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Android Based Material to Teach Early Reading for Primary Students using Construct 2 Apps

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ABSTRACT

Android based teaching material can facilitate students and teacher in the inside and outside classroom learning using smartphone. This study aims to investigate the ways in utilizing construct 2 apps to create android based material to teach early reading for primary students. This study is qualitative research in form of explorative case study which includes students in private and public primary schools at five regencies of Indonesia. The research data is collected using questionnaire and interview. It is analyzed using content analysis. The results of study show that android based material of early reading can be created by utilizing three steps. The conclusion of this study is that android based material of early reading is firstly created by investigating the need of material for primary students. Secondly, it creates the concepts of materials by preparing the material compositions, creating material order, and creating teaching material tools. Thirdly, construct 2 apps is utilized to make the teaching materials based on the concepts by creating parts of learning guide, invitation for praying, materials, evaluation, and games.

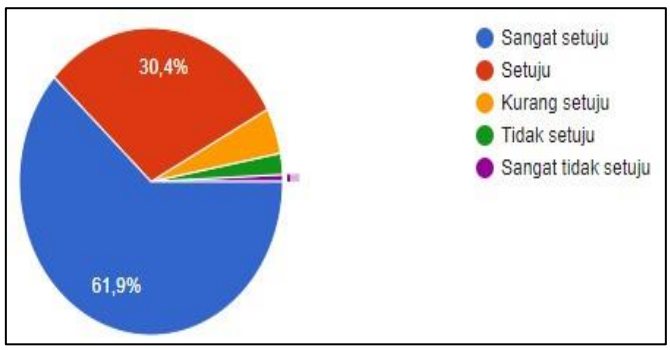
1. INTRODUCTION

Teaching innovation is one way for optimizing students' competences [1] by supporting the adaptive and individual learning process based on the subject needs [2]. As stated by Hasanudin and Fitrianingsih in the reading subject, it is able to utilize the combination of teaching materials to help students in developing their reading skill [3] by using three main methods namely integrated learning system, reading management program, and reading written media [4]. As stated by Hsu et al. in reading written media, teacher can provide the mechanism of recommended reading such as articles as teaching media [5]. Therefore, teaching media is an innovation that can support teaching and learning process especially to develop reading skill using it.

Various teaching media can be created and utilized by teacher in the teaching and learning process. One of teaching media is video, because it is able to help students in thinking critically and logically about what they see and listen [6]. It can also in form of videos uploaded on YouTube which can support students in studying material easily [7]. Moreover, teaching media can be designed by compiling pictures and verbal teaching media, so it directs to higher material teaching [8]. As stated by Leedham and Cai there is also teaching media in forms of textbook and reference book (including table of text model) which can be utilized in the classroom learning [9]. Textbook is written, so it can be read [10].

Teaching media through reading is mostly implemented in the primary school to deliver daily materials. Lewin in Kao et al. [11] explains that story book as teaching media is generally used by primary teacher with the aim to improve students motivation in reading. Motivation for reading story book with certain genre drives to make teaching materials are divided into narrative books (novel or fiction) and information books (science or history) [12]. Moreover, teacher can utilize teaching materials using storytelling method to improve motivation, understanding, and skill of primary students in reading [13], because it has been tested to have a close relationship with students' reading attitudes [14]. As stated by Yuanta it proves that most learning in primary schools uses teaching materials in form of printed books, so the teaching and learning process tends to be passive and boring [15].

Based on those studies, it can be known that the implementation of teaching material innovation in primary school has not been optimal because it cannot follow the current technological development. It can be viewed from the lack of technology based teaching materials, such as digital teaching materials via internet or applications.



The translation: Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Figure 1. Students' response on the teaching material development of reading subject

Less teaching materials cause the teacher's material to be ineffective [16] and lead to learning loss. It is a condition in which learning opportunities are lost because there is a lack of interaction in the teaching and learning process [17]. Therefore, the presence of technology in designing teaching materials is important, so students do not have difficulties in learning [18]. One of technology based teaching materials which is able to facilitate the learning interaction process is the application [19] becuse it can be intalled easily in the android smartphones [20].

Furthermore, the result of survei on 270 first grade students of primary schools especially in five regencies of Indonesia reveals that 61,9% of them are agree that teaching material of reading subject is developed to fulfill the science and technology development. It can be viewed in the following figure.

In Figure 1, it can be viewed that 61,9% of students (167 persons) are strongly agree. 30,4% of students (82 persons) are agree. 4,8% of students (13 persons) are neither agree nor disagree. 2,2% of students (6 persons) are disagree. 0,7% of students (2 persons) are strongly disagree. In other words, more than 50% of students are agree when the teaching material of reading is developed.

Based on the previous study and observation results on primary students in 5 regencies of Indonesia, the researchers are eager to investigate the ways in creating the teaching material of reading which follows the science and technology development. It is created using Construct 2 apps, so it produces a teaching material which can be utilized on Android smartphones.

2. LITERATURE REVIEW

2.1 Early reading material in primary school

As stated by Prastowo there are various subjects obtained by primary students such as civics, mathematics, science, history, and language education [21]. Language education consists of listening, speaking, writing, and reading [22]. As stated by Syelviana and Hariani in language education, the *KI* and *KD* on the curriculum of first grade are focused on the ways to make students are interested to read [23]. Therefore, various subjects have been introduced in primary school level including language learning in which reading is the main focus in it.

Reading subject in the first grade student are often to utilize the process of early reading [24]. It is started from introducing alphabets, words, and decoding language sounds [25] in several stages to make students understand the meanings of words and sentences [26]. The experience obtained in early reading leads to be the basis of literacy development for students [27]. It also relates to students' memory absorption verbally [28]. It can be concluded that the process of early reading in first grade of primary school consists of several stages which aim to make students to be able to understand the meaning of texts. It is very important for students because it becomes a basis of literacy development and students' memory absorption in reading.

2.2 The construct 2 apps

As stated by Dukut, construct 2 is an PC application platform to design simple application [29] in form of games which can be played on windows or android. It can be downloaded in PlayStore when the application has been sold [30]. The Construct 2 apps becomes interesting website because the users are able to browse various platforms freely without any rejection [31] so the application development is fast without certain code for everyone who wants to build game [32]. As stated by Yustin et al. the other advantage is that this apps has 70 visual effects and 20 object behavior that is useful to add texts, musics, data game setting, etc [33]. It can be known that construct 2 apps is a platform of application creator with many advantages for users because they are able to build game freely.

A study Apriyanto and Lasodi [34] reveals that the use of construct 2 apps can be utilized to create game with certain genre that can be played in all online website browsers. Other study reveals that construct 2 apps can be used to make educational games which has been validated to be appropriate based on its basic performance and materials by the experts [35]. It can be used as teaching material or alternative learning media to improve students' skills [33]. Based on previous researchs, the use of construct 2 apps can create educational game which help the teaching and learning process.

3. METHODOLOGY

3.1 Research design

This study is qualitative research in form of explorative case study. In this study, the researchers observe and summarize students' responses in primary schools at five regencies of Indonesia which are related to the needs of Android based teaching material for early reading subject. Furthermore, the researchers utilize construct 2 Apps to create android based teaching material of early reading starts from 1) need analysis of teaching material, 2) create the concept of teaching material, and 3) create the teaching material based on the concept [36].

3.2 Population and sample

Population of this study are the students of private and public schools at Bojonegoro regency, Tuban regency, Lamongan regency, Jombang regency, and Mojokerto regency. The samples are taken using simple random sampling technique which represents the population. It can be viewed in Table 1.

Table 1. Samples of study

Regency	Total of samples
Bojonegoro	77
Tuban	51
Lamongan	55
Jombang	48
Mojokerto	39
Total	**270**

3.3 Instruments

Research instruments are questionnaire and interview guideline. The composition of questionnaire is based on the instrument of students' need analysis is developed based on the theory of BSNP [37]. It can be viewed in following Table 2.

The interview guideline is compiled to guide the researchers

in providing questions for participants. It is based on the questions of questionnaire.

3.4 Data collection

Technique in collecting data is questionnaire and interview. The questionnaire is shared using google forms. Because the participants are children, the researchers have to read the questionnaire and help them to input their answers on google forms. The data obtained is tabulated and processed using descriptive statistics.

Table 2. Instruments of students' need analysis

No.	Aspect	Indicators	Total of items
1.	Need of teaching material	Availability of teaching media for early reading at primary school	1
2.	Need of material	Accuracy of material	3
		Accommodate the life skill	1
3.	Need of material presentation	Presentation technique	2
		Material presentation support	1

3.5 Analyzing of data

The data is analyzed using content analysis. Neuendorf explains that the archive mode messages are described in content analysis, in this case, the researchers have to conclude properly and carefully [38]. As stated by Miles and Huberman in this study, content analysis adopts the theory developed that consists of 1) data reduction, 2) data presentation, and 3) conclusion drawing / verification [39].

In the data reduction, the researchers record the percentage of answers and number of students who answer strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree for each item. In the data presentation, the researchers present the data which show the highest percentage of each item and present four data that really answer the students' need analysis in primary school. In the stage of conclusion drawing/verification, the researchers make a conclusion of students' responses on the android based teaching material of early reading. This initial conclusion is verified by interviewing four students. The interview results are supported with strong reasons, so the data is consistent with the answer of questionnaire. It can be said that their answers are the forms of data verification on questionnaire. Therefore, the researchers can write the credible final conclusion.

4. FINDINGS AND DISCUSSION

Android based teaching material of early reading for primary students using Construct 2 Apps is started from 1) need analysis of teaching material, 2) design the concept of teaching material, and 3) develop the teaching material based on the design of concept. Those stages are explained as follows.

4.1 Need analysis of teaching material for early reading

The results of need analysis are taken from the data of questionnaire which is shared using google forms. It has been answered by the samples. To obtain the validity of data, the researchers also conduct interview to the students. The data can be explained as follows.

The first question stated in the questionnaire is related to the students' responses on teaching material which can be accessed using smartphones. There are 42,2% of students (114 persons) who strongly agree when teaching material of early reading can be accessed using smartphones. It can be viewed in the following Figure 2.

Based on the responses of the first question, the researchers interview the student TSA. The researchers ask about 'Why do you choose strongly agree to the teaching material which can be accessed using smartphone?' The result of interview with student TSA reveals that she is a student of public primary school in Indonesia who says that she always interacts using smartphone. Moreover, in the covid-19 pandemic, she got assignments and sent it using smartphone. She also found materials from internet websites. Therefore, she strongly agrees when the teaching material of early reading is in form of application which can be accessed using smartphone. In this case, she can study at home.

The presence of android based teaching material will greatly facilitate students to learn comfortably, so the learning will be liked and effective. As stated by Liu et al. the teaching material that can be accessed on smartphone is a way to teach in traditional class because it drives students to participate in physical and virtual learning [40]. It is supported by the presence of smartphone which presents more innovations, so it provides a sense of comfort, ease [41], and improves students' competences effectively [42].

The second question stated in the questionnaire is related to the students' responses on content of teaching material. The 128 students (47,4%) strongly agree when the teaching material of early reading consists of the materials about a) introducing alphabets, b) reading consonant and vowel letters, c) reading syllables, d) reading words, e) reading sentences, and f) reading narrative and informative texts. It can be viewed in the following Figure 3.

Based on the responses of the second question, the researchers interview the student AH. The researchers ask about 'Why do you choose strongly agree to the second question?' The result of interview with student AH reveals that he is a student of Islamic private primary school in Indonesia who says that he likes to read. He is able to read because he learns about alphabets and its sounds, then he recognizes words. At this time, he is skilled at reading short story.

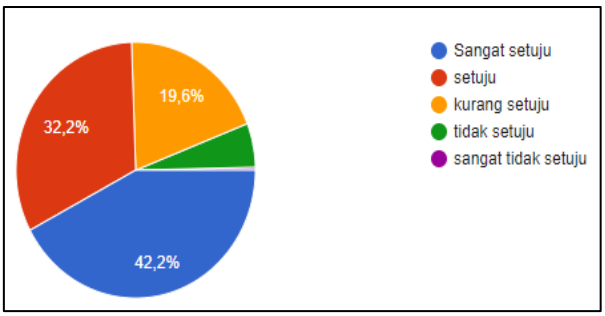
The composition of materials is very effective. It begins with introduction of alphabets to being able to read narrative texts. It creates coherent instructions. There are several directions in reading skills, starting from recognizing alphabets, distinguishing phonemes (language sounds), reading simple words [43] and sentences as a basis of reading text [44]. As stated by Trezek and Wang, skill in using aspects of alphabets, words, phonemes, etc will be identification for reader's remembering process [45].

The third question stated in the questionnaire is related to the students' responses on the material which contains pictures, sounds, and animations. The 178 students (65%) strongly agree when the material of early reading contains pictures, sounds, and animations. It can be viewed in the following Figure 4.

Based on the responses of the third question, the researchers interview the student AUM. The researchers ask about 'Why do you choose strongly agree that the material of early reading contains pictures, sounds, and animation?' The result of interview with student AUM reveals that he is a student of public primary school in Indonesia who says that he is

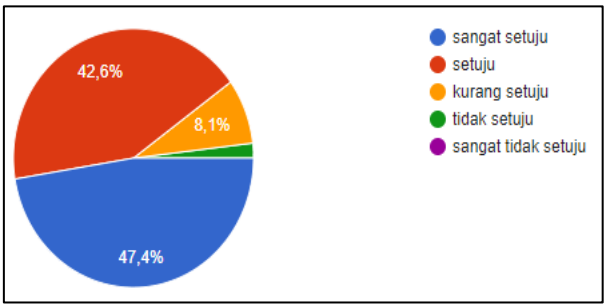
interested in reading text with pictures. He is very happy when educational game about reading is shown. Moreover, he likes to play game on his smartphone at home. He is interested in its sounds and movements. It makes him excited to play.

Texts with pictures, sounds, and animations will be interesting point for primary students to create effective learning. The presence of pictures, sounds, and animations is no longer impossible in digital era, considering the development of technology [46]. It is able to help teacher in producing media or teaching material which is appropriate with primary students' characters that are easily bored and more interested in new things [47]. Ponza et al. in Panggabean et al. [48] state that pictures, sounds, and animations in the textbook will stimulate primary students to study.



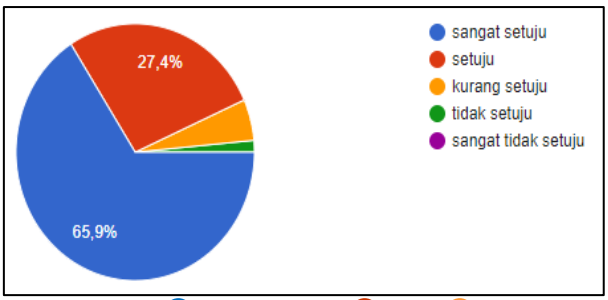
The translation: Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Figure 2. Students' responses on teaching material which can be accessed using smartphones



The translation: Strongly agree Agree Neither agree nor disagree Disagree Strongly Disagree

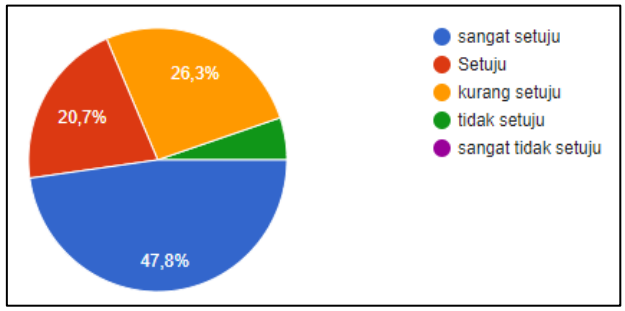
Figure 3. Students' responses on the material of teaching



The translation: Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Figure 4. Students' responses on the material of early reading which contains pictures, sounds, and animations

The fourth question stated in the questionnaire is related to the students' responses on the teaching material which is set in portrait form. The 129 students (47,8%) strongly agree when the teaching material of early reading is set in portrait form. It can be viewed in the following Figure 5.



The translation: Strongly agree Agree Neither agree nor disagree Disagree Strongly disagree

Figure 5. Students' responses on portrait form of teaching material

Based on the responses of the fourth question, the researchers interview the student AF. The researchers ask about 'Why do you choose strongly agree when the teaching material is set in portrait form?' The result of interview with student AF reveals that she is a student of public school in Indonesia who says that she is used to using her mother's smartphone in portrait/standing position. In her opinion, it is comfortable and easier to access the menus.

The screen display in portrait position is liked by children. It is also effective because it tends to be more comfortable to operate. As stated by Suyantohadi the portrait screen makes the users to be more flexible to see the screen display [49], so the students will be more interested the application with portrait position [50]. Furthermore, the interface display in different page on portrait screen looks normal to be operated [51].

4.2 The concept of teaching material

The concept of android based teaching material in early reading subject is started by:

4.2.1 Preparing the material compositions

The material composition consists of sounds, voices, animations which are adapted to the students' characters in primary school. It can be viewed in the following Figure 6.

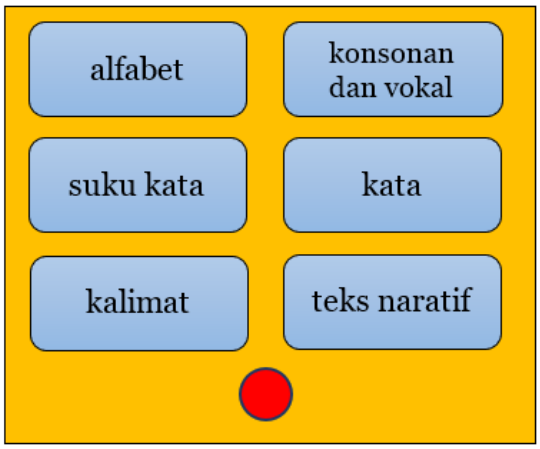
(a) (b)

Figure 6. The design of pictures for teaching material
Source: Researcher's document: (a) The picture of *Kayangan Api*; (b) the picture of *Samin* Tribe

Those pictures are local wisdom of Bojonegoro regency in Indonesia which have been visualized in cartoon. Picture (a) can be used as the material of syllables. The syllable which can be made based on the picture is *kayangan api*. Picture (b) can be used as the material of reading sentences. The sentence which can be made based on the picture is *Saya mengenal ajaran Suku Samin* [I know the tradition of *Samin* tribe].

4.2.2 Creating material order

The material order made by researchers is based on the basic competence of the curriculum which is started from the easiest to the most difficult material as shown in Figure 7.



The translation: alphabets, syllables, sentences, consonant and vowel, words, narrative text

Figure 7. Design of homepage display

The menus on the teaching material are chosen by users randomly when they use it in early reading subject.

4.2.3 Creating android based teaching material tools

The next step is the researchers design the android based teaching material tools. In this step, the researchers use construct 2 apps. It can be downloaded on https://www.construct.net/en/construct-2/download and installed in computer. The homepage of construct 2 apps can be viewed as in Figure 8.

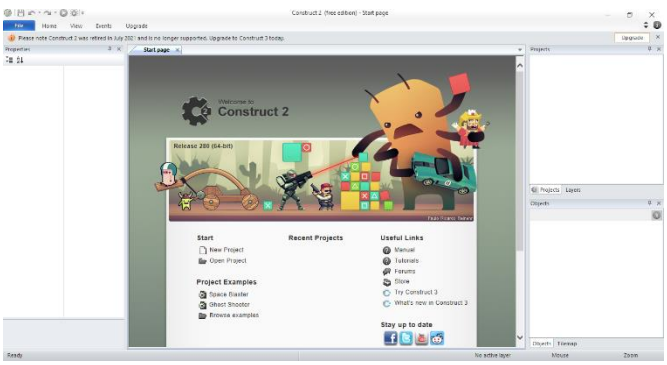


Figure 8. Main menu of construct 2 apps

In the homepage of construct 2 apps, there are menus which are explained in Table 3.

The three steps are the main part in designing the concept of android based teaching material in early reading subject. The concept is usually used in the science [52] which has a function as cognitive tool to deliver information which drives students to understand and improve their critical thinking [53]. Hung et al. in Liu and Lee [54] explain the concept as a tool to evaluate learning because it shows the relationship between knowledge obtained and understood effectively by students. In other word, it is a cognitive tool to evaluate the learning process, so it can support the students to understand and think effectively.

Table 3. Menus of construct 2 apps

Menu	Branch of menu	Function
Start	New project	To make new project
	Open project	To open saved project
Project examples	Space blaster	The example of project game with space theme
	Ghost shooter	The example of project game with monster theme
	Browse examples	To find other example of game
Recent projects		To see the opened and used projects
Useful links	Manual	To open description about construct 2
	Tutorials	To find explanation or basic tutorial for construct 2
	Forums	To open discussion on construct 2
	Store	To find asset game in construct 2
	Try construct 3	Let the developer to upgrade the software
	What's new in construct 3	To know the update of construct 3
New to construct 2?		To explain that construct 2 is mostly used by beginner
Upgrade to construct 3		To upgrade the software

4.3 Teaching material development based on the concept

The development of android based teaching material for early reading subject is inseparable from the concept design. However, in the stages of development, the researchers convey overall flow of the teaching material development. The main parts which need to be developed are as follows:

4.3.1 Creating the part of study guide

The development of study guide part is very important in the android based teaching material of early reading to help the users (students, parents, teachers, or other users) to utilize it easily. The main point of this development is as a technical guidance for user to be successful in mastering the material of early reading.

4.3.2 Creating the part of invitation to pray

The development of invitation to pray is very important because it instills students' characters. The invitation to pray is in form of sentence which reminds the user to pray before conducting activities. The sentence is "*Ayo berdoa sesuai kepercayaan masing-masing ya*!" [Let's pray based on our religion!].

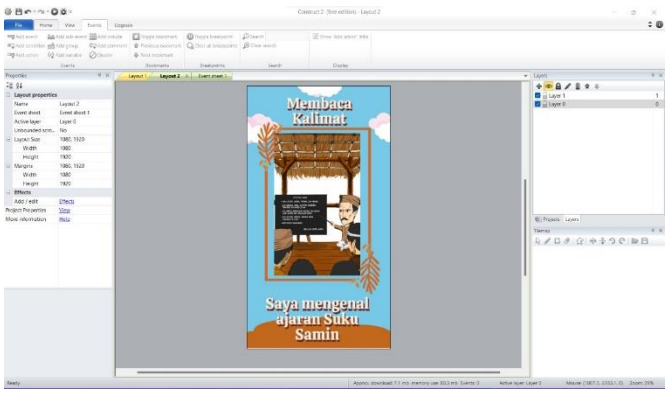
4.3.3 Creating the part of material

The development of material is very important because it is adjusted with the basic competence in the first grade. In the material, there are menus about a) recognizing alphabets, b) reading consonant and vowel sounds, c) reading syllables, d) reading words, e) reading sentences, and f) reading narrative and informational texts. Those materials support primary students to have knowledge and competence. The display

menu of material part has been developed. It can be viewed in Figure 9.

Figure 9. Main menu of early reading material

One of materials in reading sentences can be viewed in the following Figure 10.



The translation: *Saya mengenal ajaran Suku Samin [*I know the tradition of *Samin* tribe]

Figure 10. One of menu in reading sentence

4.3.4 Creating the part of evaluation

The development of evaluation part is used to measure students' knowledge and competences after using android based teaching material of early reading subject. This development is designed in form of multiple choices which are interesting because it contains pictures and animations.

4.3.5 Creating the part of game

The development of game is used to educate by playing game. Moreover, it helps students get rid of boredom after learning to read. The developed game is inseparable from reading material. One of games which is developed is finding conconant and vowel sounds.

All developments in this part are conducted using construct 2 apps. In a study, construct 2 apps can design the application which is tested using alpha and beta tests. Alpha test shows that the application operates well. Beta test shows that the application is able to interest and provide facility for students to learn [55] and it can be installed and implemented in smartphones [56]. A study by Rohman [57] reveals the success to use construct 2 apps to program *qirā'* learning media or in Indonesian language, it is mostly used to read holy books. Therefore, the game development using construct 2 apps is said to be appropriate because of the results of previous studies.

5. CONCLUSION

The conclusion of this study is that android based teaching media of early reading is started by finding students' needs of teaching media in five regencies at Indonesia. The result of need analysis reveals that most of students choose the answer 'strongly agree' for each item of questions. Furthermore, it creates the concept of teaching material by preparing the material composition, creating material order, and designing teaching material tools. Moreover, construct 2 apps is utilized to create android based teaching material which is started by creating the parts of study guide, invitation to pray, material, evaluation, and games.

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