Developing Self-Assessment with Mobile Learning-Based to Improve Learning Achievement of Indonesian Madrasah Competency Assessment at Madrasah Ibtidaiyah

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Abstract

The Minimum Competition Assessment (AKM) is a replacement for the existence of the National Examination. AKM is designed to achieve student learning outcomes through cognition, especially related to literacy and numeracy. However, there is still a problem that students experience difficulties in doing AKM or AKMI (Indonesian Madrasah Competency Assessment) questions at school. Therefore, this research provides a solution by developing learning media in the form of a mobile learning-based application using the ADDIE method. The subjects in this study are grade IV students of Madrasah Ibtidaiyah Nurul Jadid Blitar, East java, Indonesia. According to the study's findings, learning experts' validation results are 93%, media experts' validation results are 96%, and material experts' validation results are 98%. According to student learning outcomes, the SIASAT application can improve student learning outcomes; the average pretest score in the control class is 56, and the posttest average score is 79.2. Meanwhile, in the experimental class, the average pretest score was 56, and the posttest average score was 87.8. Meanwhile, based on the calculation of the T-test, a significant value of 0.042 > 0.05 was obtained. This indicates that students can enhance their learning outcomes by using mobile learning-based self-assessment media to deal with AKMI.

Keywords: *AKMI, madrasah ibtidaiyah students, mobile learning, self-assessment.*

Abstrak

Asesmen Kompetensi Minimal (AKM) merupakan pengganti keberadaan Ujian Nasional. AKM dirancang untuk mencapai capaian pembelajaran siswa melalui kognisi, terutama terkait literasi dan numerasi. Namun, masih terdapat permasalahan yaitu siswa mengalami kesulitan dalam mengerjakan soal-soal AKM atau AKMI (Asesmen Kompetensi Madrasah Indonesia) di sekolah. Oleh karena itu, penelitian ini memberikan solusi dengan mengembangkan media pembelajaran berupa aplikasi berbasis mobile learning dengan metode ADDIE. Subjek dalam penelitian ini adalah siswa kelas IV Madrasah Ibtidaiyah Nurul Jadid Blitar, Jawa Timur, Indonesia. Berdasarkan hasil penelitian, hasil validasi ahli pembelajaran sebesar 93%, hasil validasi ahli media sebesar 96%, dan hasil validasi ahli materi sebesar 98%. Berdasarkan capaian pembelajaran siswa, aplikasi SIASAT dapat meningkatkan capaian pembelajaran siswa; rata-rata skor pretes pada kelas kontrol sebesar 56, dan rata-rata skor postes sebesar 79,2. Sementara itu, pada kelas eksperimen, rata-rata skor pretes adalah 56, dan rata-rata skor postes adalah 87,8. Berdasarkan perhitungan uji-T, diperoleh nilai signifikansi 0,042 > 0,05. Hal ini menunjukkan bahwa mahasiswa dapat meningkatkan hasil belajarnya dengan menggunakan media asesmen mandiri berbasis pembelajaran seluler untuk menghadapi AKMI.

Kata kunci: *AKMI, siswa madrasah ibtidaiyah, pembelajaran mobile, penilaian mandiri.*

INTRODUCTION

Assessment is important in seeing the learning outcomes of students. In 2020 the National Exam has been abolished and replaced with AKM (Minimum Competency Assessment) (Aisyah et al., 2023; Nasution et al., 2021). The purpose of the AKM is to assess the standard of the educational system. To ensure that all educational levels in Indonesia meet the requirements established by the government, evaluation of the educational system must continue (Ernawati et al., 2022). The government has provided clear standards related to the quality of education. This shows that education is very important to improve the standard of living of the Indonesian people (Shaturaev, 2021; Sukasni & Efendy, 2017).

The importance of knowledge is realized by the existence of AKM in exchange for the abolition of the National Examination (Huelsmeyer et al., 2023; Shara et al., 2022). AKM is designed to measure learning outcomes from cognitive learning outcomes related to literacy and numeracy (Anggun, 2024). Teachers strive to develop effective and quality learning strategies to meet this level of competence. AKM will support "*teaching at the right point*." The AKM assessment is focused on the middle of the level, namely classes V, VIII, and XI (Noviantini et al., 2023).

This is in line with research conducted by Hanifah et al. (2022) outlined in his research on the creation of mobile learning applications that have been used, demonstrating reliable outcomes and having the potential to enhance student learning outcomes. Additionally, using educational material might inspire students. In addition, research conducted by Noor et al. (2022) found that the use of mobile learning is expected to facilitate students' learning and form characters in accordance with Pancasila values in students.

AKM is part of the National Assessment and has the function of evaluating and mapping the education system in terms of inputs, processes, and outcomes for each educational unit. In addition to AKM, there is a National Assessment (AN), which has

assessment instruments, namely character surveys and learning environments (Hall et al., 2020; Mohammed & Kinyó, 2022). The Indonesian Madrasah Competency Assessment (AKMI), on the other hand, attempts to give teachers access to data regarding students' proficiency in reading, math, science, and sociocultural literacy (Zarkasi & Ghozali, 2024). In order to enhance student learning outcomes, AKMI asks teachers to identify methods for raising the caliber of instruction and learning. AKMI and AKM are interconnected and complement each other because they have the goal of improving the quality of madrasas (Cahyaningsih & Santosa, 2024). While AKM assesses the caliber of the educational system, AKMI determines the learning outcomes of individual pupils. AKMI is not intended to compete with AN or AKM developed by the Ministry of Education and Culture. However, in madrasas AKMI aims to complement aspects or dimensions that do not yet exist in AKM, because madrasas have peculiarities that need to be paid attention to immediately, specifically to increase competitiveness in national education.

Research conducted by Hidayat (2023) asserted that resources for program development, government policy interventions, and mapping the quality of madrasah education were needed to raise the standard of education in madrasas, particularly in Madrasah Ibtidaiyah units, and are all part of the policy for the implementation of AKMI activities. It also serves to diagnose students' competency and monitor learning improvement. On the other hand, a statement by Sofyan explains that the implementation of AKMI was carried out on grade IV elementary school students and, in its implementation, requires the readiness of teachers and students to collaborate with each other regarding students' abilities and achievements in understanding the material (Sofyan et al., 2022).

AKM or AKMI activities, which are considered important to evaluate students' abilities and learning outcomes, also need other support besides teachers. On the other hand, the support of the use of digital applications can avoid the sense of boredom that exists in students so that when students feel happy, literacy and numeracy will be easier to accept in the learning process (Vachruddin, 2021). In addition, by utilizing mobile learning in the learning process, it also has a positive impact on students, especially in the current era. The development of technology is accelerating, so it must be used wisely to achieve educational success (Knipp et al., 2023).

Based on observations conducted at MI Nurul Jadid Blitar, significant challenges were identified in the implementation of literacy- and numeracy-based assessments, particularly in the form of the Minimum Competency Assessment (AKM) and the Islamic School Competency Assessment (AKMI). Teachers experienced difficulties in designing test items aligned with the characteristics of AKM/AKMI, especially in terms of cognitive level, contextual relevance, and appropriate formats that support the development of students' literacy and numeracy skills. On the other hand, students also faced obstacles in understanding and solving these types of questions, which require critical, logical, and reflective thinking skills. Moreover, another issue that emerged was the limited exposure to contextualized practice questions and the continued reliance on memory-based teaching methods.

In this context, the use of technology—particularly mobile learning—has not yet been optimized as a potential alternative solution. Despite the widespread familiarity and usage of mobile devices among students, these tools have not been effectively leveraged as flexible,

interactive, and adaptive media for learning and assessment. Therefore, there is a need for an innovative approach in the form of a mobile learning-based self-assessment system that not only facilitates literacy and numeracy practice in accordance with AKM/AKMI standards but also provides constructive feedback to support continuous learning. This innovation is expected to address the existing challenges while enhancing the quality of both the learning process and student outcomes at the madrasah.

This can be seen from the observation of its implementation in 2024, which was less than optimal. Therefore, the researcher wants to develop an Android-based AKM or AKMI question so that students can easily understand various kinds of literacy and numeracy problems. This Android-based learning media can be used as a self-assessment to support the AKM or AKMI evaluation process, especially since students are already using smartphones for flexible learning media that can be used anywhere. Students can access the questions on their Android phones whenever they want.

Research on the implementation of AKM or AKMI in schools has the potential to generate positive outcomes. For instance, a study conducted by Jannah et al. indicates that the presence of AKM can enhance the overall quality of education (Jannah et al., 2024). Along with the development of AKM or AKMI implementation, changes have also occurred, as noted by Amalia, who stated that there has been a shift toward higher proficiency levels across all types of literacy: reading literacy, scientific literacy, numeracy literacy, and sociocultural literacy (Amalia, 2023). Therefore, continuous and large-scale competency development must be carried out each year. As stated by Banawi et al., literacy and numeracy activities are conducted to enhance students' reading and mathematical abilities, enabling appropriate interventions in areas where competencies need improvement in order to meet educational standards (Banawi et al., 2022). In addition, a common challenge is the lack of adequate technological resources, along with technical issues that may arise, which can pose significant obstacles and have a considerable impact.

Based on previous research findings, this study aims to address existing gaps and provide alternative solutions to the challenges encountered in the implementation of AKM and AKMI. To this end, the researcher developed a mobile learning-based self-assessment tool and provided teachers with guidance on the effective use of the media. Furthermore, the distinction between this study and prior research lies in its focus on fourth-grade students, serving as an early introduction to literacy and numeracy. The intended outcome is to foster early education in these areas, thereby better preparing students and ultimately contributing to more significant results in AKM or AKMI assessments.

The findings of this study are consistent with earlier research showing that the use of AKM or AKMI improves education, particularly when it comes to assessing student achievement. However, this study also has a difference from previous studies, namely the implementation of the trial was carried out for grade IV students in even semesters. This aims to train and introduce students in advance about AKMI questions so that when students have moved up to grade V, they are not surprised and can be analyzed for further development.

The purpose of this study is to produce and determine the level of validity and effectiveness of mobile learning-based self-assessment to improve AKMI learning outcomes at MI Nurul Jadid Blitar. The learning media developed can be a self-assessment for students in understanding and practicing doing AKM or AKMI questions. So that this media can make

it easier for teachers to explain problems based on numeracy literacy. Therefore, it is important for mobile learning-based learning media to improve the learning outcomes of AKMI (Indonesian Madrasah Competency Assessment) to be developed so that it can be used in various madrasas ibtidaiyah.

METHODS

Research and development is the kind of study that is employed. R&D is a type of research that is used to develop a product and evaluate its efficacy. This research refers to the ADDIE development model with 5 stages of development, namely Analyze, Design, Develop, Implement, and Evaluate (Branch, 2021). The stages of its development are described as follows.
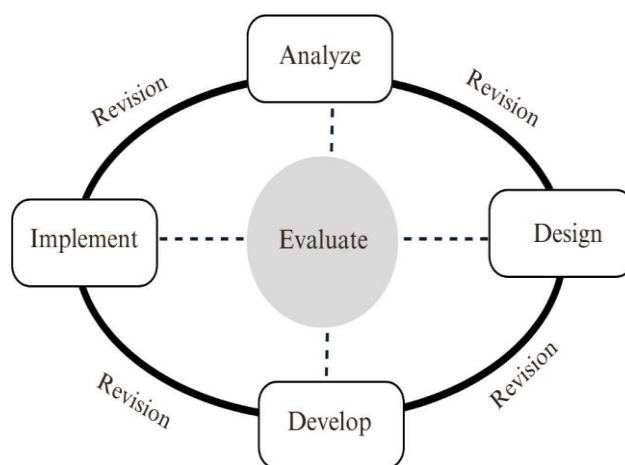
Figure 1. ADDIE Model

The stages of this research were carried out as follows.

In the analyze phase, the researcher conducted a needs analysis regarding the use of instructional media, focusing particularly on teachers and students. This phase also involved analyzing the students' learning environment and identifying student characteristics throughout the learning process. The subsequent design phase involved determining and designing instructional strategies to be implemented, as well as developing a storyboard for the media to be created. The develop phase encompassed the process of producing the media based on the results of the previous analysis and design stages. This was followed by the implement phase, during which the developed mobile learning media was applied to fourth-grade students. The final phase, evaluate, aimed to revise the product, assess its effectiveness, and identify its feasibility both before and after implementation.

The subjects of this study were fourth-grade students at MI Nurul Jadid Blitar, with the research conducted during the even semester of the academic year. The study employed a before-and-after experimental design, consisting of two groups—control and experimental—each of which was given both a pretest and a posttest. Data collection techniques included observation, which involved monitoring and gathering information through a survey of teaching activities and the implementation process of the AKM or AKMI assessments at the school. In addition, interviews were conducted with teachers to explore the instructional strategies employed during lessons and to gather insights into the challenges encountered in

implementing AKM and AKMI. Furthermore, questionnaires were used to collect evaluations of the media that had been developed. Tests were administered to measure students' achievement in utilizing the mobile learning-based media. Lastly, documentation was carried out to record and preserve the research activities.

The research instruments used in this study included observation sheets, interview guidelines, and questionnaires, which comprised expert validation questionnaires for content, media, and instructional design. The test instruments consisted of pretests and posttests. The data analysis techniques employed were both qualitative and quantitative. The qualitative analysis described direct observations as well as critiques and suggestions provided by validators. Meanwhile, the quantitative data were analyzed using Likert scale analysis, and the effectiveness of media utilization was measured through students' test results, which were analyzed using a T-test with the assistance of the SPSS software.

The subject of this study is a fourth grade student of MI Nurul Jadid Blitar, the time of conducting the research during the even semester. The type of data used is qualitative consisting of questionnaires, responses, criticisms and validator suggestions. While quantitative consists of the results of media validation assessments and the results of student learning outcome data. Media that has been declared valid is tested with a before-after experimental design. As well as the results of obtaining student scores, analyzed by T-Test using the help of SPSS application

RESULTS AND DISCUSSION

The result of this development is a mobile learning product as a self-assessment to improve the learning outcomes of madrasah competency assessment. This mobile learning can be used on Android phones, so students are more flexible in using it in various places and times. This mobile learning is especially used by fourth grade students of MI Nurul Jadid Blitar. The efforts to produce mobile learning-based self-assessments to improve AKMI's learning outcomes at MI Nurul Jadid Blitar include the following.

Analyze

Analyze is the first step taken in designing learning. This step aims to describe the things that students must learn. The goal of the analysis is to identify the issues with learning. The study conducted on the creation of learning materials based on mobile devices The goal of the analysis is to identify the issues with learning. The study conducted on the creation of learning materials based on mobile devices is needs analysis, learning environment analysis, student characteristics analysis, and learning goal analysis.

At this stage, (1) needs analysis can be carried out if the learning media product is considered as a solution to the learning problem faced which shows the results that the AKM and AKMI questions based on literacy and numeracy are assessments or assessments that must be passed in class V in their application have a strong relationship with general learning objectives in the learning process encountering several that cause the results of student score acquisition to be less than optimal so that There needs to be an increase again. (2) At this point, observation is done to determine the state of the student's learning environment in order to analyze it, based on the results of observation shows that in the learning process students have used tools in the form of laptops or smartphones. (3) Analysis of student characteristics is carried out by making observations during learning activities. From the observation results,

it was found that the characteristics of class V students of MI Nurul Jadid Blitar in general have an interest in mobile technology, especially at the level of smartphones, which is also quite high, judging from the ownership and intensity of its use. (4) Analysis of Learning Objectives, at this stage AKMI is measured from reading literacy, numeracy literacy, science literacy, socio-cultural literacy.

Design

The design stage is a follow-up process of the analysis stage, the steps taken at this stage are (1) Determining the Learning Strategy, The learning strategy used in numeracy literacy-based learning is blended learning and scientific methods by providing material deepening and evaluation features in the form of problem-solving problems (problem base learning) which are used for students' independent learning. (2) Realizing Storyboard Design Stroryboard is an application build to show an overview of the application more simply, because it can bring the reader's shadow to describe the product being developed.

Develop

The process of determining that the design is in line with reality is known as the development stage. At this point, developers are striving to combine and construct a mobile learning design based on the outcomes of information collecting that has previously been gathered. The results of this media development are named SIASAT (Self Assessment Information System) with the following display.

Figure 2. Application Logo Display

Figure 2 shows the display of the SIASAT application logo on an Android cellphone. So that the application that has been installed by the student will display a logo like the image.
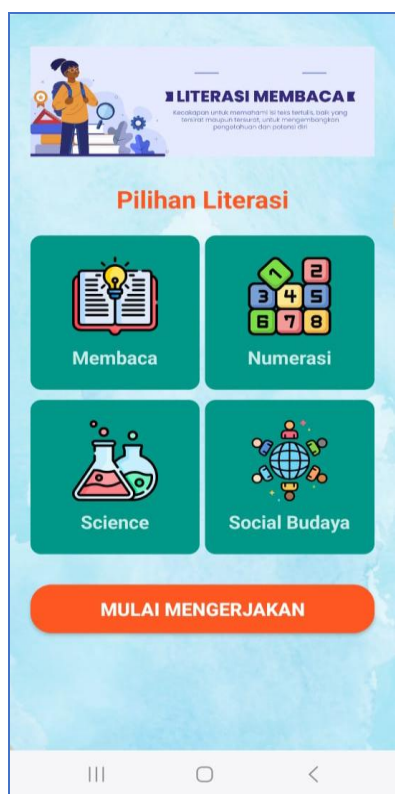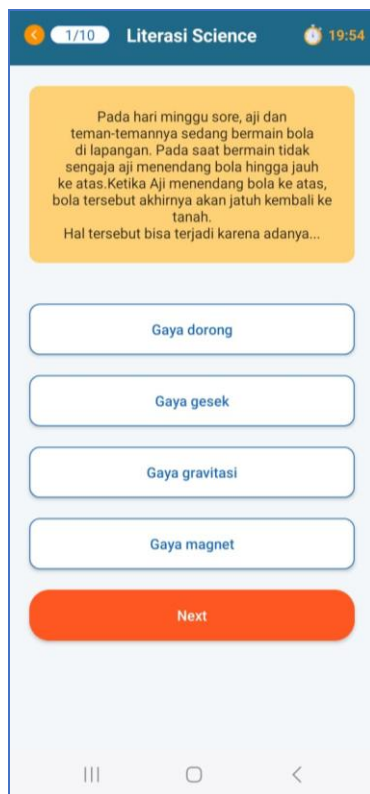
Figure 3. Start Page Display   Figure 4. Table of Contents Display   Figure 5. Final Display

Figure 3 shows the display of the initial page of the SIASAT application, the components in it consist of a reading menu, a numeracy menu, a science menu, and a socio-cultural menu and finally there is a button to start working on the question. Meanwhile, figure 4 shows the display of the content of the SIASAT media which consists of bringing up the selected literacy, then the order of the questions, the time of working on the questions, the display of the questions, the answer selection menu, and the next button to go to the next question. Next, figure 4 shows the final display of the media consisting of a picture of the trophy, a description that the work has been completed and on this page can be displayed a description of the number of correct and incorrect answers, and a button to start a new practice.

Additionally, the learning materials are now packaged as an application that can be installed on an Android smartphone following the product packaging procedure. The app can be sent via Whatsapp, Telegram, and Email. After the production of android-based mobile learning products, Testing is done in the form of validation with material experts, media experts and learning experts as expert reviews. If after validation, improvements need to be made, it will enter the review phase.

Assessment is conducted through instruments such as questionnaires to determine the suitability of the designed learning media products. The outcomes of the product validation are utilized to make revisions to the developed learning media products. The group of validation experts includes subject matter experts, media specialists, and educational practitioners. The results of the validation of material experts carried out by lecturer practitioners are presented in table 1.

Table 1. Results of Validation of Material Experts

Criterion	Score
Clarity of Learning Objectives	15
Presentation of Material/Questions	15
Completeness and Quality	19
Evaluation Facility Capabilities	19
Communicative	10
Visual	20
Total	**98**

According to Table 1, the validation outcomes from material experts indicate a 98% validity rate, demonstrating that the developed media is highly valid and can be utilized, albeit after revisions have been made in accordance with the recommendations from the material experts. At the same time, validation results from media experts were conducted with a lecturer at a state university recognized for their expertise in learning media. The findings from the media validation are shown in Table 2.

Table 2. Results of Media Expert Validation

Criterion	Score
Usability	14
Compatibility	10
Maintainbility	5
Reliable	9
Reusable	4
Communicative and Creativity	15
Visual	25
Evaluation Facility Capabilities	**14**
Total	**107**

Table 2 indicates that 96% of the validation findings from media professionals indicate that the media created is very valid and can be used, but only after revisions based on their recommendations. In the meantime, learning practitioners received the validation results. Table 3 displays the learning validation findings.

Table 3. Result of Learning Practitioners

Criterion	Score
Compatibility	5
Usability	18
Reliable	9
Clarity of Instructions for Use	9
Presentation of Questions	27
Evaluation Facility Capabilities	19
Communicative	10
Visual	10
Total	**96**

Table 3 displays the 93% validation results from learning practitioners, indicating that the created media is highly valid and can be used, albeit after revisions based on their

recommendations. It may be inferred from the validation results that SIASAT Mobile Learning materials can be utilized in AKMI exercises.

Subsequently, a product trial is conducted in phases, with three students participating in a one-on-one study and ten students participating in a small group trial. Before the product is put to the test in real life during the implementation stage, the researcher wants to see how students are motivated and how they use it during the product testing stage. Table 4 displays the data on students' individual test scores, while Table 5 displays the data on students' small group test results.

Table 4. Data on Individual Trial Results (3 students)

No	Component	Total Score	Max Score
1	Student motivation	24	30
2	Use of *mobile learning media*	102	120
	Sum	**126**	**150**

Table 4 indicates that 84% of individual testing results indicate that the created media is very valid and can be used, albeit with revisions.

Table 5. Data on the results of the Small Group Trial (10 students)

No	Component	Total Score	Max Score
1	Textbook clarity	90	100
2	Influence on students	350	400
	Sum	**440**	**500**

Table 5 indicates that 88% of the small group trial's results indicate that the created media is very legitimate and can be used, albeit with revisions.

Implement

At this stage, the learning application process was carried out on grade IV students in even semesters totaling 25 students. The results of the development of *mobile* learning-based *self-assessment* learning media to improve AKMI learning outcomes at MI Nurul Jadid Blitar, East Java.

The requirements for performing the t-test must indicate that both classes must be normally and homogeneously distributed. Therefore, the results of the pretest normality test are presented in Table 6.

Table 6. Tests of Normality

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Result	Pretest Control	.164	22	.127	.916	22	.062
	Pretest Experiment	.143	22	.200[*]	.951	22	.323

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Based on the Shapiro-Wilk output and the pretest normality test findings shown in Table 6. because there are less than thirty data or samples. Thus, the experimental class's pretest result showed a sig value of 0.323 and the control class's yield yielded a sig value of 0.62, indicating that the two classes were normally distributed.

Table 7. Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Result	Based on Mean	.162	1	42	.690
	Based on Median	.062	1	42	.805
	Based on Median and with adjusted df	.062	1	41.290	.805
	Based on trimmed mean	.127	1	42	.724

Table 7 Following the normality test, a homogeneity test was performed on the data with a normal distribution. The results based on the mean showed that the two classes were homogenous when the gis value was larger than 0.05 and the mean value was 0.690.

Table 8. The Results of Independent Sampel T Test

	Descriptives						
Class		Pretest			Postest		
		Average Score	Min	Max	Average Score	Min	Max
Result	Control	56	30	80	79,2	50	100
	Experiment	56,6	40	80	87,8	70	100

Independent Samples Test

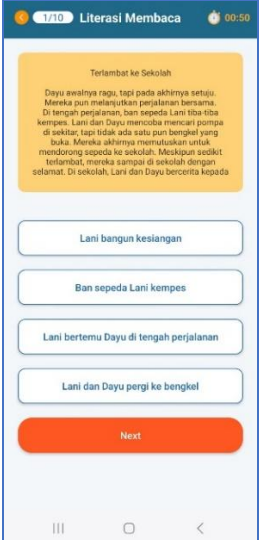|		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Result	Equal variances assumed	1.267	.267	2.098	42	.042	5.909	2.816	.226	11.592
	Equal variances not assumed			2.098	40.130	.042	5.909	2.816	.218	11.600

Since the Levene's Test for Equality of Variances value is 1,267 > 0.05, the t-test result shows that the variance of the data is homogeneous (Table 9). Therefore, while interpreting the results of the independent samples test, the values in the equal variances assumed table are used as a guide. Since the independent samples test output table in the equal variances assumed section indicates that the sig value (2-tailed) is 0.042 < 0.05, it can be concluded that ha is accepted. Thus, it can be concluded that MI Nurul Jadid Blitar's AKMI learning results were different before and after using mobile learning-based self-assessment learning materials.

Evaluate

This stage aims to revise the product, measure the success rate of the product that has been developed based on the criteria that have been set, and determine the feasibility of using the product and product quality both before and after the implementation of the product that has been developed. The result of product revision in Table 9.

Table 9. Product Revision

No	Before Revision	After Revision
1	The time show in this product	The time show in this product
2	There is an invisible "next" button	Bring up the "next" button
3	There are questions that are incorrectly grouped	From science literacy moved to socio-cultural literacy
4	There is a truncated question	Fixing the display of truncated questions

No	Before Revision	After Revision
4	Main view	Fixed main view

Media revision refers to qualitative data in the form of suggestions that have been given by material validators, media, and learning practitioners, as well as suggestions from individual tests and small group tests on students.

According to the findings of the several research phases, the self-assessment learning tool known as SIASAT (Self Assessment Information System) is a reliable and useful tool. Based on the findings of 98% material validation, 96% media, and 93% learning practitioners, it can be concluded that using media in the learning process is both practicable and highly valid. In the meantime, the T-test results for the learning outcomes of students who used SIASAT media revealed a sig2-tailed value of 0.042 > 0.05, indicating that media consumption has an impact on students' academic performance.

The use of SIASAT media in this case also provides training to students to be able to improve literacy and numeracy skills, this is in line with research by (Ali et al., 2021) That teachers provide stimulus to students through the use of learning media that are

integrated with problems so as to train students to be able to solve existing problems. In addition, the use of this media must also be carefully prepared so that learning can run according to the flow and achieve its goals. \So that the findings in this study show that the existence of mobile learning applications can provide new innovations in the realm and scope of education. In this case, it is also in line with the research conducted by (Tsaniyyati & Andriani, 2024) in their research on the development of problem-solving-based mobile learning in social science subjects to improve student learning outcomes (Hasanah et al., 2022). The study also explained that the results of the developed media can provide new knowledge to students, especially in the media associated with problems. So that students are trained to solve the problem (Binasdevi et al., 2022; Ulia et al., 2022).

On the other hand, the existence of this application can teach students that the existence of technology in the current era can have a good impact on the development of the times. Because technology can be used properly according to needs. Teachers agree with the assessment that uses an android-based application to be effective and efficient and can learn to master technological devices (Saraswati et al., 2021). Learning using technology is able to have a good impact on learning outcomes (Aeni, 2024). Mobile learning applications get a positive response because this application makes it easy for students to learn anywhere and anytime as long as their smartphones are connected to the internet (Rachmadtullah et al., 2023).

The implementation of mobile learning applications such as SIASAT also encourages the realization of independent and flexible learning. Students are no longer bound by space and time to access learning materials. This is reinforced by the findings of research by (Anuyahong & Pucharoen, 2023) which show that mobile learning provides easy access and increases students' learning motivation through a more personal and adaptive approach to individual needs.

Learning independence is one of the main competencies of the 21st century that is very important for students to have. Furthermore, the presence of SIASAT media plays a role in increasing students' active involvement in the learning process. Learning becomes more interactive because students not only receive material passively, but are also involved in solving problems, evaluating the results independently, and obtaining direct feedback. Research by (Wahyuningtiyas & Bachri, 2024) supports this, that well-designed digital-based learning media can significantly increase student activity and involvement in the learning process.

Mobile learning-based self-assessment is effective in improving AKMI learning achievement. AKMI (Indonesian Madrasah Competency Assessment) is a national assessment designed to measure students' abilities in four main literacy domains, namely reading literacy, numeracy, science literacy, and socio-cultural literacy. These four aspects not only measure basic academic abilities, but also critical and contextual thinking skills needed in real life. The use of media such as SIASAT in supporting AKMI preparation is a relevant strategy because it is able to provide problem-based exercises that are in accordance with the character of AKMI questions.

Reading literacy in AKMI measures the ability to understand written information, while numeracy tests the ability to think logically and solve mathematical problems in everyday contexts. Science literacy directs students to understand natural phenomena

through a scientific approach, while socio-cultural literacy assesses sensitivity to social values and cultural diversity in society. Literacy and numeracy-based learning must be carried out routinely in order to significantly increase students' competency achievements (Nurwahid, 2024). In addition, adaptive media such as SIASAT also helps students to reflect independently on their learning achievements, which is in line with the principles of formative assessment in AKMI (Effendi et al., 2023). Therefore, the development and utilization of mobile learning that is integrated with AKMI needs is a strategic step in improving the quality of madrasah education.

CONCLUSION

Based on the research findings, this study concludes that self-regulated learning has a significant positive impact on the effectiveness of digital learning among fifth-grade students at Madrasah Ibtidaiyah Pembangunan, Jakarta. The statistical analysis revealed that self-regulated learning contributes 36.6% to the variance in digital learning effectiveness, demonstrating a moderate but substantial influence on students' ability to utilize digital learning platforms effectively.

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