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Islamic Character Building: Developing Islamic Character with ABEL-Based Mathematics Mobile Learning for Junior High School Students

Mawi Khusni Albar¹

Abstract

Social changes, disruption era, and various rapid flow of information technology advancement put a strong pressure on education implementation. There are many constraints in moral and character building, either socially or religiously. This drives character education implementation in each lesson that student receives at school. On the other hand, the ever-changing conditions drive learning process to adjust to any development of educational technology. This research studied and developed internalization process using mathematics mobile learning in mathematics learning. This research used a Research and Development design or development research to test the effectiveness of Islamic character-building using mathematics mobile learning. As a result, the mathematics mobile learning was declared valid in Islamic modeling, analogy, illustration, and philosophy. The test on 30 Junior High School students resulted in 17 students having questionnaire outcome on religious character value at medium level and 13 students at high level. Based on the results, we may state that mathematics mobile learning can instill religious character values into students on five dimensions: faith dimension, religious practice dimension, internalization dimension, knowledge dimension and experience dimension.

Keywords: ABEL; Character Education; Developing Character; Islamic Character; Mathematics Mobile Learning.

Introduction

Students today are utterly different from students one of two decades ago, as they are the products of different eras and different socialization pattern (Novick et al., 2008). Globalization conditions and technology advancement form disruption era, which is a new wave marked with cheap information technology that facilitates information transmission and erases global community boundaries (Fukuyama, 1999). The rapid flow of information creates various conditions in the postmodern community such as advancement and decline, order and chaos at the same time (Fasya, 2020). In response to such era, education requires some adaptations and innovations in both learning methods and media (Fikri, 2019; Hasibuan et al., 2020; Lubis, 2019; Salsabila et al., 2021)

Such complex conditions were worsened by the Covid-19 pandemic in the previous years. Covid-

¹ Faculty of Education (Tarbiyah) and Teachers Training, UIN Saizu Purwokerto, Email: mawikhusni@uinsaizu.ac.id.

19 pandemic more or less required the education system to adjust and respond to the conditions (Öçal et al., 2021). Some of the adjustments included rapid change to the learning system from initially face-to-face learning to online media. This inflicted new problems such as pedagogic competency and technology mastery, student's preparedness and ability, stakeholders' support in education world, and supporting facilities and infrastructures (Rifa'i, 2023). In more in-depth review of not only on technical level of education implementation, in Indonesia, for instance, teacher's authority declines and lowers the learning motivation transferred to student (Astuti et al., 2022; Raharjo et al., 2023). The Covid-19 pandemic that occurred in a relatively long period (\pm 3 years) also had impacts on students, from significant change in learning method, how to understand lesson, response to media, personality, character, to mental health issue in some levels of education (Ayasrah et al., 2022; Julianto et al., 2023).

The latter issue on mental health and personality were one of the important bases of character building implementation in various education levels in Indonesia's education system (Sari et al., 2021). Current development also brings underlying changes to personality and character, such as moral crisis among the young generation, causing urgent implementation of character education (Fahdini et al., 2021). From student's internal factor, personality development at certain age and preparedness to face the future that emphasizes work competition, technology mastery and skills is one reason of the importance of character education implementation (Aryana, 2021; Khair, 2021; Laksana, 2021; Rony & Jariyah, 2021). On the other hand, instilling character building, especially Islamic character, refers to various fundamental bases such as Al-Quran, Hadith, Prophet's Morals, and Muslim figures of exemplary character in instilling positive character, especially into Muslim students (Basyar, 2020). Muslim scholars' exemplification is one model for students' Islamic character understanding, since Muslim scholars play strong role in the development of scientific knowledge and modern science (Salsabila et al., 2020). In mathematics learning, some Muslim scholars play significant role in the development of mathematics such as Al-Khwarizmi, Al-Biruni, and Al-Kindi. Islamic character education in integration with mathematics subject can certainly be implemented through exemplification of Muslim scholars in mathematics fields, such as careful thinking, religious practice consistency, and loyalty to the science learned (Khamidah, 2014).

Character education itself is implemented at various levels of education in Indonesia, both in state and private schools, and both in general and religious based schools. In religious based education, character building is performed to shape student's character to be civilized, self-reliant, moderate and innovative in any fields, and the character education is implemented at both schools and *pondok pesantrens* (Hidayati et al., 2022; Huda et al., 2023; Oktari & Kosasih, 2019; Sadiyah, 2022). In general education, character education is inserted into each subject, such as Pancasila (Maisyaroh et al., 2023), religious study (Das et al., 2022), mathematics (Kim et al., 2019), and various subjects taught at school.

Such trend is not surprising, given that character education has indeed been adjusted and applied to various socialization practices formally (school) and informally (culture, arts, and various life

practices). For example, the character education instilled using a cultural approach such as Dayak Meratus Language and various expressions of Dayak Meratus Ethnic Group in counseling and guidance implementation in SMA Negeri 1 Halong in Kalimantan (Akbar et al., 2023). In another case, character education is instilled using *wayang beber* media, which was once piloted at elementary schools in Pati Regency, and the character building using *wayang beber* media influenced students' critical thinking ability (Nugraheni et al., 2022). Character building using certain culture cannot be ignored since culture itself serves, among other things, to internalize and socialize positive values to the culture holders (Dwiningrum, 2019; Hutcheon, 1999). In view of such facts, ideal character education must be adjusted and inserted into each subject that students receive at all educational levels.

All this time, character building at school in learning process only takes place in specific subjects such as religious study or PKn (Anatasya & Dewi, 2021; Hubbi et al., 2020; Setiawan et al., 2021; Solehat & Ramadan, 2021; Solihah et al., 2022; Suardi et al., 2019; Zulaikhah, 2019). Meanwhile, the effort to instill religious character values into learning can be integrated into various subjects, such as mathematics. Mathematics is the basis of all scientific disciplines. The development of scientific knowledge and technology and human's daily activities cannot be separated from mathematics' role (Roth, 2020).

Thus, besides developing cognitive aspect (transfer of knowledge) in mathematical learning at school, we can also instill good moral and ethical values into students (transfer of value) through religious character values building. Religious character values building in mathematics is rarely found, even among teachers, and even in Islamic based schools (MTs and SMP IT), there is an assumption that mathematics and religion are two materials that do not interfere each other. The reason is that teachers still face constraints in planning for integration of religious character values mathematical learning (Rachmiati & Mansur, 2021).

Character education implementation in mathematics subject has some models, such as using ethnomathematics with some media such as character doll (Nuryadi et al., 2023) in instilling various characters into students through illustration of doll's character. Another application is using expressions and daily life examples to explain various mathematical concepts in a way simpler and easy to understand, thus students will understand mathematics and comprehend the noble expressions in their culture (Herawaty et al., 2020).

Besides moral character in general, some studies explain integration of mathematical learning with religious, especially Islamic, character. For example, studies on literacy based Islamic contextual mathematical learning that emphasize on Islamic character insertion through various phases such as orientation, Giving Islamic Context Problems, Mathematical Literacy Activities, in-group learning, class discussion, reflection, and evaluation. Such model has significant impact on mathematical literacy ability improvement and strengthens student's Islamic values (Imamuddin, 2022). Another study emphasizes integration of ICARE and Islamic based mathematic learning

with materials like fraction. The results of the research explain that ICARE based mathematical learning instruments with the Introduction, Connection, Application, Reflection and Extension structure are integrated into learning plan in which Islamic values are inserted. Such learning instruments have valid practicality and effectiveness for mathematical learning application with Islamic character inserted (Rahmadhani & Wahyuni, 2020). However, the two mathematical learning models explained emphasize face-to-face learning, instead of mobile learning.

Its implementation in various conditions of mathematical teaching and character internalization there are certainly problems faced, given that as an academic subject, mathematics contains prerequisites needed to develop student's cognitive ability, shape and correct their mindset, comparison, analysis, develop concrete generalization ability, and strengthen memory and analysis (Jakhongir & Mohinur, 2022). Other conditions, such as pandemic, certainly also add to the long list of problems to solve in character education and building in mathematics that, as commonly known, pandemic has changed the learning process from face-to-face (offline) to remote (online) learning, thus it for character building delivery and compatibility are urgent (Tarusu et al., 2022). This way, this research attempts to review more deeply the Islamic character internalization process, especially in mathematical learning using Mathematics Mobile Learning.

Research Method

This research used Research and Development (RnD) method, which was chosen since the main aim of this research was as explained in the understanding of this method "educational research and development is a process used to develop and validate educational product" (Gall et al., 2003). Besides practical application, Research and Development also aimed to develop empirically based theories through joint study of learning process and facilities which supported the process (van den Akker et al., 2006).

In product development, the researcher referred to the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model (Sugiyono, 2018). In the Analysis phase, the need for development product in regard to mathematical learning was studied. The Design phase was in the form of product development planning. In the Development phase, the product development plan was realized and evaluated by validators, who were composed of material expert, media expert, and Islamic teaching experts using validator questionnaire.

The Product implementation phase that had been developed was implemented to students, for which they were given with religious character questionnaire to examine whether the religious character could be instilled well or not. Lastly, the Evaluation phase, the religious character questionnaire outcome was analyzed to examine whether the product developed was feasible and effective for use.

The research's informants or respondents were grade VIII students at SMP (Junior High School) level. The respondents were chosen based on the respondents' age benchmark in understanding

and building character to be displayed as an identity through mathematics mobile learning. The respondents consisted of 30 students from a class of a Junior High School (SMP). The students would try using mathematics mobile learning entitled ABEL (Asyik Belajar Mathematics) for mathematics learning. Various Islamic characters would be inserted into some materials, including religious character covering faith dimension, religious practice dimension, internalization dimension, knowledge dimension and experience dimension.

The results of validation test by experts would first be transformed into percentage using the formula below:

$$\text{Score percentage} = \frac{\sum x}{\sum x_i} \times 100\%$$

Explanation: P = Score percentage

$\sum x$ = Total score of indicators per category

$\sum x_i$ = Total score of all categories

The percentage results were then interpreted pursuant to the table below:

Table 1: Validity Criteria

Validity Criteria	Validity Level	Remarks
80% < score ≤ 100%	Extremely Valid	No revision
60% < score ≤ 80%	Valid	No revision
40% < score ≤ 60%	Moderately Valid	Revision necessary
20% < score ≤ 40%	Invalid	Revision
0% < score ≤ 20%	Extremely Invalid	Revision

Source: (Sugiyono, 2018)

Research Results

This research started with analysis on the need for learning media development for compatibility with users' needs. Based on literature review, circular material was found of high difficulty level. The difficulty was caused by student factor and the teacher seemed to lack teaching creativity (Jayanti & Hidayat, 2020) and use of learning media (Jabir, 2016). Referring to this, mathematical learning needs to be improved by making use of interactive learning media and making learning not only teacher-centered.

The learning media developed in this research was mobile based mathematics learning entitled ABEL (Asyik Belajar Mathematics) which was aimed to give student “fun” mathematical learning. The application’s menu covered some types of learning such as material and training in the *Study* menu, learning in the form of Quiz in *Quiz* menu and learning in the form of game in *Games* menu.



Figure 1. Display of Home Page and Initial Menu of ABEL Application

(Source: Researcher’s Documentation, 2023)

Not less importantly, it is necessary to instill religious character into learning as an effort to keep student’s complete competence balanced covering cognitive, psychomotor and affective aspects (Makmun, 2014). Therefore, religious value transfer occurs through learning process, making it student’s continuous habit, thus the character instilled can be found in student’s activities, in and out of class. On this basis, an android based mobile learning media was developed while instilling religious character values. The second phase was design, formulating product design covering KI, KD, learning objectives, material coverage and storyboard. The next was development phase, realizing product planning into ABEL learning media validated by material expert, media expert, and Islamic context expert. Below are the results of validation by the three experts:

Table 2: Media Expert’s Validation Results

No.	Aspect	$\sum x$	Percentage (%)	Criteria
1.	Software	34	85	Extremely Valid
2.	Visual Communication	33	82.5	Extremely Valid

Table 3: Material Expert's Validation Results

No.	Aspect	$\sum x$	Percentage (%)	Criteria
1.	Content Feasibility	17	85	Extremely Valid
2.	Presentation Feasibility	12	80	Extremely Valid
3.	Language Assessment	26	86.7	Extremely Valid

Table 4: Islamic Context Expert's Validation Results

No.	Aspect	$\sum x$	Percentage (%)	Criteria
1.	Modeling	11	73.3	Valid
2.	Analogy	4	80	Valid
3.	Illustration	8	80	Valid
4.	Philosophy	8	80	Valid

After the ABEL (*Asyik Belajar Lingkaran*) learning media was declared valid, it was followed with implementation phase, by implementing it on grade VIII Junior High School students to examine whether the ABEL learning media could instill religious character values into students or not. To examine the level of religious character values instilled, the results of questionnaire in the implementation phase were categorized by standard deviation formula with three classifications as presented in the table below:

Table 5: Classification by Standard Deviation

Classification	Interval
High	$X > M + 1 \text{ SD}$
Medium	$M - 1 \text{ SD} \leq X \leq M + 1 \text{ SD}$
Low	$X < M - 1 \text{ SD}$

Source: (Azwar, 2013)

Therefore, the total scores of religious character questionnaire for each student, with such calculation and classification, are to be based on Table 6.

Table 6: Total Religious Character Value Classification Formula

Classification	Interval
High	Score > 79.91
Medium	$77.95 \leq \text{score} \leq 79.91$
Low	Score < 77.95

Source: Modification of Azwar's formula (2013)

Table 7: Result of Religious Character Value Classification for Each Student

Classification	Interval	Frequency
High	Score > 79.91	13
Medium	$77.95 \leq \text{score} \leq 79.91$	17
Low	Score < 77.95	0

According to table 7, there was no student with religious character score at low classification, while 13 students were at high level and 17 students were at medium level. Thus we may conclude there was religious character value building in the mobile learning developed. More specifically, the students' average scores for each dimension of religious character value are presented in Table 8.

Table 8: Average Score of Religious Character by Dimension

Dimension	Average Score	Percentage (%)
Faith	11.77	98.06
Religious Practice	19.70	98.50
Internalization	15.80	98.75
Knowledge	11.83	98.61
Experience	19.83	99.17

Analysis

Mobile learning (m-learning) means learning that makes use of mobile or handheld technology and device such as PDA, cellular phone, laptop and information technology device that will be commonly used in teaching-learning and can be implemented anywhere and anytime (Aripin, 2018). Mobile learning is a global trend in the education world that is widely spread post Covid-19 pandemic (Kaisara & Bwalya, 2023).

In the last few years, the mobile learning concept has changed people's perspective of cellular and technology devices in learning environment at all educational levels. In the previous period, cellular device was only used for communication purpose. Technology and information development leads the community to more advanced cellular technology with many new features in cellular device (Mohtar et al., 2023). This surely leads to further development of mobile phone use for mobile learning implementation. This is important since various social-cultural conditions and rapid technology advancement make learning method which was previously traditional to shift to new learning dimension, in which an individual can perform learning and teaching anywhere and anytime (Mohtar et al., 2023).

Mobile learning as a new learning media certainly retains very big potential given that the world condition in the future will require "speed" more. Ideal implementation and contextualization of mobile learning show significant impact on some cases, students express their opinion more actively, which cannot be separated from decreasing tension that they feel in direct encounter of traditional learning (Sánchez-Rivas et al., 2023). The use of mobile learning, especially in character education using mathematics mobile learning, drives internalization of strategic issues such as

technical issues in future use of mobile learning, the extent the media influences student’s learning and leads to communication pattern and new form of interaction for student and educator (Mauri Medrano et al., 2023).

Based on the results of validation by Islamic context expert, the mathematics mobile learning can be declared valid in terms of modeling, analogy, illustration, and Islamic philosophy. Test on 30 Junior High School students resulted in 17 students with religious character value at medium level and 13 students at high level. Based on the results, we may conclude that mathematics mobile learning can instill religious character values into students in five dimensions: faith dimension, religious practice dimension, internalization dimension, knowledge dimension and experience dimension. In other words, students cannot only understand mathematics learning that is the core, but they will also understand the religious values inserted into any mathematical learning in the media.

Mathematics mobile learning application to mathematics learning has significant impact on driving student’s creative thinking in understanding the learning delivered. On the other hand, mobile learning application to mathematical learning also allows student to learn mathematics without space and time constraints. This will create a selection scheme that such learning will be quite useful for student with strong interest in mathematics study. Inserting religious values into learning is also useful for forming student’s mindset in building tolerance and awareness of religious practice, especially for Muslim students. This certainly distinguishes this model from some models of mathematics mobile learning, such as mathematics mobile learning using TPACK (Technology, Pedagogy, and Content) framework that integrates the characteristics of materials with learning media, learning model, and technology choice (Hernawati & Jailani, 2019). This learning model only focuses on integration of mathematics with the use of technology mobile without inserting Islamic characters.



Figure 2. Learning Display in ABEL Application Always Starts with Prayer

(Source: Researcher’s Documentation, 2023)

We can find in Figure 2. that each time learning starts in the form of mathematical materials, the

learning in ABEL application guides student to start with prayer. This is certainly how to instill Islamic character into student, that besides learning mathematics, student is also guided to keep religious (in this case Islam) teaching in mind.

Besides, student’s Islamic character internalization is also emphasized on understanding of religious practice by Muslim such as hajj. This example, performed by Muslims, aims to gain an understanding from something that is not far away from student’s life, making the understanding built more comprehensive and applicative. This integration can be observed in the learning model in Figure 3.

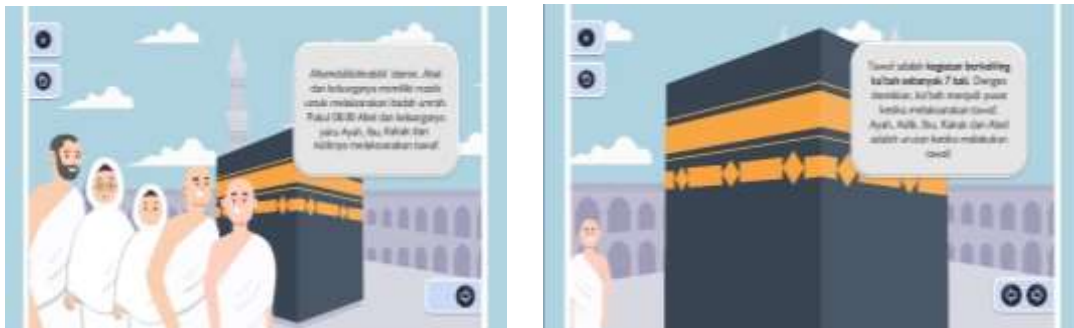


Figure 3. Display of Example of Circular Learning Case in ABEL Application

(Source: Researcher’s Documentation, 2023)

After student understands the context of material delivered, learning is followed with explanation of materials, in this case circular material (see Figure 4). This phase aims to explain to student that our life as human cannot be separated from various examples of mathematical learning. For example, giving understanding that in hajj one of the practices is Tawaf. Tawaf is an activity performed by going around Ka'bah seven times, which is one of the pillars of hajj and umrah. Upon careful observation, Tawaf forms a shape, circle.



Figure 4. Display of Circle Material Explanation Based on Example Case in ABEL Application

(Source: Researcher’s Documentation, 2023)

Through this complex learning, participant is guided to understand the materials and understand and review Islamic religious practices displayed in ABEL application. This way, ABEL application builds student's understanding of mathematics as daily religious behaviors that are also related to mathematics. This understanding indirectly leads student to more in-depth thinking of Islam that they have faith in.

On the other hand, mathematics mobile learning implementation does not only affect students, but also educators. With such results, we can find that using remote learning platform, digital education resource and mobile phone broadens educator's pedagogic instruments. According to a researcher, positive acceptance of mathematics mobile learning at school enhance teacher's motivation to keep learning technology development in the implementation of mathematical learning for student (Sharafeeva, 2022). Teacher's positive motivation is greatly needed in applying character in mathematics mobile learning, since current digital era requires teacher to create a generation with future thinking ability. Therefore, teachers are prepared with pedagogic digital competence for them to design or implement information technology-based learning, while exploring local wisdom values and applying teaching strategies for students to master the skills needed in the future, such as critical, creative and innovative thinking.

Mathematics mobile learning needs to be enforced in digital pedagogy, in making students active partner in finding and developing their own mathematical knowledge. This allows association of mathematical topics with real world that is integrated in both digital and real worlds. Learning activity will also bring the opportunity to get connected with fellow students during learning process through conversation and discussion, and drive collaborative activities between student and teacher to create new knowledge (Hernawati & Triono, 2020).

Conclusion

One of the main objectives of education in current contemporary era is to build knowledge-based community through integration of information and communication technology into learning process. Therefore, all learning aspects should be adjusted, including educational technology, learning media, educator's capacity and improving student's potential ability and character. All of these must be integrated with each other in order to realize ideal learning in the rapid pace of technology and information advancement.

One of the efforts for such adjustment is to use new media in learning implementation for students, in this case character education implementation using mathematics mobile learning. Mathematics mobile learning is one of the appropriate media for implementing character education through its insertion into mathematical learning. However, this media still requires teachers' in-depth exploration, especially in determining the suitability of characters for students to internalize. This character suitability is about material adjustment to suitable learning media, learning model, and technology choice for mathematics mobile learning in instilling the character and improving students' learning achievement and motivation.

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