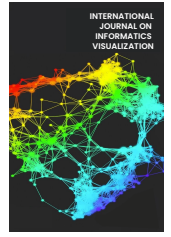




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Application of Digital Teaching Materials Based on Flipped Learning Model in Civics Education in Elementary School

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Abstract—This research aims to improve students' understanding of Pancasila Student Profile Values by implementing Flipped Learning by combining it with digital teaching materials according to the characteristics of students in elementary schools. In addition, this research also aims to create practical digital teaching materials for elementary school students in Padang City on Civic Education learning. This research uses the 4D development model (Define, Design, Develop, and Disseminate). This study involved a sample of elementary school students in Padang City who measured the practicality of the developed teaching materials assessed through a structured evaluation process. The results showed a high practicality score of 96%, which categorized the digital teaching materials as very practical for use in the classroom. In addition, researchers also measured the impact of implementing these teaching materials on student learning outcomes by obtaining significant results; 87% of students achieved scores above the threshold of completeness, with an average score of 88. The findings suggest that the integration of Flipped Learning with digital teaching materials not only facilitates a deeper understanding of Pancasila values but also positively affects students' overall performance. The implications of this study highlight the potential for further research to explore the long-term effects of digital teaching materials and Flipped Learning on different subjects and levels of education. Future research could also investigate the scalability of these materials in different educational contexts and their effectiveness in fostering critical thinking and civic engagement among students.

Keywords—Digital teaching materials; flipped learning; civics education.

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I. INTRODUCTION

The 21st century has witnessed a profound transformation in education, where Information and Communication Technology (ICT) has played a major role in changing the learning paradigm [1], [2], [3]. Especially post-pandemic, the development of information and communication technologies, such as the internet, computers, mobile devices, and various digital applications, has shaken the foundation of conventional education that has existed for centuries [4].

Rapid developments in information and communication technology are the primary catalyst behind the changes in education in the 21st century [5]. The widespread availability of internet access, increased computing, and the penetration of mobile devices have transformed how humans interact with information and knowledge. In the context of education, these

technologies open the door to unlimited educational resources and support a more interactive and connected approach to learning. Technical cooperation on teaching elements will solve problems existing in education implementation [6].

The conventional education system, with its often-passive approach, is often unable to accommodate the dynamics of learner development and the development of science [7]. Limited interaction and collaboration in the classroom and limitations in the method of teaching material have become the main challenges in creating a learning environment that spurs critical thinking and creativity [8], [9]. ICT in education makes it easier for teachers to teach and creates an atmosphere for students to learn critically, interactively, and interestingly, which is not dull and more efficient time [10]. Using digital tools for learning in primary school promotes direct student engagement [11], [12]. In addition to the rapid development of ICT. Learning models are also growing [13]. There is an

innovative learning model, one of which is the flipped learning model. Flipped learning is a modern approach that provides the proper infrastructure to acquire 21st-century learning skills [14]. The flipped learning model emerges as a promising solution to overcoming the challenges of conventional education [15]. In the conventional learning model, teachers provide materials during the school day. Then, students must complete assignments according to the learned materials. Now, the flipped learning model integrates ICT to ensure students learn at home and are ready to interact, receive feedback, and evaluate the learning process in class [16], [17].

The implementation of the flipped learning model provides advantages in improving ICT-supported constructivist teaching and learning [18]. Flipped learning has many potential benefits, including more face-to-face interaction time between teachers and students, more collaborative, active learning, and independent learning [19], [20]. In addition, this type of learning also provides flexibility for students if they are unable to join the learning [21]. In addition, flipped learning can be considered as a complement to managing the use of time during learning. This model encourages giving more time to active and collaborative learning [22].

Digital learning materials are the cornerstone of the flipped learning model. These materials, defined as digitized teaching and learning resources interconnected through multimedia platforms [23], [24], offer distinct advantages. They provide flexible access, facilitate learning through multimedia content, and allow personalized learning experiences. These attributes make digital learning materials highly effective tools for achieving broader educational goals [25]. Additionally, their presentation in engaging formats such as videos, animations, interactive simulations, and web-based content significantly enhances student interest and engagement [26], [27].

In the context of civics education, the flipped learning model provides a unique opportunity for students to independently explore the values and principles of Pancasila through digital teaching materials before attending class [28], [29], [30]. This pre-class preparation enables students to delve deeper into the conceptual meaning and relevance of the material. Classroom sessions can then focus on active discussions, collaborative problem-solving, and practical applications of Pancasila values in real-life scenarios. Furthermore, digital resources such as interactive videos and simulations facilitate understanding abstract concepts by providing visual and experiential learning opportunities.

Integrating digital teaching materials within flipped learning accommodates diverse learning styles [31], [32]. Students engage at their own pace, revisiting materials to ensure comprehension, while multimedia elements such as animations and simulations enhance accessibility for visual and kinesthetic learners. This inclusivity fosters a more equitable and engaging learning environment for all students. Flipped learning also redefines the teacher's role, shifting from a direct instructor to a facilitator. Teachers guide discussions, clarify misconceptions, and design hands-on activities that encourage critical thinking and self-directed learning [33]. This pedagogical shift empowers students to take ownership of their educational journey while nurturing

essential skills such as problem-solving and analytical reasoning.

Another integral aspect of the flipped classroom is collaborative learning. In-class group activities and discussions reinforce content learned at home, fostering a deeper understanding of the material. These interactions not only enhance academic comprehension but also develop interpersonal skills such as teamwork and effective communication, which are vital for 21st-century learners. This model aligns closely with the principles of differentiated instruction. Digital resources in various formats cater to diverse learner needs, allowing advanced students to explore complex topics while providing foundational support for those requiring additional assistance [34]. This adaptability ensures that all students make meaningful progress in their learning journey.

In civics education, the flipped learning model supports cultivating character and civic responsibility [35], [36]. Digital resources, including real-life case studies, encourage students to reflect on applying Pancasila values in societal contexts. This approach fosters a deeper understanding of civic principles and their practical implications in daily life. Moreover, integrating technology in flipped learning enhances students' digital literacy. Students acquire competencies essential for academic and professional success through navigating online platforms, critically evaluating information, and utilizing digital tools effectively [37], [38]. These skills are integral to fostering a generation capable of thriving in an increasingly digitalized world.

Technology also facilitates continuous assessment within the flipped learning framework. Digital platforms provide analytics that allows educators to monitor student progress and deliver timely, personalized feedback. These mechanisms ensure that learning objectives are met and that students receive the support they need to succeed. However, the flipped learning model is not without challenges. Limited access to reliable technology and internet connectivity can hinder equitable implementation [39]. Addressing this digital divide must ensure all students benefit from this innovative approach. Furthermore, teacher readiness plays a critical role in the success of flipped learning. Educators require comprehensive training in developing and integrating digital teaching materials, making professional development programs essential.

The flipped learning model, supported by digital teaching materials and ICT advancements, represents a transformative approach to 21st-century education. Addressing traditional methods' limitations fosters active, personalized, and collaborative learning [40]. Its application in civics education, in particular, supports the development of informed and responsible citizens while promoting the internalization of Pancasila values. The model also encourages lifelong learning habits. By facilitating self-paced study outside the classroom, students develop time management, information retrieval, and critical analysis skills, which are invaluable for continuous learning beyond formal education settings. Gamification elements within digital teaching materials enhance engagement, making learning enjoyable and effective [41], [42]. Additionally, collaborative digital tools such as online forums and shared documents extend learning beyond the classroom. These platforms enable students to discuss, share

resources, and co-create projects, fostering a culture of collective knowledge-building in line with 21st-century competencies. This model also supports global competencies by exposing students to diverse perspectives through digital resources, encouraging adaptability and critical awareness [43]. For civics education, flipped learning bridges theory and practice by integrating real-world issues into the curriculum. Digital teaching materials introduce authentic societal problems, encouraging students to analyze them critically and propose solutions grounded in Pancasila values [44], [45]. This contextual approach ensures that learning remains relevant and impactful.

Parental involvement is another benefit of flipped learning. By accessing shared digital resources, parents can monitor and support their children's progress, fostering a collaborative learning environment at home and strengthening the parent-teacher partnership. Teacher facilitation also remains crucial in ensuring effective classroom interactions, as educators guide discussions, address challenges, and encourage critical thinking during in-class activities. Robust evaluation mechanisms are essential to the success of flipped learning. Periodic assessments of teaching strategies, technology integration, and student outcomes provide valuable insights for continuous improvement [46], [47]. This ensures that the model achieves its potential in transforming educational practices.

Combining the flipped learning model and digital teaching materials in civics education is expected to enhance students' understanding and internalization of Pancasila values significantly. Encouraging active participation and fostering critical thinking prepares students to be responsible and engaged citizens [48], [49]. This research aims to develop practical digital teaching materials that align with these objectives and support the broader goals of civics education in the 21st century. Integrating the flipped learning model and digital teaching materials in learning Pancasila is expected to help students better understand and internalize the values of Pancasila while encouraging active involvement and participation in the learning process [50], [51].

This approach bridges theoretical understanding with practical application, making Pancasila education more meaningful and impactful. Moreover, integrating digital teaching materials aligns with the broader goals of 21st-century education, fostering civic responsibility and academic achievement. Consequently, the primary purpose of this research is to develop practical digital teaching materials specifically designed to implement the flipped learning model effectively.

II. MATERIAL AND METHOD

This research is research and development (R&D). Development research or research and development (R&D) is a research model that aims to develop products that begin with needs research and then develop to produce a product that has been tested [52]. The development model used in developing this digital teaching material is the Thiagarajan model. The Thiagarajan model is better known as the 4D model. The 4D model stands for (1) defining, (2) design, (3) develop, and (4) disseminate [53].

The population of this study were students at Elementary School 45 Bungo Pasang. The sample in this study was 15

fifth-grade students of Elementary School 45 Bungo Pasang. The instruments used in this study were (1) Practicality sheet consisting of 12 questions related to the practicality of using digital teaching modules. (2) Assessment sheet consisting of 10 multiple choice questions.

The data obtained from the research instrument was analyzed using a Likert scale. Likert scale is a rating scale that requires respondents to indicate the level of agreement with a statement [54]. The Likert scale used in this study can be seen in table 1.

TABLE I
LIKERT SCALE

Category	Score
Very good	4
Good	3
Fairly Good	2
Not Good	1

Source: Modified Anita et al..[55]

The score of the practicality test results of digital teaching materials is processed using the following percentage formula [56].

$$NP = \frac{R}{SM} \times 100\% \quad (1)$$

Description:

NP = percent value sought; R = raw score obtained; SM = maximum score; 100 = fixed number.

The resulting data processing results are then used to assess the practicality of digital teaching materials, referring to Table 2.

TABLE II
PRACTICALITY CATEGORY

Intervals	Category
86-100%	Very Practical
76-85%	Practical
60-75%	Practical Enough
55-59%	Less Practical
00-54%	Not Practical

Source: Rivelia & Reinita [57]

Meanwhile, to process data on student learning outcomes after using digital teaching materials obtained from the assessment sheet using the formula stated by Atmojo [35].

$$N = \frac{SP}{SM} \times 100 \quad (2)$$

Description:

N = value sought; SP = score obtained; SM =maximum score; 100= fixed number.

As explained by Kemendikbud [58] In the *Kurikulum Merdeka*, there are no more criteria for determining student completeness in learning; all decisions are left to the teacher. Therefore, in this study, researchers set the completeness students must achieve at 80.

However, researchers still categorize student learning outcomes to determine the extent of student mastery of the material that has been taught. In addition, this categorization aims to determine the follow-up given to students after the learning process is carried out.

TABLE III
VALUE CATEGORY

Value	Category
91-100	Very good
71-80	Good
61-70	Fair
0-60	Needs Guidance

Source: Kemendikbud [59]

III. RESULTS AND DISCUSSION

A. Define

The defining stage in this research was carried out by observing and interviewing Elementary School 45 Bungo Pasang, Padang City. These observations and interviews were then analyzed based on need, curriculum, and material aspects. Based on these three aspects, it is known that grade V students of Elementary School 45 Bungo Pasang have never used digital learning media. This happens because the school does not have a projector to project the learning media. Therefore, a learning model and teaching module are needed that can overcome these obstacles.

To overcome these obstacles, researchers use an innovative flipped learning model, in which students first learn about the material to be learned at school. To support this learning model, researchers use digital teaching materials in the form of flipbooks that students can access using the link provided by the researcher.

B. Design

Digital teaching materials in this study were designed using Microsoft Office Word, which was then converted to Flip PDF Professional. Flip PDF Professional is an e-book maker application in the form of a flipbook that can load various types of media such as text, images, video, and audio [60].

At this design stage, following the stages of making a digital teaching module using Flip PDF Professional, which is put forward by Himmah [61].

1) First download the professional flip pdf application already available on the internet. By entering the keyword "Download flip pdf professional".

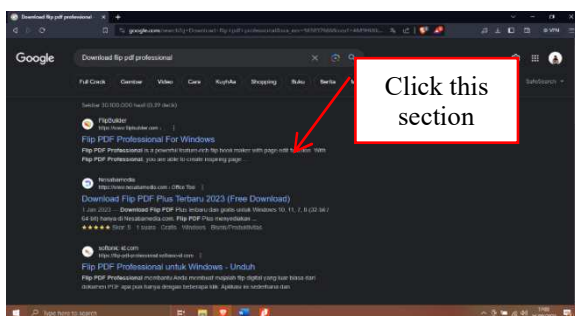


Fig. 1 Browser Search View

2) Install the app and make sure that the flip pdf professional app is in

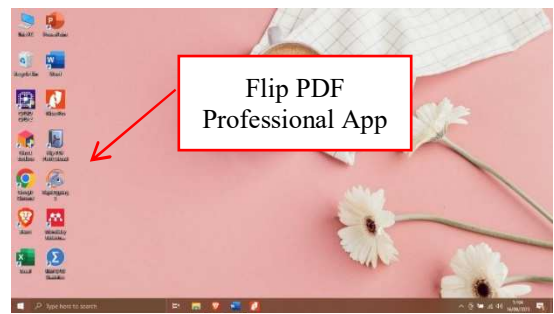


Fig. 2 Flip PDF view on Desktop

3) Open the flip pdf professional app and select "create new project".

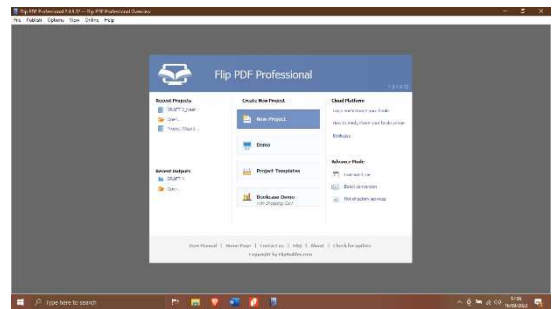


Fig. 3 Flip PDF Professional First Look

4) After that, the Pdf import window will appear. Here enter the prepared pdf handout by clicking on the "browse" button. Then "import now".

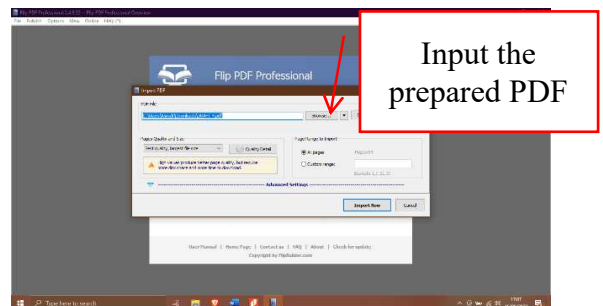


Fig. 4 PDF Import View

5) The initial view of your project will appear. To add the content of the handout click "edit page".



Fig. 5 Project Home View

6) In the edit page window, there are menu options for links, movies, YouTube, videos, sound, images, text, flash, shapes, and lines that can make the e-module display more interesting and interactive.



Fig. 6 Editing View

7) When the editing process is complete, click “save and exit” on the top right corner.

8) After the editing process is complete, click “Apply Change”, then “click publish”.

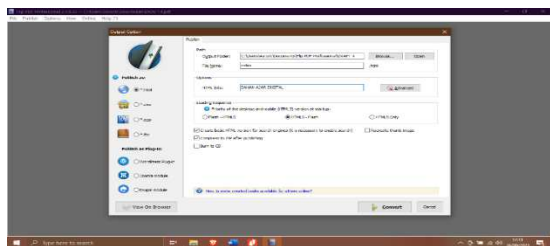


Fig. 7 Publish Media View

The project's results can be published in HTML, zip, exe, Mac app, mobile version, or burned to CD.

C. Develop

This study's development stage was to develop digital teaching materials that had been previously designed. Teaching materials are developed through the Genially application and combined with other applications, such as Canva, to design the digital teaching materials developed. The development of digital teaching materials considers the characteristics of elementary school students; digital teaching materials used in this learning are developed based on the results of the practicality test and measure the learning outcomes of fifth-grade students of SD Negeri 45 Bungo Pasang.

1) Practicality Test Result

The practicality test was conducted to determine the level of practicality of the developed digital teaching materials. This digital teaching material was tested in class V Elementary School 45 Bungo Pasang with a total of 15 students. The practicality questionnaire contains statements related to the attractiveness of the media, the use of language in the media, the ease of information in the media, and the benefits obtained from using the learning media that has been developed.

TABLE IV
PRACTICALITY TEST RESULTS

No	Assessed Aspect	Score
1	The main material on digital teaching materials about building identity in diversity is presented clearly.	4
2	The main material on digital teaching materials about building identity in diversity is presented coherently.	3.8
3	The main subject matter on digital teaching materials about building identity in diversity makes it easy for students to understand and remember.	3.8

No	Assessed Aspect	Score
4	Digital teaching materials on building identity in diversity contain images/video.	4
5	The presentation of digital teaching materials can lead me to think critically, creatively, and innovatively.	3.7
6	The material presented can increase my knowledge.	3.9
7	The images contained in the digital teaching materials are clear.	3.7
8	The letters contained in the digital teaching materials can be read.	3.8
9	The layout of images and parts of the organs of the digestive system in humans is appropriate.	3.8
10	Digital teaching materials used in learning are in accordance with the learning material.	4
11	Digital teaching materials can help understand the content of learning materials.	3.8
12	The design of digital teaching materials is attractive.	3.5
Overall Mean		45,9

Table 4 shows that the overall average score is 45.9. The score is then processed using the percentage formula to determine the practicality category of the digital teaching materials developed.

$$NP = \frac{R}{SM} \times 100\% \quad (3)$$

$$NP = \frac{45,9}{48} \times 100\%$$

$$NP = 96\%$$

The data processing above shows that 96% of digital teaching materials used in learning are practical. Based on the practicality category put forward by Rivelia and Reinita, the digital teaching materials developed fall into the very practical category.

2) Implementation of Pancasila Student Profile Values and Student's Learning Outcomes

The researchers sent a questionnaire related to the 5 values in the Pancasila Student Profile: Beriman, Bertakwa kepada Tuhan YME, Berakhlak Mulia, Bergotong Royong, Mandiri, Bernalar Kritis, and Kreatif. The table indicates that 85% of the Pancasila Student Profile values were internalized in this study.

TABLE V
IMPLEMENTATION OF PANCASILA STUDENT PROFILE VALUES

Students	Total Score	Maximum Score	Percentage
1	14	17	82%
2	14	17	82%
3	17	17	100%
4	15	17	88%
5	17	17	100%
6	16	17	94%
7	16	17	94%
8	14	17	82%
9	13	17	76%
10	10	17	59%
11	13	17	76%
12	13	17	76%
13	14	17	82%
14	15	17	88%
15	15	17	88%
	216	255	85%

Student learning outcomes are obtained from students' assessment sheet at the end of learning. The assessment sheet contains 10 multiple choice questions that must be done by students. From the data analysis, the average value of student learning outcomes was 88. Where 13 students get scores above the predetermined limit of completeness.

In addition, researchers also grouped students to find out the distribution of grades. Data on the distribution of student learning outcomes can be seen in Table 6.

TABLE VI
STUDENT VALUE DISTRIBUTION

Value	Category	Frequency
81-100	Very good	9
71-80	Good	4
61-70	Fair	2
0-60	Needs Guidance	0

Based on the data from the research that has been conducted, it is known that the digital teaching materials used in learning are efficient. The practicality of this digital teaching material is in line with student learning outcomes. 87% of students who take part in learning using digital teaching materials can achieve the predetermined completeness. This indicates that using digital teaching materials in learning can help students master learning materials. As stated by Viola and Waldi [62] the development of digital teaching materials can help the learning process in the classroom, make it easier for students to understand learning materials, and increase student interest and motivation.

IV. CONCLUSION

This is development research (R&D) with the 4D development model (Define, Design, Develop and Disseminate). The results showed that the media developed in this study fell into the convenient category, with a practicality percentage of 96%. This shows that the digital teaching materials developed can be used well by students in elementary schools learning Pancasila education. Digital teaching materials designed according to the characteristics of students in elementary schools have proven to be easily implemented by students and, at the same time, have an impact on improving their learning outcomes.

This study shows that as many as 87% of students can pass the specified completeness value limit in terms of student learning outcomes. The class average score was 88, indicating an increase in understanding of Civics learning material. These results also reflect the positive impact of flipped learning in learning. Students can better understand Pancasila's values by using digital teaching materials.

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