

## Conference Paper

# Mobile Application to Improve Student Minimum Competency Assessment

Supandi Supandi\*, Lilik Ariyanto, Widya Kusumaningsih, Anita Aulia Firdaus

Mathematic Department, Universitas PGRI Semarang, 50232, Indonesia

**ORCID ID**

Supandi Supandi: <https://orcid.org/0000-0002-3235-2970>

**Abstract.**

This paper aims to assess whether understanding of the Minimum Competency Assessment (AKM) improves when taught to students through mobile learning. The research method was adapted from a development model whose stages consist of Analysis, Design, Development, Implementation, and Evaluation, but only carried out until the third stage (Development). Material experts and media experts carried out validation. The results show that the mobile application that has been developed was scored 87.88% in the 'Very Good' category by the media experts and was scored 89.62% in the 'Very Good' category by the material experts. Based on the results of data acquisition, it is shown that the mobile application is feasible to be used as a valid source to introduce students to AKM.

**Keywords:** Media Development, Mobile Application, Minimum Competency Assesment

Corresponding Author: Supandi  
Supandi; email:  
[supandi@upgris.ac.id](mailto:supandi@upgris.ac.id)

**Published** 21 December 2022

Publishing services provided by  
Knowledge E

© Supandi Supandi et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICESRE Conference Committee.

## 1. Introduction

Learning mathematics is very necessary for science and technology problems. On the other hand, contextual problems require mathematics as a tool to find solutions. Thus, mathematics lessons in the context of mathematics education in schools are very important (1). Based on the results of the PISA study (2), Indonesian students' numeracy and reading skills need to be improved. Students' numeracy skills are more dominant at the moderate level, with a percentage of 75% (3). Thus, students must improve their literacy skills. Improving this ability can be done with a problem-based learning model. In addition, using learning media will also help students learn. Through models and media students will try to solve problems and develop their own problems (4),(5). The application of Android media in education has been widely used in the learning process. The use of Android devices is quite widespread (6). Android plays a role in exposing students to skills and situations that are not commonly encountered in real life (7).

 OPEN ACCESS

The educational component cannot be separated from educational evaluation (8). Planning, implementation, and assessment mutually influence the achievement of learning processes and outcomes (9). The evaluation measuring instrument used is a parameter of the success of an education in measuring goals. Evaluation can be carried out on students, an institution, and educational programs aimed at achieving something better than before (10). Thus every evaluation is an effort to achieve a much better quality of education.

The Minimum Competency Assessment is an assessment of the basic competencies needed by all students in order to be able to develop their own capacity and also participate positively. AKM has two basic competencies, namely reading literacy and mathematical literacy. The Minimum Competency Assessment presents issues in a variety of contexts. AKM is intended to measure competence in depth, not just content (11). The assessment generally includes all methods used to gather information about knowledge, abilities, understanding, attitudes and motivation (12), (13). Assessment in learning activities is very important to collect data and information related to the learning process (14). This means that assessments must measure student progress over time, to provide a complete picture of progress, observations over time must be linked conceptually so that changes can be observed and interpreted (15). The data obtained can be used both to make decisions about content and teaching methods, to make decisions about classroom climate, and to assign grades (16).

Technological advances allow interactive learning, and have the opportunity to be developed into media that support learning carried out in schools (17). (Design research in education aims to evaluate interactively developed mobile applications (18). Skills in the use of technology are needed for harmonization and adaptation of one's learning knowledge with the times in order to be able to operate in times of change (19).

It is undeniable that the presence of the internet is now able to gradually shift traditional media, such as print media, to television and radio (20). In the era of globalization, smartphones have become a daily necessity, including in education, especially learning. The use of mobile devices in the form of smartphones in alternative learning media is called mobile learning (21). One of the considerations using mobile learning is the base system used. The operating system acts as a liaison between applications and hardware so that users can perform certain functions. The android system that supports its application development is expected to produce representative learning media (22). The resulting media is not monotonous in the form of text only but also contains multimedia elements. So that the introduction and improvement of AKM understanding through mobile learning is needed by students so that students can understand AKM

well. Therefore, it is necessary to have a Mobile Application to introduce the Minimum Competency Assessment for junior high school students.

## 2. Method

This research method uses the ADDIE (Analysis, Design, Development, Implementation and Evaluating) model (22), but is only limited to the development stage. Because there is research on this development only assesses the validity of the Mobile Application. The Mobile Application contains elements of AKM combined with junior high school mathematics subject matter and the questions are packaged with a contextual approach to the Semarang City area. The first step in this research is an analysis which consists of an analysis of the needs and characteristics of students in the city of Semarang, material analysis, analysis of media maker tools, and specification analysis. The second step of design consists of making application storyboards, schemes for preparing questions, making images, and application buttons. The third step is development which consists of making Mobile Applications, validating Mobile Applications. The data sources in this study were two media experts and two material experts, and a questionnaire. The number of respondents involved in this study were 20 respondents from junior high school students. The instrument used is a media expert validation sheet, material expert validation, and questionnaires. The data collection technique used is the provision of expert validation questionnaires and questionnaires to students. The data analysis technique is in the form of percentage descriptive data. After the data is collected from the experts, the percentage is calculated using the formula in equation (1) (23) with the leveling according to Table 1 (24):

$$P = \frac{f}{N} \times 100\%(1)$$

With:

f = frequency being searched for percentage.

N = number of cases (frequency/number of individuals)

P= percentage number

The next step is to distribute questionnaires to students containing 10 questions that already represent the five aspects of usability. Users fill out questionnaires that have been shared based on their experiences (what they see and feel) when using the application. Each question from the questionnaire aims to indicate the level of usability according to user acceptance, which will be assessed on a five-point scale

Percentage Range	Criteria
86% – 100%	Very good
76% - 85%	Good
60% - 75%	Enough
≤ 55% - 59%	Not good

Figure 1: Percentage and Media Eligibility Criteria.

(25). According to the aspects in usability testing, it includes five things (Learnability, Efficiency, Memorability, Errors, Satisfaction).

The results of the plot of the usability aspect above for the 10 questionnaire questions can be seen in Table 2. The dimensions of the usability of the application in this study were addressed to respondents using a scale of 1 to 5 (26), to obtain data that is ordinal and scored as following:

PK	KMS	KM	CM	M	SM
Value	1	2	3	4	5

Figure 2: Value table.

With:

PK : Questionnaire questions

KMS : Not so easy

KM : Not Easy

CM : Pretty Easy

M : Easy

SM : Very Easy

### 3. Result and Discussion

#### 3.1. Results

The product resulting from this research and development is named "Mobile Application" as a medium for introducing AKM to students. This mobile application contains the definition of AKM, examples of AKM questions (numbering, text literacy, information text literacy), AKM practice questions, class AKM, web guides, and about AKM for junior high school, games and bibliography (Figure 1). The results of the assessment of the feasibility of the media were carried out by two material experts and two media experts. Judging from the material aspect obtained an average of 89.62 percent. These results indicate that material is in the very good category.

Meanwhile, when viewed from the media aspect, there is a difference of 1,74 percent. So from the aspect of the media obtained an average of 87.88 percent. The average results are also in the very good category. So that both the material and media aspects of the Mobile Application are very good.

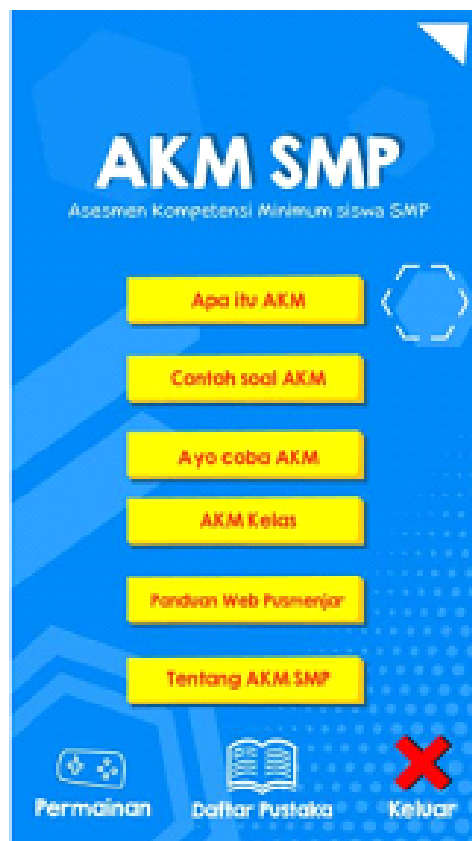
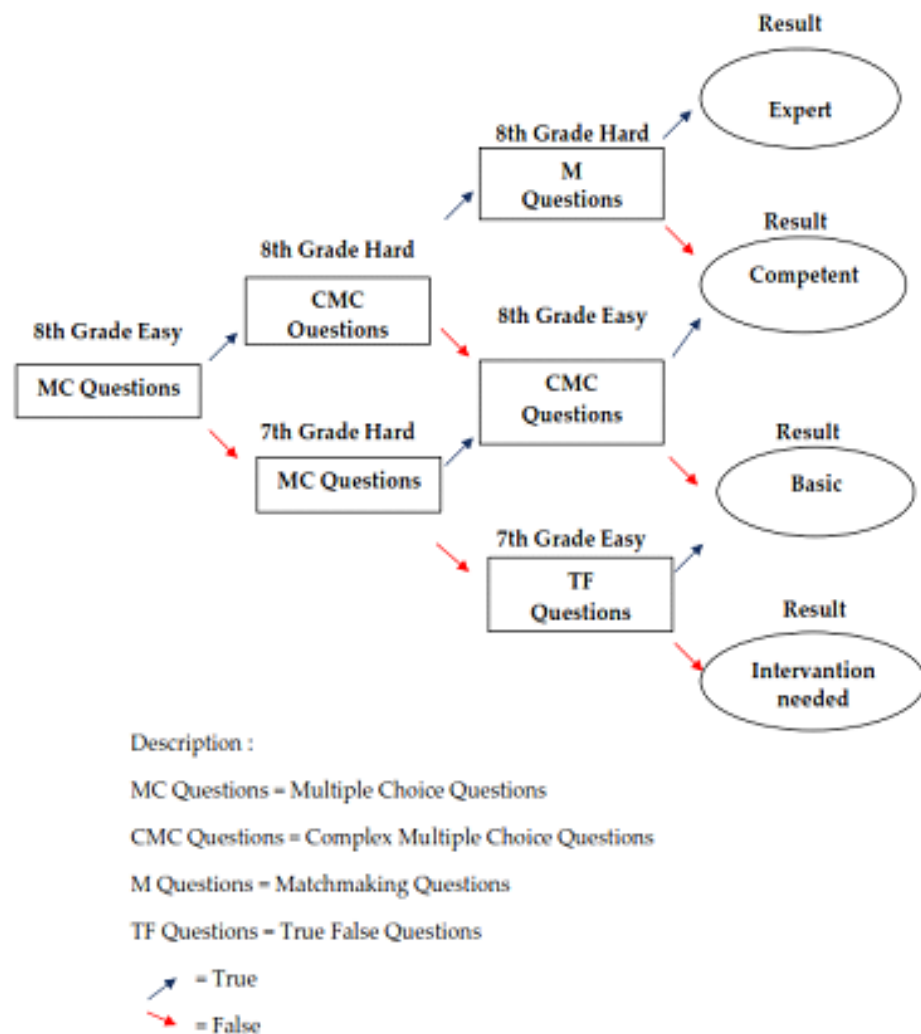


Figure 3: AKM Main Page.

Game questions in the Mobile Application consist of five types of questions: Multiple Choice questions, Complex Multiple Choice questions, True False questions, Matching questions, and short questions (Figure 2). The first question starts from multiple choice questions if correct, then the player will continue the journey to complex multiple choice questions, and when players answer the 8th grade multiple choice questions in the easy category incorrectly, then the players will continue the journey to complex multiple choice questions for class 7. The second consists of two questions: the 8th grade complex multiple choice questions and the 7th grade complex multiple choice questions. In the 8th grade complex multiple choice questions, the correct answer will continue towards the 8th grade matchmaking questions, and when incorrect, the player will continue the journey, towards true and false class 8 questions. Whereas in the complex multiple choice questions class 7 in the difficult category, when the player answers the questions correctly, the player will continue the journey to the 8th grade

short entry questions, and when the player answers the questions incorrectly, the player will continue the journey. to the question of true or false class 7.



**Figure 4:** Types of Questions in AKM.

The third question consists of four questions: the 8th grade matchmaking question (Figure 3), the 8th grade true-false question, the 8th grade short entry question, and the 7th grade true-false question. In the 8th grade matchmaking question, the player answers correctly, the player will get proficient results, and when the player answers the question incorrectly, the player will get a proficient result. In grade 8 true-false questions, when the player answers the question correctly, the player will get a proficient result, and when the player answers the question incorrectly, the player will get the basic result. In the 8th grade short question, when the player answers the question correctly, the player will get a proficient result, and when the player answers the question incorrectly, the player will get the basic result. Whereas in the 7th grade true-false questions, when

the player answers the question correctly, the player will get the basic results, and when the player answers the question incorrectly, the player requires Special Intervention.

Statement		Answer
Percentage increase in many cultural tourism objects in 2018 and 2020	<input checked="" type="radio"/> <input type="radio"/>	40,00
Increased number of natural attractions in 2017 and 2020	<input type="radio"/> <input checked="" type="radio"/>	16,6
The difference in the percentage increase in the number of cultural tourism objects (2017 & 2019) and the number of artificial tourism objects (2018 and 2020)	<input type="radio"/> <input checked="" type="radio"/>	1,25
The difference between the increase in the number of natural attractions (2018 & 2020) and the number of artificial attractions (2018 & 2020)	<input checked="" type="radio"/> <input type="radio"/>	0,59
	<input type="radio"/> <input type="radio"/>	0,35

Figure 5: Example of matchmaking questions.

### 3.2. Discussion

The advantage of the Mobile Application is revealed based on the research that has been done. Mobile Application already contains elements of AKM combined with SMP material. The questions are packaged with a contextual approach with an attractive appearance and the application is very easy to use to introduce students to AKM. The product's weakness is that the application can only be used on smartphones with the Android operating system.

The Mobile Application can be operated in offline mode. The resulting Mobile Application is in .apk format. The media has been validated by two media experts and two material experts, each of which the percentage in the material aspect is 89.62 percent. At the same time, the media section was 87.88 percent. both aspects are categorized as "Very Good".

### 4. Conclusion

The average results of media validation and material validation for the Mobile Application are in the very good category, with 89,62 percent in the material aspect and 87,88 percent in the media aspect. In addition, the Mobile Application contains routes that actually exist in real situations around students. So that the Mobile Application makes it easier for junior high school students to get to know AKM well. Based on this explanation, the product was a valid Mobile Application. This can be interpreted that the Mobile Application should be used as an alternative to get to know AKM easily, especially for junior high school students

## References

- [1] Panggabean RFSB, Tamba KP. Kesulitan belajar matematika: Analisis pengetahuan awal (difficulty in learning mathematics: Prior knowledge analysis). *JOHME: Journal of Holistic Mathematics Education*. 2020;4;17.
- [2] OECD. PISA for development assessment and analytical framework: Reading, mathematics and science, preliminary version. Paris: OECD Publishing; 2017.
- [3] Cahyanovianty AD, Wahidin W. Analisis kemampuan numerasi peserta didik kelas VIII dalam menyelesaikan soal asesmen kompetensi minimum (AKM). *Jurnal Cendekia: Jurnal Pendidikan Matematika*. 2021;5:1439–1448.
- [4] Indah N, Mania S, Nursalam N. Peningkatan Kemampuan literasi matematika siswa melalui penerapan model pembelajaran problem based learning di kelas VII smp negeri 5 pallangga kabupaten gowa. *MaPan*. 2016;4:200–210.
- [5] Mansur N. Melatih literasi matematika siswa dengan soal PISA. *Prisma*. 2018;1:40–144.
- [6] Abildinova GM, Alzhanov AK, Ospanova NN, Taybaldieva Z, Baigojanova DS, Pashovkin NO. Developing a mobile application “education process remote management system” on the android operating system. *International Journal of Environmental and Science Education*. 2016;11:5128–5145.
- [7] Liu M, Horton L, Lee J, Kang J, Rosenblum J, O’Hair M, et al. Creating a multimedia enhanced problem-based learning environment for middle school science: Voices from the developers. *Interdisciplinary Journal of Problem-Based Learning*. 2015;8;81–91.
- [8] Fauziah A, Sobari EFD, Robandi B. Analisis pemahaman guru sekolah menengah pertama (SMP) mengenai asesmen kompetensi minimum (AK M). *Edukatif: Jurnal Ilmu Pendidikan*. 2021;3:1550–1558.
- [9] Purwati PD, Faiz A, Widiyatmoko A. Asesmen kompetensi minimum (AKM) kelas jenjang sekolah dasar sarana pemacu peningkatan literasi peserta didik. *SOSIO RELIGI: Jurnal Kajian Pendidikan Umum*. 2021;19.
- [10] Sari A, Daulay S, Yola Yuliani Putri PE. Penghapusan Ujian Nasional Tahun 2021 Dalam Perspektif Guru sma di kota tebing tinggi. *Seminar Nasional PBSI-III*. 2020:213–220.
- [11] Mendikbud. AKM dan implikasinya pada pembelajaran. Pusat Asesmen Dan Pembelajaran Badan Penelitian Dan Pengembangan Dan Perbukuan Kementerian Pendidikan Dan Kebudayaan. 2020;1–37.



- [12] OECD. PISA 2015. 2015. Available from: <https://www.oecd.org/pisa/pisa-2015-results-infocus.pdf>.<https://www.oecd.org/pisa/pisa-for-development/PISA-D-assessment-and-Analytical-Framework-Ebook.pdf>
- [13] Wilson M. Making measurement important for education: The crucial role of classroom assessment. *Educational Measurement: Issues and Practice*. 2018;37:5–2.
- [14] Pellegrino JW. Assessment as a positive influence on 21st century teaching and learning: A systems approach to progress. *Psicologia Educativa*. 2014;20:65–77.
- [15] Baird JA, Andrich D, Hopfenbeck TN, Stobart G. Assessment and learning: Fields apart? *Assessment in Education: Principles, Policy and Practice*. 2017;24:317–350.
- [16] Brown GTL. Is assessment for learning really assessment? *Frontiers in Education*. 2019;4:1–7.
- [17] Yau YW, Li Z, Chua MT, Kuan WS, Chan GWH. Virtual reality mobile application to improve videoscopic airway training: A randomised trial. *Annals of the Academy of Medicine of Singapore*. 2021;50:41–58.
- [18] Liliarti N, Kuswanto H. Improving the competence of diagrammatic and argumentative representation in physics through android-based mobile learning application. *International Journal of Instruction*. 2018;11:107–122.
- [19] Keane T, Keane W, Blicblau AS. *Beyond traditional literacy: Learning*. 2014.
- [20] Cahya SD, Handayani W. Aplikasi perfect ear sebagai media inovatif belajar teori musik. *EDUTECH*. 2018;19:173–184.
- [21] Yaniawati P, Maat SM, Supianti II, Fisher D. Mathematics mobile blended learning development: Student-oriented high order thinking skill learning. *European Journal of Educational Research*. 2022;11:69–81.
- [22] Alfian DC, Saptono S, Lisdiana L. Effectiveness of e-supplement mobile Android application toward science literacy skills on minimum competency assessment oriented in respiratory system of junior high school students. *Journal of Innovative Science Education*. 2022;129–135.
- [23] Sudijono A. *Pengantar statistik pendidikan*. Jakarta: PT. Raja Grafindo Persada; 2006. Available from: [https://www.academia.edu/37436922/pengantar\\_statistik\\_pendidikan\\_anas\\_sudijono\\_34761\\_pdf](https://www.academia.edu/37436922/pengantar_statistik_pendidikan_anas_sudijono_34761_pdf)
- [24] Purwanto N. *Prinsip-prinsip dan teknik evaluasi pengajaran*. Bandung: PT. Remaja Rosdakarya. 2013. Available from: <https://onsearch.id/Record/IOS3763.001238>
- [25] Wingnjosoebroto S, Sudiarno A, Harendra D. Perancangan interface prototype web berdasarkan pada aspek usability (Studi kasus: Laboratorium ergonomi dan perancangan sistem kerja teknik industri ITS). 2009.

- [26] Rahadi DR. Pengukuran usability sistem menggunakan use questionnaire pada aplikasi android. JSI: Jurnal Sistem Informasi (E-Journal). 2014;6.