STRATEGIES TO CREATE DIGITAL LEARNING MATERIALS OF EARLY READING FOR ELEMENTARY SCHOOL STUDENTS USING KODULAR

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Abstract

The development of modern science and technology has to be accompanied by learning media innovation. The transformation of it can be in form of digital learning materials. The aim of this study is to investigate whether the Kodular can be utilized in compiling digital learning materials. This study is descriptive qualitative exploratory research based on depth interview in which the primary data is in form of field notes taken from interviews to the user of Kodular, the elementary school teachers, and the questionnaire results on the teachers' needs in the elementary school. This study involves the user of Kodular and elementary school teachers which are selected using purposive sampling. The procedures of preparing digital learning materials are 1) analyzing the needs of teaching materials, 2) designing the concepts of teaching materials, and 3) developing teaching materials based on the structure of each learning material. The results of study shows that Kodular is able to be utilized in compiling digital learning materials of early reading for elementary school students by implementing Kosasih's strategy. It can be concluded that Kodular is used as a media in compiling the materials of early reading in forms of texts, pictures, voices, and animations. The output is the digital learning materials in form of application which can be installed on Android devices.

Keywords: Digital learning material, early reading, elementary school students.

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4. Introduction

Manuscript The elementary school is one of the most important parts for students because it is the first step in introducing a more complex world of learning. It is an educational institution for children (7-12 years old) in having elementary learning for 6 years (Kurniawan, 2015). It is as a new learning source to support the learning process (Puspitasari & Hanif, 2019). This condition drives the elementary school as a determinant that greatly influences how students will carry out their future education (Chen et al., 2020). It can be done by providing understanding, skill, and attitudes for students (Marmoah, 2022). Therefore, in the early stage, students will be introduced to arts such as drawing (Caiman & Jakobson, 2019). They are trained to think using mathematical symbols (Schliemann et al., 2003) and taught learning skills such as listening, speaking, reading, and writing (Widyaningrum & Hasanudin, 2019).

The several learning have been designed, structured, and considered in form of curriculum which is suitable for students. The curriculum has to focus on students, review their personalities, facilitate them to express themselves (Altun & Büyüköztürk, 2014), develop their thinking ability about the future (Vidergor et al., 2019), and able to be accepted by students, parents, and teachers (Wylie et al., 2018). The curriculum implementation at elementary school helps the learning understanding to be more systematic and effective (Li, 2022) because it uses educational theory which has been tested and suited to the students' age and development (Schick & Cierpka, 2005).

The age and development of elementary school students greatly affect their characters. It is proven by the emergence of strong relationship between character development and school age (Zen et al., 2019). There are also the differences in students' basic characters at different class levels (Koussihouèdé, 2020). This

characteristic creates the differences in students' acquisition ability (Bourdeaud'hui et al., 2018). It will influence on their learning results in the class (Fitchett & Heafner, 2017). Therefore, the suitable learning is needed to improve their achievement and intention to learn in the elementary school (Chu et al., 2010).

The academic level at elementary school which is getting higher causes the learning process to be difficult and students' achievement to be decreased (Quilez-Robres et al., 2021). Moreover, it causes students to be difficult to concentrate in learning (Cai, 2021). As a result, it is important to provide learning which contributes to the students' success at elementary school such as social skill, self-regulation skill (McClelland et al., 2006), and the use of language skills (Ufer & Bochnik, 2020). One of the language skills that becomes the core to gain success at elementary school level is the ability to understand from early reading (Lervåg et al., 2018). Based on those explanations, it can be viewed that developed learning at elementary school is initiated by various basic skills including language skills which make early reading as a core to make students to be success.

Early reading is a process of forming reading skill which is delivered in the early years of elementary school. It is a phase in which students start to study reading and understanding an instruction (January & Klingbeil, 2020) by recognizing syllables and language sounds (da Silva et al., 2022). In the early reading, students will start to recognize clues (Nation et al., 2001) and learn to understand texts as an initial support for the desire to read in a higher stage (Stutz et al., 2016). It is also utilized to improve students' reading skill with various purposes (Slavin et al., 2009).

There are many goals that can be achieved through early reading for elementary school students starting from understanding to voicing words. Early reading can also help students to memorize words easier in the learning process (Gallet et al., 2020). Abadzi states that early reading aims to develop children's brains in the golden age by mastering and voicing words to achieve fluent reading ability (Graham & Kelly, 2019). This phase aims to train students' visual and memories related to the text given (January & Klingbeil, 2020), so it has positive effect, creates critical thinking (Coyne et al., 2004), and improves students' achievement scores in the following year (Eppler et al., 2011).

To achieve the learning goal of early reading needs to implement the suitable method (Sung, 2020). Teachers have to understand the early reading skill and learn the methods that can be used to instil and improve students' early reading skill (Andzayi & Ikwen, 2014). Eri describes several methods which can be provided to students such as pre-alphabets, partial alphabets, full alphabet, and combined alphabet (January & Klingbeil, 2020). Other methods that can be used such as 'see and say' as the beginning of letter introduction (McBride-Chang & Suk-Han Ho, 2005). The 'rhyme and analogy' method as an initial introduction to advanced learning skill (Goswami & East, 2000). The method of providing independent reading materials is as a teaching material (Wang et al., 2020). Based on those explanations, it can be stated that there are various methods which can be utilized to gain learning goals of early reading starting from introducing alphabets to providing teaching materials.

A teacher has to be able to create and provide learning materials as the student's way to understand higher reading skill (Kurniaman & Zufriady, 2019). Several learning materials that are often used by teachers can be in forms of determining reading materials, reading in groups, and reading as weekly assignments (Hamra & Syatriana, 2012). It needs to be noted that other teaching materials that can be utilized to improve reading process can be manifested in individual reading activities, group reading, and discussion (Jin et al., 2020). The early reading can also be delivered using teaching materials in forms of language word structures. However, there are many mistakes in the basic concept of the teaching materials (Joshi et al., 2009) and teacher gives no knowledge related to reading which causes it is less efficient (Phelps & Schilling, 2004). In other words, the use of various teaching materials becomes one of important aspects for the continuity of early reading. Furthermore, there are still many errors in the implementation of teaching materials, so the learning process will be less efficient.

The improper implementation of learning materials causes problems in reading such as early reading which needs more innovation. It is proven by the role of reading in most countries has decreased in the last twenty years (Kamalova & Koletvinova, 2016). It causes problems in school policy about learning to read (Coburn, 2006). The same thing happens in Indonesia in which students' early reading skill at elementary schools is still relatively low (Rahman & Haryanto, 2014). It is indicated by several elementary school students in the East Java

are not able to read and do not have good reading skill (Damaiyanti, 2021). It happens because there is no students' interest in reading all book materials (Hasanudin & Puspita, 2017), so it needs teaching materials which are more varied such as interactive teaching material or digital teaching material (Smaragdina, 2020).

Digital teaching material is one of teaching materials which is available with the support of technology, so it helps teachers in delivering materials easier and it can attract students' intention to use it. Digital learning material supports the technology which is closely related to teaching and learning process (Damirkan, 2019). It is able to help teachers in preparing learning process with automatic control and the materials can be delivered directly through technology media (Tsai et al., 2017). Materials that have been prepared by teachers can be stored in digital teaching material in form of electronic text documents and various other forms (Acker et al., 2013), so the students can easily access the learning (Walan, 2020). Moreover, it makes the digital learning material as fun guidance and provides many additional functions (Basarmak, 2019).

The function and use of digital teaching material for its users also tend to be varied (Zhang & Li, 2006). Mishra and Koehler state that digital learning material has a function to help students in carrying out the teaching and learning process and creating communication that supports it to be more effective (Walan, 2020)). Furthermore, the learning material can support the learning by examining the advantages and disadvantages of the teaching and learning process (Bergvall & Dyrvold, 2021), so it has a role as a component to improve the learning media which has not been optimal (Setiyani et al., 2020). Moreover, the learning material can increase the teachers' roles in educating and delivering the materials to students (Qi, 2018). In other words, the use of digital learning material is as the learning support and one of components in delivering materials which is very useful for students and teachers.

These various functions are one of the advantages provided in implementing digital learning material. The other advantages of digital learning material are that it can be implemented in various ways and technological devices (Buzzard et al., 2011), be able to copy the learning information, be able to construct the learning model, and be able to develop the learning system (Zhang, 2021). Moreover, it can optimize and expand the students' learning (Henderson et al., 2017). It is also able to attract students' attention, improve their focus, create fun learning, and provide learning motivation (Damirkan, 2019) because the technological media is not only the source of information, it also provides opportunity to express themselves in forms of broader imaginations (Buckingham, 2007).

Result of study on the implementation of digital learning material reveals that it is potential and practical in the learning process (Gong, 2021), the students' motivation is improved when the digital learning material is implemented and it becomes the learning technology (Flórez-Aristizábal et al., 2019). The digital learning material is proven to be more effective than traditional learning material in encouraging students to join the fun learning (Hughes-Roberts et al., 2020). Its implementation is able to maximize the use of educational tools (Hassell et al., 2021) and strengthen the relationship of classroom learning and social environment (Chen, 2022). Based on those results, the digital learning material is stated to be useful in learning, it provides students' motivation and attention, and it also optimizes the educational tools in learning.

The success of using digital learning material cannot be separated from how it is arranged and designed to meet student's and teachers' needs. It is designed comprehensively from the knowledge and the use of appropriate technology to create broader teaching and learning (Quintero et al., 2007). The examples of digital learning materials which can be used by teachers are digital whiteboards, digital portfolios (Kreijns et al., 2013), and visual technology that facilitate students in the learning process (Calandra & Lee, 2005). In addition, the use of digital learning material can be arranged by reacting to abundant learning management system (Robinson et al., 2019), for instance making digital learning material using Kodular (Syarlisjiswan & Wahyuningsih, 2021).

Kodular is a website that makes the users to be easier to create the application without coding or programming language (Firdaus & Hamdu, 2020). It becomes a platform that is enhanced to create the application (Saputra et al., 2020) for the Android devices using browser and connected smartphones (Wahyuni et al., 2021). Kodular can be considered as website for making android-based application without coding and block programming (Ronaldo & Ardoni, 2020). It also provides places to make application quickly (Alda, 2020). It can be concluded that Kodular is a website that can create an android application without going through a complicated programming process, so it is easier to be used by its users.

Kodular is a part of computer program that provides facilities to create new software (Sutrisno & Hamdu, 2020) which also has several tools in creating application easier (Kholifah & Imansari, 2022). This website has a function to develop learning through android smartphones to improve students' skills (Rismayanti et al., 2022). It is also as a medium for monitoring and storing information (Alfian et al., 2020). Kodular has the function of improving the application builder to make it more efficient and can be used as database storage (Kumala & Winardi, 2020). In conclusion, Kodular is the creator of new software in form of android-based application which can store the data without coding process.

The function of Kodular in creating application easier becomes one of its advantages. Other advantage of it is its simple appearance, so it is easier to be understood (Supanji et al., 2021) with the principle of making application from components and features based on the user's desire (Sutrisno & Hamdu, 2020). In addition, Kodular can develop learning materials so the students can understand it easier (Rizqiyani et al., 2022). It is also used as teaching-learning media that is easy to be understood (Kasma & Siaulhak, 2022). Moreover, Kodular has an advantage of online and free access method (Rismayanti et al., 2022).

The success of making digital learning material using Kodular has been proven by many researchers. A study in which a learning assisted by Kodular using smartphones reveals that it encourages students to have independent learning anywhere and anytime (Fauziyah et al., 2022). Another research shows that Kodular provides satisfactory result in creating valid, effective, and practical learning (Rizqiyani et al., 2022). Moreover, learning using Kodular is acceptable and has no access constraint (Setiawan, 2020). The learning which is supported by Kodular is fairly good because its features are very useful (Kasma & Siaulhak, 2022, so it is able to create adequate and interesting results (Rismayanti et al., 2022).

Based on those explanations, it needs a strategy in compiling digital learning material using Kodular. So, the compiled digital learning materials really help elementary school students to read.

5. Method

This study is descriptive qualitative exploratory research based on depth interview. The aims of this study are to collect as much data as possible and investigate the new relationships which show that Kodular can create digital learning materials. The analysis result creates hypothesis on whether the Kodular can be utilized in compiling digital learning materials.

The primary data is in form of field notes taken from interviews to the user of Kodular, the elementary school teachers, and the questionnaire results on the teachers' needs in the elementary school.

The research subjects are selected using purposive sampling. The subject criteria are: 1) Subject A as the users of Kodular who have ever created various applications, 2) Subject B as elementary school teachers in East Java, Indonesia.

The procedures of preparing digital learning materials are 1) analyzing the needs of teaching materials, 2) designing the concepts of teaching materials, and 3) developing teaching materials based on the structure of each learning material (Kosasih, 2020).

6. Results and Discussion

Results The strategy to compile digital learning materials of early reading for elementary school students using Kodular utilizes the strategy developed by Kosasih. It is started from 1) analysing the needs of teaching materials, 2) designing the concepts of teaching materials, and 3) developing teaching materials based on the structure of each learning material (Kosasih, 2020). It is described as follows:

3.1. Analysing the needs of teaching materials

To investigate the needs of teaching materials of early reading for elementary school students, the researchers distributed questionnaires to the elementary school teachers especially in the first grade of it. The teachers are in five districts at East Java, namely Bojonegoro, Tuban, Lamongan, Mojokerto, and Jombang.

The questionnaire is stated "Based on the development of science and technology, do you think that the availability of early reading teaching media for elementary school students needs to be developed? [In accordance with the development of science and technology, do you think the availability of peer reading learning media for elementary school students still needs to be developed?]". Based on that question, the teachers' responses can be viewed in figure 1.
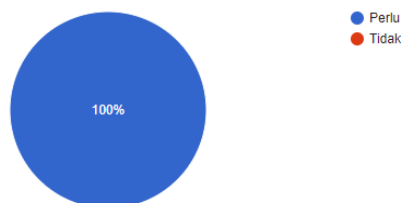

● Perlu
● Tidak

100%

Figure 1. Teachers' responses on the availability of teaching media

Source: Researchers' Data taken from Google forms

In figure 1, it can be viewed that the percentage of teachers who say 'Yes' are 100% and 'No' are 0%. In other words, the elementary school teachers agree that teaching media of early reading for elementary school students needs to be developed.

Their reasons are almost the same. It needs to be developed because in line with the development of science and technology, the teaching media has to be developed. To get more reasons, the researchers conduct interview. The interview transcript with one of the teachers in elementary school at East Java can be viewed as follows.

P   : "Assalamualaikum, Mam."

SB   : "Waalaikumusalam, Sir."

P   : "We would like to confirm your response in the questionnaire that you have submitted."

SB   : "Sure. Go ahead!"

P   : "You say that 'every year the technology is developed. The application is also updated once in a month. So, the teaching media for elementary school students has to be developed'. We would like to ask you, in what fields the relationship of technology and teaching media for elementary school students?"

SB   : "The thematic materials can be combined with the current technology. For example, the material of singing together for the first-grade students can utilize audio visual media such as YouTube or the video edited by teacher which is shown using an LCD Projector and sound to make the students follow the song played"

P   : "Then how about the materials of early reading, Mam?"

SB   : "Absolutely the children are created audio visual media. The teachers are able to read various recorded alphabets. It is edited attractively by adding animations, music. The students will be motivated to learn."

P   : "So, what form can these teaching materials be packaged in to keep up with technological development?"

SB   : "The learning materials can be created in form of short videos that can be added into the application."

P   : "Thank you for your information, Mam."

SB   : "My pleasure, Sir."

The results of interview with the elementary school teacher are strengthen by the research which reveals that the Android application in form of education games based on Nusa Tenggara Timur local wisdom can be

utilized as teaching media of early reading for the first-grade students of elementary school (Kharisma & Arvianto, 2019). Another study states that digital learning media which is popular to be used is based on website and Android (Astuti et al., 2020).

3.2. Designing the concepts of teaching materials

Designing the concepts of digital teaching materials of early reading for elementary school students is started from 1) preparing the material compositions to be written such as picture design, voices, animations about reading which are suitable for elementary school students, 2) making the sequence of materials from the easiest to the most difficult, for instance, recognizing the alphabets so the students are able to read story. It can be viewed in figure 2.
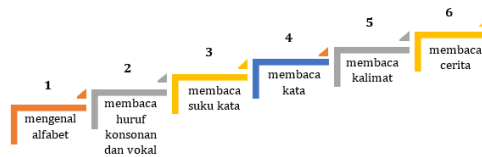

Figure 2. The sequence materials in digital teaching materials of early reading

Source: Researchers' Data

Moreover, 3) designing a digital teaching material container for early reading by utilizing free or paid websites which can produce digital teaching material. The three stages are the main parts in designing the concepts of teaching materials. A study reveals that the concepts have a function to relate one material with other materials which can be used in Maple (Yenti, 2016). Other study shows that the concepts make the students to be able to find and understand the sequences and development of structured language teaching and learning theories (Irfadila, 2020).

3.3. Developing teaching materials based on the structure of each learning material

The digital teaching materials of early reading for elementary school students can be developed using Kodular website. It can be accessed through the link https://www.kodular.io/ . The homepage of Kodular can be viewed in figure 3.
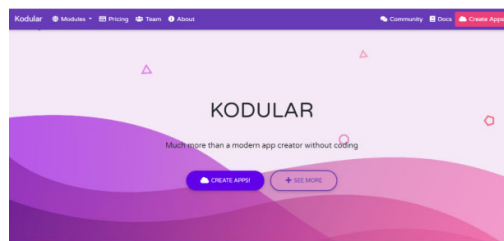

Figure 3. The sequence materials in digital teaching materials of early reading

Source: Researchers' Data

To access Kodular, the user has to register as follows:

1. Create an account in Kodular website by clicking 'Create Apps!' in the right corner or in the centre of the screen.

2. Enter the email and password.

3. Click the button 'Create Account' to make a new account, or 'Sign in' when the user has had the Kodular account.

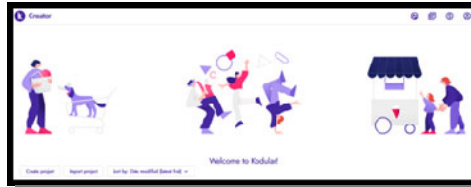4. The first page of Kodular website can be viewed in figure 2.

Figure 4. The first page of Kodular website

Source: Researchers' Data

After successfully registering, the second step is to start in compiling teaching materials. The ways to create digital teaching materials of early reading using Kodular are as follows:

1. Selecting the button 'Create Project' in the lower left corner. The button 'Import Project' is used to send project to another devices. In the 'List project', there is a project logo that has been created before. So, the user is able to find project easily because it is equipped with a description of time manufacture. To edit the project which has been created, the user needs to click the menu button based on the project image.

2. The Kodular will direct the user to give a name to the project that will be created. Pay attention to make the project name, so it is accepted by the system. The example of giving name that is rejected by system can be viewed in figure 5.

Figure 5. The way to provide name to the project

Source: Researchers' Data

It should use 'underscore', so the name is not rejected by system. The example of project name which is not suitable is "Literacy Education" (❌), the appropriate project name should be "Literacy Education" (✅).

3. Configuring the project that will be created. In the configuration window, the user is asked to fill the theme, min SDK, package name, primary colour, primary colour dark, and accent colour. The functions of the menu are explained in table 1.

Table 1. Functions in the configuration window

Source: Researchers' Data

Menu	Function
Theme	There are three choices in this menu, namely default, light theme, and dark theme. Choose one of them!
Min SDK	This menu is suitable for Android level 4.4 -4.4.4 (API 19) to Android 10.0 (API 29)
Package name	This menu is used to fill the name of company or its user
Primary color	This menu is used to choose the basic color of the application
Primary color dark	This menu is used to choose the color of the application
Accent color	This menu is used to choose the color of the application

When the setting has done, the user should click 'Finish'.

4. The main project screen of Kodular will show 'screen 1' that is ready to be filled in.

5. To add the next screen, the user has to click the button 'add screen'. The user can rename 'screen 2' as he wants. After that, he has to click the button 'create'. The screen that has been added can be viewed in the menu of 'screen 1' by clicking it. In this case, there are two screens that have been created. One screen means that one screen on Android smartphone. The more screens are created means more materials that have to be prepared and designed.

6. In processing the screen into an attractive display, it can utilize the feature 'designer'. It has a function to design the screen. While the 'assets' menu is used to input the materials in form of pictures, etc. into the Kodular. In 'designer' menu, there are many tools on the left screen, namely user interface, layout, media, drawing and animation, maps, sensors, social, storage, utilities, dynamic, components, connectivity, Google, monetization, Lego mind storms, and extension.

7. After the screen has been laid out, the user should make 'blocks. It is used to provide link to the following screen. This menu is next to the 'designer' menu. There are three main tools on the left side of the layer. In the 'built-in' menu, there are many tools which can appear by clicking the button '+' in it. The tools contain control, logic, math, text, lists, dictionaries, colours, variables, and procedures tools. It can be viewed in figure 6.
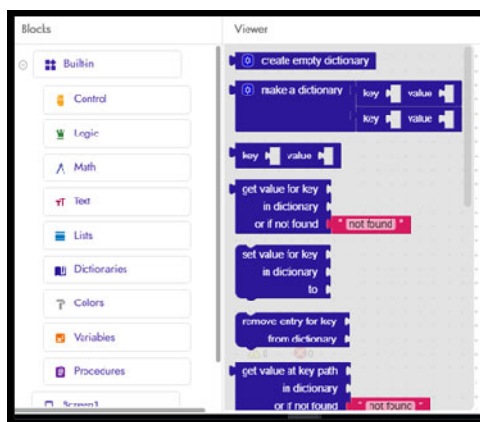

Figure 6. Tools in 'built-in' menu

Source: Researchers' Data

Those tools provide command to the next screen. This function is exactly the same with coding in programming language or hyperlink function in a PPT file at Microsoft power point.

8. After all of the materials have been inputted into Kodular and all screens have been blocked to the next screen, the user has to preview the result by clicking the button 'test'. This button aims to provide the display result on the Android-based devices. In this part, the work of application can be monitored. It needs accuracy in editing, deleting, or adding necessary materials. Both terms of aesthetics and content have to synergize to provide suitable teaching materials.

9. In the last part, the user is able to convert the materials in form of application using 'export' menu. He has to wait for Kodular to complete the export project. At the end, the menu will be appeared as in figure 7.
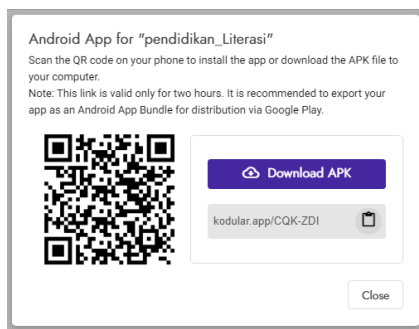
Figure 7. The menu of application downloader

Source: Researchers' Data

The user can download the application directly or scan it using QR Barcode.

10. The export result of application can be moved to Android devices.

11. Digital teaching materials of early reading at elementary school can already be used on students' Android devices.

In gaining information about Kodular website, the researchers carry out interview with one of Kodular user who has created various applications. The interview transcript can be stated as follows:

P   : "Assalamualaikum, Sir."

SA   : "Waalaikumusalam, Sir."

P   : "Do you often use a Kodular website?"

SA   : "Yes, I do"

P   : "Excuse me, Sir. What do you use it for?"

SB   : "I often use Kodular to compile teaching material, to make educational game and other simple game in which the output is based on Android."

P   : "Then, how is the Kodular's role in early reading of elementary school?"

SA   : "Kodular has a role as a media for compiling materials in early reading in which the output of digital teaching material is in form of application that can be installed in Android smartphones."

P   : "So, what are needed to compile digital teaching material of early reading in Kodular website?"

SA   : "the materials in forms of texts, pictures, voices, or animations."

P   : "You can conclude that Kodular can be utilized in compiling digital teaching material, can't it?"

SA   : "Yes, it can."

P   : "Thank you so much for your information, Sir."

SB   : "My big pleasure"

The results of interview with the Kodular users are reinforced by a study which reveals that mobile application is developed using Kodular software (Rosman & Latip, 2022). Other research explains that Kodular can be used to create application display on smartphones. To display the application on smartphone is carried out by scanning the QR barcode in the Kodular (Fitriyah et al., 2022).

4. Conclusion

The conclusion of this study is Kodular can be utilized in compiling digital teaching materials of early reading for elementary school students by implementing Kosasih's strategies, namely 1) analyzing the needs of teaching materials, 2) designing the concepts of teaching materials, and 3) developing teaching materials based on the structure of each learning material. Kodular has a role as a media for compiling early reading materials in forms of texts, pictures, voices, or animations. The output of it is the application which can be installed in Android smartphones.

5. Acknowledgement

6. References

Acker, F. V., Buuren, V., Kreijns, K., & Vermeulen, M. 2013. Why teachers use digital learning materials: The role of self-efficacy, subjective norm and attitude. *Education and Information Technologies, 18*(3), 495-514.

Alda, M. 2020. Sistem informasi penjualan ban berbasis android pada express ban. *INTI Nusa Mandiri, 14*(2), 153-162.

Alfian, A., Fauzi, L., & Firmansyah, H. 2020. Prototipe sistem informasi pemesanan valet parking berbasis internet of things. *Autocracy: Jurnal Otomasi, Kendali, dan Aplikasi Industri, 7*(2), 72-79.

Altun, S. A., & Büyüköztürk, Ş. 2014. How elementary school Principals' change tendencies are related with their opinion about curriculum change, *Procedia-Social and Behavioral Sciences*, WCLTA.

Andzayi, C. A., & Ikwen, E. U. 2014. Developing beginning reading skills among primary school pupils in Cross River State, Nigeria: A pilot study report. *Journal of Modern Education Review, 4*(6), 427-438.

Astuti, I., Ariyadi, D., & Sumaryanti, L. 2020. Prototipe media pembelajaran berbasis android untuk membaca permulaan. *Simetris: Jurnal Teknik Mesin, Elektro dan Ilmu Komputer, 11*(1), 151-156.

Basarmak, U. 2019. The effect of digital teaching material (public service ad) development process on preservice teachers' creative thinking skills. *Malaysian Online Journal of Educational Technology, 7*(4), 126-144.

Bergvall, I., & Dyrvold, A. 2021. A model for analysing digital mathematics teaching material from a social semiotic perspective. *Designs for Learning, 13*(1), 1-7.

Bourdeaud'hui, H., Aesaert, K., Keer, H. V., & Braak, J. V. 2018. Identifying student and classroom characteristics related to primary school students' listening skills: A systematic review. *Educational Research Review, 25*, 86-99.

Buckingham, D. 2007. Digital media literacies: Rethinking media education in the age of the Internet. *Research in Comparative and International Education, 2*(1), 43-55.

Buzzard, C., Crittenden, V. L., Crittenden, W. F., & McCarty, P. 2011. The use of digital technologies in the classroom: A teaching and learning perspective. *Journal of Marketing Education, 33*(2), 131-139.

Cai, P. 2021. Thinking skills development in mobile learning: The case of elementary school students studying environmental studies. *Thinking Skills and Creativity, 42*, 1-10.

Caiman, C., & Jakobson, B. 2019. The role of art practice in elementary school science. *Science & Education, 28*(1), 153-175.

Calandra, B., & Lee, J. 2005. The digital history and pedagogy project: Creating an interpretative/pedagogical historical website. *The Internet and higher education, 8*(4), 323-333.

Chen, M. 2022. Digital affordances and teacher agency in the context of teaching Chinese as a second language during covid-19. *System, 105*, 1-13.

Chen, Y., Feng, S., & Han, Y. 2020. The effect of primary school type on the high school opportunities of migrant children in China. *Journal of Comperative Economics, 48*(2), 325-338.

Chu, H. C., Hwang, G. J., Tsai, C. C., & Tseng, J. C. 2010. A two-tier test approach to developing location-aware mobile learning systems for natural science courses. *Computers & Education, 55*(4), 1618-1627.

Coburn, C. E. 2006. Framing the problem of reading instruction: Using frame analysis to uncover the microprocesses of policy implementation. *American educational research journal, 43*(3), 343-349.

Coyne, M. D., Kame'enui, E. J., Simmons, D. C., & Harn, B. A. 2004. Beginning reading intervention as inoculation or insulin: First-grade reading performance of strong responders to kindergarten intervention. *Journal of Learning Disabilities, 37*(2), 90-104.

da Silva, G. C., et al., 2022. Game learning analytics can unpack Escribo play effects in preschool early reading and writing. *Computers and Education Open, 3*, 1-8.

Damaiyanti, R. 2021. Kemampuan membaca permulaan siswa kelas I SDN Petrang 01 Jember pada masa pembelajaran daring. *Jurnal Ilmu Pendidikan Sekolah Dasar, 8*(2), 78-87.

Demirkan, O. 2019. Pre-service teachers' views about digital teaching materials. *Educational Policy Analysis and Strategic Research, 14*(1), 40-60.

Eppler, M. A., Ironsmith, M., Dingle, S. H., & Errickson, M. A. 2011. Benefits of service-learning for freshmen college students and elementary school children. *Journal of the Scholarship of Teaching and Learning, 11*(4), 102-115.

Fauziyah, R. S., Anriani, N., & Rafianti, I. 2022. Kemampuan pemahaman konsep matematis siswa SMP menggunakan e-modul berbantu kodular pada smartphone. *Wilangan: Jurnal Inovasi dan Riset Pendidikan Matematika, 3*(1), 71-77.

Firdaus, S., & Hamdu, G. 2020. Pengembangan mobile learning video pembelajaran berbasis STEM (Science, Technology, Engineering And Mathematics) di sekolah dasar. *JINOTEP (Jurnal Inovasi dan Teknologi Pembelajaran): Kajian dan Riset Dalam Teknologi Pembelajaran, 7*(2), 66-75.

Fitchett, P. G., & Heafner, T. L. 2017. Student demographics and teacher characteristics as predictors of elementary-age students' history knowledge: Implications for teacher education and practice. Teaching and Teacher Education 67 (2017) 79-92.

Fitriyah, Q., Siahaan, Y. D., & Wahyudi, M. P. E. 2022. Alat sterilisasi lampu UVC portable berbasis IOT. *Jurnal Integrasi, 14*(1), 8-13.

Flórez-Aristizábal, L., et al. 2019. Digital transformation to support literacy teaching to deaf Children: From storytelling to digital interactive storytelling. *Telematics and Informatics, 38*, 87-99.

Gallet, C., Viriot-Goeldel, C., & Leclercq, V. 2020. Effects of an early reading intervention based on grapho-syllabic decoding and fluency training in French elementary schools. *European Review of Applied Psychology, 70*(1), 1-12.

Gong, Y. 2021. Application of virtual reality teaching method and artificial intelligence technology in digital media art creation. *Ecological Informatics, 63*, 1-9.

Goswami, U., & East, M. 2000. Rhyme and analogy in beginning reading: Conceptual and methodological issues. *Applied Psycholinguistics, 21*(1), 63-93.

Graham, J., & Kelly, S. 2019. How effective are early grade reading interventions? A review of the evidence. *A Review of the Evidence, 27*, 155-175.

Hamra, A., & Syatriana, E. 2012. A model of reading teaching for university efl students: Need analysis and model design. *English Language Teaching, 5*(10), 1-11.

Hasanudin, C., & Puspita, E. L. 2017. Peningkatan motivasi dan keterampilan membaca permulaan siswa kelas I melalui media aplikasi bamboomedia bmgames apps. *PEDAGOGIA: Jurnal Pendidikan, 6*(1), 1-13.

Hassell, L. A., Peterson, J., & Pantanowitz, L. 2021. Pushed across the digital divide: Covid-19 accelerated pathology training onto a new digital learning curve. *Academic pathology, 8*, 1-7.

Henderson, M., Selwyn, N., & Aston, R. 2017. What works and why? Student perceptions of 'useful' digital technology in university teaching and learning. *Studies in Higher Education, 42*(8), 1567-1579.

Hughes-Roberts, T., et al. 2020. Examining the potential impact of digital game making in curricula based teaching: Initial observations. *Computers & Education, 158*.

Irfadila, M. S. 2020. Praktikalitas pengembangan bahan ajar berbasis peta konsep pada mata kuliah teori pembelajaran bahasa dan IBM mahasiswa program studi PBSI FKIP UMSB. *Inovasi Pendidikan, 7*(2), 76-83.

January, S. A., & Klingbeil, D. A. 2020. Universal screening in grades K-2: A systematic review and meta-analysis of early reading curriculum-based measures. *Journal of School Psychology, 82*, 103-122.

Jin, T., Liu, X., & Lei, J. 2020. Developing an effective three-stage teaching method for collaborative academic reading: Evidence from Chinese first-year college students. *Journal of English for Academic Purposes, 45*, 1-10.

Joshi, R. M., et al. 2009. Why elementary teachers might be inadequately prepared to teach reading. *Journal of Learning Disabilities, 42*(5), 392-402.

Kamalova, L. A., & Koletvinova, N. D. 2016. The problem of reading and reading culture improvement of students-bachelors of elementary education in modern high institution. *International Journal of Environmental and Science Education, 11*(4), 473-484.

Kasma, S., & Siaulhak. 2022. Media pembelajaran unsur kimia pada SMP Negeri 3 Kota Palopo berbasis android. *Jurnal Ilmiah Teknologi Informasi, 12*(1), 42-47.

Kharisma, G. I., & Arvianto, F. 2019. Pengembangan aplikasi android berbentuk education games berbasis budaya lokal untuk keterampilan membaca permulaan bagi siswa kelas 1 SD/MI. *Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran, 9*(2), 203-213.

Kholifah, U., & Imansari, N. 2022. Pelatihan membangun aplikasi mobile menggunakan kodular untuk siswa SMPN 1 Solorejo. *ABDINAS GALUH: Jurnal Pengapdian kepada Masyarakat, 4*(1), 549-553.

Kosasih, E. 2020. *Pengembangan bahan ajar*. Jakarta: PT Bumi Aksara.

Koussihouèdé, O. 2020. Primary school size and learning achievement in Senegal: Testing the quantity–quality trade-off, *International Journal of Educational Development, 77*, 1-11.

Kreijns, K., Acker, F. V., Vermeulen, M., & Buuren, H. V. 2013.What stimulates teachers to integrate ICT in their pedagogical practices? The use of digital learning materials in education. *Computers in Human Behavior, 29*(1), 217-225.

Kumala, A., & Winardi, S. 2020. Aplikasi pencatatan perbaikan kendaraan bermotor berbasis android. *Jurnal Intra Tech, 4*(2), 112-120.

Kurniaman, O., & Zufriady. 2019. The effectiveness of teaching materials for graphic organizers in reading in elementary school students. *Journal of Educational Sciences, 3*(1), 48-62.

Kurniawan, M. 2015. Tri pusat pendidikan sebagai sarana pendidikan karakter anak sekolah dasar. *Pedagogia: Jurnal Pendidikan, 1*(4), 41-49

Lervåg, A., Hulme, C., & Melby-Lervåg, M. 2018. Unpicking the developmental relationship between oral language skills and reading comprehension: It's simple, but complex. *Child development, 89*(5), 1821-1838.

Li, Y. 2022. Knowing, understanding and exploring the content and formation of curriculum materials: A Chinese approach to empower prospective elementary school teachers pedagogicall. *International Journal of Educational Research, 37*(2), 179-193.

Marmoah, S., & Poerwanti, J. I. S., & Suharno. 2022. Literacy culture management of elementary school in Indonesia. *Heliyon, 8*(4), 1-10.

McBride-Chang, C., & Suk-Han Ho, C. 2005. Predictors of beginning reading in Chinese and English: A 2-year longitudinal study of Chinese kindergartners. *Scientific studies of Reading, 9*(2), 117-144.

McClelland, M. M., Acock, A. C., & Morrison, F. J. 2006. The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly, 21*(4), 471-490.

Nation, K., Allen, R., & Hulme, C. 2001. The limitations of orthographic analogy in early reading development: Performance on the clue-word task depends on phonological priming and elementary decoding skill, not the use of orthographic analogy. *Journal of Experimental Child Psychology, 80*(1), 75-94.

Phelps, G., & Schilling, S. 2004. Developing measures of content knowledge for teaching reading. *The Elementary School Journal, 105*(1), 31-48.

Puspitasari, Y. D., & Hanif, M. 2019. Using learning media to increase learning motivation in elementary school. *Anatolian Journal of Education, 4*(2), 53-60.

Qi, A. 2018. A study of the effect of implementing intellectual property education with digital teaching on learning motivation and achievements. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(6), 2445-2452.

Quilez-Robres, A., González-Andrade, A., Ortega, Z., & Santiago-Ramajo, S. 2021. Intelligence quotient, short-term memory and study habits as academic achievement predictors of elementary school: A follow-up study. *Studies in Educational Evaluation, 70*, 1-7.

Quintero, M. S., Blake, B., & Eppich, R. 2007. Conservation of architectural heritage: The role of digital documentation tools: The need for appropriate teaching material. *International Journal of Architectural Computing, 5*(2), 239-253.

Rahman, B., & Haryanto. 2014. Peningkatan keterampilan membaca permulaan melalui media flashcard pada siswa kelas I SDN Bajayau Tengah 2. *Jurnal Prima Edukasia 2*(2) (2014) 127-137.

Rismayanti, T. A., Anriani, N., & Sukirwan. 2022. Pengembangan e-modul berbantu kodular pada smartphone untuk meningkatkan kemampuan berpikir kritis matematis siswa SMP. *Jurnal Cendekia: Jurnal Pendidikan Matematika, 6*(1), 859-873.

Rizqiyani, Y., Anriani, N., & Pamungkas, A. S. 2022. Pengembangan e-modul berbantu kodular pada smarthphone untuk meningkatkan kemampuan literasi matematis siswa SMP. *Jurnal Cendekia: Jurnal Pendidikan Matematika, 6*(1), 954-969.

Robinson, J., et al. 2019. State of the field: Teaching with digital tools in the writing and communication classroom. *Computers and Composition, 54*, 1-19.

Ronaldo., & Ardoni. 2020. Pembuatan aplikasi mobile" Wonderful of Minangkabau" sebagai gudang informasi pariwisata di Sumatera Barat Melalui website kodular. *Info Bibliotheca: Jurnal Perpustakaan dan Ilmu Informasi, 2*(1), 88-94.

Rosman, A. A., & Latip, H. F. M. 2022. Mobile Application for Horse Training Program System. *Journal of Human Centered Technology, 1*(1), 48–53.

Saputra, A. W., Kusuma, W. A., & Suharso, W. 2020. Rancang bangun aplikasi pemesanan molly molen malang berbasis android menggunakan metode waterfall. *Jurnal Repositor, 2*(7), 855-862.

Schick, A., & Cierpka, M. 2005. Faustlos: Evaluation of a curriculum to prevent violence in elementary schools. *Applied and Preventive Psychology, 11*(3), 157-165.

Schliemann, A., et al. 2003. Algebra in elementary school. *International Group for the Psychology of Mathematics Education, 4*, 127-134.

Setiawan, R. 2020. Rancang bangun media pembelajaran berbasis android tanpa coding semudah menyusun puzzle. *Jurnal Sistem Informasi dan Sains Teknologi, 2*(2), 1-7.

Setiyani, D. P. P., Ferdianto, F., & Fauji, S. H. 2020. Designing a digital teaching module based on mathematical communication in relation and function. *Journal on Mathematics Education, 11*(2), 223-236.

Slavin, R. E., et al. 2009. Effective reading programs for the elementary grades: A best-evidence synthesis. *Review of Educational Research, 79*(4), 1391-1466.

Smaragdina, A. A. 2020. Pelatihan pemanfaatan dan pengembangan bahan ajar digital berbasis multimedia interaktif untuk menghadapi Era Revolusi Industri 4.0. *Jurnal Karinov, 3*(1), 53-57.

Stutz, F., Schaffner, E., & Schiefele, U. 2016. Relations among reading motivation, reading amount, and reading comprehension in the early elementary grades. *Learning and Individual Differences, 45*, 101-113.

Sung, H. 2020. Togetherness: The benefits of a schoolwide reading aloud activity for elementary school children in rural areas. *The Library Quarterly, 90*(4), 475-492.

Supanji, N., Yuliati, Y., & L. 2021. Ayundasari, Pengembangan bahan ajar m-pror tentang peran pahlawan sukarni kartodiwiryo untuk kelas XI SMA. *Candrasangkala: Jurnal Pendidikan dan Sejarah, 7*(2), 145-157.

Sutrisno, R. R., & Hamdu, G. 2020. Aplikasi mobile learning model pembelajaran STEM untuk guru sekolah dasar. *Jurnal Kajian Teknologi Pendidikan, 3*(3), 227-238.

Syarlisjiswan, M. R. & Wahyuningsih, D. 2021. The development of e-modules using Kodular software with problem-based learning models in momentum and impulse material. *Journal of Physics: Conference Series, 1796*(1), 1-12.

Tsai, H. C., Jou, M., Wang, J. Y., & Huang, C. C. 2017. An empirical study on the incorporation of APP and progressive reasoning teaching materials for improving technical creativity amongst students in the subject of automatic control. *Computers in Human Behavior, 75*, 997-1007.

Ufer, S., & Bochnik, K. 2020. The role of general and subject-specific language skills when learning mathematics in elementary school. *Journal für Mathematik-Didaktik, 41*(1), 81-117.

Vidergor, H. E., Givon, M., & Mendel, E. 2019. Promoting future thinking in elementary and middle school applying the Multidimensional Curriculum Model. *Thinking Skills and Creativity, 31*, 19-30.

Wahyuni, E. D., Kusuma, W. A., Zaky, A., & Sari, Z. 2021. Pengembangan sistem informasi keberadaan dosen menggunakan model prototype. *Jurnal Tekno Kompak, 15*(2), 100-111.

Walan, S. 2020. Embracing digital technology in science classrooms—secondary school teachers' enacted teaching and reflections on practice. *Journal of Science Education and Technology, 2*(3), 431-441.

Wang, H., et al. 2020. Independent reading in rural China's elementary schools: A mixed-methods analysis. *International Journal of Educational Development, 78*, 1-11.

Widyaningrum, H. K., & Hasanudin, C. Kajian kesulitan belajar membaca menulis permulaan (MMP) di sekolah dasar. *Pedagogia: Jurnal Pendidikan, 8*(2). DOI: https://doi.org/10.21070/pedagogia.v8i2.2219 .

Wylie, A., Pierson, S., Goto, K., & Giampaoli, J. 2018. Evaluation of a mindful eating intervention curriculum among elementary school children and their parents. *Journal of nutrition education and behavior, 50*(2), 206-208.

Yenti, I. N. 2016. Hasil perancangan modul kalkulus dasar dan lanjut dengan menggunakan maple 14. *Ta'dib, 19*(1), 49-60.

Zen, Y., et al. 2019. Gender differences in occurrence of behavioral and emotional problems at the lower grades of elementary school: Association with developmental and behavioral characteristics at 5 years. *Brain and and Development, 41*(9), 760-768.

Zhang, C., & Li, L. 2006. Digital teaching reference book service: A case study on knowledge-object-based microstructure of digital resources. *The International Information & Library Review, 38*(3), 110-116.

Zhang, N. 2021. Development and application of digital assistive teaching system for anatomy. *Virtual Reality & Intelligent Hardware, 3*(4), 315-335.