

## Development of Ethnomathematical Media Based on the Book Creator Application on the *Syawalan* Tradition in the Junior High School Curriculum

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### ABSTRACT

Culture-based learning enables teachers and students to participate actively based on their knowledge about culture, producing optimal learning results. Ethnomathematics, particularly math, is a potential bridge gap Between culture and education. Because of that's very important to plan appropriate teaching materials in Pasuruan with characteristics of learning mathematics-based ethnomathematics in traditional *syawalan*. Study this aim for make product in the form of a book -based creator ethnomathematics in understand draft for could complete problem mathematics, as well knowing response and results in study student after using learning media on the material algebra. The techniques used are descriptive and qualitative using ethnomathematics e-books. The development used a 4D model consisting of 4 stages: definition, design, development, and stage dissemination. Instruments used shaped responses students through sheet questionnaires and test results studied through sheet tests. Based on validity test analysis by (media, materials, and experts culture), practicality test through response student gets average score 3.62 with category excellent practicality, effectiveness test, and analysis ability understanding draft student through test understanding completeness study by 82 percent. So that could conclude that the developed ethnomathematical e-book media in traditional *syawalan* "lontong vegetables" for increase understanding draft middle school students about operation algebra worthy used to enhancement understanding draft students because of Fulfill valid, practical, and effective criteria.

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## 1. INTRODUCTION

Some people, whether consciously or not, apply algebraic concepts to routine problems, especially people at who level of education (Noeruddin & Piyanto, 2021; Sukmawati, 2015). Algebraic perception can be taught and instilled effectively by teaching it to students in middle school (SMP), prioritizing the principles of logical, systematic, and rational thinking (Fitri, 2018; Malihatuddarajah & Prahmana, 2019; Zahid & Sujadi, 2017).

But the reality is that in learning algebra material, especially when distinguishing which ones included variables, coefficients, and which ones are included, students still have many difficulties (Astuti & Sari, 2018; Dewi et al., 2020; Sari et al., 2020). Some students encounter difficulties when participating in learning mathematics in class (Lailiyah et al., 2020; Rosmayadi, 2018). When students have difficulty learning mathematics, it also means difficulty earning certain parts of mathematics (Liu et al., 2013, 2015). Difficulty can be one part. It can also be more than one part of the studied mathematics (Arjudin, 2020). Assessing the diversity of mathematics subjects, whether a discussion involves one or more topics, how difficult a student's difficulty in a debate will affect the difficulty of one or more other issues. (Neic et al., 2012; Saaroh et al., 2021; Turidho et al., 2021). So one of the difficulties students face when studying one part of mathematics can affect the difficulties experienced by students when looking at different aspects of mathematics.

In the mathematics learning objectives stated in the Minister of Education and Culture Number 59 of 2014 concerning the 2013 Curriculum for SMA/MA: (a) Understanding mathematical concepts, namely the competence to explain the interrelationships between concepts and apply concepts and algorithms flexibly, accurately, efficiently, and precisely in problem solving; (b) Using patterns as conjectures in solving problems and being able to make generalizations based on existing phenomena or data; (c) Using reasoning on traits, performing mathematical manipulations which include the ability to understand problems, build mathematical models, complete models and interpret solutions obtained and solve problems in everyday life; (d) Communicating ideas, reasoning, and being able to construct mathematical proofs; (e) Have an attitude of appreciating the usefulness of mathematics in life; (f) Have attitudes and behaviors that are in accordance with values in mathematics and learning; (g) Performing motor activities using mathematical knowledge; and (h) Using visual aids or simple technology results to carry out mathematical activities.

Mathematical activities utilizing technology as a learning medium are needed to optimize the learning process. According to Nurdyansyah (2019), using learning media can increase students' motivation, activeness, and new interests and increase activity stimulation in the learning process. Nurdyansyah (2019) states that visual-assisted learning activities in the form of teaching aids or learning media can provide visual experiences to students, encourage learning motivation, and clarify and facilitate complex abstract concepts to be simpler, specific, and easy to understand, well as more exciting and complete. In terms of explanation. This needs to be done so that students can study at home, and it will be easier to learn the material from these teaching materials. Various learning media types use technology, including educational media, electronic books, or e-books on the book creator application.

Book Creator is an electronic book that contains information in the form of text and images and can also insert audio or video. Book Creator is the definition of a book that is compiled or converted into a digital format for viewing on a computer screen or mobile device (Atherton, 2022; Ezeh, 2020). Aprillianti & Wiratsiwi (2021), book creator is a textbook that is converted to digital format, where the book creator acts as a learning environment with applications containing a multimedia database with documents. Various educational resources organize multimedia presentations on topics covered in the book. The advantages of the book creator are its compact size, making it easier for users to store it easily, easy to carry anywhere, the quality remains the same, and can be consulted anytime, anywhere, anyone (Asyrofi et al., 2018; Klaehn, 2015; Puspitasari & Walujo, 2020). Book Creator was developed in 2011 to support reading development and help learners learn foreign languages. In addition, digital book creators can be used to develop students' productive skills, and teachers can easily create and share

them. More book app creators can increase the interaction between teachers and students, the learning process is attractive, not tiresome, and students with different characteristics will be easier to understand in the mathematics learning process (Anjarwati, 2021; Aprillianti & Wiratsiwi, 2021; Widyasmi et al., 2021).

In line with research results from various international studies that describe the conditions of learning mathematics in Indonesia, it does not guide students in reasoning, communication, problem-solving, and mathematical literacy (OECD, 2019). This condition is in line with the results of the daily student class VII test on material algebra at the Assyifa Learning Center Foundation (ALC Pasuruan which shows a low average value. This value got from the results test every student who attends school in different places, both public, private, and Tsanawiyah. This problem is a blow to classroom learning and requires constructive evaluation. More carry on in attachment Permendikbud (2016), on the standard of learning mathematics, allows for recognizing students' differences and cultural backgrounds. Cultural study relevance is one of the trends in mathematics known as ethnomathematics (Ardhi et al., 2021; Hardiarti, 2017; Yudianto et al., 2021 (Utami et al., 2020).

Ethnomathematics research results are applied in the classroom through cultural resources and equipment in the form of crafts, arts, fairy tales, values, ethics, morals, and theory firmly embedded in the belief system. In Sundanese society, mathematics is applied through a system of numbers, measurements, geometry, and arranged patterns (Abdullah, 2017). To dig draft math in ceramics \_ Mlaten could be applied through the draft circle, transformation geometry, wake up flat, space side curve, concept function, and object volume concept turn (Pertiwi & Budiarto, 2020). Tulungagung people train mathematics To do exploration and interview in dig elements get up flat on Ratu Boko temple for get description shapes the objective (Jayanti & Puspasari, 2020). More the Dayaks continue to practice mathematics by carving, making patterns, determining dates, and numbering systems (Hartoyo, 2012). In the context of Bugis Makassar culture, learning mathematics can improve attitudes toward the ways and habits of universal society (Akib, 2016). Mathematics is practiced by Balinese people in traditional rituals and tower construction (Darmayasa, 2016). Papuans also have mathematical concepts such as honai, centipedes, para beads, and batik patterns of various geometric shapes (Mumu, 2018). Meanwhile, the people of Maluku apply mathematics to buying and selling, weaving patterns, textile patterns, and geometric shapes on local food products (Laurens, Ngilawayan, & Pattiasina, 2019). Whereas learning math that will be applied in a study with link problem in life real inside, there are concepts related math with culture local "Lontong Sayur" often found a student in life true to tradition *syawalan*.

Study related book creator in learning has done by (Asyrofi et al., 2018; Muslimin et al., 2021; Puspitasari & Walujo, 2020; Widyasmi et al., 2021; Anjarwati, 2021; Siti Rodi'ah, 2021). Research conducted by Asyrofi et al. (2018) and Puspitasari & Walujo (2020) is on developing application book creators based on education conservation in learning biology. Muslimin et al. (2021) build book creators to write poetry and text descriptions in learning the Indonesian language. Widyasmi et al. (2021) developed an application book creator for evaluation educandy on material temperature and heat. Then Anjarwat (2021) created a book creator in e - module preparation based potency natural in science learning. More carry on Siti Rodi'ah (2021) developed book creator for increase ability motor rough on learning education physical. Besides no in learning mathematics, research conducted the sixth used in situation pandemic covid-19. Besides, the subject used is more dominant in tiered elementary (SD) and intermediate first (junior high) students. However, a book creator study in learning mathematics has conducted by Aprillianti & Wiratsiwi (2021) on the material get up space on level school base.

A study related to applied ethnomathematics to help resolve difficulty studying algebra has been done by Oktafiani, (2020); Richardo (2020); Yulianto & Arumsari (2016). Ethnomathematical studies developed in LKS teaching materials with distinct typical culture Tegal, Java middle in increase connection mathematical students on the material algebra (Oktafiani, 2020). Nex, in understanding challenging algebraic ideas, understood students, reminiscent of operations subtraction and addition algebra with presenting theory designed algebra with outside learning class to produce experience

valuable, authentic character culture Dayeuhluhur. "Nambungan" community in Cilacap, Central Java (Yulianto & Arumsari, 2016). In resolving difficulty learn on the material, algebra could be overcome through construction character to student internalization of Islamic culture and religion in the learning process of mathematics (Richardo, 2020). Many results have been obtained in ethnomathematical studies that require more profound insight into its application and classroom problems.

Research linking application book creator and ethnomathematics in learning math on material algebra is not yet researched. Developed media in the study highlights elements of culture in the scenario. Flow in e-book media with the book creator app is about acculturation, interpretation of material, and interactive questions with the user. Acculturation used in e-books with application book creator is tradition *syawalan* with destination for introducing culture local to students. Tradition *syawalan* carried out on the 8th day after Eid Fitri, especially in Pasuruan with each other, stay in touch for halal bi halal or each other forgive for elders or parents and genealogy family, personally take turns. Temporary using halal bi halal in the media is the right thing to do. Tradition *Syawalan* also has the typical serving of "lontong sayur". Abstract rice cake in Cook vegetable rice cake is soft and supple, so understandable aim for strengthening rope brotherhood with each other forgive what you can imitate. Expected besides studying about culture, students can also imitate the taste of traditional *syawalan* by serving "lontong sayur".

Support e-books based ethnomathematics made with application easy book creator used with instructions that can be used student in the learning process teach as method intermediary for interpreting the material. The materials used are application derivative function algebra. Related material with life daily in the form of materials used for making rice cake vegetable in introduction variable use illustration. Draft interpret Theory by deductive, especially with explaining related things with life every day, then served in form sentence mathematical for stimulating understanding conceptually. This medium introduced materials that apply algebra with mixed materials like rice cake, tofu, and eggs, for created "lontong sayur" which are delicious and savory. Then you can also enter this in the draft when we do "Lontong sayur" for  $x$  people and estimate how many rice cakes will be generated. Keep going; mix ingredients like rice cake, tofu, and eggs until they form "lontong sayur".

Research linking application book creator and ethnomathematics in mathematics learning on application derivative function algebra is not yet researched. Because, based on the problem presented in the previous paragraph and supported by relevant research, questions study submitted is based on book creator application ethnomathematics in learning algebra could help teachers create favorable conditions for study student or not? Study this aim for make product in the form of based book creator ethnomathematics in understanding draft for could complete problem mathematics, as well knowing response and results from study student after using learning media on the material algebra.

## 2. METHODS

Developed Products is an ethnomathematics e-book on app book creator. The development model used the 4-D model (Thiagarajan, 1974), consisting of 4 stages: Step definition, design, development, and dissemination. Ethnomathematics e-book media on app developed book creator tested in the seventh grade of the Assyfa Learning Center Foundation. Following the description, the 4-D effect is described in Figure 1.

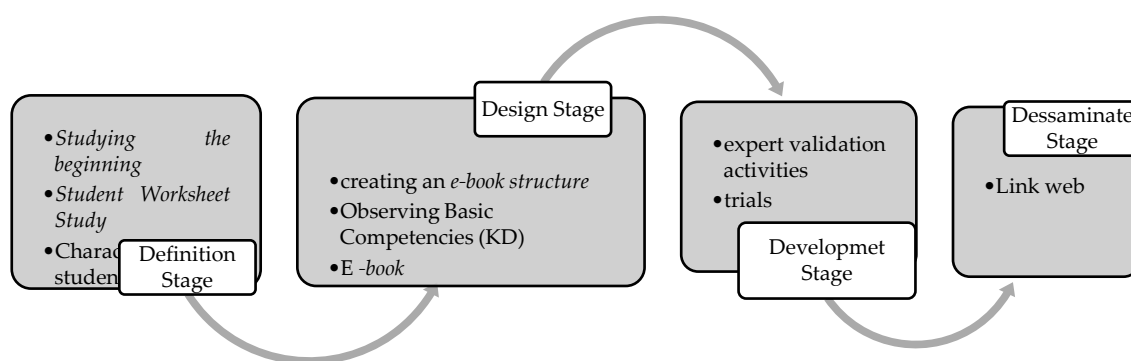


Figure 1. 4D Development Stages

Making comics as a learning medium started with observation using stages 4D by Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel. The background behind the use of steps observation is in tune with references in journals and observations previously that 4-D stages match used in making comics as means of learning. Then the process that will be conducted is: (1) define ( formation process which includes observation beginning and end, observation teaching materials, observations material, observation students, and formulation destination learning), (2) design (the process of forming namely the design process synchronous e-books with algebra material in the 2013 curriculum with based ethnomathematics), (3) develop (the manufacturing process which includes validation experts and trials). The last process is socialization (disseminated) through online web links.

Through data with the qualitative descriptive technique after using ethnomathematics e-book for device learning math response through sheet questionnaire and test results study through sheet test. Response sheet students and sheets test given to 25 students class VII of the Assyfa Learning Center Foundation which later quantified to get the results in the form of numbers a who will be measured in make ethnomathematics e-book as teaching materials. Ethnomathematics e-book media that has been revised based on results validation next will test 25 students who have ability mathematics different in class VII Assyfa Foundation Learning Center.

**Validation Theory**

Material validation was carried out by two validators (two mathematics teachers). The validator investigated by filling out the material verification sheet using a four-choice Likert scale (4 = excellent, 3 = good, 2 = usual, 1 = a little).

Table 1. Grid sheet validation Theory

Number	Corner look	Instruction	Unit
1	Presentation	Destination	1, 2
		Relevance	3, 4
		collapse	5, 6
		Quality contents	7, 8
2	Appropriateness	Theory	9, 10, 11
		Scope Theory	12, 13, 14
		Depth Theory	15, 16
3	Language and writing	Truth language	17, 18
		Suitability with EYD	

Kustandi & Sutjipto (2013)

### Cultural Expert Validation

Table 2. Grid sheet validation expert culture

Aspect	Component	Unit
Culture	History of Shawwal, Meaning rice cake vegetables, Ingredients maker rice cake vegetable	1, 2, 3, 4, 5, 6, 7

Source: adapted from Supriadi (2019)

### Media Validation

Table 3. Grid sheet validation teaching materials

Number	Corner look	Instruction	Unit
1	Contents	Theory	1, 2, 3, 4, 5
2	Language	Language Compilation	6, 7, 8, 9, 10
3	Presentation	Carrier Theory	11, 12, 13
4	Appearance	Appearance e-book:	14, 15

Laksmi (2019)

### Response Student

Table 4. Grid Questionnaire response student

Number	Corner look	Unit
1	Usefulness	1, 2, 3, 4
2	Convenience	5, 6, 7, 8, 9
3	Appearance	10, 11, 12, 13, 14, 15
4	attractiveness	16, 17, 18, 19, 20
5	Ethnomathematics	21, 22, 23

Source: adapted from Laksmi (2019)

### Test Results

The questionnaire was used to see the results development of students after using the ethnomathematics e-book as a means of learning. A questionnaire in the form of two questions containing instruction ability understanding and given separated from ethnomathematics e-book next will be measured based on the Polya solution step.

Table 5. Grid Ability Understanding student

Aspect	Indicator	Item
Understanding Mathematical	Restate the concept Presenting concepts in various forms of mathematical representation Using thoughts or algorithms in solving math problems	1, 2

Source: adapted from Laksmi (2019)

Table 6. Classification of Polya. Stages

Number	Indicator	Description
1	Understanding the Problem	Students to work on problems must first have the initial ability to understand the situation as a basis for determining the strategy to solve the problem.

Number	Indicator	Description
2	Planning a Plan	Students can use the ability to make plans or strategies by choosing the formula to be used through their reasoning in selecting and sorting out which procedure to use.
3	Executing the Plan	Students could do the plans arranged in stages by performing calculations through a predetermined formula.
4	Reviewing Results	Students could review the return results written on the sheet answer by making a conclusion or re-evidence that is useful for checking whether what has been done is correct.

### 3. FINDINGS AND DISCUSSION

Learning digital media comic developed use 4D models. Models consist of 4 stages: step definition, stage design, stage development, and stage dissemination. As for the explanation described as follows:

#### 3.1. Definition Stage

Stage definition conducted start from learning part early, consult with a mathematics teacher at the Assyfa Foundation Learning Center, on activities learning mathematics use method lesson study. Problems found During activity learning include lack of interest in reading to students and lack of interpretation and perception of junior high school students. Junior high school subjects at the Assyfa Learning Center Foundation are students who attend different schools. Some go to public, private, and boarding schools. Students are bored with schools still implementing an online system due to the impact of COVID-19, which limits face-to-face meetings. LKS books and readings are boring to read because they are all in the form of numbers, the color of the book or LKS is dark in color, and students' misunderstanding of what is written makes student learning outcomes low. This is evidenced by the number of complaints from the guardians of students if the teacher reprimands their children because of their low grades. Students say that mathematics is complex. The teacher only gives a link vid e o learning to watch students without being explained or any feedback from the teacher to review the material. The teacher does not understand how to use technology-based media because almost all of their mathematics teachers lack knowledge of technology.

#### Analysis of Teaching Material Needs

They were conducted to obtain information about the type and quality of teaching materials used. At this stage, the researcher conducted unstructured interviews with the seventh-grade mathematics teacher of SMA /MA and researched the desk to obtain this information. Based on discussions about the types and quality of teaching materials used by teachers. Researchers received information that confirmed and involved conventional teachers in class and scheduled lessons; only when they dared to learn did the teacher teach the material on the blackboard while directing a laptop or smartphone—others to video conferencing applications, particularly the zoom meeting application that connects students to other learning places. Students listen to teacher-taught material from printed books from several publishers in their schools via video conferencing applications.

In the current normal condition, the calculation of Pasuruan YALC hours, originally 90 minutes for face-to-face lessons, is reduced to 60 minutes for one hour. Due to reduced class time, delivering information from teachers to students is not optimal. To overcome this problem and achieve learning objectives, teachers use videos made and uploaded via YouTube as teaching materials for students outside class time. Other teachers prepare modules to deliver certain materials. Teachers may be unable

to provide modules for all the material taught due to time and capacity constraints, where one teacher is responsible for teaching at several grade levels. So, for other supports that do not apply modules, teachers only use essential support in the form of printed and digital books. The information obtained by the researcher after conducting desk research on the teacher's design module only contained text, namely the subject title, a brief explanation of the learning material, examples, and practice questions. According to the PMPTK General Manager (in Syahrir & Susilawati, 2015), a module is said to be good if it has the characteristics of independent learning, autonomy, adaptation, and user-friendliness. The criteria for modules that meet the elements of separate teaching include:

According (Astutiningtyas, 2017; Blumenfeld et al., 2020; Ginosyan & Tuzlukova, 2015; Wulandari et al., 2016; Müller & Wulf, 2021; Patri & Heswari, 2021; Prihatin & Oktaviana, 2021) A module is said to be good if it has the characteristics of independent, adaptive, and user-friendly learning. The criteria for modules that meet the elements of separate teaching include: (a) learning objectives are formulated, (b) contain learning materials packaged in small units to facilitate learning as a whole, (c) examples and illustrations that support the discussion of learning materials, (d) practice questions and assignments that support student responses and can measure their level of mastery, (e) contextual problems, (f) simple and communicative language, (g) summary of learning materials, (h) instruments that allow users to make their assessments, (i) feedback, so that users know the level of mastery of the material, and (j) provide references or reference information that supports learning materials and modules, and (k) able to relate learning into the real world. Based on these criteria, it can be seen that the module designed by the teacher has deficiencies in items a, e, g, h, i, j, and k, where one of these deficiencies does not exist because there is no learning goal to be achieved by linking problems to the real world.

In addition, there are many complaints from students regarding the obstacles experienced during learning mathematics, namely: 1) students have difficulty due to shorter learning, this is because the time spent is more used to discuss homework, so that the focus on the material is less, 2) students feel bored and tend to choose not to watch learning videos sent by the teacher, 3) students stated that their guardians felt the impact of the cost overruns used to watch lessons because the quota they had to have access to learning videos was limited, 4) students wanted exciting learning to be available such as books in which there are variations or features that students can choose from. This book not only contains a lengthy article on the material, then some examples, then real reproduced without explanation. Media is also not only distributed as video. It will be easier to reach if the material is not only presented in writing but is equipped with exciting sounds, videos, and animations. With teaching materials, it is hoped that learning activities will be more meaningful for students and achieve the desired learning objectives.

### **Material Analysis**

The material analysis begins with the selection of material that is applied to the derivative of algebraic functions in this study because this material is one of the materials that is difficult for students to master. The basic skills (KD) for algebraic functions are KD 2.1 and 2.2. The description of KD 2.1 and 2.2 is "Recognizing form algebra and its elements" and "Doing operation on shape algebra". Dwiwandira & Tsurayya (2021). The difficulty is marked by the students' failure to solve the problem of the derivative of the given algebraic function.

The research by Dwiwandira & Tsurayya (2021) shows that the material factor is the main reason that hinders students in solving the problem of applying algebra because students do not master the concept of algebra to determine which one is an algebraic concept. Coefficient and which one is a variable. In this study, Asih et al. (2018) found that students had difficulty connecting the problem with other related concepts and making mathematical models of story problems. Most students study mathematics separately; few understand the images or materials' interrelationships. This makes it difficult for them to do math problems. In addition, conditions in the field in general in the mathematics learning process that is carried out emphasize memorizing formulas/concepts. This resulted in students' low ability to work on questions on algebraic topics.



The causes of students having difficulty in solving problems regarding the application of derivatives of algebraic functions were also revealed because students experienced obstacles in the concept of material which contained several things:

1) Understanding the Symbol concept of "equal to ( $=$ )."

The same symbol looks simple, but many students misunderstand the emblem. This can be seen when the teacher gives a problem related to algebra in class XI in the learning process at the ALC Foundation. The students cannot provide the correct answer. For example, when students are given a question to determine the value of  $m$  on the question " $9 + 5 = m + 2$ ". However, students did not have difficulty solving the questions " $9 + 5 = \dots$ " or " $8 \times 6 = \dots$ ".

Several studies (Price, 2004; T. P. Carpenter, M. L. Franke, 2003) stated that students perceive the "equals" symbol ( $=$ ) as "the answer is" or "can be executed" instead of a sign that describes equivalence (equivalence). Correct understanding of the "equals" character is essential for students to understand and symbolize the relationship between numbers. In addition, students who do not understand the "equals" notation tend to have difficulty with algebraic forms (Baker et al., 2011; Godsil C., 2001; Saaroh et al., 2021).

2) Tendency to Use Arithmetic Procedures and Neglect Variables

When students are given the same problem as mentioned above, namely " $9 + m = 4$ " or " $11 - n = 5$ ", students still have difficulties. Students are still confused with the letter " $m$ " or " $n$ ". Students think that these questions cannot be done because numbers (numbers) cannot be added or subtracted by letters. This often happens to students who are new to learning algebra. Interestingly, when the presentations in the questions are presented in different forms such as " $9 + m = 4$ " or " $11 - n = 5$ " it is changed to " $9 + \dots = 4$ " or " $11 - \dots = 5$ ". It seems that students have no difficulty when completing subtraction or addition operations that contain " $+$ " or " $-$ ", but students are confused when the symbol " $+$ " or " $-$ " is replaced with the letter " $m$ " or " $n$ ". This shows that variables such as letters are not easy for students. To overcome these difficulties, we can use arithmetic operations as a starting point for studying algebra. The transition from arithmetic operations to algebraic operations becomes easier. An example is asking students to understand that the letter " $m$ " or " $n$ " has the same place as the symbol " $+$ " or " $-$ ".

Learning difficulties in performing algebraic operations are not only experienced by students who are just learning algebra, but also occur to class XI students at the Pasuruan ALC Foundation by showing that many students cannot perform addition and subtraction operations in algebraic form. These students often omit (release) variables or symbols when performing algebraic operations. Students ignore variables and only focus on addition or subtraction operations. An example is the problem " $(3m + 2) + (4m + 2)$ ". Some possible incorrect answers due to variable neglect are " $(6m) + (2m) = 8m$ ", " $8$ ", or " $8mm$ ". Several studies (Drijvers et al., 2010; Maclachlan & Oosterlee, 2007; Saundarajan et al., 2020; Shitrit et al., 2011) state this kind of thing, it can show how important it is to understand the concept of variables.

### Student Characteristics

Student characteristics are analyzed to know the features of students who will use the developed product if the product is an application to make ethnomathematics textbooks. This is done so that the application of making this ethnomathematics-based learning book is appropriate and appropriate to facilitate learning for students. Characteristics of students analyzed include background knowledge, learning experience, and cognitive development obtained through field observations. Based on the statements of the seventh-grade students of SM P at YALC Pasuruan, it was found that the ages of the seventh graders were between 13 and 14 years old. At this age, students tend to take advantage of technological developments in learning activities, especially in doing the tasks given by the teacher. Grade VII students generally can access the internet using a computer, laptop, or smartphone and have been trusted by their parents to access information independently through these devices. Based on data obtained by researchers through field observations, all students have devices in the form of laptops,

computers, or smartphones that they can use to get educational book materials other than the printed books they usually use, such as e-learning books which are widely introduced on internet sites. Seeing the status of class VII SM P students at YALC Pasuruan who already have devices in the form of laptops, computers, or smartphones and the ability to use these devices to access the internet, learning resources for algebraic function derivative application materials in the form of ethnomathematics-based book creator applications as teaching materials are deemed suitable to be developed to facilitate student learning.

### 3.2. Design Stage

This stage is divided into two parts: theoretical design and product design. In the visionary design, it is explained that "lontong Sayur" is part of ethnomathematics, while ethnomathematics is part of practical learning, which is expected to improve understanding of concepts and design evaluation questions based on indicators of conceptual understanding. Product design, on the other hand, includes media selection, scene preparation, and material illustration design.

After determining the theoretical design, manufacture an ethnomathematics e-book with the title "Ethnomathematics E-book: Algebra in tradition syawalan rice cake vegetables" using stages, make the cover, page title, preface, table of contents, instructions use, Basic Competencies and Indicators, Objectives Learning, materials learning in the form of text and inserted a tutorial video containing indicator in strengthening understanding draft student with link content ethnomathematics, activities learning, practice questions/quizzes, references, and teams author.

### 3.3. Design Stage

At this stage, the manufacturing process product initial and media validation on design is done by lecturer media, materials, and cultural experts. Following are the results product early.

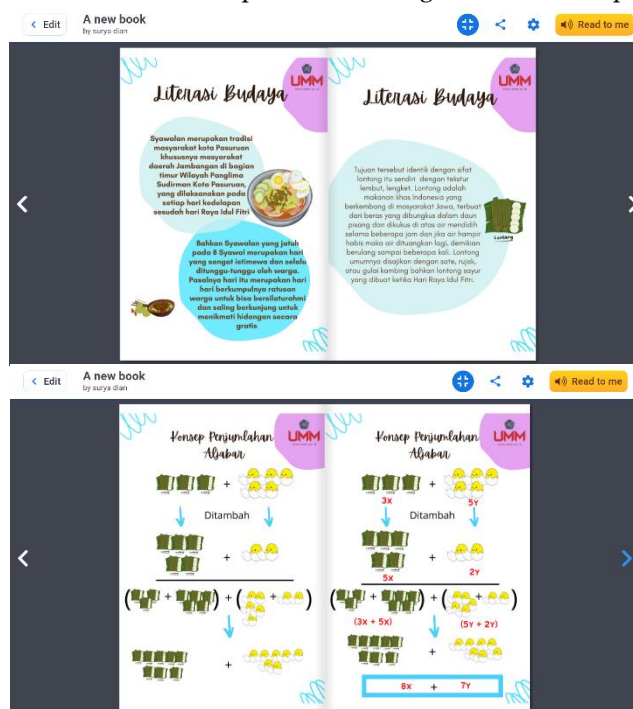


Figure 3. Activity to introduce the concept of algebraic addition

Validation experts consist of validation expert materials and media experts. Validation result materials and experts acquired culture from The two validators are presented in Tables 7 and 8. While

results of media validation were carried out by two validators (two expert media experts). Validators do investigation with fill in sheet verification Theory use Likert scale four options (4 = very good, 3 = good, 2 = normal, 1 = little) are presented in Table 9.

Table 7 Results of Validation Data Analysis Theory

Expert	Aspect	Average score validation	Information
Theory	Presentation	3,61	Very good
	Appropriateness	3,83	Very good
	Language and writing	3,75	Very good
	<b>Total Average Score</b>	<b>3,73</b>	<b>Very good</b>

Table 8 Results of Validation Data Analysis Culture

Expert	Component	Average score Validation	Information
Culture	History of Shawwal Meaning rice cake vegetables, Ingredients maker rice cake vegetable	3,86	Very good

Overall, the overall average validation material and culture in the table above are 3.73 and 3.86, which are very useful (very valid) categories. In short, ethnomathematics e-book media contain quality and decent material for testing.

Table 9. Results of Media Validation Data Analysis

Corner look	Average	Information
Contents	3.82	Very valid
Language	3.57	Very valid
Presentation	3.84	Very valid
Appearance	3.65	Very valid
Amount score average	3.72	Very Valid

From the table above, the average total media validation is 3.72 with the excellent category (very valid), which means ethnomathematics e-book media is already worthy of testing.

After Revising by suggestions and criticism from the validator, the stage next is the trial stage. Trial on developed products, namely ethnomathematics e-book media carried out at this. The trial product includes media trials with learning based on design implementation learning made for 25 students in class VII at YALC Pasuruan. Response data student on ethnomathematics e-book media in tradition syawalan "lontong sayur" based on filled out questionnaire based on confidence students.

Table 10. Analysis results Questionnaire response student

Number	Aspect	Average	Category
1	Usefulness	3.43	Practical
2	Convenience	3.65	Very Practical
3	Appearance	3.74	Very Practical
4	attractiveness	3.47	Practical
5	Ethnomathematics	3.81	Very Practical

Based on Table 10, the calculation produces a score end practicality of 3.62. According to (Mauluah & Marsigit, 2019), ethnomathematics e-book media in traditional syawalan "lontong sayur" excellent practicality score end bigger of 3.50, which is 3.62. Ethnomathematics e-book media about tradition syawalan "lontong sayur" "easy" used, with clear language, illustrations, and easy material understood, and expand knowledge student about tradition syawalan "lontong vegetables". This is seen in the average obtained of 3.65 in category practicality good media with score practicality tall easy used and valuable for students.

Sell other than knowing response student after using media is with knowing results study student after using that medium. Test results meant for learning ethnomathematics e-book media efficacy in traditional syawalan "lontong sayur". Stage this occurs after the ethnomathematics e-book media tradition syawalan "lontong sayur" is said to be valid for tested with through Step revision with giving question test understanding draft. Test results understanding draft students are shown in Table 11.

Table 11. Test results understanding draft

Indicator	Average Percentage	Category
Understanding the Problem	90%	Very Good
Planning a Plan	84%	Very Good
Executing the Plan	80%	Well
Reviewing Results	75%	Well
Average Score	82%	Very Good

Based on these data, the results test understanding draft student after learning ethnomathematics e-book media on tradition syawalan "lontong sayur" said complete and improve understanding draft because all student get points more many than the value obtained. KKM who have determined which is 73 with the presentation completeness study 82%. After the data is collected, the following analysis to produce results end. Validity, practicality, and effectiveness of ethnomathematics e-book media in traditional syawalan "lontong sayur" used to evaluate eligibility. Based on the analysis of validity tests conducted by ( media experts, experts materials, and experts' culture ), a practical test is carried out by students.

### 3.4. Deployment Stage

The product results are an ethnomathematics e-book in traditional syawalan "lontong sayur" to improve comprehension ability students are disseminated online to students by sharing links to them which will then be uploaded on the web can be used by other students and can be used as interactive teaching materials as a solution to student boredom in learning.

## 4. CONCLUSION

Based on results research and discussion, it determined that the developed ethnomathematical e-book media in tradition *syawalan* "lontong sayur" for increase understanding draft middle school students about operation algebra worthy also used to enhancement understanding draft student because of Fulfill valid, practical, and effective criteria. Based on validity test analysis by ( media experts, experts materials, and experts culture ), practicality test through response student gets average score 3.62 with category Excellent practicality, effectiveness test, and analysis ability understanding draft student through test understanding draft completeness by 82 percent. Study this only limited in ability experience student hope for study next could conduct in capacity mathematical other students likeability reasoning, connection, thinking critical and so on. In an election, subjects can also be chosen based on criteria that can be customized with conditions and use the culture of each area.

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