Quizizz's Augmented Reality (AR) Based Mathematics Digital Pocketbook Design Using GOLD (Guided, Organizing, Leaflet, Discovery) Learning Model

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Abstract

This research was conducted with the aim of meeting the needs of students in learning in the 21st century, where both students and educators are required to have good skills in utilizing technology in the learning process, especially when conducting distance education. This study aims to produce a digital pocket book based on Augmented Reality (AR) assisted by quizizz using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model. This research is a development research that uses 4-D models (Four-D Models). Which consists of 4 stages of development, namely, the definition stage (define), the planning stage (Design), the development stage (develop), and the dissemination stage (Disseminate). The results of this study indicate that the product produces a useful pocket book. With a pocket book quality level based on 3 criteria, namely: valid and practical. From the research results obtained: 1) the percentage of pocket book validity from material experts 88% (very valid) and from design experts 87.6% (very valid), 2) the percentage of pocket book practicality by educators 88.75% (very practical) and by students 88, 8% (very practical). This research is still limited to testing the validity and practicality of digital pocket book.

Keywords: *Math Digital Pocket Book; Augmented Reality; Quizizz; GOLD Learning Model.*

Abstrak

Penelitian ini dilakukan dengan tujuan untuk memenuhi kebutuhan peserta didik dalam pembelajaran di abad 21, dimana peserta didik maupun pendidik dituntut memiliki keterampilan yang baik dalam memanfaatkan teknologi dalam proses pembelajaran khususnya pada saat melakukan pendidikan jarak jauh. Penelitian ini bertujuan menghasilkan buku saku digital berbasis *Augmented Reality* (AR) berbantuan quizizz dengan menggunakan model pembelajaran GOLD (*Guided, Organizing, Leaflet, Discovery*). Penelitian ini merupakan penelitian pengembangan yang menggunakan model 4-D (*Four-D Models*). tahap pengembangan yaitu, tahap pendefinisian (*define*), tahap perencanaan (*Design*), tahap pengembangan (*develop*), dan tahap diseminasi (*Disseminate*). Hasil penelitian ini menunjukkan bahwa produk tersebut menghasilkan buku saku yang bermanfaat. Dengan tingkat kualitas buku saku berdasarkan 3 kriteria yaitu: valid dan praktis. Dari hasil penelitian diperoleh: 1) persentase validitas buku saku dari ahli materi 88% (sangat valid) dan dari ahli desain 87,6%

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(sangat valid), 2) persentase kepraktisan buku saku oleh pendidik 88,75% (sangat praktis) dan oleh siswa 88,8% (sangat praktis). Dalam penelitian ini masih terbatas untuk menguji validitas dan praktikalitas dari buku saku digital.

Kata Kunci: *Buku Saku Digital Matematika; Augmented Reality; Quizizz; Model Pembelajaran GOLD.*

INTRODUCTION

Teaching materials have become one of the main aspects supporting the success of a learning process. Especially in mathematics learning. The use of teaching materials is one of the solutions that can be done so that students have mathematical abilities. This is in line with research conducted by Rahmawati, et al (2014) which states that there is a significant influence between the use of teaching materials on learning outcomes of 65.7%. Nowadays, Distance Education is a system for conveying knowledge through technology to support the teaching and learning process that should occur in the classroom. This is stated in Circular Letter No. 4 of 2020 concerning the Implementation of Education Policies in the Emergency Period of the Spread of Corona Virus Disease (Covid-19). The main point of the instruction is the transfer of the school learning base from offline-based learning to online-based learning. With online learning, one of the tools that students and educators are sure to use is the use of mobile devices or mobile phones. Therefore, one of the innovations that educators can make in effective learning in this new normal era is to design subject matter that is easier to understand, short, clear, and easy to carry and can be used at any time.

Pocket book is one of the teaching materials that can be used in the learning process. However, because the current education system is based online, pocket books can be adapted in a digital version and will be easier to use and more practical. The function and purpose of a digital pocketbook is as an alternative medium for the use of technology, which is used to learn a science, material, knowledge, and insights sourced from a book. Practically speaking, this digital pocketbook can make students easy in the learning process and userfriendly, which is easy to use in its operation, practical to use

This is reinforced by the opinion of Dewi, W.A.F (2020) where online / distance learning provides a new thing for all parties, especially in the case of teachers changing learning that was originally offline to online. So learning in the present can provide a new variety. In addition, Widodo and Wiyatmo (2017) also stated that the use of digital pocket books can increase the interest in learning students from all levels of education. So that digital pocketbooks are feasible and very suitable for use in online learning.

A teaching material is considered incomplete if it does not contain learning media in it. One of the technology-based learning media suitable for online learning is Augmented reality. Augmented reality is a technology that can visualize two-dimensional or three-dimensional virtual objects into the real world in the form of three dimensions. The success of Augmented reality-based learning media in education has been proven by Akcayir et al., (2016) where Augmented Reality is believed to be able to encourage the development process and quality of science learning and science literacy even in mathematics learning.

In addition to teaching materials or learning media, learning evaluation is one of the main contexts in a teaching material. For this reason, in getting around online learning, one of the applications that can be used in the process of evaluating learning outcomes is the application of Quizizz. According to Aini (2019) the quizizz application is an online application that can be used and developed as a learning medium both at all levels and all subjects. In addition, the quizizz application has many advantages for educators, one of which is that it can make an analysis of question items with reports submitted in sufficient detail, where the correct or false answers of each participant will be reported and can be downloaded in excel form, as well as the percentage of quiziz achievement.

The success of applying Quizizz in the process of evaluating learning outcomes has been proven by Noor (2020) in his research, namely there is an increase in learning outcomes with an average percentage of completion of 20%. This can happen because evaluation using quizizz is very interesting and fun so that students are motivated by the learning material. Based on the above presentation, it is thus necessary to develop teaching materials in the form of a

digital pocketbook of mathematics based on augmented reality (AR) and quizizz. The learning model that will be raised in this mathematics digital pocketbook is the GOLD (Guided, Organizing, Leaflet, Discovery) learning model.

The GOLD learning model is one of the learning models used to develop student participation skills in the learning process. According to Nur, Aisah, et al (2018: 233) stated that "The GOLD learning model is the result of combining the steps of the Guided Discovery learning model with Organizing and Leaflet learning media. The GOLD learning model is one of the learning models used to develop students' participation skills in the learning process." Thus the GOLD learning model is designed so that when applied it can help students participate more in the learning process so as to create effective learning. From the results of research by Aisyah Nur et al., (2019) in their research, this research revealed that there was an increase in students' analogy abilities in learning after the application of the GOLD learning model. So that with the design of digital pocketbooks using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model and utilizing Augmented Reality technology in mathematics learning with the application of quizizz is able to attract students, facilitate students to better master the material, and create new innovations in learning so as to create interesting, varied, and effective learning.

RESEARCH METHODS

This research includes Research and Development (R&D) research. Where the purpose of R&D research is to develop and validate products that can be used in the field of education. The development model used uses a 4-D (four-D Models) model. According to Thiagarajan, Semmel and Semmel (Trianto, 2014) This 4-D model consists of 4 stages of development, namely the defining stage (define), the planning stage (Design), the development stage (develop), and the dissemination stage (Disseminate). In this study, the first year was only carried out in the limited dissemination stage. But for the following year, with the isbn from this pocketbook so that it can be published and spread widely and credibly.
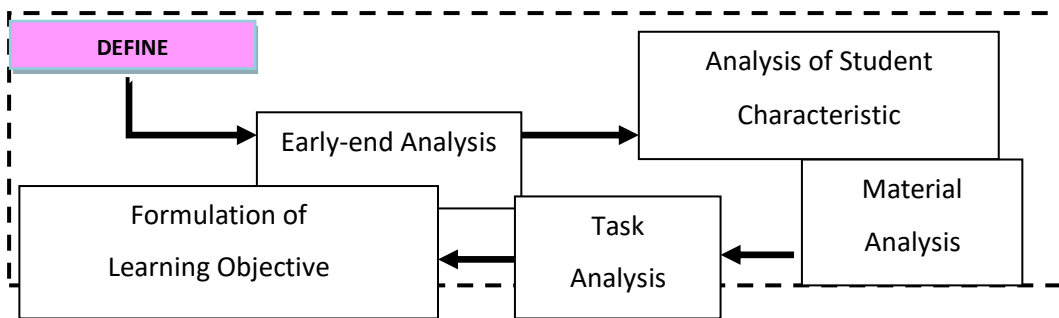
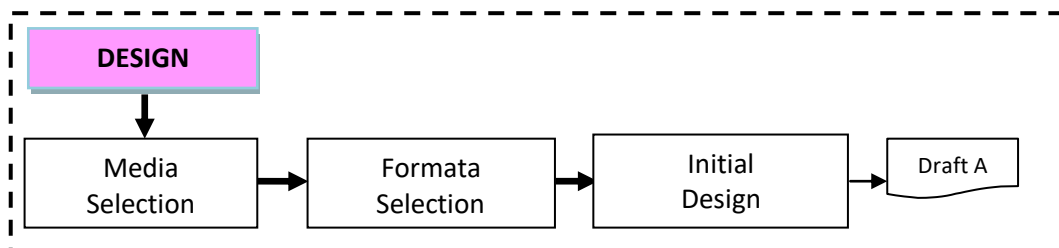**Figure 1. Define Phase on the 4-D Development Model**
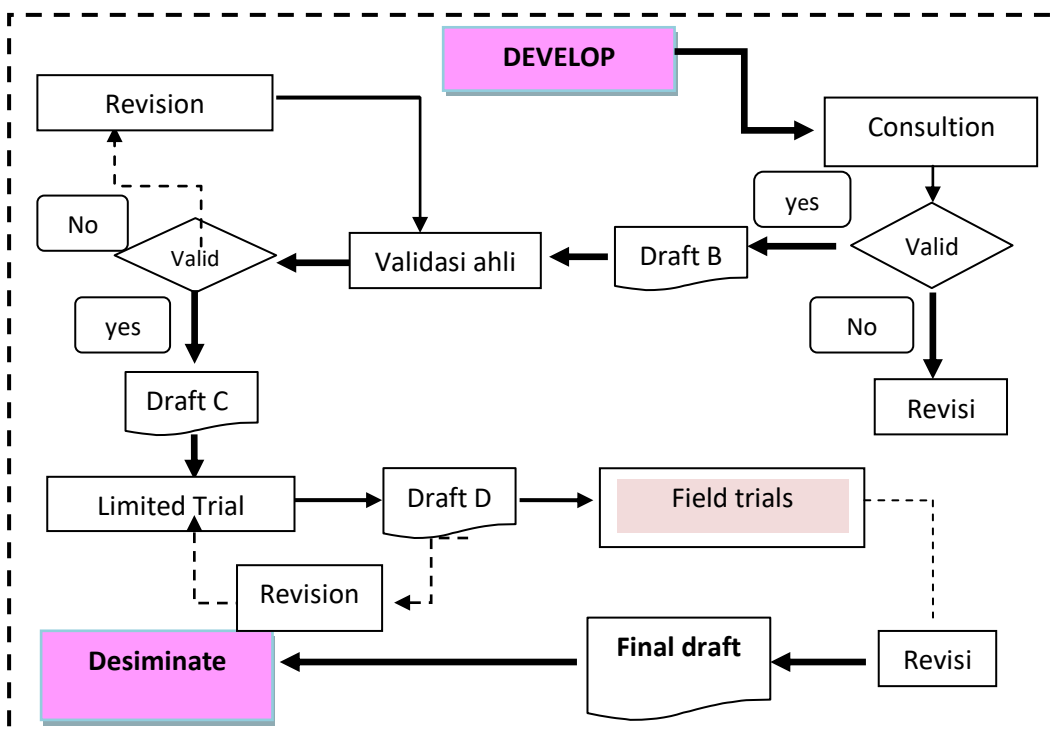

Figure 2. Design Phase on the 4-D Development Model

Figure 3. Develop Stage in 4-D Development Model

Image Caption:

⟶ : Implementation line (process direction)   ╌╌➤ : cycle line (if needed)

▭ : Types of activities (processes)   ⬡ : decision

▱ : Results of activities (documents

RESULTS AND DISCUSSION

Quizziz-assisted Augmented Reality (AR)-based mathematics digital pocketbook using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model was developed using the 4-D model.

1. Define Stage

The defining stage is a stage that aims to obtain the supporting data necessary for the development of a pocketbook. In other models, this stage is called the needs analysis stage. At this stage, there are five stages carried out.

a.   Early and Late Analysis

This recent analysis was aimed at establishing the basic problems that were the reason for the need for the creation of pocket books. Distance Education is a system for conveying knowledge through technology to support the teaching and learning process that should occur in the classroom. This is stated in Circular Letter No. 4 of 2020 concerning the Implementation of Education Policies in the Emergency Period of the Spread of Corona Virus Disease (Covid-19). The main point of the instruction is the transfer of the school learning base from offline-based learning to online-based learning. This will require students to study more independently at home. In addition, the ability of teachers to innovate in the learning process must be further improved and developed. One of the innovations that educators can make in effective learning in this new normal era is to sigh [/n subject matter that is easier to understand, concise, clear, and easy to carry and can be used at any time. So that the design of digital pocketbooks using the GOLD learning model (Guided, Organizing, Leaflet, Discovery) and utilizing Augmented Reality technology in mathematics learning with the application of quizizz.

b.   Students Analitics

After the initial analysis is carried out, the next analysis of students is carried out. Data obtained from interviews and observations made that students are very enthusiastic and motivated when learning independently and utilizing technology that helps them understand a concept in the

learning process. With the help of technology and learning applications, it is able to attract students, facilitate students in mastering the material and create new innovations in learning so as to create interesting, varied and effective learning.

c.   Task Analysis

In carrying out task analysis, the preparation of the main tasks that will be given to students is carried out in the hope that students can master minimal competencies. Task analysis is also carried out based on early-late analysis as well as student analysis. Student analysis is taken based on data from school mathematics capita selecta courses in the mathematics education study program, where the course is a compulsory course of study program that discusses junior and senior high school mathematics material. Based on the results of the analysis, there are several materials that are considered to have some obstacles and students have difficulty in learning some of the material in the course. Where the material that will be presented in this pocket book includes algebra, geometry and trigonometry material contained in junior high and high school mathematics materials.

d.   Concept Analysis

Concept analysis is carried out in order to identify the main concepts to be taught, structure them in the form of a hierarchy and detail individual concepts into critical and irrelevant matters. Based on the analysis of the tasks that have been described above, the concept of the material will be adjusted to the indicators of the selected material. The mathematics material chosen in this case is the material that is considered the most important and more deeply discussed according to the needs of the student (Material capita selecta of mathematics). The mathematics material presented in this pocket book is the mathematics material for junior high school and high school.

e.   Analysis of Learning Objectives

Analysis of learning objectives is useful for summarizing the results of the analysis of concepts and analysis of tasks to determine the

behavior of the object of study. In line with the analysis of tasks and concepts, it is necessary to carry out an analysis of learning objectives in accordance with the syllabus used.

2. Design Stage

After the analysis stage, the design stage was carried out, namely to start designing a digital pocket book using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model and utilizing Augmented Reality technology in mathematics learning with the application of quizizz. This design is still contextual and will underlie the next development process. All the things needed to make a product according to the design began to be realized to produce a product that could be used in learning activities. The product produced from the realization is in the form of a pocket book that is obtained through several stages as described below.

The initial stage that is done is to hold or make the things needed. At this stage all the necessary things will be made according to those at the stage of analysis. All the things needed to make a product according to the design began to be realized to produce a product that could be used in learning activities.

The next stage is the preparation of instrument tests. In this activity, the preparation of the instruments to be used is carried out. In this study, researchers compiled validity instruments in the form of material validation questionnaires and design validation questionnaires, lecturer and student response questionnaires.

The third stage is the selection of media. The media chosen in this study is a dugital pocketbook. The digital pocketbook uses the GOLD learning model (Guided, Organizing, Leaflet, Discover) and utilizes Augmented Reality technology in mathematics learning with the application of quizizz.

Then proceed with the stage of format selection. The format that will be used in designing this pocketbook is adjusted to the structure of the pocket book arrangement. In addition, the design of this pocket book will be designed using AR technology and the application of quiziz to the practice questions.

The follow-up activities were preliminary design. After the flowchart and story board are designed, the next step will be to make a pocket book using micsrosoft word. The design of the digital pocketbook uses the GOLD (Guided, Organizing, Leaflet, Discovery) learning model and utilizes Augmented Reality technology in mathematics learning with the application of quizizz based on the structure of the pocketbook is as follows:
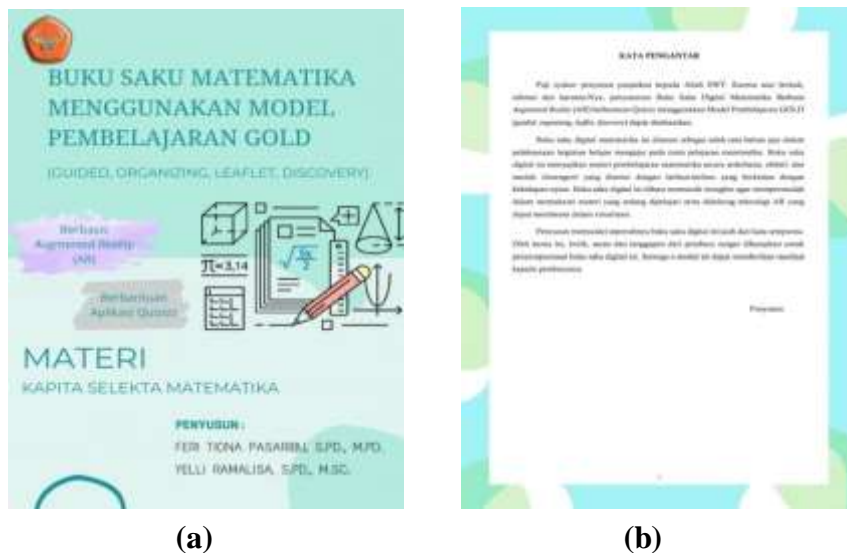
(a)

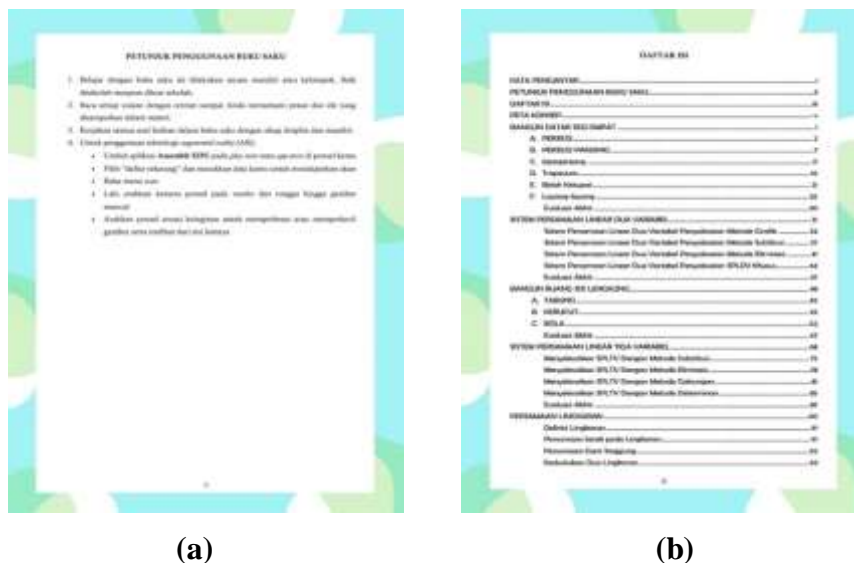**(b)**

Figure 4. (a/b). Pocket Book Cover/ Foreword

(a)

(b)

Figure 5 (a/b). Instructions for Using Pocket Book/ Table of Contents

(a) **(b)**

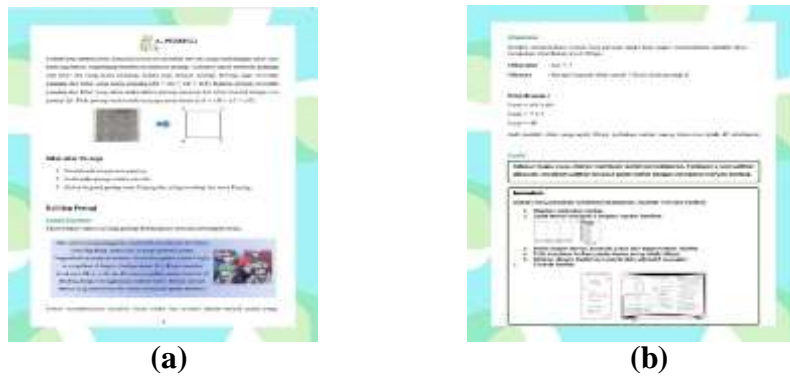**Figure 6 (a/b). Materials that Support the Characteristics of the GOLD Model are Guided Discovery, Organizing, and Leaflet**
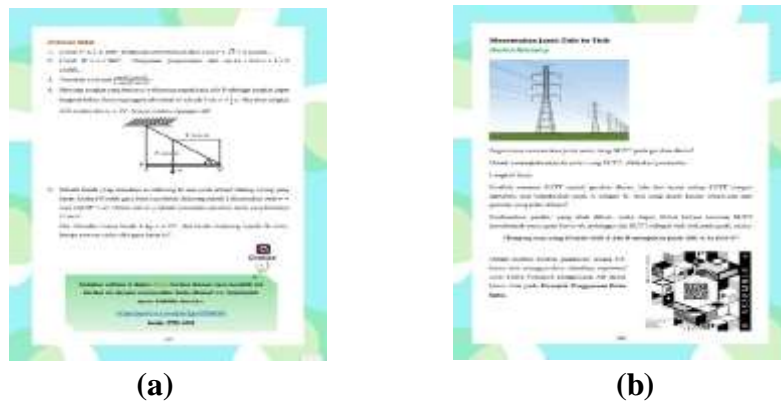

(a) **(b)**

Figure 7 (a/b). Final Evaluation Questions Using the Quizizz Application and Problem Concepts Using AR

Figure 8. References

3. Develop Stage

After the initial design of digital pocket books using the GOLD learning model (Guided, Organizing, Leaflet, Discovery) and utilizing Augmented Reality technology in mathematics learning with the application of quizizz,

several steps were taken such as assessment by expert experts and trials, in order to produce a digital pocketbook using the GOLD learning model (Guided, Organizing, Leaflet, Discovery) and utilizing Augmented Reality technology in mathematics learning with the application of quizizz that is worth using.

a. Validation by a Team of Experts

Validation is carried out to provide input and responses to the pocketbook designed to provide stages of revision of the digital pocketbook through the assessment of aspects of material validation and design validation. Based on the results of material expert validation, the validation results were obtained, namely 88%, where the criteria for the percentage of validity of digital pocketbooks based on Augmented Reality (AR) and Quizizz using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model, obtained very valid criteria.

Meanwhile, based on the results of the validation of pocketbook designs by experts, the results of design validation by design experts were obtained, namely with a percentage of 87.6%. So based on the criteria for the validity of the Augmented Reality (AR) based digital pocketbook based on Quizizz using the GOLD learning model (Guided, Organizing, Leaflet, Discovery) the criteria are very valid. At the time of the assessment by material experts and design experts, there were several comments and suggestions given by material expert validators. Based on the comments and suggestions given by the material validators, improvements were made in accordance with the suggestions and comments on quizizz's Augmented Reality (AR)-based digital pocketbook using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model.

b. Individual Trials

This individual trial was conducted on three mathematics teachers who are experienced in their fields. the teacher shown is a teacher who teaches mathematics representing middle and high schools. Based on the results of individual trials, results were obtained by 88.75%. So based on

the criteria for the percentage of practicality of Augmented Reality (AR)-based digital pocketbooks based on Quizizz using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model, very practical criteria were obtained. In addition, comments and input from teachers will be used as the basis for improving digital pocketbooks.

c. **Individual Trials**

The small group trial was carried out by asking for opinions from 20 respondents consisting of several students spread across the middle and high school levels. The respondents used in this study for small group trials were class students. From the results of small group trials, namely with a percentage of 88.8%. So based on the criteria for the percentage of practicality of Augmented Reality (AR)-based digital pocketbooks based on Quizizz using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model, the criteria are very practical.

4. **Disseminate Stage**

The dissemination stage according to Thiagarajan (1974) aims to obtain input, corrections, suggestions, assessments to improve the final product of development so that it is ready to be adopted by product users. At this stage is carried out the application of widely developed media. In this study, the dissemination stage has not been carried out because the writing team will still continue the research stage, namely a large group trial, namely applying learning in the field using digital pocketbooks that have been designed.

CONCLUSION

The results of this development research are in the form of a digital pocket book based on Augmented Reality (AR) and Quizizz using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model as follows. Quizizz's Augmented Reality (AR)-based digital pocketbook development procedure uses the GOLD (Guided, Organizing, Leaflet, Discovery) learning model, using the stages of the 4-D development model (Define, Design, Develompent, and Disseminate). The Define stage carried out is preliminary-final analysis, student analysis, task

analysis, concept analysis and learning objective analysis. Then the design stage is carried out, namely holding or making the things needed, compiling instrument tests and making the initial design of the pocket book. The development stage is carried out in the pocketbook validation stage by experts (material experts, media experts and design experts) using validation questionnaires, individual trials by mathematics teachers using individual trial questionnaires that have previously been validated, small group trials on 20 students using small group trial questionnaires have previously been validated by validators. For the quality of development results in the form of Augmented Reality (AR)-based digital pocketbooks, Quizizz uses the GOLD (Guided, Organizing, Leaflet, Discovery) learning model in terms of valid, and practical aspects. The validation results show that the Augmented Reality (AR) based digital pocketbook using the GOLD (Guided, Organizing, Leaflet, Discovery) learning model is very valid with the validity rate of the pocket book from the mater aspect is 88% (very valid) and the validity level of the design aspect is 87.6% (very valid). To see the practical aspects, individual trial questionnaires and small group trials are used. The practicality level of the teacher's response questionnaire was 88.75% (very practical) and the practicality level of the student response questionnaire results was 88.8% (very practical). The results of the questionnaire showed that Quizizz's Augmented Reality (AR)-based digital pocketbook uses the GOLD (Guided, Organizing, Leaflet, Discovery) very practical.

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