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PBL-Based Electronic Teaching Materials Using Flip PDF Corporate in Elementary Schools

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ABSTRAK

Sejalan dengan perkembangan zaman, maka di perlukan pembelajaran menggunakan bahan ajar elektronik. Guru dituntut untuk dapat memenuhi kriteria pembelajaran yang sesuai dengan perkembangan teknologi. Penelitian ini bertujuan untuk mengembangkan bahan ajar elektronik berbasis Problem Based Learning (PBL) menggunakan flip pdf corporate yang valid. Metode pengembangan menggunakan model ADDIE dengan tahap analisis, desain, pengembangan, implementasi, dan evaluasi. Penelitian ini meliputi metode pengumpulan data lembar validasi dari validator media, validator bahasa, dan validator materi. Pengumpulan data praktikalitas angket respon peserta didik dan guru. Hasil uji validasi media 93.75% masuk kategori sangat valid, hasil validasi materi 93.75% masuk kategori sangat valid, hasil validasi bahasa 95% masuk kategori sangat valid. hasil uji praktikalitas guru 97,14% dengan kategori sangat praktis dan peserta didik 93,7% dengan kategori sangat praktis. Dengan bukti hasil validasi produk dan hasil praktiklitas tersebut disimpulkan bahwa bahan ajar elektronik berbasis PBL menggunakan flip pdf corporate di sekolah dasar adalah valid dan praktis. Penelitian ini berimplikasi pada variasi bahan ajar yang valid untuk menunjang proses pelaksanaan pembelajaran.

ABSTRACT

In line with the times, it is necessary to learn using electronic teaching materials. Teachers are required to be able to meet learning criteria in accordance with technological developments. This study aims to develop electronic teaching materials based on Problem Based Learning (PBL) using valid corporate pdf flips. The development method uses the ADDIE model with the stages of analysis, design, development, implementation and evaluation. This research includes methods of collecting validation sheet data from media validators, language validators, and material validators. Collecting data on the practicality of student and teacher response questionnaires. The media validation test results were 93.75% in the very valid category, the material validation results were 93.75% in the very valid category, the language validation results were 95% in the very valid category. the results of the teacher practicality test were 97.14% in the very practical category and 93.7% of students in the very practical category. With the evidence from product validation results and practicality results, it is concluded that PBL-based electronic teaching materials using flip pdf corporate in elementary schools are valid and practical. This research has implications for a variety of valid teaching materials to support the process of implementing learning.

1. INTRODUCTION

The development of the times has become something that must be followed by all elements and must be able to adapt to these developments. Enterprise 4.0, like all the well-liked fact advancements, has its own proper form or configuration model. More or less, the notion of intelligent frameworks can, from one point of view, reproduce schedules as easily as digital large-scale productions (Shahroom & Hussin, 2018; Spante et al., 2018). Training 4.0 is a response to the necessities of industry 4.0 where human and technology are associated to facilitate novel capacity. Despite the fact that education 4.0 is one of the crucial mechanisms for countries to jump to this industry, the training approach and implementation must be numerous based totally on each state (Puriwat & Tripopsakul, 2020; Yoshino et al., 2020). Learning methods in the Education 4.0 era underwent a significant transformation, driven by technological

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advances and changes in the educational paradigm. In this context, learning is no longer limited to channeling information from teacher to students, but rather empowering students to become active and independent learners. Learning methods in this era combine advanced technologies such as artificial intelligence, data analysis, virtual reality and the Internet of Things to create learning experiences that are more interactive, personalized and connected to the real world (Robandi et al., 2019; Wang et al., 2021). Education 4.0 encourages approaches such as flipped classes, where students acquire learning content through online resources prior to class meetings, and in-class time is used for in-depth discussion, collaboration, and problem solving. Another approach is gamification, in which game elements are applied in learning to increase student motivation and engagement (Ahdhianto et al., 2020; Monica et al., 2019). In addition, Education 4.0 also promotes project-based learning, where students are involved in real projects to develop skills and practical concrete solutions. Thus, learning methods in the Education 4.0 era aim to prepare students with the critical, collaborative, creative, and problem-solving skills needed to face the challenges of an increasingly complex and technologically connected world (Kwangmuang et al., 2021; Mee Mee et al., 2020). PBL or Problem-Based Learning is an approach in education where learning is done through solving real problems or scenarios that are relevant to the learning material. This approach emphasizes providing real contexts to students so they can develop a deeper understanding of the subject matter as well as critical thinking skills (Sani et al., 2020; Sulaiman & Azizah, 2020). In the PBL method, learning begins with presenting a complex problem or situation that often does not have a clear answer. Students are then given the task of analyzing the problem, identifying necessary information, finding possible solutions or approaches, and working together to find understanding and plausible solutions. In this process, students will develop analytical, collaborative, and problem-solving thinking skills (Saputra et al., 2019; Sulistyaningrum et al., 2019).

Teachers have to lessen the dominance of information in schooling within the wish that students may be capable of surpass tech intelligence. Education this is balanced with character and literacy will make college students very clever in using machines for the gain of society (Koltay, 2011; Rachmadtullah et al., 2020). But what was done in a preliminary study in class v in cluster 1 Pauh District, Padang City found that the teacher had not implemented technology-based learning. this is due to the lack of facilities and teachers' understanding of existing technological developments. One of the ideal demands of the 2013 Curriculum is the use of ICT to increase the efficiency and effectiveness of learning (McLoughlin, 2011; Winda, 2016). Electronic teaching materials is a collection of several concern be counted published in digital shape, which is composed of text, photos or each and can be examine through a laptop or different digital device. Presently the electronic teaching materials can be displayed in the shape of a flip e-teaching materials (Kurnianto, 2022; Sriyanti et al., 2021). With flip PDF corporate edition, it is easy to embed several multimedia elements into your electronic book, as an example, text, shapes, links, audio, video, YouTube films, Vimeo videos, buttons, photos, and Flash animations (Erniwati, 2022; Sriyanti et al., 2021).

Therefore, Flip PDF Corporate can be used as a tool to develop electronic teaching materials. Problem based learning as a getting to know approach that starts with offering a hassle designed in contexts which can be applicable to the fabric with the intention to be found out to encourage students: acquiring understanding and information of principles, reaching crucial questioning, having self-reliance getting to know, collaborating abilities in organization work, and trouble solving abilities (Malmia, 2019; Zinnurain, 2021). PBL is a student-centered approach to getting to know which permits the scholars to paintings cooperatively in small agencies for in search of answers to conditions/problems (Susanti & Sholihah, 2021; Verma & Banerji, 2023). With the above background, it is necessary to develop PBL-based electronic teaching materials using Flip PDF Corporate that is valid and practical to use in learning.

2. METHOD

The type of research used by researchers is research and development (R&D). The development model applied is ADDIE. The ADDIE version changed into utilized to have a look of research and development method to create an effective semester instructional plan and to create analyzing substances (Ilma, 2023). The ADDIE model of educational design is a established educational model that gives an organized technique for developing instructional materials (Shelton & Saltsman, 2006). The ADDIE development model includes 5 pastime sequel steps there are analysis, design, development, implementation, and evaluation (Abd Razak et al., 2020; Najuah et al., 2021). This ADDIE model is one of the strategies which can manual the development of structured modules. Validity or validation test in the development of electronic teaching materials is to obtain results of valid electronic teaching materials to be developed and used in learning. The validation method was carried out before the start of the study to ensure the accuracy of the data (Devhare & Gokhale, 2023). Based on the results of the validation and suggestions given in the early stages, revisions were then carried out to produce teaching materials that

were valid according to the validity category. The validation test subjects or validators consist of media experts, material experts, and language experts. The instrument used is a validation questionnaire. The level of validity and reliability of a studies device could be very essential to make certain studies credibility (Daud, 2022). Likert scale is data collected in the form of ordinal or interval data types. Consequently, we want to recognize the shape of the Likert scale (such as the calculation and purpose of information series) earlier than identifying to apply the Likert scale in preparing research devices or data evaluation (Hendriani & Gusteti, 2021; Kusmaryono et al., 2022). Electronic teaching material validation instruments include media validation questionnaires, material validation questionnaires, language validation questionnaires (Andini & Qomariyah, 2022; Rikizaputra, 2021). Scores in the electronic teaching material validity questionnaire using the Likert scale category, can be seen in Table 1.

Table 1. Validation questionnaire rating scale

Information	Score
Very Good	4
Good	3
Good Enough	2
Not Good	1

To enter the percentage of validation results can be guided in **Table 2**.

Table 2. Percentage of Teaching Material Validity

Criteria	Percentage of Teaching Material Validity (%)
Very Valid	86-100
Valid	71-85
Invalid	41-55
Very Invalid	<40

After getting a validation score, whether or not a test is sensible or no longer is associated with the resource demands of the check set towards the available resources and is taken into consideration an critical standards contributing to its fulfillment (Nicholson, 2015). The practicality test was applied to the test subjects, namely grade v elementary school students at SDN 04 Pisang, Pauh District, Padang City with 20 students and 1 teacher. Practicality data using student and teacher response questionnaire sheets. To measure the level of practicality used percentages. The assessment score per question to fill out the practicality test can be seen in Table 3.

Table 3. Practicallity Questionnaire Rating Scale

Criteria	Score
Totally Agree	5
Agree	4
Less Disagree	3
Disagree	2
Strongly Disagree	1

To enter the percentage of validation results can be guided in **Table 4**.

Table 4. Percentage of Teaching Material Practicallity

Information	Percentage of Teaching Materials Practicallity (%)
Very Practical	81-100
Practical	61-80
Quite Practical	41-60
Less Practical	21-40
Impractical	<20

After getting a practicallity score, then calculate the final practicallity value using the average formula (Tilova, 2022).

3. RESULT AND DISCUSSION

Result

The validity test was carried out using an assessment questionnaire sheet to media experts. The validation assessment was carried out twice to produce a very valid category of media experts. The result is show in Table 5.

Table 5. Data Analysis Results of Media Expert Validation Test

NO	Assessment Rating	Results	
		I	II
1.	The layout and display layout of electronic teaching materials are consistent.	3	4
2.	Consistency of the content of electronic teaching materials with the table of contents.	4	4
3.	The use of text, images, videos in electronic teaching materials is proportional.	3	3
4.	The background display of electronic teaching materials is very interesting.	4	4
5.	Compatibility of images and videos with the content of electronic teaching materials.	4	4
6.	Pictures and videos clarify the concept.	4	4
7.	The front view (cover) of electronic teaching materials is interesting	4	4
8.	Selection of colors in interesting electronic teaching materials.	3	4
9.	The use of variations of letters (fonts) is not excessive.	3	4
10.	Easy operation of electronic teaching materials.	4	4
Total		**36**	**39**
Averange		**0.9**	**0.975**
Maximum Score		**40**	**40**
Percentage		**90%**	**97.5%**

Based on Table 5, the media expert validity test can be concluded very valid. Then data analysis results material expert validation test is show in Table 6.

Tabel 6. Data Analysis Results Material Expert Validation Test

NO	Assessment Rating	Results	
		I	II
1.	The suitability of the material with the 2013 curriculum	3	4
2.	Material on electronic teaching materials can support the achievement of core competencies.	4	4
3.	The description of the material on electronic teaching materials is clear and complete.	3	3
4.	Systematic presentation of consistent material.	4	4
5.	Teaching materials are developed according to the needs of students	4	4
6.	Teaching materials developed can provide opportunities for students to learn independently and with their respective abilities	4	4
7.	Electronic teaching materials are developed in accordance with the Learning Implementation Plan.	4	4
8.	The content of electronic teaching materials developed can add to the knowledge and insight of students.	3	4
9.	Display videos and learning pictures that help students.	3	4
10.	The accuracy of the videos and images presented in electronic teaching materials.	4	4
Total		**36**	**39**
Averange		**0.9**	**0.975**
Maximum Score		**40**	**40**
Percentage		**90%**	**97.5%**

Based on Table 6 can be concluded that obtain score 93.75 as very valid category. Data analysis of language expert validation test that was carried out using an assessment sheet. The results of language analysis is show in Table 7.

Table 7. Results of Data Analysis of Language Expert Validation Test

NO	Assessment Rating	Results	
		I	II
1.	The shape and size of the letters used in electronic teaching materials are easy to read.	3	4
2.	The description of information conveyed in electronic teaching materials is easy for students to understand.	4	4
3.	Teaching materials use simple and clear sentences and are easy to understand.	3	4
4.	Teaching materials use good and correct Indonesian language rules in accordance with EBBI.	2	3
5.	Sentences used according to the ability level of students.	4	4
Total		**16**	**19**
Averange		**0.8**	**0.95**
Maximum Score		**20**	**20**
Percentage		**80%**	**95%**

Based on **Table 7** show the results of language validation obtained score 95% or can be conclude as very valid. A data analysis result of practicality by Students is show in Table 8.

Table 8. Results of Data Analysis of Practicallity by students Test

NO	Assessment Rating	Results	
		Score	Maximum Score
1.	Attractive display of electronic teaching materials.	95	100
2.	The display on electronic teaching materials adds to the spirit of learning.	95	100
3.	Using electronic teaching materials makes the learning atmosphere not boring.	93	100
4.	The presentation of materials, images and videos is excellent.	94	100
5.	The color combination in electronic teaching materials is very good.	96	100
6.	Images and videos help in understanding the concept of the material.	92	100
7.	The material presented in electronic teaching materials is easy to understand	94	100
8.	The presentation of material on electronic teaching materials encourages students to be with other friends.	92	100
9.	The sentences and paragraphs used in electronic teaching materials are clear and easy to understand.	93	100
10.	Electronic teaching materials can be used easily.	93	100
Total		**937**	**1000**
Percentage		**93.7%**	

Based on **Table 8** show the results of practicallity by students obtained score related to 93.7% or categorize as very practical. Data analysis results of practicality by teacher are show in Table 9.

Table 9. Results of Data Analysis of Practicallity by Teacher Test

NO	Assessment Rating	Results	
		Score	Maximum Score
1.	The language used in electronic teaching materials is in accordance with EBBI.	**5**	5

NO	Assessment Rating	Results	
		Score	Maximum Score
2.	The material presented in electronic teaching materials is in accordance with the level of knowledge of students.	**5**	5
3.	Teaching materials make it easier for teachers to teach material to students.	**5**	5
4.	Proper placement of image illustrations in accordance with the description of the material.	**5**	5
5.	The presentation of material in electronic Teaching materials can help students understand the material.	**5**	5
6.	Electronic teaching materials make it easier for teachers to attract students' interest in learning.	**4**	5
7.	Visualization in engaging electronic teaching materials.	**5**	5
Total		**34**	**35**
Percentage		**97.14%**	

Based on Table 9 show results of the validation test by expert validators, the validity of this electronic teaching material product can be analyzed. Media expert validators get results of 93.75% with a very valid category, material experts at 93.75% with a very valid category, linguists at 95% with a very valid category. Practicallity results by students is 93.7% with a very practical category and by teacher 97.14% with a category very practical. With reference to the results of the validity test and the practicallity test, it can be said that PBL-based electronic teaching materials using Flip PDF Corporate in elementary schools are valid in terms of media, language, and material, and practical to use in learning.

Discussion

The purpose of this research is to measure the practicality and validity of the teaching materials developed. Based on the results of the analysis it is known that the results of the material validation test show that the teaching materials developed using PBL-based electronic teaching materials using Flip PDF Corporate have a very high validity, which is equal to 93.75%. Previous research stated that the validity of teaching materials is very important to ensure that the content presented is in accordance with the curriculum and learning objectives (García-Ceberino et al., 2020). These results indicate that the teaching materials successfully integrate PBL principles properly and are in accordance with learning needs in elementary schools (Adifta et al., 2022; Ahdhianto et al., 2020). Media validity refers to the extent to which teaching materials can facilitate learning effectively. The results of the media validation test of 93.75% indicate that the media used in electronic teaching materials is very valid for use in learning contexts. Thus, Flip PDF Corporate can be considered as an effective tool in designing and presenting PBL-based teaching materials in elementary schools. Language validity refers to the clarity and fluency of the language used in teaching materials (Susanti & Sholihah, 2021; Zinnurain, 2021).

The results of the language validation of 95% indicate that the language used in these electronic teaching materials is very valid and easily understood by students. Clear and communicative language is important to ensure that students can understand the concepts being taught properly. The practicality test results show that teachers consider PBL-based teaching materials that use Flip PDF Corporate to be very practical in the context of learning in elementary schools. The teacher's practicality percentage of 97.14% indicates a high level of satisfaction with the use of this teaching material. Flip PDF Corporate provides intuitive and easy-to-use tools for designing and presenting PBL-based teaching materials. Teachers can quickly develop engaging and interactive content without the need for in-depth technical knowledge. In addition, according to previous research, this electronic teaching material may include elements such as animation, video, and other interactives that can assist teachers in explaining concepts in a more interesting and effective way (Asrizal et al., 2022). In an increasingly sophisticated educational environment, the use of electronic teaching materials allows teachers to easily access and share teaching materials with students, even outside the classroom. Electronic-based teaching materials often allow teachers to adjust and customize materials according to the specific needs of the class and students. Students also gave positive responses to the practicality of PBL-based teaching materials using Flip PDF Corporate. The percentage of 93.7% indicates that students feel this teaching material is very practical and useful in the learning process. Interactive and diverse content in electronic teaching materials can make learning more interesting and enjoyable for students. This can help them be more engaged and actively participate in learning. Previous research found that the use of visual elements such as images, graphics, and animation in teaching materials can help students to more easily understand abstract or

complex concepts (Rohmah & Bukhori, 2020). Electronic teaching materials can be accessed on various devices, so students can study independently and flexibly outside of formal learning time. E-learning materials often include personal progress measurement features, which allow students to track their own progress in understanding learning concepts. Thus, the results of high practicality from both teachers and students show that PBL-based electronic teaching materials using Flip PDF Corporate have succeeded in creating an effective, interactive, and relevant learning environment at the elementary school level (Erniwati, 2022; Fairuzi, O., & Bentri, 2021).

Overall, these results support the claim that these teaching materials have a positive impact on the learning process and can improve the quality of education at the primary level. Based on the results of product validation and practicality tests conducted, it can be concluded that PBL-based electronic teaching materials using Flip PDF Corporate are valid and practical for use in elementary schools. This teaching material has high validity in terms of content, media, and language, and provides significant practical benefits for teachers and students in the learning process. This research makes an important contribution in the development of innovative and effective teaching materials to improve the quality of learning in elementary schools. By combining the PBL approach with electronic teaching material technology, the results of this study can serve as a guide for further development in designing more interactive and problem-based learning strategies. However, this study may have limitations in generalizing the results to a wider learning environment. The positive results of this study may not always apply perfectly to all primary schools due to differences in technological infrastructure, teacher abilities and learning conditions. In addition, this research may be carried out within a certain period of time and in a certain environment. The results and findings may differ if the research is carried out in different time periods or in different learning environments. Assessment of the practicality and validity of teaching materials can be influenced by the subjective perceptions of students and teachers. Some participants may be more comfortable with certain learning approaches than others, which can influence research results.

4. CONCLUSION

As found in the field there is no use of electronic-based learning such as electronic teaching materials which causes the lack of fulfillment of the characteristics of the 2013 curriculum and the lack of motivation of students in learning. So PBL-based electronic teaching materials were developed using corporate PDF flips that were valid in terms of media, language and material. This research has developed a product and obtained a very valid category. This product is expected to help schools and teachers carry out learning using PBL-based electronic teaching materials using flip PDF corporate in grade V elementary schools. For readers who wish to carry out further development, it is hoped that they will be able to apply the product in a broad term in a scope that is in accordance with the designed teaching materials.

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