Al-Ishlah: Jurnal Pendidikan
Vol.16, 3 (September, 2024), pp. 3322-3334
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v16i3.5044

Developing Flipbook-Based on Competency for Vocational High School Teacher

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ARTICLE INFO

Keywords:

Development
Flipbook;
Competency;
Vocational High School

Article history:

Received 2024-02-12
Revised 2024-03-01
Accepted 2024-07-03

ABSTRACT

This research aims to improve the quality of learning in vocational high schools by strengthening teachers' teaching skills as a learning tool, encouraging innovation in teaching methods, and providing a competency development model for vocational school teachers. This research uses research methods (Research & Development) with the 4D Define, Design, Development, and Disseminate model. This research method provides a systematic approach that includes steps and focuses on effectively developing teacher competency to ensure that the flipbook developed is relevant to practical and contextual needs. The 4D model provides a planned testing and evaluation framework, so that research can provide strong empirical evidence about the success of the learning model being developed. The first stage is to determine the needs and objectives of developing the flipbook, which is then continued by designing the concept and structure of the flipbook in accordance with the curriculum and teaching needs of vocational school teachers. After that, the development team carried out the flipbook development process based on a predetermined design, by carrying out regular trials and revisions. The final step is to socialize the flipbook to vocational school teachers and distribute it to relevant stakeholders. The research results obtained in the media validation test were 86%, material 88%, and language 89%. The Practicality Assessment obtained a score of 89% and classical completeness 100%. It was concluded that this medium for developing vocational teacher competency is effective as a reference choice in developing vocational teacher competency.

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1. INTRODUCTION

Education is a dynamic manifestation of human culture and continues to develop in line with the evolution of cultural life. Change and progress in education are necessities that always go hand in hand with changes in cultural life. The development of education, especially vocational secondary education, must continue to be carried out to anticipate future demands and developments, in line with the dynamics of the industrial world, the world of work, and advances in science, technology and the arts. In the current process of administering vocational schools, superior quality of human

resources (HR) is of course required (Sari et al., 2022). A challenge that knows no time limits and no country of origin. Only a nation that has superior human resources and good performance will win global competition. For this, of course, an effective school management system is needed, which of course requires a standard school. Vocational High Schools serve as educational institutions tasked with cultivating individuals equipped with abilities, skills, and expertise, enabling graduates to thrive in the professional realm. Aligned with Law No. 20 of 2003, Vocational Schools aim to enhance students' capabilities in line with advancements in science, technology, and the arts, while also preparing them for the workforce and fostering professional attitudes (Astalini et al., 2023). Two notable advantages of vocational education include: (1) graduates are poised to seize employment opportunities across various industries and entrepreneurship ventures, bolstered by certifications obtained through competency assessments, and (2) graduates have the opportunity to pursue advanced education provided they meet the requisite criteria.

The teaching staff holds a pivotal role in executing the instructional process, underscoring the crucial need for teacher competency in nurturing students' abilities. The proficiency of vocational educators is consistently emphasized to be intricately tied to the mastery of the skills taught and enhancing the quality of the teaching and learning experience (Eliyasni et al., 2021). Government Regulation of the Republic of Indonesia Number 19 of 2005 concerning National Education Standards Article 28 (3) delineates that competence as an educational facilitator across primary, secondary, and early childhood education encompasses (1) teacher proficiency, (2) personal attributes, (3) professional aptitude, and (4) social skills (Rohman, 2020). The teacher's competencies encompass various areas, including: comprehending the fundamental principles of education, recognizing students' attributes across physical, moral, spiritual, social, cultural, emotional, and intellectual dimensions; proficiency in learning theories and educational principles; crafting curriculum or syllabi pertinent to the subjects taught; designing learning frameworks; implementing engaging and interactive educational methods; incorporating information and communication technology into learning activities; fostering students' development to realize their diverse potentials; effectively, empathetically, and respectfully communicating with students; evaluating and assessing learning outcomes; utilizing assessment findings for learning enhancement; and engaging in reflective practices to enhance the quality of instruction (Sulistianingsih & Annisa, 2019).

In the collaboration for 21st-century education, there exist three essential skills to cultivate in the learning process. These competencies encompass: (1) fostering learning and innovation skills; (2) acquiring proficiency in information, media, and technology; and (3) nurturing life and career aptitudes. As future educators in the 21st century, vocational teachers need to acquire these proficiencies during their academic tenure. By doing so, they can then impart the same competencies to their future students. Consequently, the competence of vocational teachers in the 21st century hinges on various elements, such as comprehending knowledge and research findings related to education, discerning diverse learning characteristics, understanding educational frameworks, and analyzing and enhancing learning capabilities. Additionally, it involves grasping the concepts and theories encountered in their studies, as well as effectively utilizing information and communication technology (Narsih, 2017). The qualifications associated with vocational teacher competence, as outlined by the International Labor Organization (ILO) and other sources, include possessing comprehensive knowledge of learning materials, ICT prowess, the ability to share economic and social insights with students, instilling fundamental learning skills, engaging in reflective teaching practices, fostering empathy and communication with students, and fostering innovation in the learning process (Syaidah et al., 2018). Moreover, Technical and Vocational Education and Training (TVET) teacher standards emphasize skills such as planning, implementing, and evaluating learning, creating conducive learning environments, offering relevant learning materials, providing guidance

to students, and contributing to curriculum development (Giantoro et al., 2019) (Surani & Mifthahudin, 2018). TVET teachers are expected to possess ICT proficiency and be adept at analyzing, designing, and evaluating learning practices. Their competencies should also extend to implementing and refining learning strategies aligned with professional contexts. Effective TVET teachers must demonstrate proficiency in teaching ethics, managing industrial relations, curriculum design, pedagogy, evaluation techniques, and career guidance. Ultimately, the quality of vocational teacher competence is gauged by the excellence of their instructional practices (Sobandi, 2010) (Kamaruddin, 2021)(Astalini et al., 2023). A comprehensive evaluation of vocational teacher profiles suggests that qualified instructors should possess an understanding of vocational education concepts, student characteristics, and adeptness in managing contemporary learning environments conducive to fostering critical thinking, practical skills, and technology integration in the modern era.

The expectation for vocational educators is to grasp the fundamental purpose of vocational education, which is to prepare graduates for the workforce (Yulianto, 2019). Proficient vocational instructors must acquaint themselves with the principles of vocational education to ensure their students are adequately prepared for employment in their respective fields (Paida, 2018). Prosser identifies 16 theories of vocational education, one of which emphasizes creating learning environments that simulate real-world work scenarios. With advancements in technology, educators are increasingly integrating various multimedia software tools to develop instructional materials such as Flipbooks (Situmorang et al., 2020) (Suharsono et al., 2023).

Previous research has shown that increasing teacher competence through the use of interactive media has a significant impact on the level of student success in vocational education institutions. Teachers who have strong knowledge, skills, and attitudes in vocational fields tend to provide more effective learning, motivate students, and create a conducive learning environment (Agustini et al., 2022). A teacher's ability to manage the classroom, address individual student needs, and create an inclusive learning environment contributes to student engagement and academic achievement. Therefore, increasing the competency of vocational teachers through training and professional development is important to improve the quality of vocational education and achieve effective learning goals (Maknun et al., n.d.) (Nurlaila & Rambitan, 2020). Especially by using interactive media which helps make it easier for teachers to access information quickly and effectively, making it easier to understand the various competencies of vocational teachers.

2. METHODS

This research uses research and development methods (Research & Development). This research method is used to produce a particular product and test its effectiveness. What differentiates research and development methods from other methods is in terms of their objectives. The aim of research and development is to develop a product based on trials that have been carried out, then revise it to produce a product that is said to be suitable for use. So the research and development method is not just about developing a product but also validating the product being developed.

The 4-D model (Define, Design, Develop, Disseminate) was developed by S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel in 1974 and is a systematic approach to developing learning media or educational innovation. In the context of flipbook-based vocational teacher competency development research, the 4-D model can be very appropriate to the project objectives, effective in its implementation, and supported by its successful implementation in previous similar research.

a. Define: This stage is related to clearly identifying project needs and objectives. Researchers will define the problem, target audience, objectives of flipbook development, as well as other aspects

relevant to developing vocational school teacher competencies. By establishing clear parameters, 4-D models help focus on specific needs and direct efforts in the right direction.

b. Design: After the problem definition is carried out, the next stage is to design an appropriate solution. Here, researchers will develop a flipbook design plan that considers the needs of vocational school teachers and students, the applicable curriculum, and the technology to be used. Careful design helps ensure that flipbooks can provide effective solutions to the challenges faced in developing vocational school teacher competencies.
c. Development: This stage includes implementing the design plan into a flipbook that is functional and meets your needs. Researchers will develop flipbook materials, content and features by paying attention to technical and pedagogical aspects. Careful development ensures that the flipbook can be an effective learning tool for vocational school teachers to improve their competence.
d. Disseminate: After the flipbook is developed, the final stage is to disseminate the results to the intended target audience, namely vocational school teachers. This involves training, workshops, or seminars to introduce teachers to flipbooks and support them in their use. Effective dissemination ensures that the development results can be widely adopted and utilized by the vocational school teacher community.

The successful application of the 4-D model in previous research, which was proven to be effective in a similar context, provides strong justification for the selection of this model in a flipbook-based vocational teacher competency development project (Agustini et al., 2022). Therefore, the 4-D model is a solid and structured basis for achieving research objectives and ensuring its effectiveness in improving the quality of learning in vocational schools.

The population in this study were all vocational high school teachers in Karimun Regency, Riau Islands. In this research, sampling used purposive sampling technique. Purposive sampling is a sample determination technique with certain considerations in Sugiyono (2016: 85). The samples taken in this research were 37 teachers at Kundur Vocational School and 21 Kuta Vocational School teachers.

3. FINDINGS AND DISCUSSION

3.1. Definition Stage

3.1.1. Need Analysis

Observations on teachers at Kundur Vocational High School, Karimun Regency, Riau Islands Province became the focus of activities at the needs analysis stage. The purpose of analysis is to collect data and identify underlying problems with learning implementation. Observations provide researchers with various information regarding phenomena related to teacher competence in schools.

The school principal provided information based on researchers' observation findings that many teachers had low teaching competence. Researchers obtained information about when learning was taking place. There were still many teachers who did not understand the teacher's own competence. It is hoped that with this media teachers can improve the quality of competence as a result of the integration of developments in information and communication technology and the use of interactive media. It is hoped that this flipbook-based media can help teachers develop educational competencies, understand them, be motivated, and achieve their learning goals.

3.1.2. Teacher Analysis

Those who will be used as test subjects in this research are teachers at Kundur State Vocational high School and North Kundur State Vocational High School. It is necessary to pay attention to the teacher's characteristics, grasping power, motivation, and obstacles to determine appropriate procedures in developing media. In making this media, there is teacher analysis which functions as a development-oriented reference.

3.1.3. Formulation of Media Objectives

The final step at this stage is to formulate learning objectives. This is important so that the flipbook-based media is developed without being broad and focused on the expected competencies. Learning objectives are formulated from needs analysis, task analysis and formulation of media objectives so that indicators can be determined for achieving teacher competency results.

3.2. Design Stage

3.2.1. Flipbook Preparation

This stage is carried out to study teacher competency material on the flipbook. Then write down the questions that have been tested, then analyze the level of difficulty of the questions and the differentiating power of the questions, for questions that are indicated to be difficult or bad, improvements or replacements are made so that the questions used to test effectiveness are valid and reliable questions. This test will be used as a tool to determine teacher abilities and as an evaluation tool after implementing flipbook-based interactive media.

After using flipbook-based interactive media, this test is used to evaluate teacher abilities. Both pre-test and post-test were carried out. There are a total of forty questions in the form of objective or multiple choice tests.

3.2.2. Media Selection

The process of selecting learning media for presenting content is carried out. This research chose flipbook-based interactive media with the heyzine application. The software's ability to display images, videos, create buttons, and combine text, images, video, and sound into learning media is the reason for choosing this media.

3.2.3. Format Selection

When creating learning media, format selection is used to design and shape the content presented and the presentation methods used in the learning process. The media format has been selected. Starting with basic skills and a theoretical description of the material by adding images, video tutorials and so on.

3.2.4. Intial Design

Before continuing with further testing and validation, the initial design, which is a flipbook-based interactive media prototype, needs to be refined. A design framework for displaying flipbook-based interactive media was implemented during this phase. The main components of the media developed are as follows:

Figure 1. Result Cover Design, Material Page, and Video Content.

3.3. Development Stage

3.3.1. Validity of Learning Media

The data collected through filling out questionnaire-based validator questionnaires is used as the basis for determining how effective the interactive coefficient media is. Six verifiers who tested the media, materials and language developed were interviewed by researchers. The designed media designs are confirmed by the first and second validators respectively. Meanwhile, the media content developed is validated by the third and fourth validators and the language is validated by the fifth and sixth validators.

1) Media expert validator

   The Media Validator evaluates the media design created. Media expert suggestions and comments on flipbook-based interactive media. The content of the media is used as a guide to revise and perfect the media before use. By using the V Aiken statistical formula, the results of the validator evaluation for each expert are then analyzed. Media expert validation values can be seen in the table.

Table 1. Media Expert Validity Results Data

No.	Validator	Assessment (%)	Category
1.	Validator 1	87	Valid
2.	Validator 2	84	Valid
	Average	**86**	**Valid**

Based on the data in Table 1, Validator 1 got a validity score of 87 percent, Validator 2 got a validity score of 84 percent, and the average score was 86 percent. Flipbook-based interactive media received a media validation test score with an average score of 86 which was declared valid and suitable for use.

2) Material/Content Expert

Material quality, interaction, display, and learning are just a few of the many aspects examined by material experts. The two verifiers assess each aspect given to them and analyze them using the Aiken's V formula to obtain material validation results. The table displays the overall material validation results.

Table 2. Material/Content Expert Validity Result Data

No.	Validator	Assessment (%)	Category
1.	Validator 1	85	Valid
2.	Validator 2	87	Valid
Average		**88**	**Valid**

Based on the data in table 2, Validator 1 got a validity score of 85 percent, Validator 2 got a validity score of 87 percent, and the average score was 88 percent. Flipbook-based interactive media received a language validation test score with an average score of 88 percent which shows it is valid and can be effectively used in flipbook-based interactive media.

3) Linguist Validity

This assessment is carried out to see the quality of the language in the content or media content. The two verifiers assess each aspect given to them and analyze them using the Aiken's V formula to obtain language validation results. The table displays the overall language validation results.

Table 3. Linguist Expert Validity Results Data

No.	Validator	Assessment (%)	Category
1.	Validator 1	90	Valid
2.	Validator 2	88	Valid
Category		**89**	**Valid**

Based on the data in Table 3, Validator 1 got a validity score of 90 percent, Validator 2 got a validity score of 88 percent, and the average score was 89 percent. Flipbook-based interactive media received a material validation test score with an average score of 88 percent, which shows it is valid and can be effectively utilized in flipbook-based interactive media.

3.3.2. Practicality Test (Teacher Response)

The presence of a medium for developing teacher competency should be able to provide practicality and ease in searching for literature on developing teacher competency. For this reason, in developing a product, practicality tests are needed to produce a good product. Information about the practicality of this flipbook-based interactive media was obtained from a questionnaire filled out by 5 Kundur State Vocational School teachers. The results of the assessment of the practicality test are summarized in the table 4 below.

Table 4. Data on the Practicality Results of Teacher Responses

No.	Respondent	Percentage	Category
1.	1	93	Very Practical
2.	2	86	Very Practical
3.	3	91	Very Practical
4.	4	89	Very Practical
5.	5	87	Very Practical
	Average	**89 %**	**Very Practical**

Table 4 shows that the teacher's practicality test of flipbook-based interactive media received an average score of 89 percent from the five verifiers. This shows that flipbook-based interactive media is very useful for teachers as a medium to help develop teacher competence.

3.3.3. Effectiveness of Flipbook-Based Interactive Media

Apart from finding out practicality, the large group test also aims to find out its effectiveness. The effectiveness of using flipbook-based interactive media can be seen from the influence of media use on hypothesis testing on teacher test results between experimental and control classes.

1) Classical Completeness

Classical completion or completeness in test results can be seen from the percentage of teachers who completed it after using flipbook-based interactive media. The basis for determining a media with a classical completeness percentage greater than or equal to 85% is that flipbook-based interactive media is effectively used. If, on the other hand, the classical completeness percentage result is lower than 85%, then the media is not used effectively. The following are the results of the average test scores given to teachers in the control and experimental groups, which can be seen in the following table.

Table 5. Data on Classical Completion Results

Group	Amount	Pass	Not Pass	Percentage
Experiment	37	37	0	100 %
Control	21	10	11	50 %

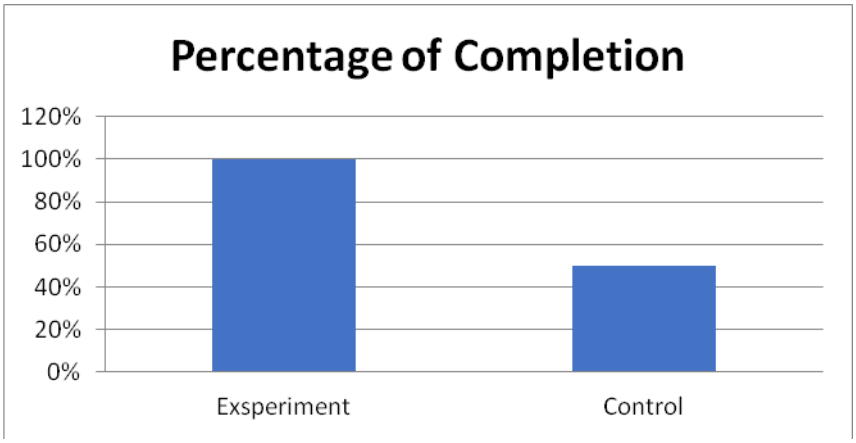

Figure 2. Effectiveness Testing Results Diagram

Based on the results of the analysis described in Table 5, the data obtained in the experimental group were 37 teachers or 100%, while the control group had 10 teachers or 50%. From the data obtained, it can be concluded that classical completeness has been achieved, which means that flipbook-based interactive media is effective when viewed from classical completeness.

2) Analysis Requirements Test Assessment Results (Pretest and Posttest)
There are two analytical requirements that must be met before carrying out hypothesis testing, namely the normality test and the homogeneity test. For more details, see the following description:
a) Normality Test
The normality test was carried out using the Kolmogorov-Smirnov formula which was carried out with the help of the IBM SPSS 16 application. This test was carried out to determine whether the experimental class and control class data were normally distributed, below are the results of the normality test, namely:

Table 6. Normality Test

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	df	Sig.	Statistic	df	Sig.
Test Result	PreTest Experiment	.104	30	.200*	.972	30	.592
	PostTest Experiment	.122	30	.200*	.903	30	.010
	PreTest Control	.127	30	.200*	.948	30	.152
	PostTest Control	.144	30	.114	.893	30	.006

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.

Based on the analysis of experimental and control class data at a significance level of 0.05, a normality value of 0.200 was obtained for the experimental class data, as indicated by the sig (2-tailed) asymp. With the normality value exceeding the significance threshold (0.200 > 0.05), the data is considered to be normally distributed. Similarly, the normality value for the control class data was 0.114, observed in the asymp sig (2-tailed). Since the normality value surpasses the significance level (0.114 > 0.05), the data is also deemed to be normally distributed.

b) Homogeneity Test
This test is carried out to find out whether the data has a homogeneous variance or not. The test uses the Levene Statistics formula with the help of the IBM SPSS 16 application. For more details, see the following description.

Table 7. Homogeneity Test

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Test Result	Based on Mean	3.693	3	116	.014
	Based on Median	3.570	3	116	.016
	Based on Median and with adjusted df	3.570	3	85.285	.017
	Based on trimmed mean	3.701	3	116	.014

Based on the SPSS output, the significance value for the experimental and control classes is 0.14>0.05, meaning that the experimental and control class data have the same/homogeneous variance and can be continued with hypothesis testing.

c) Hypothesis Test

This hypothesis testing stage was carried out to find out whether there was a difference in the average teacher test results in the experimental class and the control class. Hypothesis testing uses the comparative t test formula (independent sample t test) with the help of the IBM SPSS 16 application. For more details, see the following description.

Table 8. Hypothesis Test

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
HASIL TES GURU	Equal variances assumed	7.100	.010	-14.045	58	.000	-35.5000	2.5276	-40.5595	-30.440
	Equal variances not assumed			-14.045	43.931	.000	-35.5000	2.5276	-40.5943	-30.405

Hypothesis testing is conducted through comparative t-test analysis (independent sample t-test) using the SPSS 16 software. The criterion for decision-making is if the sig (2-tailed) value is <0.05, then the hypothesis under consideration is accepted. From this analysis, a sig (2-tailed) value of 0.000 is obtained. Since the sig (2-tailed) value is <0.05, it can be concluded that the proposed hypothesis is accepted. This indicates that there exists a variance in the average outcomes of teacher understanding between the experimental and control groups. By validating the proposed hypothesis, it is affirmed that flipbook-based interactive media is effective in enhancing the competencies of vocational school teachers.

3.3. Dissiminate Stage

In the final stage, the flipbook-based interactive media that has been produced is ready for teachers to use as a guide in developing teacher competency. This dissemination stage aims to find out how teachers use flipbook-based interactive media so that this media can be used as a supporting tool to improve teacher competence so that they become professional teachers.

Discussion

The process of developing flipbook-based interactive media starts with the process of defining, designing, developing and distributing. At the definition stage, several activities are carried out, namely needs analysis, teacher analysis, concept analysis, and at the end, conclusions are produced in the form of goal formulation. This stage was carried out as a basis for developing flipbook-based interactive media for developing teacher competency. After carrying out the definition stage,

flipbook-based interactive media was obtained which was ready to be tested.

The validity assessment of flipbook-based interactive media yielded an average validity score of 86%, falling within the valid category. The validators rated the material with an average validity score of 88% and the language with an average validity score of 89%, both categorized as valid. These findings align with previous research conducted by (Aswirna & Ritonga, 2020) and (Kusumatuty et al., 2018), indicating that the developed media was deemed valid in 94% of media aspects, 88% of material aspects, and 90% of language aspects. This observation is supported by the perspective of (Latifah et al., 2022) that learning media should fulfill certain criteria, such as being easy to comprehend, visually appealing, and precise, facilitating readability and serving as a motivational tool for readers. Based on validator assessments obtained from media experts, material and language experts regarding the use of flipbook-based interactive media as guidelines for developing teacher competency, it was concluded that flipbook-based interactive media was valid and suitable for use.

The results of the practicality of this flipbook-based interactive media were taken through product trials and questionnaire distribution conducted at Kundur State Vocational School. An assessment of the practicality of this learning media was carried out by teachers who obtained an average result of 89.2% in the very practical category. The practicality of the flipbook-based interactive media above is in line with the research of (Situmorang et al., 2020) with the results of her research providing information about the practicality of the media in the teacher respondent questionnaire which obtained a result of 85% in the very practical category. Referring to the response given by the teacher, the overall response given explains that the use of this media is very practical. This is further supported by the opinion of (Rahmawati et al., 2018) (Nurhikmah et al., 2021) that learning media must value practicality and simplicity so that it can be used easily to achieve learning goals.

Flipbook-based vocational teacher competency development media has a number of advantages compared to other development methods. First of all, interactive flipbooks offer a more visual and interesting presentation of information, utilizing images, animation and multimedia elements to enrich learning material. The flexibility of flipbooks allows the presentation of content tailored to the needs and characteristics of vocational school teachers, from tutorials to learning modules, in a format that is easy to access and learn. The interactive features in flipbooks allow teachers to actively participate in the learning process, carry out exercises, and test their understanding directly, which can increase their engagement and understanding of the concepts being taught. Additionally, the ease of use and accessibility of flipbooks allows teachers to access learning materials via a variety of electronic devices without the need for special hardware or software. Thus, flipbooks as a medium for developing vocational school teachers' competencies promise an interesting, interactive and easily accessible learning experience, which can improve the quality of teaching and learning in vocational high schools and help teachers to develop their competencies effectively.

The use of flipbook-based vocational teacher competency development media has important implications in improving the quality of teaching and learning. Interactive flipbooks can increase teacher engagement through interactive activities and multimedia content and help them adapt to developments in technology and curriculum. With flipbooks, teachers can efficiently search for relevant learning resources and develop innovative learning approaches. Overall, the use of flipbooks has the potential to encourage innovation in learning in vocational schools and increase teaching effectiveness.

4. CONCLUSION

Based on the results of the research conducted, it was concluded that this research produced a flipbook-based interactive media for teachers at Kundur State Vocational High School as an

alternative teacher competency development product or material that can be accessed via PC, laptop and mobile devices that can be used anytime and anywhere, especially to help in understanding the competencies of educators which are very suitable for use and valid. This is proven based on the results of media validity testing of 86%, material validity of 88% and language 89% with the category very valid for use. In the practicality test based on interactive media, the practicality test results obtained from teacher responses were 89% by category. And in the flipbook media effectiveness test, classical completion was 100%. This means that this media is very suitable to be used as an alternative guide for vocational high school teachers to understand the competencies that must be possessed so that the quality of learning can increase and learning objectives can be achieved. There are several limitations to developing flipbook-based vocational school teacher competencies. Limitations in resources, both software and content, can limit the quality and creativity of flipbooks produced in field applications such as school support and resistance to changes in a research context. Limitations in scope, time, and data can affect the validity and generalization of research findings. By considering these limitations, collaboration between related parties, the development of appropriate resources, as well as further research for further evaluation are needed to optimize the use of flipbooks in improving the competence of vocational school teachers.

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