Development of Android Application-Based Early Childhood Learning Devices (PAUDPEDIA) During the COVID-19 Pandemic

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Abstract—Early Childhood Education has an important role in the development of a child. When talking about Early Childhood Education quality is the most critical, especially during the Covid-19 Pandemic as it is today and coincides with the era of the industrial revolution 4.0 where the education system underwent drastic changes. This study aims to (1) produce an Early Childhood Education application based on android; (2) test the effectiveness of the Early Childhood Education application. The development of the Android-based PAUDPEDIA application will be carried out using the 4D Model Research and Development method proposed by Thiagarajan and Semmel. This research and development are divided into four stages, namely define, design, develop, and disseminate. The results of this study indicate that researchers can achieve the expected output targets, namely (1) the results of the expert trial of the Android-based PAUDPEDIA Application showed a percentage of 86.7%. This means that the Android-based PAUDPEDIA Application is very feasible to be distributed to users and ready to use; while the results of user trials on the Android-based PAUDPEDIA application showed a percentage of 86.2%. This means that the Android-based PAUDPEDIA Application is effective for use by users; and (2) the Android-based PAUDPEDIA application is effective to be used to facilitate distance education activities in Early Childhood Education. It can be concluded that the Android-based PAUDPEDIA application is very suitable for use by users and is effectively used for distance education activities in PAUD, especially during the current COVID-19 pandemic.

Keywords—education, early childhood education, android

1 Introduction

Early childhood development is the most important stage for children to reach full maturity [1]. Therefore, at this early age children must be educated properly so that there will be no stages of development that are not perfect or even missed which will have an impact on the child's maturity [2]. Educators and also parents, in particular, must be able to choose learning methods that suit the needs of children, not too inclined to study alone but also must be balanced with children's playing time because at this age

children will be able to learn many things from playing [3]. Research has shown that play provides a safe and necessary way for young learners to practice and experience a variety of life skills, including problem-solving in peer groups while acquiring and improving language skills. Through daily play, children gain valuable life experiences through various roles that will support growth and ultimately translate into maturity [4]. According to research, play is an important aspect of developing key skills including social, behavioral, language, and cognitive [5,6]. These skills developed through play as young learners will grow into useful and important skills that are used not only throughout childhood but also into adulthood with the aim of providing appropriate learning methods for early childhood, Early Childhood Education exists [7].

Early Childhood Education has an important role in the development of a child [8]. When talking about Early Childhood Education quality is the most critical, especially during the Covid-19 Pandemic as it is today and coincides with the era of the industrial revolution 4.0 where the education system underwent drastic changes [9]. Around the world, COVID-19 has also pushed early childhood education systems to the brink of collapse as well as children whose parents have the ability to adapt quickly at times like these. will be an unavoidable disaster for early childhood [10]. To overcome this problem, it is necessary to develop a strong, safe, and sustainable early childhood education and care system [11].

The education system that is more adaptive to overcome the problem of the Covid-19 pandemic is the distance education system [12–14]. As distance education has proven to be the dominant or sole means of education worldwide today, it is evident that many preschool programs are turning to distance learning, for example, 75% of New York City preschools and 50% of preschools across the state provide distance teaching [5]. Distance education is becoming increasingly common although distance learning is not uncommon at the K-12 level, especially in early childhood education [6]. However, the industrial revolution that has taken place from the early 21st century provides a solution to this problem, namely by utilizing technology to provide facilities that can be used to assist the implementation of distance education. This development is carried out to ensure that all early childhood children have access to free education and good quality Early Childhood Education services to support their learning. The Government of Indonesia has made various efforts to provide access to Early Childhood Education services for children in Indonesia [15]. This effort is realized through the issuance and enactment of Law Number 20 of 2003 concerning the National Education System, Presidential Regulation Number 60/2013 concerning Holistic-Integrative Early Childhood Development, Presidential Regulation Number 87/2017 concerning Strengthening Character Education, and most recently, Presidential Regulation Number 59/2017 concerning Implementation of the Achievement of Sustainable Development Goals (SDG) [16].

The formulation of these regulations is a form of the importance of Early Childhood Education. In the Covid-19 pandemic situation, such as when many young people in Indonesia miss school, recreation, interaction with their peers and with the general public, as well as their childhood, because of the health crisis [17]. This is certainly a problem for Early Childhood Education in the world. At the global level, UNESCO Bangkok (2018) states that there are three main problems currently preventing Early Childhood Education from developing in many countries: namely, (i) the government's

low commitment to pre-primary education; (ii) lack of sustainable Early Childhood Education financing; and (iii) the absence of an effective governance model and weak coordination between stakeholders [18]. However, by critically examining the results of the UNESCO Bangkok (2018) study, there is one important thing that has not been able to be explored, namely: the trend of developing Early Childhood Education policies and programs in various countries, including Indonesia, which has not paid attention to the double helix approach. top-down and bottom-up.

Based on the fact that it is difficult to realize the development of Early Childhood Education policies that are carried out through an approach that is not only top-down but also bottom-up, this action plan will seek to realize the quality of Early Childhood Education through a double helix approach: top-down and bottom-up. To facilitate a double helix approach through changes in action, the Early Childhood Education Directorate developed an Android-based PAUDPEDIA Application which aims to facilitate distance learning activities by using facilities that are easy to access anywhere and anytime, so as to realize the government's goal of providing quality services for all early childhood students and ensure that they receive a great quality education.

The development of the Android-based PAUDPEDIA application will be carried out using the 4D Model Research and Development method. This research and development are divided into four stages, namely define, design, develop, and disseminate.

2 Research methods

This research is included in the type of research and development (R&D) of the 4D model. This research is divided into four stages, namely define, design, development, and disseminated.

Explanation:

- Define: this stage is the stage where the researcher compiles the objectives, materials, and methods that will be used to develop educational products based on the results of the needs analysis that has been done previously.
- Design: the second stage is after the preparation of objectives, materials, and methods, at this stage everything that has been prepared previously is implemented by making educational product designs according to those that have been prepared in the first stage.
- Develop: at this stage, the researcher will implement what has been prepared in the previous stage. At this stage, the product will also be tested in two stages, namely by experts and users.
- Disseminate: this is the last stage where the product that has been developed is distributed to users.

Data from user trials will be analyzed using percentage data analysis techniques. The data analysis technique which is included in the type of quantitative data (questionnaire) uses the percentage data analysis technique.

The guidelines used to interpret the results of data analysis are set with valid, moderately valid, less valid, and invalid criteria. This information is explained in the

guidelines for the success criteria for fingerprint-based employee attendance applications and the personnel database as follows:

- 80%–100%   Valid
- 60%–79%   Moderately Valid
- 50%–59%   Less Valid
- < 50%   Invalid

Explanation:

- If the results of the analysis obtain criteria A (80%–100%) then the media is valid and is suitable for use.
- If the results of the analysis obtain criteria B (60%–79%) then the media is categorized as moderately valid and feasible to use.
- If the results of the analysis obtain criteria C (50%–59%) then the media is categorized as less valid and must be revised.
- If the results of the analysis obtain criteria D (<50%) then the media is invalid and must be replaced.

3   Results

3.1   Define

Define is a step where the researcher defines or sets certain things at the beginning of the research, the defining step in this research consists of the following things:

- Need analysis: where the researcher conducts a survey to find out what the users (parents and Early Childhood Education students) need.
- Define objective: an activity where researchers formulate goals based on the results of the needs analysis, namely to facilitate distance learning activities using facilities that are easy to access anywhere and anytime, so as to realize the government's goal of providing quality services for all early childhood and ensure they get a quality education.
- Define method: at this stage the researcher defines or determines what method is appropriate for this research. The method used in this research is Research and Development (R&D) and 4D development model.
- Collecting materials: this is an activity where researchers collect materials used to develop this product. The PAUDPEDIA application is based on Android, therefore at this stage the researcher collects materials, both software and hardware needed.

3.2   Design

Design is the second stage after the preparation of objectives, materials, and methods, at this stage everything that has been prepared previously is implemented by making educational product designs in accordance with those that have been prepared in the first stage. The results of the design stage in this study are as follows:
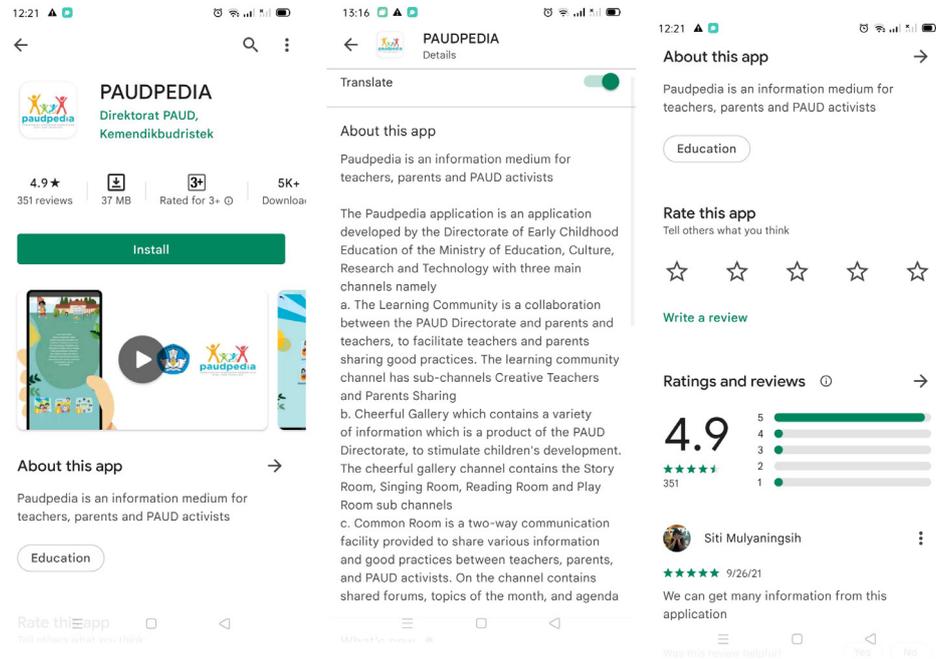
Fig. 1. PAUDPEDIA application that has been designed

3.3 Development

Development stage is the stage where the researcher will implement what has been prepared in the previous stage. At this stage the product will also be tested in two stages, namely by experts and users. The results of the calculation of the trials of each stage of the Android-Based PAUDPEDIA Application are as follows:

Table 1. Expert trial results

Aspect	Total Respondent Score	Maximum Score	Eligibility Score (%)
Functional	27	30	90
Design	25	30	83.3
Ease of Access	28	30	93.3
Suitability of Needs	24	30	80
Total	104	120	86.7

Table 2. Trial results

Aspect	Total Respondent Score	Maximum Score	Eligibility Score (%)
Functional	475	500	95
Design	400	500	80
Ease of Access	450	500	90
Suitability of Needs	399	500	79.8
Total	1,724	2,000	86.2

3.4   Disseminate

Disseminate or disseminate is the final stage of this research. The distribution of the Adroid-based PAUDPEDIA application in this study was carried out through the Google PlayStore application. Users can access the PAUDPEDIA Application by downloading it through the Google PlayStore, so that this PAUDPEDIA Application is not only intended for one particular educational institution, but all levels of Indonesian society, especially parents of early childhood children, can access the PAUDPEDIA application anywhere and anytime just by downloading it on Google PlayStore.

4   Discussion

The expert trial results from the Android-based PAUDPEDIA Application received a response of 90% for the functional aspect, the design aspect as much as 83.3%, the ease of access aspect as much as 93.3%, and the suitability of needs aspect as much as 80%, and a total percentage of 86.7%. In the category of qualification percentage range, 80%–100% is included in the valid category. This means that according to experts, the Android-Based PAUDPEDIA Application is very valid or very ready to be distributed to users.

The results of the second stage of the trial, namely users of the Android-based PAUDPEDIA Application received a response of 95% for functional aspects, 80% for design aspects, 90% for ease of access aspects, and suitability of needs aspects of 79.8%, and the total percentage as much as 86.2%. In the category of qualification percentage range, 80%–100% is included in the valid category. This means that according to users, the Android-Based PAUDPEDIA Application is very valid or very ready to be widely distributed to the public. This is supported by the research of (Srivastav et al 2021), which describes the use of mobile-based health applications to improve physical fitness during COVID-19 [19]. Recent research reports that mobile technology can be used as a tool for health care and education tools during the COVID-19 pandemic [20].

The use of technology in learning in PAUD is very important and also provides an appropriate opinion on the results of his research, namely the importance of issues and modeling of the use of ICT in Early Childhood Education for students and teachers because mobile devices have become a useful tool for teaching over the last two decades, learning practices Effective digital technology suggests using technology education tools to connect learners' on-screen experiences with off-screen experiences.

5   Conclusion

The Android-based PAUDPEDIA application is very suitable for use by users and is effectively used for distance education activities in PAUD, especially during the current COVID-19 pandemic.

6   Acknowledgment

7   References

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