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# NEEDS ANALYSIS FOR THE DEVELOPMENT OF ANDROID-BASED E-MODULE IN SECONDARY SCHOOL MATHEMATICS

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ABSTRACT

The objective of this study is to analyze the necessity for the development of Android-based e-module teaching materials in junior high school mathematics topics. The subjects in this study were VIII grade students of SMPN I Plumbon as many as 75 students. The data collection techniques used in this study were questionnaire techniques. The data analysis in this study consisted of data reduction, data presentation and conclusion. The findings of this observe had been that arithmetic mastering has implemented the Merdeka Curriculum using a systematic method, students nevertheless have difficulties in mastering arithmetic fabric, and teachers and students want teaching materials that may be accessed on mobile telephones, coaching substances are used in the form of textbooks, the most normally used teaching media by teachers is PowerPoint, and Android-primarily based e-modules have in no way been advanced. The results showed that there is a need to develop an Android-based e-module in mathematics subjects.

***Keywords: Android; E-module; Needs Analysis.***

## INTRODUCTION

Education is a cultural process carried out by adults on immature people with the aim of changing their behaviour, both in terms of expertise and competencies (Masykur, 2013). Education is one of the important aspects in preparing the more youthful technology to stand the demanding situations and demands of real life, which are increasingly complex and uncertain. Education plays an important role in shaping individuals and societies. Through the cultivation of knowledge, skills and values, education opens the door to better opportunities. Education is not only about the transmission of information, but also about the development of character and a deep understanding of the world around us. An important aspect of education is the inculcation of moral values that help produce responsible and socially conscious citizens. Education also opens doors to economic opportunity by expanding skills and knowledge, enabling individuals to gain more career opportunities and improve their financial well-being.

Education cannot be separated from a curriculum. A curriculum plays a very important role in education because it determines how the curriculum will be delivered according to the needs and goals of education. The curriculum is not just subject matter or lesson plans, but also learning guidelines that are adopted by someone to carry out learning activities. Thus, the curriculum has a very central position in the whole educational process (Ahmad Dhomiri et al., 2023). Curriculum development itself is very important because it determines how the curriculum flows according to the needs and goals of education. The curriculum is designed to develop skills, form valuable national character and civilisation, and educate people's lives. the curriculum also has a role in achieving educational goals. The curriculum in training performs a totally important role in determining the development of

schooling in a rustic, from idea to software and exercise inside the subject (Mulia et al., 2023).

Since the covid-19 pandemic, the quality of Indonesian training has declined. The pandemic, which befell for 2 years, ended in no longer reaching overall learning objectives (Putri & Suyadi, 2021; Rachman et al., 2021). The Merdeka Curriculum has been initiated by way of the Indonesian government as an effort to enhance the first-class of schooling. This curriculum specializes in getting to know this is greater bendy and orientated to the desires and characteristics of college students, with an emphasis on intracurricular, co-curricular, and extracurricular gaining knowledge of. This curriculum change is predicted to deliver adjustments in training, with more emphasis on competency-primarily based person development and tender abilities (Indarta et al., 2022; Aini Qolbiyah et al., 2022).

Mathematics is a subject that has never been missing from the curriculum, including the Merdeka Curriculum currently used by schools. Mathematics is a widely wide-spread technological know-how that underlies the development of modern generation, has an crucial function in numerous disciplines, and advances human thinking, equipping students with logical, analytical, systematic, crucial, and innovative questioning competencies and the capacity to paintings collectively (Kasri, 2018). Mathematics is the ability to use reasoning in solving problems. Reasoning is the fundamental logic of thinking in mathematics. Reasoning is very important for humans, this is because in navigating life humans will find so many problems that must be solved. Therefore, students need to learn mathematics. Mathematics contains various materials that need to be mastered by students. Teaching materials in mathematics are an integral part of the curriculum. The teaching materials taught to students have been compiled in the learning outcomes of the Merdeka Curriculum which have been adjusted to the characteristics of students of various levels and grades.

Teaching material is the main component in teaching materials. Teaching materials are a summary of the material designed by the teacher to be taught to students to make it simpler to understand. Teaching materials make it easier for teachers to carry out learning and students more easily support their learning. Teachers can make teaching materials in a format that is in accordance with the instructional rules and characteristics of the coaching substances to be presented (Magdalena et al., 2020). Indariani et al., (2018) revealed that teaching materials are important written and unwritten elements that contain content that is systematically arranged. Ritonga et al., (2022) Define coaching cloth as a fixed of books containing statistics or fabric organized systematically to facilitate college students in learning or finding information in order that learning targets are created and abilties are achieved, and the statistics acquired may be implemented in normal lifestyles. The objectives of preparing coaching substances, specifically: 1) offer teaching substances which might be in accordance with the demands of the curriculum through considering the needs of college students, faculties, and regions; 2) assist students in obtaining alternative coaching substances; 3) facilitate teachers and students in carrying out learning; 4) assist students in learning something; and 5) learning activities are more interesting. (Departemen Pendidikan Nasional, 2008; Guntur et al., 2017).

There are various types of teaching materials. In popular, coaching materials are categorised into published and non-revealed teaching substances (Pribadi & Putri, 2019). Kinds of coaching substances inside the shape of: 1) revealed teaching substances, together with handouts, books, modules, posters, brochures, pupil worksheets (LKS), wallcharts, pictures or snap shots, and leaflets; 2) audio coaching substances including cassettes, radios, vinyl records, and audio compact discs; three) audio-visual teaching materials inclusive of compact disc videos, films; and four) interactive multimedia teaching substances together with CAI (laptop Assisted coaching), interactive learning multimedia compact discs (CDs),

and web-based totally gaining knowledge of substances (Pribadi & Putri, 2019; (Departemen Pendidikan Nasional, 2008). Correct teaching materials include as a minimum getting to know commands, abilties to be achieved, lesson content, helping statistics, exercises, paintings instructions, assessment and response to assessment results (Lestari, 2013). Through the existence of teaching materials, the teacher's role is no longer principal as the most effective source of gaining knowledge of in school room studying, but rather a facilitator who directs and guides student learning. The preparation and development of teaching materials must be adjusted to technological developments. In addition to requiring creativity and uniqueness, teachers also need teachers' knowledge of the surrounding environment so that the teaching materials developed are in accordance with the availability of surrounding materials that are familiar to the environment and have a cultural insight (Manurung et al., 2023).

The economic revolution four.zero has impacted fundamental adjustments in civilisation and affected various aspects of human existence, along with schooling (Dito & Pujiastuti, 2021; Putrawangsa & Hasanah, 2018). Generation is an critical tool for learning maths inside the twenty first century.Every school should ensure that all students have access to technology and information. Teachers can maximise the use of technology to develop understanding, stimulate interest and improve students' ability to learn mathematics. The use of technology increases student engagement, increases learning motivation, enables better interaction between teachers and students, supports student collaboration, improves the accuracy of mathematical calculations, and increases student engagement to become more comfortable learning mathematics, as well as gaining a deeper understanding of mathematical concepts (Murphy, 2016). Students' attitudes and engagement towards learning mathematics influence good mathematics learning habits (Lijie et al., 2020). The use of technology in mathematics has a positive impact on students and influences their attitude towards mathematics. Technology has become a means to improve students' attitudes towards mathematics (Higgins et al., 2019).

The improvement of technological know-how and technology permits all events to acquire facts abundantly, fast and without difficulty from various assets and places within the global (Rahmayanti et al., 2021). Integrating computers in learning has the potential to positively influence the teaching and learning of mathematics at various levels of education (Tamur et al., 2020). Chalkiadaki (2018) explains that the use of electronic media is a major demand and characteristic in 21st century learning. Apart from being able to use the available tools, teachers are also required to be able to develop skills in making learning media that will be used (Purwaningtyas & Hariyadi, 2017). The rapid development of technology needs to be used as a momentum for teachers to innovate in developing digital-based teaching materials in the form of electronic modules (e-modules). Imansari & Sunaryantiningsih (2017) argue that e-module is a module in electronic format that runs on a computer. Nugraha et al. (2015) outline e-module as a learning media the use of a pc that displays textual content, photos, images, audio, animation and video in mastering. The teaching material to be developed is an android-based e-module.

The consequences of studies carried out via (Mahuda et al., 2021) display that android-based coaching substances in mastering mathematics are powerful in improving trouble solving skills. Putra et al., (2017) also mentioned that learning using e-modules makes students more excited and not bored quickly. Based on the explanation above, this study intends to describe the needs of android-based e-modules in mathematics subjects for junior high school students.

## RESEARCH METHODS

This research is descriptive research using the survey method. Descriptive research is research that aims to describe phenomena that occur, both natural and man-made phenomena, or research that is used to analyse or describe the results of a subject, but not to provide broader implications (Saputra et al., 2021). This research was conducted in August 2024 at SMP Negeri 1 Plumbon. The subjects of this research were grade VIII students. The object of this research is an android-based e-module as teaching material for grade VIII junior high school students. The samples in this study were 4 mathematics teachers and 75 grade VIII students. The instruments used were teacher questionnaires

and student questionnaires made using google form. The teacher questionnaire consists of 5 aspects, namely, the Operational Curriculum for Education Units (KOSP), teaching resources, technology, and teaching materials. The student questionnaire consists of 4 aspects, namely interest in learning mathematics, mathematics learning process, teaching materials and e-module development. The analysis used was data reduction, data presentation, and conclusion drawing (Miles et al., 2014).

## RESULTS AND DISCUSSION

### RESULT

The results of the study were obtained from a questionnaire analysing the needs of teachers and students for android-based e-module teaching materials. The teacher needs questionnaire is in the form of closed questions with two answer choices using a guttman scale and open questions in the form of short answers. The results of the teacher needs questionnaire contain 4 aspects that were analysed, namely the operational curriculum of the education unit (KOSP), teaching resources, technology and teaching materials used by teachers can be seen in Table 1.

Table 1
Results of Teacher Needs Questionnaire

| Number | Quetion | Answer |
|---|---|---|
| 1 | Has the teaching of mathematics in your classrooms implemented the Merdeka Curriculum? | 100% of teachers answered that mathematics learning in the classroom has implemented the Merdeka Curriculum |
| 2 | Does your school apply the regular face-to-face learning system (6 working days) every week? | 100% of teachers answered that they apply a regular face-to-face learning system (6 working days) every week |
| 3 | Is the allocation of Maths lesson hours (JP) in accordance with the Merdeka Curriculum? | 100% of teachers answered that the allocation of Mathematics Lesson Hours (JP) was in accordance with the Merdeka Curriculum, namely 5 JP |
| 4 | Do you prepare the teaching module (RPP) before the maths lesson? | 100% of teachers prepare teaching modules (lesson plans) before mathematics learning is carried out, but some of these modules are designed independently and some are not. |
| 5 | Have you applied the scientific approach in learning mathematics? | 100% of teachers have implemented a scientific approach in learning mathematics, namely PBL, PjBL, Discovery Learning. |
| 6 | Do you use learning media when teaching maths in class? | 100% of teachers use learning media when teaching mathematics in the classroom, namely power point, geogebra, quizziz, google form designed by themselves or others. |
| 7 | Do you conduct assessments in mathematics learning? | 100% of teachers carry out assessments in learning mathematics, namely formative and summative assessments. |
| 8 | Do you involve cognitive, affective and psychomotor domains in the assessment of mathematics learning? | 100% of teachers involve cognitive, affective and psychomotor domains in the assessment of mathematics learning. |
| 9 | Do you use different forms of tests in your assessment of mathematics learning? | 100% of teachers use various forms of test types in assessing mathematics learning, namely written tests (multiple choice, complex multiple choice, and description), oral tests, observation sheets and attitudes. |
| 10 | Does your school provide mathematics teaching materials? | 100% of teachers answered that the school provides mathematics teaching materials, the teaching materials used by teachers are Merdeka Curriculum package books, summary mathematics materials and e-LKPD. |
| 11 | Do you need teaching materials that support | 100% of teachers need teaching materials that |

| | | |
|---|---|---|
| | mathematics learning in addition to the existing teaching materials at school? | support mathematics learning in addition to teaching materials available at school. |
| 12 | Do you need teaching materials that contain multimedia (text, images, animation, audio, and video)? | 100% of teachers need teaching materials that contain multimedia (text, images, animation, audio, and video) |
| 13 | Do you need interactive teaching materials? | 100% of teachers need interactive teaching materials |
| 14 | Does the school allow the use of mobile phones in learning maths? | 100% of teachers said that the school allows the use of mobile phones in learning mathematics |
| 15 | Does the school have internet network facilities that can be accessed by learners? | 75% of teachers said that the school has internet network facilities that can be accessed by students. |
| 16 | Are the available internet network facilities adequate for use by learners? | 50% of teachers said that the internet network facilities available are adequate for students to use. |
| 17 | Have you ever used mobile phones in learning mathematics? | 100% of teachers said they have used mobile phones in learning mathematics, namely to study materials and questions designed in the quizziz application, conduct daily assessments and exams, use the geogebra application, create e-lkpd and questions. |
| 18 | Do you think that learning mathematics would be more interesting if the teaching materials used could be accessed via mobile phones? | 100% of teachers think that learning mathematics will be more interesting if the teaching materials used can be accessed via mobile phones. |
| 19 | Do you support the development of android-based teaching materials as a teacher reference to support mathematics learning? | 100% of teachers support the development of android teaching materials as one of the teachers' references to support mathematics learning. |

The results of the questionnaire of students' needs for android-based e-module teaching materials that contain 4 aspects, namely interest in learning mathematics, the learning process, teaching materials, and e-module development can be seen in table 2.

Table 2
Results of Student Needs Questionnaire

| Number | Question | Answer |
|---|---|---|
| 1 | Do you enjoy learning maths? | 62.7% of all learners who were respondents in this study liked mathematics. |
| 2 | Do you look for additional information about maths outside of class time? | 62.7% of all learners who were respondents in this study sought additional information related to mathematics materials outside of mathematics hours. Respondents seek additional information through websites, YouTube, social media and tutoring. |
| 3 | Do you experience difficulties in learning mathematics material? | 62.7% of all learners experienced difficulties in understanding mathematics material. Respondents experienced difficulties in learning mathematics material, due to low mastery of basic mathematical operations, too many mathematical formulas, |
| 4 | Do you actively participate in learning mathematics in class? | 62.7% of all learners actively participate in learning mathematics in class. |
| 5 | Do you use learning media in teaching maths? | 82.7% of all learners responded that teachers use learning media in teaching |

| | | |
|---|---|---|
| | | mathematics. |
| 6 | If you answered yes to the previous question, what learning media do you use? (you can choose more than 1 answer) | 46.4% of all learners answered that the teacher used power point learning media. Then use maths apps, teaching aids and videos. |
| 7 | Do you use teaching materials during maths learning? | 90.7% of the respondents answered that they use teaching materials during mathematics learning. |
| 8 | What teaching materials do you use during maths learning? (more than one answer is allowed) | 94.7% of the respondents said that they use textbooks during mathematics learning. Then using Learner Worksheets (LKPD), E-LKPD, BSE, Modules. |
| 9 | Do you need teaching materials that can be accessed on mobile phones? | 90.7% of all learners who were respondents in this study needed teaching materials that can be accessed on mobile phones in mathematics subjects. |
| 10 | Do you need teaching materials that contain audio and video? | 60% of all students who are respondents in this study need teaching materials that contain audio and video. |
| 11 | Do you need interactive teaching materials that can check answers and scores when doing maths problems? | 82.7% of all learners who are respondents in this study need interactive teaching materials that can check answers and scores when doing mathematics problems |
| 12 | What methods do you use to teach maths? (you can choose more than one answer) | 64% of all learners who became respondents in this study answered the lecture method, 54.7% answered the question and answer method, and 46.7% answered the discussion. |

## DISCUSSION

The discussion in this study is based on the results of questionnaires obtained from teachers and students. The questionnaire used to determine the needs of teachers and students on android-based e-module teaching materials. There are 4 aspects of needs analysis in the teacher questionnaire. The first aspect of needs analysis is the Operational Curriculum for Education Units (KOSP) implemented by SMPN 1 Plumbon. This aspect consists of two components, namely learning organisation and learning planning. The learning organisation component describes the use of Merdeka Curriculum (KurMer) at SMPN 1 Plumbon school. Teachers as respondents answered 100% the use of Kurmer in mathematics learning. All teachers answered that the school implemented a regular face-to-face learning system with 6 working days with the number of lesson hours (JP) of mathematics learning in Kurmer consisting of 5JP. Based on the KOSP aspect, SMPN 1 Plumbon has implemented the Merdeka Curriculum in accordance with applicable guidelines (Anggraena et al., 2022).

The lesson planning component describes the planning and learning process of mathematics at SMP 1 Plumbon. In this questionnaire question, 100% of teachers prepare teaching modules (lesson plans) before mathematics learning is carried out, but some modules are designed independently and some are the result of modifications. This shows the readiness of the mathematics teachers to teach in the classroom. The teaching module is a design that is prepared as a reference for teachers in learning in the classroom, this helps teachers to organise the course of learning, prepare the media and teaching materials needed for learning. Next, 100% of the teachers have applied the scientific approach in learning mathematics, namely Problem Based Learning (PBL), Project Based Learning (PjBL), and Discovery Learning (DL). This shows that teachers have understood the Merdeka Curriculum well through the implementation of this learning model. The Merdeka Curriculum emphasises student-centred learning while still using the scientific approach and PBL and PjBL learning models. 100% of teachers use learning media when teaching mathematics in class. This shows that teachers understand the importance of utilising technology to improve the quality of learning. The learning media used by mathematics teachers are power point, geogebra, quizziz, google form designed by

themselves or by others. The utilisation of various learning media in learning mathematics, shows that teachers have the skills in operating learning media.

In addition to asking about learning media, the lesson planning component also asked about the assessment used by mathematics teachers. 100% of teachers conducted formative and summative assessments in their mathematics learning. 100% of respondent mathematics teachers involve cognitive, affective, and psychomotor domains in assessing mathematics learning and use various forms of test types in assessing mathematics learning, namely written tests (multiple choice, complex multiple choice, and description), oral tests, observation sheets and attitudes. There are many types of Merdeka Curriculum assessments (Anggraena et al., 2022), and based on the questionnaire results, SMPN 1 Plumbon mathematics teachers have used various Merdeka Curriculum assessments with various types of tests in mathematics learning.

In relation to the teaching materials used by mathematics teachers in schools, based on the questionnaire results, it was found that schools provide mathematics teaching materials, namely textbooks. The teaching materials used by teachers are in the form of textbooks, summarised mathematics materials and e-LKPD. This shows that teachers do not only use teaching materials provided by the school, but teachers look for and design other teaching materials in learning mathematics. Teachers have understood the importance of teaching materials in learning mathematics. This is reinforced by the opinion of Sungkono (2022), that the use of teaching materials is an inseparable component in a learning process, which is very necessary for the target achievement of student competence. Based on the results of the questionnaire, all teachers need teaching materials that support learning mathematics in addition to teaching materials available at school. The teaching materials needed contain multimedia (text, images, animation, audio, and video) and interactive.

The use of technology has been done at SMPN 1 Plumbon. Based on the questionnaire results, the school allows the use of mobile phones in learning mathematics. The school has an internet network facility that can be accessed by students but it is not sufficient to be used by all students. This can be seen from the response of teachers who answered 50%. All mathematics teachers have used mobile phones in learning mathematics, namely to study materials and questions designed in the quizziz application, conduct daily assessments and exams, use the geogebra application, create e-lkpd and questions. All mathematics teachers agreed that learning mathematics would be more interesting if the teaching materials used could be accessed via mobile phones and supported the development of android teaching materials as one of the teachers' references to support mathematics learning.

The results of the student needs questionnaire consisted of 4 aspects, namely: interest in learning mathematics, learning process, teaching materials, and e-module development. The first aspect of needs analysis is the interest in learning mathematics of SMPN 1 Plumbon students. 62.7% of all students who were respondents in this study liked mathematics subjects. 62.7% of all students who were respondents in this study sought additional information related to mathematics materials outside of mathematics hours. Respondents sought additional information through websites, YouTube, social media and tutoring. 62.7% of all learners actively participated in learning mathematics in class.

90.7% of respondents said that they use teaching materials during mathematics learning. 94.7% of respondents said that they used textbooks during the learning of mathematics. Then using Learner Worksheets (LKPD), E-LKPD, Electronic School Books (BSE), Modules. The teaching materials circulating so far in schools are textbooks that only contain text and images, so they have not facilitated all learning styles that exist in students. teachers rely more on textbooks, often textbook-centred teaching materials make students feel bored, bored, or monotonous in learning (Lubis, 2018). Modules among students are mostly printed modules that tend to be informative, simple illustrations and contain only practice questions (Puspitasari, 2019). Whereas the teaching materials available should be able to provide equal learning opportunities by paying attention to the learning styles of students.

The use of learning media used by teachers is mathematics applications. The use of mathematics software has a significant effect on students' mathematics skills (Siswanto & Kusumah, 2017; Nuraeni & Rosyid, 2019), but also the use of mathematics software has an insignificant effect

(Ramadhani, 2017; Setyani & Lestari, 2016). Maths software is more effective under certain conditions (Tamur et al., 2020), this depends on the mastery of the teacher and the condition of the students. 90.7% of all students who were respondents in this study needed teaching materials that could be accessed on mobile phones in mathematics subjects. 60% of all students need teaching materials that contain audio and video and 82.7% of all students need interactive teaching materials that can check answers and scores when doing mathematics problems. Based on student responses in this aspect, students still need teaching materials other than those already used by teachers in learning mathematics. The teaching materials needed are multimedia teaching materials that combine various media in learning mathematics. This is in accordance with the opinion of Sousa & Rocha (2019), who revealed that digital learning that utilises technology to provide learning that increases the effectiveness of students' knowledge and skills must meet the needs of 21st century education.

Multimedia teaching materials have advantages that are not possessed by printed teaching materials, especially package books provided by schools. Digital teaching materials that can be accessed on mobile phones make it easy for students to learn mathematics wherever and whenever students need it. The teaching materials needed must be interactive, so as to provide a response to students when they work on problems. Real-time scoring makes students aware of the extent of their mastery and makes it easier for them to evaluate and repeat.

## CONCLUSION

Starting from the results of the research analysis that has been carried out, it can be concluded that: 1) mathematics learning has used the independent curriculum at every level; 2) Teachers have prepared teaching modules before learning; 3) Teachers apply the syntific approach by using PBL, PjBL and Discovery Learning learning models; 4) Teaching materials used are dominated by school pack books; 5) Learning media used are dominated by power points; 6) Teachers conduct mathematics learning assessments; 7) The school allows the use of mobile phones in learning, has an internet network that can be accessed by students but is not yet adequate for all students. 8) Teachers and students need teaching materials that can be accessed on mobile phones, contain multimedia and interactive.

Based on the conclusions of this study, the android-based e-module teaching material product can be developed and used in the mathematics learning process at Junior High School as a reference to support mathematics learning in empowering students' 21st century skills.

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