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Development Of Independent Learning Activity Unit Of Digital Based On Android To Improve Student Learning Outcomes

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Abstrak
Penelitian ini bertujuan untuk mengembangkan ILAU Digital Berbasis Android dalam meningkatkan hasil belajar siswa pada materi pendidikan agama Islam di Madrasah Aliah. Jenis penelitian ini termasuk dalam Research and Development (R&D) dengan tahapan pengembangan seperti pendefinisian, perancangan, pengembangan, dan penyebaran. Teknik pengumpulan data yang digunakan dalam penelitian ini adalah validasi ahli, angket respon, dan tes tertulis. Analisis keabsahan data menggunakan Aiken's V dan Percentage of Agreement. Analisis peningkatan hasil belajar menggunakan uji N-Gain. Pengambilan data hasil belajar berdasarkan desain Nonequivalent Control Group sehingga terdapat kelas eksperimen dan kontrol. Hasil penilaian validator ahli menunjukkan bahwa instrumen penelitian dan produk yang dikembangkan termasuk dalam kategori sangat valid. Siswa dan guru memberikan respon yang sangat baik terhadap penggunaan produk. Ilau Digital berbasis Android praktis digunakan dalam pembelajaran. Sedangkan hasil uji efektivitas menunjukkan produk ilau digital berbasis Android dapat meningkatkan hasil belajar siswa dan mempengaruhi hasil belajar siswa. Peningkatan yang terjadi setelah penggunaan produk sebesar 82% dan termasuk dalam kategori efektif. Kesimpulan penelitian ini adalah pengembangan ilau digital berbasis Android dapat meningkatkan hasil belajar siswa.

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Abstract
This study aims to develop ILAU Digital Based on Android in improving student learning outcomes in Islamic religious education materials in Madrasah Aliah. This type of research is included in Research and Development (R&D) with development stages such as define, design, develop and disseminate. Data collection techniques used in this study are expert validation, response questionnaires, and written tests. Validity data analysis using Aiken's V and Percentage of Agreement. Analysis of increased learning outcomes using the N-Gain test. Taking data on learning outcomes based on the Nonequivalent Control Group design so that there are experimental and control classes. The results of expert validator assessment show that the research instrument and products developed are included in the very valid category. Students and teachers give very good responses to the use of products. Ilau Digital based on Android is practically used in learning. Meanwhile, the results of the effectiveness test show that Android -based digital ilau products can improve student learning outcomes and affect student learning outcomes. The increase that occurred after the use of the product was 82% and included in the effective category. The conclusion of this study is that the development of Android -based digital ilau can improve student learning outcomes.

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1. INTRODUCTION

21st century oriented to the development of the Industrial Revolution era 4.0. As part of the global community, teachers and students are both challenged to be able to master the 21st century skills. Technology is an important element for the survival of society (Dakhi et al., 2020; González-Pérez & Ramírez-Montoya, 2022; Mishra & Mehta, 2017). Every aspect of life requires the role of technology in supporting their needs. The application of technology can be applied to various sectors, one of which is in the field of education as in the learning process (Bahtiar, 2023; Kim et al., 2019; Popkova & Gulzat, 2020).

The use of information technology and computers in the world of education is often used as a learning medium for learning and learning evaluation (Palvia et al., 2018). Technology in the field of education is very helpful for teachers when carrying out learning activities (Christensen & Knezek,

2017; Maimun & Bahtiar, 2022; Susilo et al., 2020). Therefore, educators and students must be able to make adjustments to existing technological advances. This has become a demand for the times that occur. If you are not able to make adjustments, the world of education in Indonesia will experience a lag (Bahtiar et al., 2022).

Along with technological advances, it turns out that there are still many people who do not understand in using existing technology. The fact that it appears that in Indonesia, awareness and knowledge of the public about information and communication technology is still low (Bantugan, 2017; Maimun & Bahtiar, 2022). Observation results also show that there are still teachers who minimal information about the use of several technological platforms. Though there are several digital platforms that can present a learning unit that is useful for students in learning activities.

21st century learning has the essence of student -centered (student center). The teacher is no longer the central learning but as a facilitator (Bahtiar, 2018; Jan, 2017). The teacher focuses on developing high -level thinking, communication, collaboration, and other skills needed. But in reality there are still many teachers who dominate learning activities so that the teacher is seen as a learning center. Traditional learning methods are still the choice of teachers. This method does not mean that it is not good, but it would be better if the learning carried out varies and involves several digital platforms. The goal is that students do not get bored following learning and are able to produce effective and efficient learning. Another goal is so that student learning outcomes increase.

This problem is an important concern for teachers so that students are able to learn independently anytime and anywhere. Therefore it is necessary to develop an independent learning activity unit (ILAU) in the form of a digital platform. One form of digital ilau that can be produced is Android -based. So far, the making of ILAU Digital Based on Android is still minimal.

Another problem that is often faced by students and educators is the effectiveness of learning that is often disrupted. Most Islamic religious education teachers record material on the board and students again record in their respective notebooks. This certainly disturbs their focus and enthusiasm for learning. Every element of education certainly expects an effectiveness and efficiency in the learning process so that it also has a positive impact on learning outcomes. Utilization of technology is one of the best choices when faced with some existing problems. Learning using technology is more effective than traditional methods because it makes many benefits (Ahmadi & Reza, 2018). Research provides evidence that mobile devices have become learning tools with great potential in education (Wu et al., 2018).

The selection of Android as the basis for developing ILAU Digital based on several reasons. Android touches a lot of the wider community including the world of education (Liliarti & Kuswanto, 2018). In addition, the use of Android is easier so that learning activities look more efficient and have a positive impact (Dwandaru et al., 2021). Making an Android application itself is not so complicated. One of the platforms that can be used as the basis for creating an Android application is Microsoft PowerPoint software. Many teachers only know the use of Microsoft PowerPoint only as a medium for learning presentations.

Microsoft PowerPoint support software in producing application products, namely Ispring Suite. This software is still not widely known by teachers in elementary school. The advantages of the Ispring Suite include being able to provide an interesting form of learning evaluation in a ILAU Digital platform. Ispring Suite also helps the final process of making applications by publishing files created to the application format.

Based on some of the problems above, it is necessary to make an effort to overcome them. One form of business that can be done is by developing Android-based digital ilau to improve the learning outcomes of Islamic Religious Education (Fiqh) Madrasah Aliyah students. This research is expected to increase learning independence and student learning outcomes in Islamic religious education lessons.

2. RESEARCH METHOD

Types of research

This type of research includes research and development (R&D). This study refers to the 4D development model consisting of four stages of development, namely Define, Design, Develop and Disseminate. The development of Android -based digital ilau uses a 4D model because the 4D model is more collapsed and simple. The development flow of Android -based Digital Ilau products can be seen in Figure 1 below.

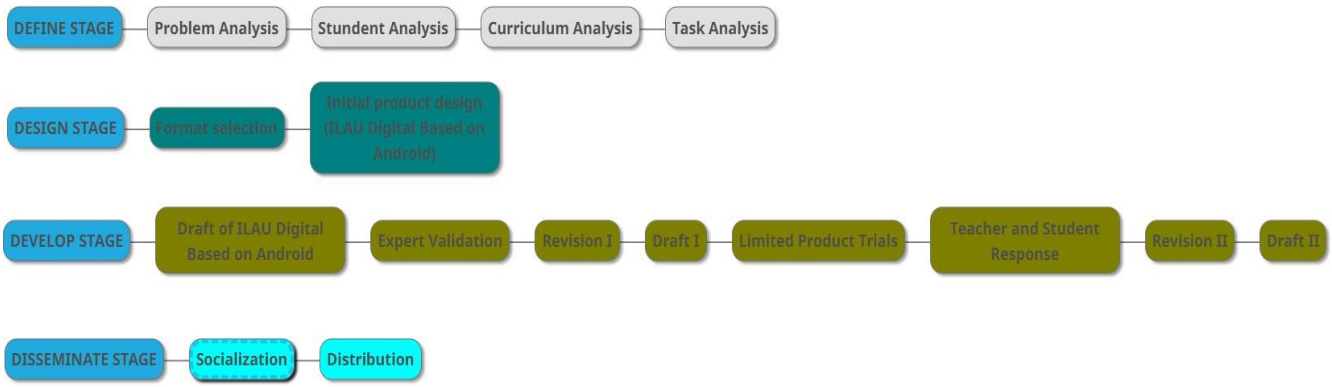

Figure 1. Development Flow of ILAU Digital Based on Android

Population and Sample

Population is a collection of respondents in an organization under study. The population used in this study was Madrasah Aliyah Negeri 1 Mataram. The research sample is part of the population. The sampling technique used in this study was purposive sampling, so the sample used in the limited XOBA test was 30 students of Madrasah Aliyah 1 Mataram, while the sample of the trial was a class XI Madrasah Aliyah Negeri 1 Mataram as many as 2 classes with The total sample is 58 people. Characteristics of research samples by sex are presented in Figure 2 below.

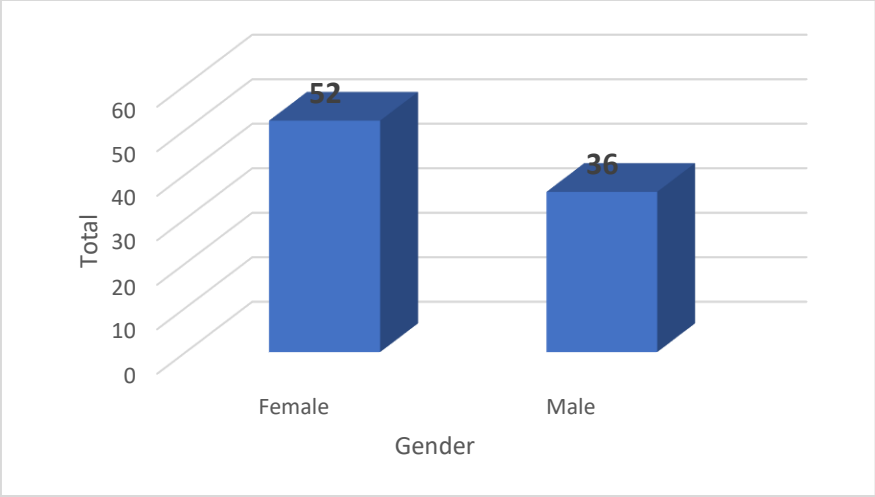

Figure 2. Sample Characteristics Based on Gender

Product Trial

Trial of ILAU Digital Based on Android Products using the One Group Pretest and Postest design. Students involved in class XI Madrasah Aliyah. The first meeting of students will be given a pretest. Then students are given treatment in the form of the use of digital ilau in learning. The final meeting of students is given a posttest. The purpose of this trial is to determine the response of students and

teachers so that they get product readability data. Therefore, at the end of the test, students will be distributed response questionnaires.

Test the area of ILAU Digital Based on Android products developed using the type of experimental quasi research with the Nonequivalent Control Group design. The test design is shown in Table 1. This test uses two classes, namely the experimental class and the control class. The control class uses learning with ILAU Digital Based on Android that is commonly used in learning (X2) while the experimental class uses ILAU Digital based on Android (X1). Before being given treatment, the two groups were given an initial test (O1 and O3) to see the initial capabilities they have. After treatment, students are given a final test to find out the increase in student learning outcomes (O2 and O4).

Table 1. Extensive Trial Design

Classes	Pretest	Treatment	Posttest
Experimental	O_1	X_1	O_2
Control	O_3	X_2	O_4

Data Collection Technique

Data collection is the process of gathering the required data. Data collection techniques used in this study are interviews and observations, expert validation and practitioners, response questionnaires, written tests and documentation. The data collection instrument used is an interview guide (instrument), expert validation sheet, response questionnaire sheet, assessment sheet of learning outcomes instruments, test instruments. The learning outcomes test instrument is in the form of multiple choice questions. The learning outcomes test instrument in the form of multiple choice questions consists of 30 questions with five choice answers. The learning outcomes test instruments in the form of multiple choice questions are spread from the cognitive level of knowledge (C1), understanding (C2), application (C3), analysis (C4), synthesis (C5), and evaluation (C6).

Data Analysis Technique

The next stage is the data analysis stage. For pre-research, an Android-based digital ilau feasibility test was developed after being validated by an expert lecturer using the Aiken's V and Percentage of Agreement formula. During the research process, the learning process practicality testing using observation sheets and questionnaire sheets. As for the post-research, the effectiveness test was carried out using the N-Gain test and the effect testing using paramteric statistics in the form of a Paired Sample t test with SPSS.

3. RESEARCH AND DISCUSSION RESULTS

3.1 Research Result

This development research aims to describe the validity, practicality and effectiveness of the learning process of the ILAU Digital Based on Android. Development carried out measures the ability of students to the variables of learning outcomes of jurisprudence. The main stages in this development are validation assessments, practicality tests and effectiveness. The following is a review of the results of the development that has been carried out by the researcher.

Validity and Reliability

Every development research needs to assess validity of the research tools and products developed. Assessment is carried out by several experts including media and material experts. The decision on the results of the assessment is carried out by confirming the value with the specified criteria.

The device validation is carried out by three expert validators. Assessment is carried out on the syllabus, lesson plan, and instrument of learning outcomes tests. In addition, product

validation is also carried out in the form of assessment and input on material and media. The assessment is carried out by three validators. Aspects of material assessment include the completeness of the material and language use. Meanwhile, media assessments include aspects of appearance and engineering. Data collection uses validation sheets that have been made. The following data are the results of the validation of research devices and ILAU Digital Based on Android that have been carried out.

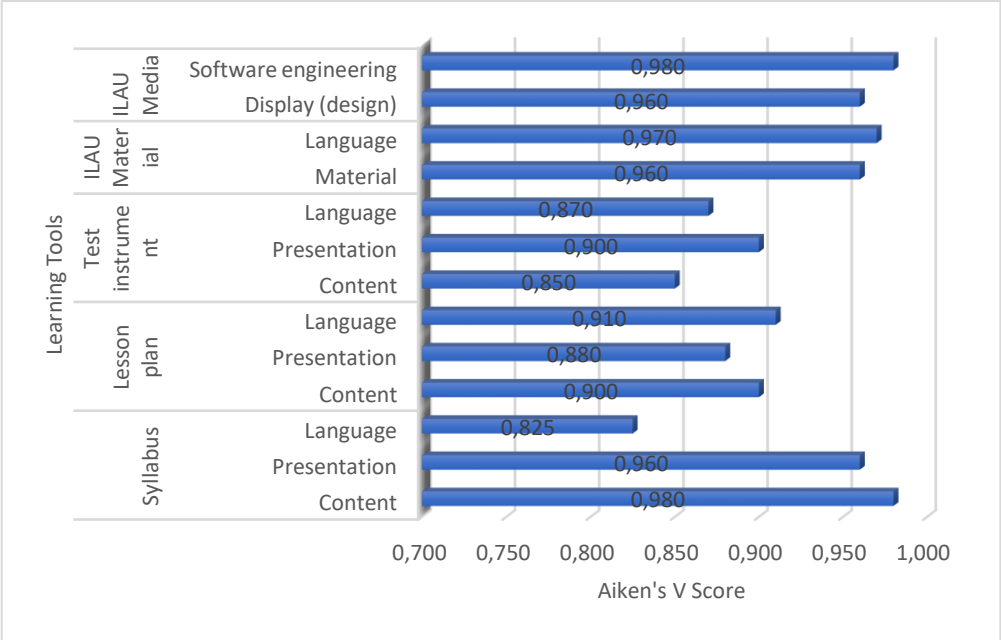

Figure 3. Expert Validation Results

Based on the results of the expert validation in Figure 3, it can be seen that the average score given by the validator of each aspect of learning tools and ILAU Digital Based on Android is in the range of Aiken index values of more than 0.80. The range of values indicates that the validity level of android -based digital devices and iluu is developed in a very valid category.

In addition to analyzing the validity level, reliability was also carried out from the results of the assessment of each expert. Reliability The results of the assessment are based on an agreement between validators. Agreement between validators was analyzed using the Percentage of Agreement. The results obtained based on the reliability of each validator are presented in Table 2 below.

Tabel 2. Learning Tools Reliability Results

Component	$V_{1.2}$	$V_{1.3}$	$V_{2.3}$	***Percentage of Agreement***
Syllabus	95.56	96.67	98.61	96.95%
Lesson Plan	95.96	95.98	94.87	95.60%
Test Instrument	94.87	97.33	97.92	96.71%
ILAU Digital Based on Android	95.50	94.50	95.95	95.32%

Table 2 shows that the results of the Percentage of Agreement analysis are in a range of values of more than 75%. These results indicate that the device developed is in the reliable category. The level of confidence in measurement of the data obtained is trustworthy.

The assessment results in the form of qualitative data are also given by the expert validator. Constructive suggestions are made during the assessment. The entire records and suggestions from

the validator have been improved well. The results of this improvement (Figure 4-9) can be continued to the trial stage. Trials are carried out in a limited or broad manner.

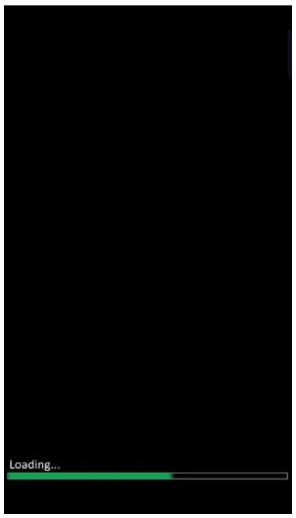

Figure 4. Initial Loading Display

Figure 5. Developer Profile

Figure 6. Main Menu

Figure 7. First Activity

Figure 8. Task Description

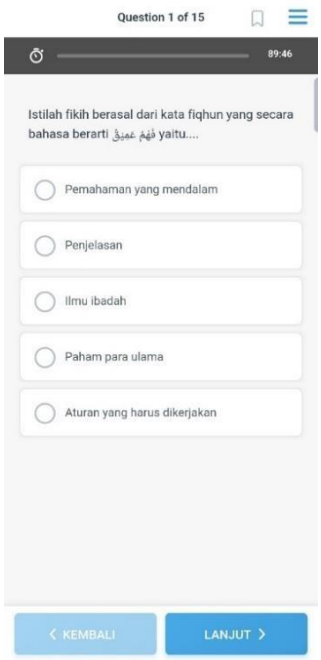

Figure 9. Multiple Choice Task

Product Trial Results

The product trial results presented consist of quantitative and qualitative data that have been obtained during learning in class. The trial data obtained include the results of observations of learning implementation, assessment of learning outcomes, responses of teachers and students. Product trials are further activities of the development stage after the validation and revision process. Trials are carried out in a limited and broad manner.

The trial process is commonly referred to as Developmental Testing which aims to find response data, correction and suggestions from users of learning devices developed. Limited trials are carried out to determine the practicality of the device developed. This trial was conducted during four meetings at 30 students of Madrasah Aliyah Negeri 1 Mataram.

This limited trial was carried out by researchers as teachers and two people as observers to observe the implementation of the learning process. The observer in a limited test involved a class XI fiqh teacher at Madrasah Aliyah Negeri 1 Mataram and a research assistant. Observers' assessments are aimed at initial activities, core activities, and final activities. Overall the learning process using Android -based digital ilau that was developed well. The results of the implementation of the learning process can be seen in Table 3 below.

Table 3. Data on The Implementation of The Learning Process

Meeting to	Observer	Total score	Maximum Score	Percentage (%)	Average (%)	Criteria
1	1	78	90	86.67	87.23	Good
	2	79		87.78		
2	1	82		91.11	91.67	Very Good
	2	83		92.22		
3	1	83		92.22	92.78	Very Good
	2	84		93.33		
4	1	83		92.22	93.33	Very Good
	2	85		94.44		
		Average			91.25	Very Good

Based on table 3 it can be seen that the percentage of learning implementation from the first to the fourth meeting has increased. The average learning implementation of four times was 91.25% with very good criteria. During the learning process there are no significant obstacles. But there are some suggestions and input from the observer to improve the learning process. As for example the style of speaking and class conditioning that still needs to be improved. Things like this are limitations because researchers who are not enough experience in teaching. The rest of the research can still be continued with the teacher as executing broad trials.

Teacher response data to Android -based digital ilaus that were developed were obtained from the questionnaire filled by the Madrasah Aliyah Negeri 1 Mataram Madrasah Teacher. Teacher response data to ILAU Digital Based on Android can be seen in Figure 10. Based on the picture that the ILAU Digital Based on Android is developed by a positive response from the teacher with an average score of 4.84.

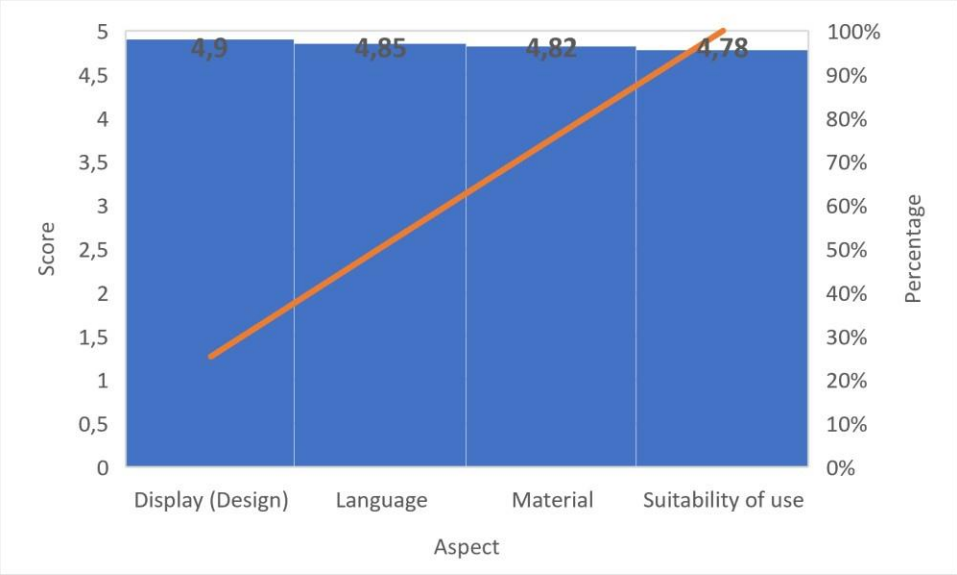

Figure 10. Product Teacher Response of ILAU Digital Based on Android

Student response data is also needed in this trial. The complete response results of the students can be seen in Figure 11. Based on these data, the average perceived aspect of ease of use is 0.93 and usability is 0.89 which is included in the very good category. The mean aspect of product attractiveness was 0.94 and 0.90 for the aspect of actual use. Overall the results of student responses were very good. But there are interesting suggestions given by students. They want additional music in the application so that it makes it more interesting and enthusiastic about using the application in the learning process.

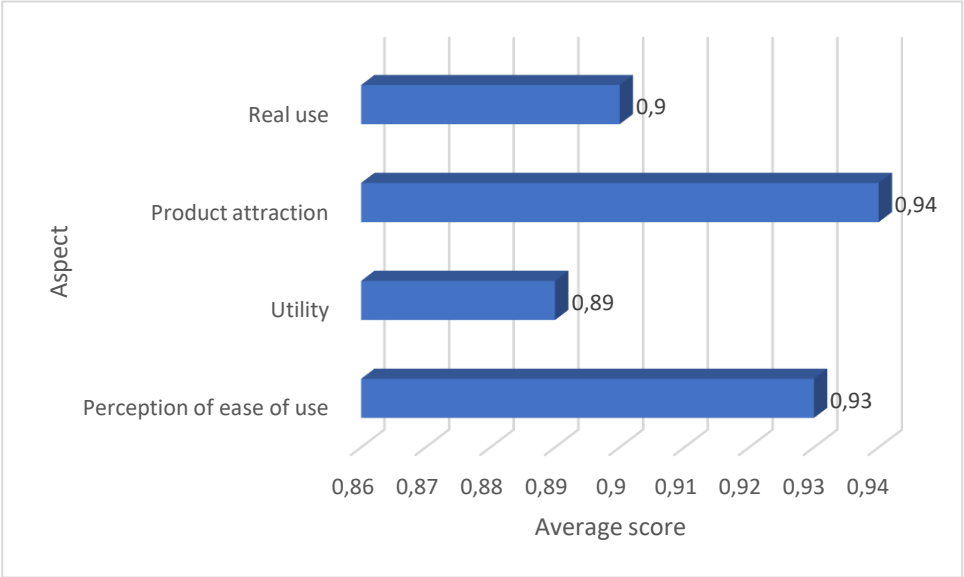

Figure 11. Results of Student Response Analysis

The revised Android-based digital ILAU based on the results of a limited trial was then re-tested on different classes at a wider trial stage. The wider trial aims to determine the effectiveness and influence of the ILAU Digital Based on Android implementation that has been developed. This wider trial was conducted on 28 students in class X-B and 30 students in class X-C during three to four meetings, so that the total number of students used in the wider trial was 58 students. The test results data are broader including the initial test data and the final test results of student learning.

The initial ability data used in this study is the result data from the students' initial test before being given treatment, while the final ability data is obtained from the students' final test results. Pre-test data, post-test, and students' N-Gain are presented in the following table.

Tabel 4. Learning Outcome Data

No	Class	Total Student	Average		N-Gain	Category
			Pretest	*Posttest*		
1	Control	28	14.82	41.57	0.65	Medium
2	Experimental	30	14.67	80.40	0.82	High

The results of calculations based on Table 4 show that there is an increase in student learning outcomes after being given treatment. The experimental group experienced a higher increase in learning outcomes compared to the control class. The percentage increase in the control class was 65% while the experimental class increased by 82%. This is because the two classes are given different treatment. The experimental class was treated using a ILAU Digital Based on Android while the control class used ILAU Digital Based on Android with sheets. These results provide an illustration that the use of ILAU Digital Based on Android is effective in improving student learning outcomes.

The results of the analysis were also carried out using parametric statistics in the form of a Paired Sample T test to determine the effect of ILAU Digital Based on Android on student learning outcomes. Before testing the hypothesis, homogeneity and normality tests were first carried out. The results of the homogeneity test are presented in Table 5 below.

Table 5. Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Learning_ Outcomes	Based on Mean	7.180	1	56	.110
	Based on Median	2.727	1	56	.104
	Based on Median and with adjusted df	2.727	1	42.735	.106
	Based on trimmed mean	6.823	1	56	.112

Based on the table above it is known that the Based on Mean Significance value is 0.110. This value is greater than 0.05. This shows that the data is homogeneous. The normality test results are also presented in Table 6 below.

Table 6. One-Sample Kolmogorov-Smirnov Test

		Control Group Pretest	**Experiment Group Pretest**	**Control Group Postest**	**Experiment Group Postest**
N		28	30	28	30
Normal Parameters[a,b]	Mean	14.821	14.666	41.571	80.400
	Std. Deviation	4.611	6.288	14.250	9.984
Most Extreme Differences	Absolute	.235	.246	.210	.141
	Positive	.235	.246	.098	.126
	Negative	-.158	-.196	-.210	-.141
Test Statistic		5.235	6.246	5.210	8.141
Asymp. Sig. (2-tailed)		.230[c]	.120[c]	.253[c]	.133[c]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.

Table 6 shows that the Asymp. Significance (2-tailed) for pretest and posttest data for experimental class and control class is greater than 0.05. This indicates that the data is normally distributed. The analysis prerequisite test has been carried out and the data is homogeneous and normally distributed, then it is continued with a parametric statistical test using the Paired Sample T test and the following data is obtained.

Table 7. Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Experiment Group Pretest - Experiment Group Postest	-65.73	13.11	2.39	-70.63	-60.83	-27.44	29	.000
Pair 2	Control Group Pretest - Control Group Postest	-26.75	15.20	2.87	-32.64	-20.85	-9.310	27	.100

Based on Table 7, it can be seen that the significance value (2-tailed) for the experimental class is 0.000, while the control class is 0.100. The value obtained by the experimental class is less than 0.05, while the value obtained by the control class is greater than 0.05. This indicates that the experimental class that uses an ILAU Digital Based on Android during learning affects

student learning outcomes, while the control class that uses sheet-based ILAU Digital Based on Android has no effect on student learning outcomes.

3.2 Discussion

This development research aims to develop a valid, practical, and effective ILAU Digital Based on Android in improving student learning outcomes. The final product developed in this study is an ILAU Digital Based on Android to improve student learning outcomes. In order to fulfill the ILAU Digital Based on Android category as valid, practical and effective in learning, the development steps refer to the 4D research development stages. The following is a discussion of the results of the validity, practicality and effectiveness of ILAU Digital Based on Android tests that have been carried out.

Discussion of Validity Results

The product validation stage is the stage of assessing the feasibility of the product design that has been developed. This product validation was carried out by a team of learning material and technology experts. Assessment was carried out on syllabus, lesson plans, learning achievement test instruments, and applications developed (ILAU Digital Based on Android). Device assessment is carried out by material experts. The results of the assessment show that all the tools, including the syllabus, lesson plans and test instruments, are in the valid criteria and can be used. Validity test is an important factor in the development process. Good validity indicates good instrument quality (Almanasreh et al., 2019).

The level of trust in the device is also tested using a reliability test with a percentage of agreement. The test results show that the syllabus, lesson plans, and learning outcomes test instruments can be said to be reliable with a percentage of more than 90%. This means that the device has a high level of confidence in measuring what it will measure.

Implementation of the validity test did not experience significant problems. Even though the results show that the device is valid and reliable, the validator still provides suggestions and input for the improvement of the device. The suggestions given were immediately corrected by the researcher as a whole. The result is that the trial runs smoothly. Validity assessment is also carried out on products that have been developed. The assessment was carried out by material and media experts. Material experts assess the content and language aspects while media experts assess the design (appearance) and software engineering. The application assessment shows that the material is in the very valid category with an average Aiken'V score of more than 0.80. Meanwhile, the media review on the application shows that the product, both in terms of design and software engineering, is in the very valid category (Muhfiyanti et al., 2021).

Success in the assessment also gets more attention from the validator. The validator provides constructive suggestions so that the application product is getting better. One of the important suggestions given is to add apperception so that it can make the application more attractive. Several formats for solving questions in the application are also notes so that students can correct answers that are still in doubt. This suggestion is very positive for researchers because it makes it easy for students to test their abilities.

Discussion of Practicality Test Results

The ILAU Digital Based on Android which has been validated and revised based on suggestions from the validator (draft 2) is then subjected to a limited trial to determine the level of practicality. ILAU Digital Based on Android is said to be practical if experts and practitioners state in theory that the device can be implemented in the field and the level of implementation is in the good category. The practicality data in the trial were in the form of observational data on the implementation of learning, teacher and student response questionnaires.

The results of the implementation of the learning process in product trials by the teacher obtained results in the practical category. The learning process was carried out during two meetings with fiqh sub-materials and worship sub-materials. Observations made included

observing the management of learning and activities carried out by students during learning using the ILAU Digital Based on Android.

At the first meeting, the fiqh sub-material obtained a percentage of learning implementation of 87.23. Observations showed that at this meeting several activities had not been carried out optimally. This is because students are not used to learning to use ILAU Digital Based on Android, such as activities giving students the opportunity to give opinions about the apperceptions given. This result is in line with the findings of Muhfiyanti et al., (2021), which explains that only a few students know about mobile learning and how to use it.

At the second meeting, the worship sub-material obtained the learning implementation criteria in the very good category with an implementation score of 91.67%. At the third and fourth meetings, the implementation criteria were obtained in the very good category. This result seems to have increased from the previous meeting because there were several changes made based on the notes at the first meeting. Each meeting held a reflection activity by correcting existing deficiencies. This is very important for the continuity of a research.

Discussion of Effectiveness Test Results

The effectiveness of the ILAU Digital Based on Android was obtained from extensive trials conducted in two classes, namely class X-B with a total of 28 students, and X-C with a total of 30 students, for a total of 58 students. Android-based UKBM effectiveness data is in the form of learning outcome data. The learning outcomes studied contain five indicators, namely remembering, understanding, applying, analyzing, evaluating. Data about student learning outcomes before and after treatment were obtained through pre-tests and post-tests.

The initial test was carried out to determine the initial abilities of students. The initial ability of students before being given treatment had an average value of 14.82 in the control class and 14.67 in the experimental class. The average score of the student's initial test was classified as very low. This is because students have not studied fiqh material extensively, and most students do not answer a number of the questions provided.

The final ability of students is obtained through a final test. The final test was carried out after being given the treatment. The final ability of students after being given treatment has an average value that is relatively high, namely 41.57 for the control class and 80.40 for the experimental class. Based on the pre-test and post-test data, it can be seen that the learning outcomes of students in both classes experienced an increase in average scores. The increase in the value of student learning outcomes can also be seen from the N-gain value, where the N-gain value is 65% for the control class and 82% for the experimental class. The results of the parametric statistical test also show that there is an effect of implementing ILAU Digital Based on Android in the experimental class. The average increase in student learning outcomes in the experimental class is included in the high category. The acquisition of the N-gain score in the high category is due to the application of ILAU Digital Based on Android in learning. These results are in line with research conducted by Aryanta, (2020) which found that the application of STEM-oriented ILAU applications can improve learning outcomes. Other research also explains that the use of mobile-based learning guidebooks is more effective than the use of printed guidebooks (Astalini et al., 2019).

ILAU Digital Based on Android is a unit of independent learning activities for students in the digital design of the Android platform. This Android-based digital ILAU is designed with the aim of facilitating students in carrying out learning activities. The developed ILAU Digital Based on Android has structured learning procedures according to the depth of the material and the steps contained in the lesson plan. Learning procedures embedded in the application make student learning more focused. As a result, their learning outcomes also increase. In line with the findings of Serevina et al., (2018) (that electronically designed ILAU can increase students' understanding of a material.

This is proven by the active role of students in participating in learning that is carried out independently and the teacher acts as a facilitator. Their enthusiasm in participating in learning increases because it becomes a new experience in learning to use Android applications. The android application is able to increase students' learning motivation Adrizal & Ilham, (2021) and has implications for their learning outcomes. Student learning outcomes show good criteria (Hediansah & Surjono, 2019).

The choice of Android as a learning platform is not without reason. The advantages of using Android in learning are easier to use. Android as a learning tool is considered good because it is able to embed several learning features such as videos, animations and so on. The addition of this feature provides an increase in student learning motivation (Sastradika et al., 2021). In addition, the learning process using mobile knows no boundaries of place and time (Nikolopoulou & Kousloglou, 2019; Pei & Wu, 2019). So this is suitable for training students' independence in learning (Arista & Kuswanto, 2018).

The difference between the ILAU Digital Based on Android and other ILAU is the basis of the ILAU. This also has an impact on the differences in the features contained therein. For example, the apperception activities that are presented when using an Android application are more concrete because they can embed videos. Whereas paper-based ILAU is only able to display apperceptions in the form of images. The understanding that students receive will also be different, because learning videos have a positive influence on learning outcomes (Pal & Patra, 2021; van Alten et al., 2020).

The form of assignments and practice questions is also a differentiator between the ILAU Digital Based on Android and the usual ILAU. ILAU Digital Based on Android presents a more effective and efficient form of assignment and practice questions. Students do not need to take out paper anymore to answer existing questions so that they are able to reduce costs (Efendi & Irawati, 2020). They can fill directly on the given application. Answers are sent directly to the subject teacher's email. The time allocation contained in each assignment becomes a reminder tool for students to be more serious and focused in completing assignments. The teacher's response to this is to facilitate teacher performance Rolim & Isaias, (2019) without being busy taking or asking students to collect answer sheets. These results were also expressed by Sangle et al., (2020) that the use of this tool helps increase teacher efficiency and the level of understanding of students and academic results of the intended subject. These findings explain that embedding ILAU Digital Based on Android in the form of an android is successful and provides effectiveness and influence in learning.

4. CONCLUSION

Based on the results of research that has been carried out through the development of ILAU Digital Based on Android to improve student learning outcomes, it can be concluded as follows.

1. The ILAU Digital Based on Android to improve student learning outcomes developed is included in the very valid category with an Aiken index score above 0.8, and a percentage of agreement value above 75%.
2. The implementation of the learning process carried out by the teacher/researcher using ILAU Digital Based on Android devices and products shows that the category is well implemented, and the responses of teachers and students during use in learning are positive, so that the ILAU Digital Based on Android developed is practically used in learning.
3. The ILAU Digital Based on Android used in the learning process is included in the effective category for increasing students' problem-solving abilities with an N-Gain score percentage of 82% and influencing student learning outcomes.

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