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Effectiveness of Using Technological Pedagogical and Content Knowledge (TPACK)-Based Digital Functional Nahwu Material

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Abstract

This research is urgent because Nahwu is one of the basics of learning Arabic, especially for everyday communication. As time goes by, it has been developed by utilizing TPACK-based technology. The research aims to determine the effectiveness of digital Functional Nahwu material developed based on TPACK at MAN Pacitan. This research uses a quantitative approach with a population of all class X MAN Pacitan totaling 352 students. The sampling technique was purposive, so the samples were taken from class X.1 with 35 students and class X.4 with 35 students of MAN Pacitan. Data collection techniques used tests and questionnaires. The analysis uses an independent sample t-test. The research results are the independent sample t-test with SPSS, obtained Sig results. (2-tailed) 0.000 so that it is smaller than 0.05, then Ho is rejected, and Ha is accepted. This means that the TPACK-based digital functional Nahwu material is effectively used in Nahwu learning in class X.4 MAN Pacitan.

Keywords Digital Material; Functional Nahwu; TPACK

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1. INTRODUCTION

This research aims to determine the effectiveness of using digital Functional Nahwu based on Technological Pedagogical and Content Knowledge (TPACK) in class X MAN Pacitan. In other words, this research aims to evaluate how technology integration in teaching Nahwu Fungsional can enhance the learning process and outcomes for 10th-grade students at MAN Pacitan. Using the TPACK framework, which combines technology, pedagogy, and content knowledge, the study seeks to identify how digital tools specifically designed for Nahwu Fungsional can enrich the learning experience and facilitate a deeper understanding of the material. The research also aims to assess the impact of technology-based teaching methods on students' skills in understanding and applying Arabic grammatical rules and to measure how effective this approach is compared to traditional methods. Therefore, the findings are expected to provide valuable insights for curriculum development and teaching strategies in the field of Nahwu Fungsional and contribute to the digital pedagogy literature.

Functional grammar is not limited to the role that words or phrases play in a sentence, that is, to their syntactic or linguistic functions. This is because these semantic functions are only a part of the whole, such that the structural features of linguistic phrases are connected to the communicative purposes that these phrases serve as a means to achieve (Jamil et al., 2020). Teaching grammar should

support students in mastering linguistic skills, and the most suitable type of grammar instruction that supports skill mastery is functional grammar. This is because functional grammar and its rules serve as the skeleton of the language. Therefore, we urgently need to teach functional grammar by equipping students with grammatical skills that help in mastering the four skills (listening, speaking, reading, and writing). In other words, it involves the grammatical topics used in the students' spoken and written language, ensuring correct usage in parsing, structuring, and linking to make the meaning clear and understandable.

In teaching, grammar has specific educational problems, which is a field with a lot of ambiguity and difficulty in choosing the correct teaching method. Experts explain that the problems in teaching grammar are caused by presenting the grammatical material in a complex and detailed manner, and there are many differences in experts' opinions on explaining the applicable grammatical rules. (Munajat, 2015).

Like foreign languages, Arabic is one subject that requires the teacher's ability to manage the classroom, particularly their ability to effectively use available educational resources to create a comfortable and enjoyable learning environment. This helps engage and motivate students to follow the lesson independently or in groups. In the teaching and learning process, the teacher bears the burden of a manager, meaning that all tasks and responsibilities related to planning and implementing education in the school are entirely left to the teachers. (Hasibuan et al., 2023).

Thus, it is understood that success in the educational process depends on whether the teacher can effectively collaborate on the approach, strategy, method, material, and resources in the teaching and learning process to achieve the educational goals effectively. The teacher should have a strategy for choosing methods and using appropriate resources to deliver the material being taught, considering the classroom conditions. This helps to create a comfortable and enjoyable learning environment where students can easily understand and engage with the material.

Today's world is witnessing an increasing interest in media and its means, as media in the modern world is developing astonishingly due to technological advancements in communication arts, electronics, and printing technologies (M FIKRA, 2023). Educational resources are a fundamental source, and their need is essential for acquiring education in schools. Modern educational tools include the internet, computers, and language laboratories, which serve as models that encourage students to enhance their motivation to learn. This is because we have known that educational technology and its impact have been important and relied upon for a long time (Tafonao, 2018).

Machines have been developed so that what a person can see is no longer restricted by place or time. Schramm says: Initially, the camera and projection devices were introduced. Then came the printing of images, followed by cinema studios, distribution, and theaters. Similarly, machines were invented that allowed people to hear and be heard over vast distances, leading to the development of major telephone networks, sound recording, and radio. As listening machines were complemented by viewing machines, the foundation for sound films and television was established. (Abidin, 2016). Regarding the origins and development of information and technology, there has been a strong emphasis on achieving progress in utilizing technological advancements in the educational process. Teachers must be capable of using various educational devices effectively in the classroom. (Wachidi & Risdianto, 2019).

Technology and communications are now characterized by their presence in all areas of life, including the educational process. The fundamental characteristics of education in the 21st century are: (1) information is available anywhere and can be accessed at any time, (2) faster computing, (3) automation replacing routine tasks, (4) communication can be done from anywhere and at any time. Today, education has become increasingly important to ensure that students acquire the necessary skills for learning and innovation, using information technology and media, and the ability to succeed and survive using life skills. (Raihany et al., 2022).

The ability to think critically, solve problems, and collaborate has become essential competencies that students must possess. The 21st century is the age of knowledge, where information and technology are widely disseminated and generalized. As knowledge becomes more widespread, the synergy becomes faster and more advanced. The Research and Development Agency of the Ministry of Education and Culture (Litbang Kemdikbud) emphasizes that education in the current era allows students to explore various sources, formulate problems, engage in critical thinking, and collaborate in groups to solve problems. (Karim, 2017).

The researcher found issues in the 10th-grade class at MAN Pacitan, where Nahwu learning remains traditional, relying only on blackboard media and textbooks in plain PDF format. This reflects a significant challenge in the modernization and enhancement of educational effectiveness. First, the traditional Nahwu teaching method often depends on conventional approaches that may need to align with current technological advancements and students' needs. This approach typically involves using printed textbooks and teaching techniques that do not fully leverage digital technology. As a result, the learning process can become less interactive and less engaging for students accustomed to digital tools and media.

Second, the use of textbooks in plain PDF format presents several drawbacks. Although PDFs provide easier access compared to printed books, plain PDFs do not support interactive or multimedia elements that could enrich the learning experience. PDF textbooks often consist only of static text without additional features such as videos, animations, or interactive quizzes that could help students better understand Nahwu concepts. Additionally, the less dynamic presentation may cause students to lose interest and motivation, especially if they are more familiar with more interactive and engaging learning methods.

Third, the traditional approach to Nahwu teaching can limit teachers' ability to utilize technology in the instructional process. With advanced digital tools and technology-based teaching materials, teachers may be able to present content in a varied and engaging manner. This potentially reduces teaching effectiveness and students' learning outcomes.

Therefore, exploring and implementing teaching materials and methods innovations is crucial to align with technological advancements and modern students' learning needs. By identifying these issues, efforts to update and improve teaching methods and materials are being made by utilizing digital resources based on the TPACK framework. After development, it is essential to evaluate the effectiveness of the developed materials to determine whether they are effective and suitable for the 10th-grade students at MAN Pacitan.

Several researchers have conducted research related to this theme, including (1) Research conducted by (Khoiroh, 2022) shows the results that (a) The reading skill teaching model based on higher-order thinking Skills (TPACK) developed for students at Abdullah Faqih Islamic University is presented as a teacher's guidebook and is equipped with application software. The teaching model consists of the main contents, which include an introduction to the model, its characteristics, stages, and components that cover the objectives of teaching the reading skill. The model is deemed applicable, as the result obtained from the content expert for the model was 88% or a 'Good and Accurate' rating, from the technology tools expert 80% with the same standard, and from the educational material expert 87% with the same standard. The average result of the three experts for this developed teaching model is 85%. (b) After field testing, it was found that the model is effective for teaching reading skills to students in the Arabic Language Education Department at Abdullah Faqih Islamic University, as indicated by the validity score (0.000) being less than 0.05 in the SPSS statistical program. Furthermore, the final test result showed an average score of 81.7, indicating that the students were successful. The difference between that research and this study is that the former focuses on TPACK-based development in teaching reading skills at the university level, aiming to assess the effectiveness of reading skills instruction at the university stage. In contrast, this study evaluates the effectiveness of TPACK-based

digital functional grammar for the MA level.

(2) A research by Maisaroh (Maisaroh, 2022) Shows that: (a) The developed educational materials align with the principles of education based on higher-order thinking skills, students' interests, and needs analysis. The materials aimed at developing reading skills in students address current and realistic issues and phenomena occurring in society. The materials developed by the researcher consist of ten topics designed to enable students to achieve inferential, evaluative, and appreciative understanding. (b) The validity of the developed educational materials for reading skills is very good and suitable for use, as indicated by expert validation, with results of 94.62% for the educational materials, 87.25% for reading skills, 85% for educational technology, and 92% for language. (c) The effectiveness of using the developed educational materials is very good, as evidenced by the pre-test and post-test results, with a t-test value of 19.724 and a probability (P) of 0.000. Since the probability is less than α = 0.005, Ho is rejected, and H1 is accepted. This means that the instruction of reading skills developed for third-level students in the Arabic Language Education Department at Madura State Islamic University is effective and suitable for teaching. The theoretical result of this research is that the developed materials based on higher-order thinking skills combine psychology and local culture and help achieve inferential, evaluative, and appreciative understanding according to Barrett's reading skills classification. The difference between that research and this study is that the former focuses on developing teaching materials for reading skills at the university level, specifically evaluating the effectiveness of TPACK-based reading materials for university students. In contrast, this study focuses on assessing the effectiveness of TPACK-based digital functional grammar, which has been developed for the MA level.

(3) Research by (سيد صالح &محمد, ٢٠٢١) shows that The theory of functional grammar is considered a linguistically valuable theory because it has successfully attracted many researchers who have adopted its principles. This is because it covers essential aspects of linguistic phenomena and addresses gaps left by non-functional linguistic theories in critical areas such as speech and context. This has greatly assisted in understanding the rules of the Arabic language for non-native speakers, making it easier to comprehend and teach. (4) Research by Mabruroh (Mabruroh, 2019) shows that Developing the material involves ten steps: analyzing the problem and then planning and developing the material. Afterward, experts validated it to determine its suitability, implemented it with the students, and corrected the product. The researcher tested the material with five students, corrected the product, and tested it with a specified group. The pre-test was conducted before applying the material, and the post-test was applied to the developed material, which consists of three sections (subject pronouns, the subject and predicate, and factors). The steps followed are: Let us observe, Let us ask, Let us practice, Let us summarize, Let us present. 2. The development of the educational book for functional grammar with a scientific approach in the Religious Refinement School at Malang Islamic High Institute is effective, as indicated by the result where sig. (2-tailed) is greater than 0.05 (0.005), so H0 is rejected, and H1 is accepted, meaning 0.000 < 0.005. The difference between that research and this study is that the former focuses on the impact or influence of functional grammar in teaching Arabic. In contrast, this study focuses on the effectiveness of TPACK-based digital functional grammar at MAN Pacitan.

(5) Research by مؤيد فاضل (مؤيد فاضل et al., ٢٠١٩) It shows the importance of organizing the educational classroom environment for students according to the theory of functional grammar, which directs the educational process toward achieving the set goals correctly by stimulating variables and receiving responses. The diversity in using different teaching strategies and models, which includes educational activities within the proposed program, leads to achieving the desired educational objectives. The difference between that research and this study is that the former focuses on the influence of functional grammar theory and its role in Arabic language instruction. In contrast, this study focuses on the effectiveness of using TPACK-based digital functional grammar at MAN Pacitan.

In general, the conclusion from the previous research highlights the differences and similarities between the previous research and this study. The differences lie in that previous studies focus on the

development based on technological pedagogical content knowledge (TPACK) for reading skills at the university level, the development of educational books on functional grammar with a scientific approach, and the impact of teaching functional grammar in Arabic and its role. Therefore, research is needed to determine the effectiveness of using digital functional grammar materials based on TPACK. The similarities involve using the basis of TPACK for development in research and the study of functional grammar.

One of the key issues in the field of education during Indonesia's G20 presidency is digital technology in education. There has been an extraordinary acceleration in the use of digital technology in the world of education during the pandemic. About this issue, Indonesia aims to improve discussions and solutions on how digital technology can address problems of access, quality, and social equity in the education sector. As a result of this issue, teachers are expected to utilize technology in education, particularly in teaching Arabic. The researcher identified the use of digital functional grammar books based on TPACK in teaching grammar in the tenth grade at MAN Pacitan and is interested in examining the effectiveness of these books when used in Nahwu instruction. So, the main aim of this research is to determine the effectiveness of using TPACK-based digital functional nahwu books in class X MAN Pacitan.

The digital functional grammar here is based on TPACK, utilizing technology aspects such as Book Creator to produce digital books, Eleven Labs to generate Arabic voice recordings from text, and Plotagon Studio to create instructional videos. These three technologies are combined to produce a digital functional grammar book. The pedagogical aspect involves using a digital communication approach, where communication with students during the learning process relies on digital or technological means. The content consists of functional grammar material by Ahmad Mutawakil.

2. METHODS

This research uses a quantitative approach because it aims to determine the effectiveness of using the TPACK-based digital Functional Nahwu material that has been developed. The population in quantitative research is all objects or subjects that will be studied and have certain characteristics relevant to the research objectives. (Swarjana & SKM, 2022). Population is not just a number but includes all the characteristics or traits of the subject or object being studied. (Amin et al., 2023). The population in this study was all class X students at MAN Pacitan, **totaling 352 students**. The sampling technique in quantitative research is a systematic way to select a portion of the population to be studied, and the sample can be interpreted as a small portion of the research object selected by the researcher. (Firmansyah, 2022; Sudaryono, 2017). The sampling technique used in this research was purposive sampling, so the samples were class X.1 and class X.4. Class X.1 is a control class with a total of 35 students, and class X.4 is an experimental class with 35 students.

Primary data sources refer to information from the first source, namely data obtained directly from objects or individuals involved in the research. This means primary data is collected directly by researchers through various methods such as surveys, interviews, experiments, or observations. The main advantage of primary data sources is that the information obtained is very specific and relevant to the research objectives and can provide in-depth insight into the phenomenon under study (Hermawan & Pd, 2019). Primary data sources in this research were obtained from class X Arabic teachers and class X students at MAN Pacitan to obtain data related to the Nahwu learning process in class and to determine the characteristics of class X students at MAN Pacitan. Secondary data sources refer to information collected and processed by another party before being used for new research purposes. In contrast to primary data, which is collected directly from sources, secondary data comes from previous studies or research. This can include various types of information, such as research reports, journal articles, books, statistical data, and other published documents (Arifin, 2018). Meanwhile, secondary data sources were obtained from the TPACK-based digital Functional Nahwu

book, class X student grade data documents, and articles related to this theme. From the TPACK-based digital Functional Nahwu book, data was obtained in the form of material that will be given to students, then from the student score data document to determine the level of students' Nahwu abilities before using the digital Nahwu book and from articles to obtain data related to previous research and theories related to the theme this research.

Data collection techniques refer to the various methods and procedures researchers use to collect the information needed in a study or research. This technique is very important because the quality and reliability of research results depend on how the data is collected. (Herdayati et al., 2019). In quantitative methods, data collection techniques usually involve collecting numerical data that can be analyzed statistically. (Jogiyanto Hartono, 2018). In this research, data collection techniques used questionnaires and tests. Researchers used a closed questionnaire because the answers were given choices using a Likert scale. This questionnaire was given to class X.4 students or the experimental class to determine student satisfaction with the TPACK-based digital Functional Nahwu book. Meanwhile, the test was carried out twice, namely pretest and posttest, in the control and experimental classes. This test was conducted to obtain data regarding the effectiveness of using the TPACK-based digital Functional Nahwu book in class X MAN Pacitan.

Data analysis techniques refer to the processes and methods used to process and interpret data collected during research, aiming to identify patterns, draw conclusions, and make data-based decisions. This process involves several important steps, from cleaning and organizing the data to applying appropriate analysis methods and interpreting the results. (Nurlan, 2019). In this research, the data analysis technique used is the independent sample t-test with the prerequisite tests of data normality test and homogeneity test. The test was calculated using SPSS.

A research hypothesis is an initial statement or conjecture formulated by a researcher as a basis for testing in research. This hypothesis functions as a prediction that can be tested empirically to determine whether there is a certain relationship or effect between the variables studied. Typically, hypotheses are formulated based on theory, preliminary observations, or existing literature, providing clear direction for research design and data analysis methods. (Lolang, 2014). The hypothesis in this research is:

H_0: The TPACK-based digital functional Nahwu book is effectively used in Nahwu learning in Class X MAN Pacitan

H_a: The TPACK-based digital functional Nahwu book is not effective for using Nahwu learning in Class X MAN Pacitan

3. FINDINGS AND DISCUSSIONS

Findings

The TPACK-based digital Functional Nahwu Book was implemented in the experimental class, namely class X.4 MAN Pacitan, with 35 students in the even semester of the 2023/2024 academic year. Implementation is carried out in 5 meetings every Monday with an estimated 2 x 45 minutes, namely 10.10 WIB - 11.20 WIB, and on Wednesdays with an estimated 2 x 45 minutes, namely 07.00 WIB - 08.30 WIB. Implementation will start on Friday, May 3, 2024, and end on Wednesday, May 15, 2024.

Table 1. Activities in Experimental Class

Meeting	Day	Activity
First	Friday	Pre-test
Second	Monday	Chapter 4
Third	Wednesday	Chapter 5

Fourth	Monday	Chapter 6
Fifth	Wednesday	Post-test

This research is experimental, so there is a control class, class X.1 MAN Pacitan, with 35 students. Nahwu learning in the control class uses Arabic textbooks from the Ministry of Religion with blackboard media. The meetings will also be held five times starting Friday, 3 May 2024, and ending on Wednesday, 15 May 2024. Learning is held every Tuesday at 07.00 WIB - 08.30 WIB and Wednesday at 08.30 WIB - 10.00 WIB.

Table 2. Activities in Control Class

Meeting	**Day**	**Activity**
First	Friday	Pre-test
Second	Tuesday	Chapter 4
Third	Wednesday	Chapter 5
Fourth	Tuesday	Chapter 6
Fifth	Wednesday	Post-test

Table 3. Group Statistics Post-Test Control and Experimental Class

Class		**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Functional Nahwu	Experimental Class	35	85.6571	4.76472	.80538
Learning Results	Control Class	35	77.0286	6.13805	1.03752

Based on the image above, the SPSS results show that the average post-test score for students in the control class is 77.0286, and the average post-test score for students in the experimental class is 85.6571. This shows that the post-test scores of students in the experimental class are superior to those in the control class. Apart from that, the post-test scores of students in the experimental class were above the KKM score, namely above 75, while in the control class, there were 12 students whose scores were below the KKM score or below 75.

Data Normality Test

Before carrying out the t-test, researchers perform a data normality test using SPSS to determine whether the data is normally distributed. This is a prerequisite test for carrying out the t-test. The basis for decision-making in the data normality test is:

- When Sig. > 0.05, then the data is normally distributed

- When Sig. < 0.05, then the data is not normally distributed

The results of the data normality test are as follows:

Table 4. Pre-Test Normality Test Results

	Kolmogorov-Smirnov[a]			**Shapiro-Wilk**		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Control Class	.116	35	.200*	.961	35	.242
Experimental Class	.088	35	.200*	.980	35	.749

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

a. Lilliefors Significance Correction

The researcher used Shapiro-Wilk's data normality test because the sample was smaller than 50 (Nasrum, 2018; Usmadi, 2020). Based on the results of the pre-test normality test above, it shows that Sig. in the control class 0.242 and Sig. in the experimental class 0.749 then both are greater than 0.05 (0.242 > 0.05 and 0.749 > 0.05), so it can be concluded that the data is normally distributed in both the control and experimental classes.

Table 5. Post-Test Normality Test Results

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Control Class	.114	35	.200*	.970	35	.453
Experimental Class	.146	35	.058	.945	35	.080

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

a. Lilliefors Significance Correction

The researcher used Shapiro-Wilk's data normality test because the sample was smaller than 50 (Nasrum, 2018; Usmadi, 2020). Based on the results of the post-test normality test above, it shows that Sig. in the control class is 0.453 and Sig. in the experimental class is 0.080 then, both are greater than 0.05 (0.453 > 0.05 and 0.080 > 0.05), so it can be concluded that the data is normally distributed in both the control and experimental classes.

Homogeneity Test

After completing the data normality test and declaring that all data was normally distributed, the researcher conducted a homogeneity test using SPSS. The basis for decision-making in the homogeneity test is:

- When Sig. > 0.05, then the data is homogeneous

- When Sig. < 0.05, then the data is not homogeneous

The homogeneity test results are as follows:

Table 6. Pre-Test Homogeneity Test Results

Levene Statistic	**df1**	**df2**	**Sig.**
.496	1	68	.484

Based on the picture above, it can be seen that Sig. is 0.484, which is greater than 0.05 (0.484 > 0.05), so it can be concluded that the data is homogeneous.

Table 7. Post-Test Homogeneity Test Results

Levene Statistic	**df1**	**df2**	**Sig.**
.347	1	68	.558

Based on the picture above, it can be seen that Sig. is 0.558, which is greater than 0.05 (0.558 > 0.05), so it can be concluded that the data is homogeneous.

Independent Sample T-Test

Before carrying out the t-test, the researcher determines the research hypothesis, namely:

H_0: The TPACK-based digital functional Nahwu book is not effective for using Nahwu learning in Class X MAN Pacitan

H_a: The TPACK-based digital functional Nahwu book is effectively used in Nahwu learning in

Class X MAN Pacitan

The basis for making decisions on the results of the independent t-test using SPSS is as follows:

- If Sig. (2-tailed) > 0.05, then H_0 is accepted, and H_a is rejected

- If Sig. (2-tailed) < 0.05, then H_a is accepted, and H_0 is rejected

Table 8. Independent Sample T-Test Results

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std.Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Functional Nahwu Learning Results	Equal variances assumed	.347	.558	6.570	68	.000	8.62857	1.31343	6.00767	11.24947
	Equal variances are not assumed.			6.570	64.060	.000	8.62857	1.31343	6.00475	11.25240

Based on the picture above, it is known that the Sig (2-tailed) value is 0.000, so it is smaller than 0.05 (0.000 < 0.05) so that Ha is accepted. Ho is rejected, which means that The TPACK-based digital functional Nahwu book is effectively used in Nahwu learning in Class X MAN Pacitan.

Discussion

In this study, the researcher uses a quantitative approach. Quantitative research systematically investigates phenomena by collecting data that can be measured. This data is collected using statistical, mathematical, or computational techniques. (Abdullah et al., 2021). Quantitative research aims to develop and use mathematical models, theories, or hypotheses about natural phenomena. (Anshori & Ismawati, 2019).

Functional Nahwu learning in class X MAN Pacitan already uses TPACK-based digital books, so it uses technology. This makes learning more interesting for students, as stated by (Sanusi et al., 2023) In his research, using technology-based teaching materials in education has shown significant effectiveness compared to traditional methods. One of the main advantages of technology-based teaching materials is their ability to increase student engagement and motivation. With interactive features, multimedia, and attractive visual elements, technology can make learning material more interesting and relevant for students.

Additionally, technology-based teaching materials offer greater flexibility and accessibility. Students can access learning materials anytime and anywhere via computer, tablet, or smartphone. This supports distance or blended learning, where students can continue learning outside regular school hours. This easy access allows students to learn at their own pace and repeat material as needed, which can be especially helpful in understanding difficult concepts (Firmadani, 2020). Technology also supports the development of digital skills that are important in the modern era. By using digital tools and applications in learning, students gain academic knowledge and practical skills relevant to their future, such as using software, searching for information online, and collaborating virtually. Technology-based teaching materials often have analytical features that help teachers monitor student progress in real time and adjust their instruction as needed (Widianto, 2021).

However, more than just using technology in textbooks is needed; it is also necessary to use it appropriately so that teachers can learn innovatively. In line with what was stated by (Andriani, 2016), it is important to note that the effectiveness of technology-based teaching materials depends on how they are used. Technology integration must be done carefully and planned, ensuring that technology is used to support educational goals and not simply as an adjunct. In addition, teachers need to have adequate skills in using technology to maximize its benefits in the learning process. With the right approach, technology-based teaching materials can effectively improve learning outcomes and provide a better educational experience for students. The effectiveness of technology-based teaching materials depends on how they are used. Although technology offers various advantages, such as interactivity, accessibility, and the ability to present material in multimedia form, its success in improving learning outcomes is determined by the technology's existence and how it is integrated into the learning process. (Zahwa & Syafi'i, 2022).

Therefore, the Arabic language teacher for class X at MAN Pacitan often attends training related to technology-based learning and innovative teaching methods to effectively integrate TPACK-based digital Functional Nahwu books with innovative teaching practices to achieve more optimal and effective results.

Teachers need to have a good understanding of the technology they use. Technology can be an ineffective or even confusing tool for students without adequate knowledge. Teachers must be able to operate devices and applications smoothly and utilize them to achieve learning goals. This includes selecting applications that fit curriculum needs, integrating technology with existing teaching methods, and overcoming technical challenges that may arise. (Syamsuar & Reflianto, 2019). The effectiveness of technology in education also depends on the support and training provided to teachers and students. Effective training programs help teachers understand how to integrate technology with their teaching strategies and ensure that students know how to use digital tools properly. With adequate training, teachers and students may exploit the full potential of technology, which can reduce the effectiveness of technology-based teaching materials. (Nursyam, 2019).

Continuous evaluation and adjustment is key to ensuring that technology remains effective in learning. Teachers must continually evaluate how technology impacts learning outcomes and make necessary adjustments. This includes gathering student feedback, monitoring their learning progress, and adapting teaching strategies and materials according to evolving needs. With a proactive approach, technology can be a highly effective tool to support learning and achieve better educational outcomes (Adam, 2015). Apart from that, evaluation is also crucial to ensure that technology remains effective in learning. The evaluation process involves a final assessment of student learning outcomes and ongoing monitoring of technology use and its impact on learning. By conducting a thorough evaluation, teachers can identify the strengths and weaknesses of technology use in the classroom and make necessary adjustments to increase its effectiveness (Ambarwati et al., 2021).

In this research, the form of the evaluation carried out to determine the effectiveness of using the TPACK-based digital Functional Nahwu book was to use a test, namely a post-test. In this way, it can be seen how the digital book affects the Nahwu Functional learning outcomes of class X students at MAN Pacitan.

Evaluation should include an assessment of technology integration in the curriculum and teaching strategies. Teachers must evaluate whether the technology supports the stated learning objectives and integrates well with traditional teaching methods. This evaluation also analyzes whether the technology enhances the learning experience or becomes a distraction. In doing so, teachers can adjust how they use technology, such as choosing more appropriate applications or changing how the material is delivered to maximize the benefits of technology. (Damayanti & Nuzuli, 2023; Sari & Syarifuddin, 2022).

After the evaluation, which this research carried out through tests, showed increased functional nahwu learning outcomes for class X MAN Pacitan students. The TPACK-based digital Functional

Nahwu book is effectively used in Nahwu learning in class X MAN Pacitan. Apart from that, its use also attracts more students' attention during the learning process because learning becomes more fun and makes students more curious about the material presented, fostering a sense of enthusiasm for Nahwu learning in class.

Digital books can significantly increase student attention through interactive and multimedia features unavailable in traditional printed books. One of the main advantages of digital books is their ability to present learning material more dynamically and interestingly. (Syawaludin, 2019). Digital books often include videos, animations, and interactive graphics that can help explain abstract concepts more visually and intuitively. Digital books can capture students' interest and retain their attention longer than static text by presenting material in a more visual and engaging format. (Ruddamayanti, 2019).

4. CONCLUSION

In this study, tests were carried out twice in both the control class (X.1), and the experimental class (X.4). The results of the pre-test and post-test were used to carry out a t-test to determine the effectiveness of using the TPACK-based digital Nahwu Functional book. After the test, an independent sample t-test is carried out with two prerequisite tests: the data normality test and the homogeneity test. The analysis used an independent sample t-test. The research results are the independent sample t-test with SPSS, obtained Sig results. (2-tailed) 0.000 so that it is smaller than 0.05, then Ho is rejected, and Ha is accepted. This means that the TPACK-based digital functional Nahwu material is effectively used in Nahwu learning in class X.4 MAN Pacitan.

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