students in the classroom (Alsubaie, 2016). As an educator, the teacher can understand the psychology of students and know about learning methods and strategies. The teacher also acts as an evaluator for assessing student learning outcomes. Therefore, in curriculum development, teachers must have abilities such as planners, designers, managers, evaluators, researchers, decision-makers, and administrators. Teachers can play these roles at every stage of the curriculum development process (Jaghav & Patankar, 2013).

However, Indonesian students have low competence compared to students from other countries in international standard assessments in the Program for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS) (OECD, 2018). The PISA assessment aims to obtain an overview of students' reasoning ability mathematically by using mathematical concepts, procedures, and facts to explain and predict a phenomenon (OECD. 2018). According to Bando (2022), many regions have not yet reached national standards; for example, NTB, Indonesian language scores are 425, mathematics scores are 444, and IPA scores are 429, while the national average score is 500. This effort is a form of involvement in improving the quality of elementary education so that it is

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relevant to future students' times and needs. The government develops a curriculum. The curriculum was developed to create an advanced Indonesia that is sovereign, independent, and has personality through the creation of Pancasila. Students who are reasonable, critical, creative, independent, faithful, devoted to God Almighty, have noble character, work together, and have global diversity (Kemendikbud, 2020).

Implementing a curriculum in the classroom requires software, namely textbooks, because they are books referred to by the teacher in the learning process. The textbook must enable students to learn, collaborate, make observations, solve problems, and self-assess. However, demanding teachers work alone to write books following the curriculum is unwise. According to the results of research conducted by Dhani (2020), Saleh (2020), and Yamin & Syahrir (2020), in implementing curriculum, there are no teachers who write textbooks. Therefore, we need a sample book and a writing guide. It is suspected that the interactive booklet with *Kastem* content can build students' independent learning behavior because the book is designed by combining elements of *Kastem* and multimedia. Learning activities using interactive books must be designed so that students are actively involved in learning activities (Asrowi et al., 2019). E-books can deliver a better learning experience for elementary school students (Lidinillah et al., 2019). Integrating *Kastem* and multimedia aspects in textbooks is strategic because adding more subjects or study time is unnecessary. This booklet supports the iPusnas program, accelerating book digitization (Bando, 2022). The books compiled must be interesting and easy (interactive), can be used for independent study (electronic), related to daily life (thematic), logical and creative (engineering and mathematics), and by the development of science, technology, and character. Therefore, the compiled book must fulfill these elements: an interactive e-book containing *kastem*.

Many e-books have been developed to complement learning activities. Several studies related to the development of textbooks, including 1) The development of problem-based mathematics textbooks using Adobe Flash CS5 software, have met the criteria for use in the learning process (Bayani, 2019; Lieung et al., 2021), 2) E-module development using the kvisoft flipbook maker application (Suwardi & Farnisa, 2018; Jannah et al., 2017), 3) The development of interactive mathematics digital books on geometry material using the Ispring Quiz Maker software can improve student learning outcomes (Vince & Muhtadi, 2019), 4) Development of STEM-based digital modules using flipbook applications in operating system courses (Suryani et al., 2020; Puspita et al., 2021), 5) *Lectora-based interactive e-book development for elementary schools* (Wahyuningtyas et al., 2020). The five studies focused on the type of program or hardware used to design the book. In addition, some conduct research by combining STEM elements in writing booklets. Integrating STEM education into science learning and teaching in primary and secondary schools (Syukri et al., 2013). In addition, integrating STEM in the booklet can increase motivation, interest, activeness, literacy, and learning outcomes (Sung et al., 2022). A contextual learning model for developing interactive e-books to improve students' performances of learning the Analects of Confucius (Agung et al., 2022; Rusdiana & Wulandari, 2022; Suprapto et al., 2019; Asrowi et al., 2019; Andaresta & Rachmadiarti, 2021; Pangesti et al., 2017). The integration of STEM into learning needs to be supported by the professional development of teachers because not all teachers understand STEM and can apply it to learning (Andaresta & Rachmadiarti, 2021; Yanthi et al., 2019).

This STEM approach can create a cohesive learning system and active learning because all four aspects are needed simultaneously to solve problems (Rahmi et al., 2014). STEM is an approach that links and integrates several STEM subjects to create learning based on the problems of everyday life (Meishanti, 2020). The rapid development of science and technology today is very real. It can be seen from the advanced technologies that help us in various aspects of life. Research and development continue to be carried out in various parts of the country to create new findings to prevent lagging. It indirectly fosters the spirit of global competition in various fields of life. It is why learning activities that can include science, technology, engineering, and mathematics need to be developed. STEM education plays an important role in modern education for the country to stay abreast of the competition in the global economy (Mustafa et al.. 2016). In fact, during his administration in America, President Obama prioritized improvements in STEM education (LaForce et al., 2016). Applying STEM education can develop students' scientific thinking toward problems that must be solved (Scott, 2012). Skills for applying scientific knowledge are one of the demands of STEM engineering (Firman, 2016). This study uses a STEM approach, aiming to develop content and practice in learning and apply STEM education

when dealing with real-life situations or problems (Kaniawati et al., 2015). STEM-based learning can improve the relationship between all the STEM elements so that learning can be more meaningful and foster student interest in liking and mastering science, technology, engineering, and mathematics. Other studies develop STEM animation based on local wisdom in high school physics learning (Utami et al., 2018).

Through interactive e-books with *Kastem* content, students can interact directly with books in digital forms containing text, color images, animations, simulations, and videos. In the interactive booklet, multimedia integration occurs into a digital book that is interactive and suitable for use by elementary students. Objects originally displayed as still images can be animations, simulations, and videos. In addition to reading books, students can directly witness the objects related to the material being studied. Animations and simulations can be used to discuss sample questions so students can see the problems displayed. Displaying objects through animation in interactive booklets has indirectly helped to overcome time constraints. The interactive booklet also provides interactive quizzes for students that they can use to measure their cognitive abilities based on the material they have learned. Interactive quizzes are a collection of multiple-choice questions and essays that students can access directly, and the results can be immediately known.

The application of STEM in learning activities consists of 4Cs: creativity, critical thinking, collaboration, and communication, so students can find innovative solutions to real problems and convey them well (Lestari et al., 2018). The use of the STEM approach is intended so that students can have the ability and understanding of the four aspects of STEM that are interrelated in one subject and can help students solve problems and draw conclusions from previous learning by applying them through science, technology, engineering, and mathematics (Bashooir & Supahar, 2018). Lestari (2014), in his research at SMK N 1 Cimahi, entitled "Implementation of e-books as learning media to improve understanding of basic electronics concepts," found that the results were effective. Wijayanti (2015), entitled "Development of an Interactive e-book on Chemical Equilibrium based on Chemical Representation," aims to develop an interactive chemical equilibrium booklet based on chemical representations and to describe the characteristics of the interactive booklet, teacher and student responses, supporting factors, and obstacles faced in this study. Overall, the books developed already have very good criteria for construction, conformity of the material's content with the curriculum, and aspects of readability (Wijayanti et al., 2015). Students can study anywhere by utilizing independent learning resources, anytime, according to their abilities and needs. In addition, to achieve learning objectives, the 2013 revised 2017 curriculum integrates 21st-century skills, termed 4C (creative, critical thinking, communicative, and collaborative) (Kemendikbud, 2017).

The reforms carried out in this research include including elements of children's characters in the stem and creating interesting, familiar, concrete, and specific themes and sub-themes. Another novelty is that the subjects are elementary school students in Phase A and early Phase B, while the research is conducted on junior high, high school, and college students. The purpose of this research is to produce an interactive e-book containing *Kastem*. Interactive e-books containing *Kastem* are electronic books whose presentations include text, images, animations, simulations, and videos containing children's characters, science, technology, engineering, and mathematics published in digital form that can be read through computers or other electronic devices.

METHODS

Research Design

This type of research is research and development. The development model used is the ADDIE model. The ADDIE model was chosen because it is suitable for use in various forms of learning product development (Welty, 2007). The development procedure carried out in this research is only in 2 stages, namely the analysis and design stages.

Analysis Stage

At the analysis stage, the activities identify the problems encountered in the books used so far. Next is the needs analysis on developing interactive booklets with *Kastem* content. Next, analyze the feasibility and requirements for developing books. This analysis stage will be divided into three stages, which include the following: a). Problem Analysis, b) Needs Analysis, and c). Analysis of student learning behavior: a questionnaire was developed for the three analyses. Before being used, six elementary

school teachers and six student assistants tested the three questionnaires for readability. The six elementary school teachers consist of 2 grade 1 teachers, 2 grade 2 teachers, and 2 grade 3 teachers. The six primary school student assistants are alumni of the PAUD S1 program.

Design Stage

At this stage, the researcher will set learning objectives (competency standards and basic competencies) and teaching and learning activities, design learning strategies and tools, learning materials, tests, and required instruments, formulate teaching materials, and select media. The e-book design that will be developed is a draft.

Population and Sample

The population of this research is elementary school students in Bengkulu City, Indonesia. The research sample for problem analysis needs analysis and student learning behavior analysis was selected from 10 elementary schools (10%). The research sample was grade 1, 2, and 3 students in 10 Bengkulu City Elementary Schools selected based on the A, B, and C accreditations and the region (beach and city). This method of sample selection is sufficient (Gay, L.R. 2006).

Data Collection Techniques, Research Instrument Development, and Data Analysis

The data that will be collected in this research are needs analysis data, student learning behavior, and book assessments by teachers, students, and researchers. Questionnaires and interviews collected the data. Before being used in the study, the questionnaire was tested for readability by six prospective student assistants and six elementary school teachers (2 grade 1 teachers, 2 grade 2 teachers, and 2 grade 3 teachers). The results of the questionnaire readability test were as follows: 6 student companions rated four questionnaires as very easy to understand, four teachers rated four questionnaires as very easy to understand, and two teachers rated three questionnaires as very easy to understand and one questionnaire, namely the needs analysis questionnaire for teachers was considered easy understood but in the suggestion section one teacher wrote "non-standard sentences" and one teacher wrote, "sentences need to be corrected." After reviewing the lack of subjects in each statement item, all items of the needs analysis questionnaire statement for teachers are added with "subject sentences." Data analysis techniques for the results of interviews and questionnaires used descriptive analysis (Best, 2005).

RESULTS AND DISCUSSION

This research was conducted in 2 stages, namely the Analysis and Design stages. The following is a detailed description of the activities carried out:

Analysis Stage

In the analysis stage, the activities carried out are: a) Needs analysis, b) Analysis of student learning behavior, and c) Assessment of books by teachers, students, and researchers.

Needs Analysis Results

It needs analysis data was collected through a questionnaire. The subjects were elementary and madrasah teachers. Thirty teachers filled out the needs analysis questionnaire, namely grade 1, 2, and 3 teachers from SDN 1, SDN 11, SDN 75, SDN 86, SDN 88, SDN 102, SDN106, MIN 1, MIN Kandang Limun, MI Baitul Izzah Bangalore city. The results of the needs analysis can be seen in Table 1.

Table 1. Results of Needs Analysis

Statement	Answer Interval			
	Always	Often	Seldom	Never
Teachers use thematic teaching materials provided by the Ministry of Education and Culture	50	30	20	

Statement	Answer Interval			
	Always	**Often**	**Seldom**	**Never**
Teachers use thematic teaching materials published by private publishers	23	43	27	7
The teacher uses self-developed thematic teaching materials	7	57	37	
Teachers use conventional methods in thematic learning	10	53	30	7
The teacher motivates students to be active in thematic learning activities	83	17		
The teacher gives assignments at school and homework	73	24	3	
Teachers use computers/laptops in thematic learning	20	47	20	13
The teacher permits students to use smartphones in the thematic learning process	10	4	33	53
Teachers use LCD/infocus in thematic learning	7	17	40	37
Teachers teach thematically using online/internet devices	10	30	50	10
The teacher provides thematic textbooks in the form of interactive multimedia (a combination of text, images, animation, sound and video about the explanation of the material)	17	47	30	6
Teachers need electronic thematic books that students can study anywhere and anytime and have media interactivity that can motivate students to learn	33	13	27	27
Teachers have limited time to compile interactive e-books	7	3	37	23

Based on the data presented in Table 1, it can be elucidated that 50% of teachers utilize thematic books published by the government, 30% employ private publications, 7% fabricate self-generated materials, and 13% use a combination. While teachers have dutifully fulfilled their roles, there remains a paucity of utilizing computers, LCDs, smartphones, and multimedia during instructional sessions. Most teachers (78%) exhibit proficiency in navigating interactive e-books. However, there is room for enhancement in leveraging technology for pedagogical purposes, which could significantly enrich students' learning experiences.

Student Learning Behavior

Student learning behavior data was collected through a questionnaire. The subjects were elementary and madrasah students. There were 716 students involved in filling out the student learning behavior questionnaire, namely grade 1, 2, and 3 students from SDN 1, SDN 11, SDN 75, SDN 86, SDN 88, SDN 102, SDN 106, MIN 1, MIN Kandang Limun, MI Baitul Izzah, Bengkulu City. A data collector accompanied the students to fill out the questionnaire. The analysis results of student learning behavior can be seen in Table 2.

Table 2. Student Learning Behavior

Statement	Answer Interval			
	Always	Often	Seldom	Never
Students do schoolwork on time	46	33	19	2
Students bring textbooks according to the schedule	60	26	10	4
Students use mobile phones to search for additional study materials on the internet	9	16	29	46
Students are allowed by the teacher to use mobile phones during learning as a learning resource	3	4	8	85
Students study at home individually	22	30	34	14
Students reading thematic books	25	42	27	6
Students have difficulty learning mathematics in thematic books	9	29	42	21
Students have difficulty in learning science/IPA material in thematic books	10	29	39	22
Students have difficulty learning language material in thematic books	9	25	37	29
Students have difficulty studying social studies material in thematic books	11	25	36	26
Students have difficulty understanding the instructions for working on practice questions in thematic books	13	3of 1	38	18
Students like teacher explanations rather than reading	53	24	17	7
Students need audio-visual assistance when studying in class	8	14	25	54

According to the findings outlined in Table 2, it becomes evident that a significant proportion of students, specifically 78%, exhibit diligence in completing their assignments, while an overwhelming 86% consistently bring their books. Approximately 52% of students engage in home-based study sessions. Furthermore, a substantial 79% of students still favor and appreciate learning through traditional teacher explanations, while a minority, ranging from 7% to 25%, express a preference for alternative learning resources. The data also highlights challenges faced by students, with 63% encountering difficulties in mathematics, 61% in Indonesian language studies, 66% in science, and 62% facing challenges in comprehending social studies. These statistics underscore the need for tailored educational approaches to address diverse learning needs and support students in overcoming these academic hurdles.

Teacher Grading of Books

The data on the teacher's assessment of the book was collected through a questionnaire. The subjects were elementary and madrasah teachers. Thirty teachers filled out the needs analysis questionnaire, namely grade 1, 2, and 3 teachers from SDN 1, SDN 11, SDN 75, SDN 86, SDN 88, SDN 102, SDN 106, MIN 1, MIN Kandang Limun, MI Baitul Izzah Bengkulu City. The results of the needs analysis can be seen in Table 3.

Table 3. Assessment of Books by Teachers

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Presentation of basic competency maps helps in teaching	50	30	20	
Preface according to content/material	23	43	27	7
Sentences in thematic books are easy to understand	40	57	3	

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Interesting thematic book cover images	50	50		
The pictures in the thematic book are interesting	37	63		
Description of the subtheme according to the content	47	53		
The number of sub-themes for each theme is following the basic competencies	33	67		
The examples presented help understanding	37	57	6	
The examples provided are sufficient	17	73	10	
Completing sample questions makes it easy	27	70	3	
Practice questions can be answered after students learn	37	63		
The summary helps to understand	37	60	3	
Thematic books make learning fun	23	70	7	
The pictures/graphics in this book make it easy to understand	23	74	3	
The pictures presented are interesting	27	73		

The findings from Table 3 highlight the favorable evaluation by teachers of various components within thematic books, with a significant portion—ranging from 66% to 100%—being rated positively. While 66% of teachers specifically commend the introduction, the remaining components are highly regarded by 80% to 100% of educators. Insights gleaned from an open questionnaire further shed light on teachers' preferences: 60% opt for subject-specific books due to their depth, while 40% favor thematic books for their holistic subject coverage, finding them more engaging for students. Additionally, the alignment of thematic books with basic competencies and subject matters is acknowledged by 70% of teachers, although 23% find inconsistencies, and 7% note a lack of alignment. A substantial 73% of teachers find these books easy to comprehend, attributing this ease to clear content and abundant visual aids, yet 13% find them acceptable, and 10% find them confusing. Teachers also widely appreciate the enjoyable aspect of thematic books, with 70% finding them fun and 30% expressing moderate satisfaction. When considering the level of interest, 66% of teachers find the thematic books captivating, 23% moderately intriguing, and 10% express disinterest. According to teachers, students display predominantly good abilities across all subjects. Notably, subjects like natural sciences and social sciences are exclusively present in schools implementing *Kurikulum 13* and *Kurikulum tingkat satuan pendidikan* at the third-grade level. Collectively, these insights underscore the strengths and areas for potential enhancement within the educational landscape as perceived and experienced by educators.

The comprehensive data from Table 3 showcases the positive evaluation by teachers of various components present in thematic books, with a substantial majority, ranging from 66% to 100%, receiving a commendation. Notably, the introduction is praised by 66% of teachers, while the remaining components are highly valued by 80% to 100% of educators. Insights from an open questionnaire unveil teachers' preferences, with 60% opting for subject-specific books due to their depth, while 40% favor the broader coverage of thematic books, finding them more engaging for students. Furthermore, the alignment of thematic books with basic competencies and subject matters is acknowledged by 70% of teachers, although 23% perceive inconsistencies, and 7% indicate a lack of alignment. A significant 73% of teachers find these books easy to comprehend, attributing this to their clear content and abundant visual aids; however, 13% find them acceptable, and 10% find them confusing. Teachers also widely appreciate the enjoyable aspect of thematic books, with 70% finding them fun and 30% expressing moderate satisfaction.

Regarding interest, 66% of teachers find the thematic books captivating, 23% moderately intriguing, and 10% express disinterest. According to teachers, students exhibit predominantly good abilities across all subjects. Notably, subjects like natural sciences and social sciences are exclusively present in schools implementing Kurikulum 13 and Kurikulum tingkat satuan pendidikan at the third-

grade level. These insights collectively highlight the positive aspects and areas for potential improvement within the educational landscape, as perceived and experienced by educators.

Book Assessment by Students

Book assessment data by students were collected through a questionnaire. The subjects were elementary and madrasah students. There were 716 students involved in filling out the student learning behavior questionnaire, namely grade 1, 2, and 3 students from SDN 1, SDN 11, SDN 75, SDN 86, SDN 88, SDN 102, SDN 106, MIN 1, MIN Kandang Limun, MI Baitul Izzah Bengkulu City. A data collector accompanied the students to fill out the questionnaire. The results of the needs analysis can be seen in Table 4.

Table 4. Student Assessment of Books

Statement	Strongly Agree	Agree	Disagree	Strongly Disagree
Sentences in thematic books are easy to understand	28	56	16	
Interesting thematic book cover images	38	58	4	
The pictures in the book are interesting	35	57	7	
Description of the subtheme according to the content	23	67	10	
Examples help understand learning	31	60	8	
The examples provided are sufficient	23	65	11	1
Completing sample questions makes it easy	22	64	14	
Practice questions can be answered after students learn	25	61	14	
Summaries help students understand	24	58	17	1
Thematic books make learning fun	44	50	6	
The pictures/graphics in this book make it easy to understand	30	59	11	
The pictures presented are interesting	40	54	6	

As per the evaluations conducted among students, it was found that a substantial majority, ranging between 82% and 96% of the student body, appraised the components of the thematic books favorably. This data suggests a widespread positive reception among students regarding the various elements present within these thematic books.

Book Assessment by Researchers

The researcher's assessment of the book was carried out qualitatively. Three researchers carried out the assessment. The results of the assessment of the book by the researcher were as follows. The writing of textbooks is only based on basic competencies and is not done through needs analysis, book design, and evaluation. The elements of children's character in thematic books in elementary schools are not yet visible because thematic books are STEM-based. The selection of themes follows the Ministry of Education and Culture and is not based on student needs, so the chosen theme is not interesting, familiar, concrete, or specific. There are no guiding or trigger questions at the beginning of the sub-chapter, so it does not stimulate students to read the book's contents.

The assessment of the linguistic aspects in the thematic books for grade 1 elementary school is focused on the mechanical aspects of language and aspects of language functions. The mechanical aspects include using letters and choosing words and sentences. In contrast, the function aspect of language is as a thinking tool. Aspects of the use of letters generally use the type and size of clear and attractive letters. It increases the readability of the text by children. Grade 1 SD still has the characteristics of early childhood, so the use of onset and rhyme in reading needs to be considered because it can increase children's enjoyment of reading and reading. Reading formats generally do not have rhymes. The choice of words in the book is also still colored by the choice of words that are difficult for first graders to understand. The word sitting position may be more difficult to understand than how

to sit. The phrase "how to thank God" may be more difficult to understand than "how to thank God." The function of language as a means of thinking at a higher level is still not optimally emphasized in reading texts in books. Questions accompanying reading texts require low-level thinking, such as mentioning again.

The results of the Illustration Analysis were carried out on Grade 2 thematic books, as follows: Theme 1: live in harmony. Some illustrations tend to be less concrete and varied, especially on mathematical material, such as piles of small cubes that make it difficult for students to count. Clear explanations do not accompany some illustrations or illustrations on let's look at the pictures in the book, but there are no further instructions on what students must respond to. Theme 2: playing in my environment. Some illustrations appear repeatedly so that they seem monotonous. Some illustrations do not show the full picture.

For example, if a child picks fruit from a tree, the picture of the tree is not intact. Only the sides (the part of the tree where the fruit is picked) are shown, so it looks like the tree is floating. Theme 3: My Daily Tasks In Mathematics: recognizing fractions of money is necessary for the updated image of the new currency launched by the government in 2022. The graphic image only describes the x-axis, while the y-axis is not explained. There is an illustration of two children playing cards. This picture does not describe what game is being played so that it can create a negative perspective for children. Some illustrations do not conform to the norms of decency.

Like the picture of a child who answers the teacher's response by raising his left hand, theme 5: My Experience In observing animals, there are pictures of animals that are not shaped. Theme 7: Togetherness There are irrelevant illustrations. The text states that the school garden has a family medicinal plant (toga), but the picture does not show the plant.

Design Stage

At this stage, the researchers set learning objectives (standard competencies and basic competencies), teaching and learning activities, designing learning strategies and tools, learning materials, tests, and required instruments, formulating teaching materials, and selecting media. The e-book design that will be developed is a draft. There were two designs at the design stage: a guide for developing an e-book and an interactive e-book containing *Kastem*. Here are presented the two aspects.

E-Book Development Guide

The guide for developing an interactive e-book containing *Kastem* has different specifications from the existing textbook writing guides. The difference is that there are two aspects: process and goal. This guide starts with needs analysis, book design, and evaluation, while the textbook writing guide is only based on objectives. This guide aims to write interactive, thematic, and *Kastem* e-books. In this guide, four elements of novelty are added, and the additions are made through research. The four novelty elements are: 1) adding elements of children's character to thematic books in elementary schools from STEM-based to *Kastem*-based (character, science, technology, engineering, mathematics). 2) Choosing interesting, familiar, concrete, and specific themes. 3) Adding questions at the beginning of each sub-theme as guiding questions and trigger questions, and 4) combining six media types in the book.

Adding Elements of Children's Characters to Elementary Thematic Books

The addition and placement of character elements in the first order is important because character planting is more important than the ability of science, technology, engineering, and mathematics (STEM), especially in elementary school-age children. The words of teachers in developed countries, we are not worried when our students do not understand mathematics. We are more worried when they do not know how to queue. The phrase is true because teaching a child to read, write, count or increase academic grades only takes 3-6 months to teach intensively. However, to educate a child's moral behavior, it takes >15 years to teach it. Character is the foundation of knowledge and skills. Research at Harvard University in the United States found that success is not determined solely by knowledge and technical abilities (hard skills) but rather by the ability to manage oneself and others (soft skills). According to Schonfeld, in learning mathematics, attitude is important, not ability. Therefore, the character element in the development of books must be formalized so that teachers and

students have a reference in learning character. In general, teachers use books as the main reference in learning.

1. Forming a Theme

In the development of e-books, themes are formed based on the proximity of basic competencies from several subjects. It considers the characteristics of elementary school students: the theme must be interesting, familiar, and concrete, and specific themes should be in the form of activities or objects. The way the theme is chosen differs from the method used by thematic book writers. Choosing a theme is based only on the proximity of basic competencies from several subjects. Through this new method, the types of themes developed are not limited to 8 themes per class created by the Ministry of Education and Culture team. In addition, the authors can develop different themes tailored to the characteristics of students and local culture. This method is done because the basic competencies between subjects in elementary school are close to each other. It is because the basic competencies at the elementary level of grades 1-3 are still simple, such as the introduction of whole numbers, vocabulary recognition and others that can be combined with any basic competencies from other subjects.

Eight themes determine the number of themes for each class and consist of 4 sub-themes. Determining eight themes and four subthemes is based on the number of weeks each semester. The number of weeks each semester is 19 weeks. Three weeks are used for deepening, mid-semester and end-of-semester exams, so there are 16 weeks per semester for study. If each class has eight or four themes every semester, each theme takes four weeks and one sub-theme weekly. The number of basic competencies for each subject is not the same, so it is necessary to map the basic competencies for each subject. There are subjects with only four basic competencies and 20 basic competencies. Therefore, it is necessary to formulate indicators so that the basic competencies of each subject in making themes and sub-themes are evenly distributed.

2. Adding Questions at the Beginning of Each Subtheme in the Form of Guide Questions and Trigger Questions

The addition of questions at the beginning of the sub-theme aims to stimulate students to think because someone will think when faced with a problem. This thinking stimulation trains students to activate the mind. Through guiding questions, students understand the sub-themes' concepts, principles, and procedures, while through trigger questions, students can solve problems/high-level thinking.

3. Integrating 6 Types of Media in Electronic Books

Six types of media are combined in e-books, so e-books provide a variety of media. The selection of media is adjusted to the type of learning material, whether the type of concept, principle, or procedure. With various media, students become happy to learn because electronic books become interesting.

The media chosen must be under the purpose, easy to understand, and interesting. There is no best media, but the best media are suitable for learning objectives and conditions. Developing e-modules using the kvisoft flipbook maker application on set materials suitable for use in learning (Kemendikbud, 2020). Developing interactive mathematics digital books on geometry material using the Ispring Quiz Maker software can improve student learning outcomes (Dhani, 2020).

E-Book Development Stage

The development of electronic books is carried out in 3 stages: the stage of presentation techniques, systematic presentation, and assembly of learning media.

Presentation Technique

Two activities are carried out at the presentation technique stage: organizing the material and giving examples. The two activities are described as follows.

1. Material Organizing

Elementary school materials are presented thematically by combining materials, elements of *Kastem*, types of media, student characteristics, teacher expectations, and researchers' expectations. E-books consist of several themes, each combining several basic competencies from several subjects. Themes are determined based on the proximity of basic competency keywords from several subjects. The theme must be interesting, familiar, concrete, and specific in the form of activities or objects. To obtain the proximity of basic competencies from several subjects, mapping basic competencies from

several subjects was carried out (see examples in Table 2 and Table 3). Each theme comes with core competencies and images. Based on the proximity of the basic competencies of the five subjects, three adjacent keywords can be raised as themes: living in harmony, living politely, and the precepts of *Pancasila*. The theme of cooperation was chosen from the three keywords.

2. Giving Examples

Examples are arranged to make it easier for students to understand abstract concepts. Examples are arranged in 2 types: understanding the concept and its application.

Presentation Systematics

The systematics in this book are presented in the following order: a) themes, b) subthemes, c) bibliography, d) QR CODE, e) and index lists. Themes are determined based on the proximity of basic competency keywords from several subjects and students' interests. The theme must be illustrated with pictures; b) subtheme is part of the theme. Each sub-theme contains 1) guiding/trigger questions, 2) learning activities, 3) summaries, and 4) exercises. Guiding questions contain questions that provide direction for students to understand the concept, while trigger questions contain questions that encourage students to solve problems. Learning activities contain material that students in thematic and Kastem must study -charged forms. The summary contains the main points of the material in the sub-theme. The exercises contain sub-theme questions and hots. The bibliography and index list are compiled at the end of each theme. QR CODE contains additional literature to broaden horizons.

Based on the needs analysis, 50% of teachers use government thematic books. Not many teachers use computers, LCDs, smartphones, and multimedia. As many as 78% of teachers have no difficulty using interactive e-books. Some teachers do not use the thematic books the government publishes even though they are free. It is suspected that the books are not interesting. Maybe the illustrations are not attractive because they are not colored, and the themes are not interesting. Not many teachers use IT in learning, especially in rural areas, allegedly due to the lack of facilities that support the use of IT, such as electrical power, weak signals, or expensive pulses. According to the results of research by Mahdum et al. (2019), there is a need for teachers in rural areas to be more ready to use IT in learning compared to teachers in urban areas.

Based on the analysis of student learning behavior, 78% of students diligently do assignments, and 86% of students carry books. There are 52% of students who study at home, 79% of students still like the teacher's explanation, and only around 7%-25% of students who like to study with other learning resources. Some students (24%-51%) have difficulty understanding the subject. Based on the teacher's assessment of the thematic books, 80%-100% of the teachers assessed that the components of the thematic books were good. Only the preface component was rated well by 66% of teachers. Meanwhile, 82%-96% of students assessed that the thematic book components were good.

The results of the book assessment by researchers are as follows. Writing textbooks is only based on Basic Competencies and is not done through needs analysis, book design, and evaluation. The elements of children's character in elementary thematic books have not been seen because the thematic books are STEM-based, the theme selection follows the Ministry of Education and Culture, is not based on student needs, so the theme chosen is based on the selected uninteresting, familiar, concrete, and specific, there are no guiding questions and or trigger questions at the beginning of the sub-chapter, so it does not stimulate students to read the contents of the book. Illustration elements and language aspects generally do not have rhymes, especially in reading formats. The function of language as a means of thinking at a higher level is still not optimally emphasized in reading texts in books. Questions that accompany reading texts tend to require low-level thinking. 4th- or 5th-grade students may have difficulty dealing with higher-level questions.

According to the results of the PISA survey, Indonesian children's reading ability is still in the level 1 category, even below level 1. Some teachers assess thematic books as not good and, supported by the assessment of researchers indicating that thematic books need to be perfected to improve students' character to think critically, creatively, communicatively, and collaboratively. Therefore, designing an interactive e-book containing Kastem and its guides is necessary. This e-book combines elements of character. The chosen theme is interesting, familiar, concrete and specific, adds questions at the beginning of the sub-themes, and combines six media types.

This interactive e-book containing *Kastem* meets the criteria of a textbook proposed that a quality textbook must have ten components and be under the applicable curriculum. The ten components of the textbook are: 1) attracting children's interest, 2) being able to motivate students, 3) containing illustrations that attract students' hearts, 4) considering linguistic aspects, 5) being closely related to other lessons, 6) can stimulate or stimulate students' activities, 7) be aware and firmly avoid vague concepts, 8) have a different point of view. Clear, 9) able to provide reinforcement, emphasis on the values of children and adults, and 10) can respect the personal differences of students and users. The electronic book meets the criteria for a good-quality textbook because it already has the ten components described according to the curriculum. The development of this electronic book needs to be done because, according to Dhani (2020), Saleh (2020), and Yamin & Syahrir (2020), in implementing the curriculum, there are no teachers who write textbooks. The design of this e-book also follows the textbook criteria proposed by Pannen and Purwanto (2001) and Dikti (2016).

This e-book is designed according to the level of student's understanding through interesting, familiar, concrete, and specific themes. This method follows the opinion (Ausubel, 1963; Dhani, 2020; Schwartz dan Curcio, 1995) that students will easily learn because they can relate new concepts to what they experience every day. This electronic book's writing also considers students' characteristics by paying attention to abilities and learning behavior. This book was compiled by combining six media types according to the opinion (Dhani, 2020) that media-assisted learning is more effective. The design of the e-book supports the research results of Pangesti et al. (2017), which show that technology-oriented mathematics books can build mathematical concepts.

CONCLUSION

This research resulted in an interactive e-book development guide containing *Kastem* and e-books. The guide for developing an interactive electronic book containing *Kastem* electronic books was developed based on the results of a needs analysis study, student learning behavior, and assessment of thematic books by teachers, students, and researchers. The conclusions of the five studies are described below. The guide for developing an interactive electronic book containing *Kastem* has different specifications from the previous textbook writing guides. The difference is that there are two aspects: process and goal. This guide starts with needs analysis, book design, and evaluation, while the textbook writing guide is only based on Basic Competencies. This guide aims to write interactive, thematic, and *Kastem* e-books. In this guide, four elements of novelty are added, and the additions are made through research. The four novelty elements are: 1) adding elements of children's character to elementary thematic books from STEM-based to *Kastem*-based (character, science, technology, engineering, mathematics). 2) Choosing interesting, familiar, concrete, and specific themes; 3) Adding questions at the beginning of each sub-theme as guiding questions and trigger questions; and 4) combining six media types in the book.

The systematics in this book are presented in the following order: a) themes, b) subthemes, c) bibliography, d) QR CODE, e) and index lists. The theme is determined based on the proximity of the basic competency keywords from several subjects and students' interests. The theme needs to be illustrated with pictures; b) The sub-theme is part of the theme. Each sub-theme contains 1) guiding/trigger questions, 2) learning activities, 3) summaries, and 4) exercises. Each theme has a bibliography and index list at the end of each theme, as well as a QR CODE containing additional literature to broaden your horizons.

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