HOTS-Based Pocketbook Development Using QR Scan

*Salsabila Karina Manik[1], Suci Dahlya Narpila[2]
[1, 2] State Islamic University of North Sumatra
*ssblakrna.salsa@gmail.com

ABSTRACT

The purpose of this study is to develop a HOTS-based pocketbook using QR scans to create student-friendly learning media. The effectiveness of the products developed makes development research activities meaningful. This type of research uses R&D (Research and Development) research or development research using the ADDIE model developed by Dick and Carry. This ADDIE model has five stages, namely, analysis, design, development, application, and evaluation. The subjects of the study were material experts, media experts, teachers, observers, and XI Science 1 students at MAN 1 Medan, totaling 30 students. Data collection techniques in this study are in the form of questionnaires and post-tests. Initially, the researcher designed the book, then made it until it reached the evaluation stage. The results showed that the percentage value of media experts was 84% and the results of material expert validation were 88% with very feasible criteria. While the practicality value is 93.33% with very practical criteria. The effectiveness value of this study was 76.83% with effective criteria.
Keywords: pocketbook, QR scans, HOTS

INTRODUCTION

Education is a very important dedication in life. With an education, human life can be more organized and directed in achieving physical and mental happiness. During the industrial revolution 4.0, education has become the main pillar for a country in positive change and development, because through this education it can have a major impact on the welfare of the people in the future (Thaus Sugihilmi Arya Putra, 2022). Supposedly, prioritizing education in the system of life, is the embodiment of a great country (Nurbayan & Basuki, 2022) (Utami & Wutsqa, 2017)(Fendrik et al., n.d.)

The most basic education and has a big impact on the Indonesian state is mathematics learning. Mathematics is a structured discipline that discusses relationship patterns, thinking patterns, art, and language which as a whole are reviewed through logic and are deductive (Fadia & Fitri, 2021). In the process of its development, it can be seen that mathematics is a very important basic science and has become a tool in overcoming various problems in life, such as education or work, personal, social, and citizen life. Therefore, mastery of mathematics is absolutely necessary (Lisnawati, M. Khoirul Amri, 2019).

Mathematics is one of the subjects that is useful for equipping students with the ability to think logically, systematically, creatively, work together, and the ability to think critically (Narpilah, 2016). Where these five abilities can help students learn to process other abilities, such as the ability to obtain, utilize, and process the information they get so that later students are able to survive in an ever-changing world (Santosa et al., 2020). Mathematics is a science that can be used to help solve problems in other sciences, such as physics, astronomy, medicine, computers, science, and many others.

Mathematics is known for abstract lessons, but students always find it difficult to understand mathematics. In fact, almost all students are not able to do mathematics if it is different from the example. This is in line with Patahuddin and Rokhim's presentation explaining that mathematics is a part of learning that gives fear to students, as a result of which students become difficult and lazy in learning mathematics in the classroom (Syafira Masnu'ah, Nyanyu Khodijah, 2022). However, mathematics lessons have been included in the school curriculum since the reform era, indicating that students are obliged to learn mathematics. Therefore, schools must fulfill learning facilities by providing learning media that become learning references, so that the implementation of mathematics learning is more effective (Nurbayan & Basuki, 2022).

Based on observations in MAN 1 Medan, out of 30 students who filled out the questionnaire, there were 24 students who did not like mathematics subjects. Student dislike of mathematics is caused by many factors, one of which is the lack of use of student-friendly learning media. With a thick math print book and contains many formulas, it makes it difficult for students to understand the material. To get in-depth facts, researchers conducted an interview with one of the mathematics teachers at the MAN 1 Medan school. Based on the results of the interview, there have been many media that have been used by mathematics teachers at the school, such as package books, UKBM (Independent Learning Activity Unit), PPT, learning videos, and geogebra applications.

Though learning media has a role to help learning strategies in attracting the attention of students. The media commonly used in schools is printed books, where these printed books usually have a thickness that is quite thick and also heavy. In the Oxford dictionary, books are described as many sheets of paper, either in printed or blank form that are joined together in a cover or tied and given leather (Zahra, 2021). Students expect teachers to be able to use simple media, uncomplicated material explanations, have many discussion questions in it, can be accessed via (Zahra, 2021) *mobile phones*, free of charge, and media that can be used anywhere. One that can cover all the expectations of learners is on a pocket book.

According to the Big Dictionary Indonesian (2008), a pocket book is a book that has a small size that can be stored in a pocket and is easy to carry everywhere, Izzatin & Mucti (2019) said that a pocket book is a book that has a small size and is also lightweight, where this book can be read at any time and is very easy to carry anywhere. A pocket book is a book that has a small size in which there are learning materials that are presented briefly, concisely, and precisely, and are easy to use anywhere and anytime. A similar statement has been expressed by Hidrolaksmi et al (2023) where the use of pocket books has the advantage of being able to be carried anywhere so that it can make it easier for students to learn. Where this pocket book has the advantage that this book is small in size and contains more concise material. In line with research conducted by Sinaga & Rakhmawati (2022), the effectiveness of learning using this mathematics pocketbook media gets a very effective category with a percentage of 95%. (Izzatin & Mucti, 2019)(Hidrolaksmi et al., 2023)(Sinaga & Rakhmawati, 2022)

Along with the development of science and technology and human thinking, learning media has also developed into many variations. One of them is a pocket book that was originally in the form of *hardcopy* into *softcopy*. One of the digital pocket books is a digital pocket book based on QR Scan. Where this book can be used anywhere and also anytime, this book can be accessed using the internet, and for free. This book can also be used outside of classroom learning. Can be used if students at certain times want to discuss with friends and need learning resources, this book can be the main source. Where for its use we can directly *scan the barcode* that we have and we will immediately get this pocket book. This pocketbook development research is supported by research conducted by Dwi Utari (2021). Where the study obtained very interesting attractiveness response test results with 3.49 from a small group and 3.64 from a large group. This is also in line with Chairudin & Dewi's (2021) research, using digital pocketbooks as learning media to get an increase in learning outcomes of 36.9. (Chairudin & Dewi, 2021).

This digital pocket book is not only superior in terms of cost and external appearance of the book, also the content contained in the book is also a concern in compiling a good book. Good content in an Education is content that leads to higher order thinking, such as HOTS (*Higher Order Thinking Skills*).

HOTS is a basic skill that must be mastered by educators where this will be the core focus of classroom teaching that is emphasized globally (Norma Dewi Shalikhah, 2021). *Higher Order Thinking Skills* (HOTS) is a high-level ability that combines various thinking

abilities, including complex thinking, logical, creative, critical, problem-solving skills, manipulating information, drawing conclusions, developing representations, and analyzing and building mental relationships. Resnick revealed that HOTS is a complex thinking process by linking various sources and criteria that are in line to be able to solve an existing problem (Purba et al., 2021).(Purba et al., 2021)

Looking at some of the reviews above, it is necessary to develop a teaching material in the form of a HOTS-based mathematics pocket book using *QR scans* in the hope that the book can make it easier for students to understand mathematics learning material and can improve students' thinking skills. With this, researchers want to examine the effectiveness of HOTS-based mathematics pocket books using QR *scans* to determine the response of educators and students to HOTS-based mathematics pocketbooks using *QR scans*.

RESEARCH METHODS

This research uses a type of development research or often referred to as R&D (*Research and Development*) research. Sugiono said that development research is a method in research used to create certain products, and test the effectiveness of these products (Pramono, 2022). Development research aims to find products based on findings from field tests which are then revised so as to achieve complex products (Sugianti, 2020).(Pramono, 2022)(Sugianti, 2020)

The design used in this study refers to the ADDIE model. The ADDIE model contains individual-centered learning, directly, systematically, using a real approach to human life, and has a long period of time (Hidayat & Nizar, 2021). The stages of the ADDIE model used in research can be seen from the following cycle:
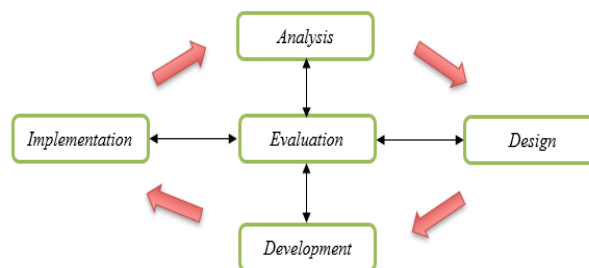

Figure 1. Model ADDIE

From figure 1, there are 5 stages of ADDIE (1) *Analysis* (initial analysis), which is an activity to describe problems in the learning process, so that teaching materials that need to be developed are obtained. (2) *Design*, namely designing teaching materials and materials to be developed. (3) *Development*, namely the activity of developing products that have been designed and carrying out validation of experts. (4) *Implementation*, namely activities to apply products that have been developed in classroom learning. (5) *Evaluation*, which is an activity to see the achievement of the product and make improvements to the product. (Rismayanti &; Sukirwan, 2022)(Rismayanti & Sukirwan, 2022)

The subjects of this study were material experts, media experts, teachers, observers, and grade XI students of Science 1 at MAN 1 Medan, totaling 30 students. Data collection techniques are carried out by questionnaires and tests. The data collection instrument in this study is (1) validation questionnaire, which is an assessment sheet given by material experts and media experts to see the feasibility level of HOTS-based pocketbooks using QR scans. (2) questionnaires of teacher abilities and

student activities, these two questionnaires have the aim of obtaining practical scores of HOTS-based pocketbooks using QR scans. (3) student response questionnaire and *posttest*, this data aims to find the effectiveness value of HOTS-based pocketbooks using QR scans.

Data obtained from validation sheets, questionnaire sheets and *post tests* will then be analyzed by researchers using quantitative descriptive analysis techniques. For validation questionnaires, teacher ability questionnaires and student activities, as well as student response questionnaires to HOTS-based pocketbooks using this QR scan using *Likert* scale, the results are then analyzed using the following formula:

$$\% = \frac{Jml\ skor\ total\ (X)}{Skor\ Maks\ (Xi)} \times 100\%$$

To obtain the validity level of a HOTS-based pocketbook using this developed QR scan, using assessment qualification criteria based on the following scale:

Table 1. Product Eligibility Criteria

Presentation Interval	Criterion
81% − 100%	Very Worth It
61% − 80%	Proper
41% − 60%	Pretty Decent
21% − 40%	Not Worth It
0% − 20%	Very Unworthy

(Sinaga & Rakhmawati, 2022)

Meanwhile, to get the practicality value of HOTS-based pocketbooks using *QR scans*, teachers and observers are directly involved in the trial process. Shiva participation is the main assessment for teachers and observers. To determine the level of practicality of a HOTS-based pocketbook using this *QR scan*, the following qualification

criteria are used:

Table 2. Product Practicality Criteria

Presentation Interval	Criterion
81% − 100%	Very Worth It
61% − 80%	Proper
41% − 60%	Pretty Decent
21% − 40%	Not Worth It
0% − 20%	Very Unworthy

(Ferdiansyah et al., 2021)

Then to see the level of effectiveness of HOTS-based pocketbooks using *QR scans* obtained from student response questionnaires and *posttests* with the following assessment qualification criteria:

Table 3. Product Effectiveness Criteria

Presentation Interval	Criterion
81% − 100%	Very Worth It
61% − 80%	Proper
41% − 60%	Pretty Decent
21% − 40%	Not Worth It
0% − 20%	Very Unworthy

(Sabaniah et al., 2019)

RESULTS AND DISCUSSION

There are various stages in making a HOTS-based class XI math pocket book using *QR scans*. The first stage, the analysis stage is carried out. At this stage, observe what material will be learned in class XI and what kind of media students want. The second stage is *Design*. At this stage, the preparation of concepts according to what students want that has been obtained previously in the *analysis* stage. The third stage is *development*. At this stage it is done with the aim of being able to produce products that we have designed in the second stage and become the results at the analysis stage. Then at this stage, product validation is also carried out against 2 validators, namely material expert validation and media expert

validation. The fourth stage is *implementation*. At this stage, product application activities are carried out in the learning process. This stage is a real step to implement the resulting product. Then the fifth is the *evaluation* stage, which is data processing activities in the form of criticism and suggestions from teachers, observers, and students.

Analysis

At this stage of analysis, observation is carried out on teachers and students about what media is used during the learning process. To get the desired data, interviews were conducted with mathematics teachers at MAN 1 Medan schools. Then, to get the desired data on students using questionnaires. Based on interviews with teachers, it was found that many media have been used during the learning process at MAN 1 Medan. Such as package books, UKBM books, and learning videos. Through filling out the questionnaire, the results of the analysis of the needs and character of students were found, where students wanted media that contained material that was easy to understand, could be used anywhere, and the last was media that had minimal cost.

At this stage, not only needs analysis and analysis of student characteristics are carried out, curriculum analysis is also carried out. Where this analysis is useful for determining the quality of the product to be made, with product contents that are in accordance with the KI and KD applied in schools. At this initial analysis stage, researchers also determine the advantages possessed by the product sowned. As for increasing the excess of the product in this study. The contents of this product contain HOTS questions to improve the ability of students. By applying HOTS in

mathematics learning, it can reduce dependence on memorizing formulas so that later students can be encouraged to understand concepts in complex mathematical materials.

Design

At this stage, the selection of what type of product is desired according to the needs obtained at the initial analysis stage. The first step is to adapt the material to the core competencies and basic competencies applied in schools, as in this study integral material is applied. The second step is to find references to make materials, such as textbooks, *youtube*, question bank books, and olympic books to get references for sample questions and exercises based on HOTS. The third step is to design the pocket book *cover* and pocket book background that will be used in the process of developing the product. Researchers used *Canva* to design *pocket book covers* and *backgrounds*. The *cover* and *background* are as follows:

Figure 2. Pocket Book Cover and Background

The fourth step is to choose the features that will support the media to be created. Researchers make fullscreen, lighmode, word search and page features to make it easier for readers to find the desired material. The

resulting features are as follows:

Figure 3. Features on Media

Development

Making a pocket book using *a QR scan* is done using webhost.com website. The first step at this stage is to compile the material that has been obtained by adjusting KI and KD. Where if based on core competence, the book must contain the definition of algebraic indefinite function integrals and the analysis of indefinite integral properties based on the derivative indefinite properties of functions. Meanwhile, if it is based on basic competencies, the book must contain examples of questions and exercises on indeterminate integral problems.

The second step at this stage is to compile mathematical material into one complex book. Where the material stages are (1) definition and notation of indefinite integrals, (2) formulas of indefinite integrals, (3) definitions of definite integrals, (4) properties of indefinite integrals, (5) examples and applications of integrals, and (5) exercises.

The third step is to create the desired website, then enter the book that has been made into the website and create a *barcode* against the book website. The fourth step is validated by

media experts. In this validation, decent results were obtained after revision with several suggestions, namely when applying this product, teachers must prepare a smooth internet network to help students who have network difficulties and font selection that is too tight. The results of HOTS-based pocketbook media validation using *QR scans* obtained a value of 84%. Based on the product eligibility qualification criteria in table 1, the criteria are very feasible to use.

The fifth step is carried out expert validation of the material. In this validation, decent results are obtained after revision with suggestions to separate the material and examples so as not to confuse readers later. The results of validation of HOTS-based pocketbook material using *QR scans* obtained a value of 88%. Based on the product eligibility qualification criteria in table 1, the criteria are very feasible to use.

Implementation

After revising the product, the next step is to apply the product to the learning process. At this stage, it is a trial activity for HOTS-based pocket books using *QR scans* in class XI Science 1 as many as 30 students. The learning process is carried out using HOTS-based pocket book media using *QR scans*. At this stage, the value of practicality and effectiveness of the product will be obtained. For the teacher ability questionnaire, it was assessed by the mathematics teacher at the school, Mrs. Yusra Hasibuan, S.Ag. Then for the student activity questionnaire was assessed by an observer, namely Muhammad Irfan Yusuf. The following data is presented on the practicality of HOTS-based pocketbooks using *QR scans*:

Table 4. Product Practicality Assessment Results

Types of Questionnaires	Percentage	Criterion
Teacher Abilities	95%	Very Practical
Student Activeness	91,66%	Very Practical
Average	**93,33%**	**Very Practical**

Based on the table, the practicality of the product gets an average value of 93.33% where if the basis in table 2 contains very practical criteria.

To get the value of product effectiveness, it is obtained by using student response questionnaires and *post tests*. Where in the questionnaire activity, student responses were filled individually and the *post test* obtained results with group discussions. In this discussion process, researchers who serve as teachers play an active role in guiding students in the discussion process. The following data on the average effectiveness of HOTS-based pocketbooks using *QR scans* is presented:

Table 5. Product Effectiveness Assessment Results

Data Type	Percentage	Criterion
Student Response	73,77%	Effective
Student Activeness	79%	Effective
Average	**76,39%**	**Effective**

Based on the table, the effectiveness of the product gets a value of 76.39%, where if you refer to table 3 you get the effective criteria. Through the two analyses above, it shows that the results of the HOTS-based pocket book using *QR scans* obtained are 93.33% very practical to use and 76.39% effective to use.

EVALUATION

This evaluation stage is a stage that is always inserted in the previous four stages. Where at this stage improvement activities are carried out on products that refer to comments and suggestions provided by media experts, material experts, students, teachers, and observers.

CONCLUSION

The development of HOTS-based pocketbooks using *QR scans* obtained media expert validation results of 84% and material expert validation results of 88% with very feasible criteria for use. The development of a HOTS-based pocket book using *QR scans* obtained product practicality assessment results of 93.33% with very practical criteria based on the average value of the teacher ability questionnaire and student ability questionnaire. The development of a HOTS-based pocket book using *QR scans* obtained the results of a product effectiveness assessment of 76.39% with effective criteria. This research is designed not only to provide sources of information or reference materials for learning disciplines for the world of education, but this research can be used as a positive system support for mathematics education scholars, to continue to provide bright ideas related to the development and progress of better mathematics learning. Therefore, researchers really hope that there will continue to be further research on scientific journals that have been made by researchers, researchers hope that there will be a movement or breakthrough in the development of innovative ideas in the development of this journal in a more qualified direction. Such as the development of learning media by utilizing technological developments.

REFERENCE

Chairudin, M., & Dewi, R. M. (2021). EDUKATIF: JURNAL ILMU PENDIDIKAN Pengembangan Bahan Ajar Buku Saku Digital Berbasis Problem Based Learning Pada Mata Pelajaran Ekonomi. *Edukatif : Jurnal Ilmu Pendidikan*, *3*.

Dwi Utari, I. (2021). Pengembangan Buku Saku Digital Berbasis STEM Terhadap Pemahaman Konsep Matematis. *Jurnal Penelitian Pendidikan dan Pengajaran Matematika*, *7*(2), 97–106. https://doi.org/10.37058/jp3m.v7i2.3221

Fadia, S., & Fitri, N. (2021). *Problematika Kualitas Pendidikan di Indonesia*. *5*, 1617–1620.

Fendrik, M., Kemampuan, P., & Matematis, K. (n.d.). *KONEKSI MATEMATIS DAN HABITS OF MIND PADA SISWA*.

Ferdiansyah, H., Haling, A., & Nurhikmah H. (2021). Pengembangan Multimedia Interaktif dalam Pembelajaran Simulasi dan Komunikasi Digital. *Indonesian Journal of Learning Education and Counseling*, *3*(2), 148–155. https://doi.org/10.31960/ijolec.v3i2.879

Hidayat, F., & Nizar, M. (2021). Model Addie (Analysis, Design, Development, Implementation and Evaluation) Dalam Pembelajaran Pendidikan Agama Islam. *Jurnal Inovasi Pendidikan Agama Islam (JIPAI)*, *1*(1), 28–38. https://doi.org/10.15575/jipai.v1i1.11042

Hidrolaksmi, S., Nur, A., & Rosyidah, K. (2023). *Pengembangan Buku Saku Matematika Berbasis Mind Mapping Materi Debit Siswa*. *d*(2).

Izzatin, M., & Mucti, A. (2019). *Desain Pengembangan Buku Saku Digital Matematika SMP Berbasis Android Sebagai Media Pembelajaran Dalam Meningkatkan Minat Belajar Siswa Design of Development of Digital Math Book Mathematics Android Based Junior High School as a Learning Media in Increasi*. *6*.

Lisnawati, M. Khoirul Amri, E. F. N. (2019). Pengembangan Bahan Ajar Buku Saku Matematika Berbasis Mind Mapping Pada Matero Statistika. *Attractive : Innovative Education Journal*, *1*(1).

Narpilah, S. D. (2016). Peningkatan Kemampuan Spasial dan Self Efficacy Siswa melalui Pembelajaran Inquiry Berbantuan Software Cabri 3D di Kelas X SMA YPK Medan. *Jurnal Tarbiyah*, *23*(1).

Nurbayan, A. A., & Basuki, B. (2022). Kemampuan representasi matematis siswa ditinjau dari self-efficacy pada materi aritmatika sosial. *Jurnal Inovasi Pembelajaran Matematika: PowerMathEdu*, *1*(1), 93–102. https://doi.org/10.31980/powermathedu.v1i1.1919

Pramono, K. H. (2022). *Pengembangan Media Video Pembelajaran Untuk Matakuliah Metode Penelitian Teater Menggunakan Model R & D Pendahuluan Penelitian Sebelumnya*. *XIX*(1), 9–16.

Purba, A., Silalahi, M., Girsang, S. E. E., & Saragih, N. (2021). Pengembangan Kreativitas Mengajar Dan Kemampuan Berpikir Tingkat Tinggi (Hots) Bagi Guru-Guru Ekklesia Private English Course. *Community Development Journal : Jurnal Pengabdian Masyarakat*, *2*(2), 293–297. https://doi.org/10.31004/cdj.v2i2.1

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Rismayanti, T. A., & Sukirwan, N. A. (2022). *Pengembangan E-Modul Berbantu Kodular pada Smartphone untuk Meningkatkan Kemampuan Berpikir Kritis Matematis Siswa SMP*. *06*(01), 859–870.

Sabaniah, N., Winarni, E. W., Jumiarni, D., Studi, P., Biologi, P., Keguruan, F., Ilmu, D., & Bengkulu, U. (2019). *Peningkatan Kemampuan Berpikir Kreatif Melalui Lembar Kerja Peserta Didik (LKPD) Berbasis Creative Problem Solving*. *3*(November), 230–238.

Santosa, F. H., Negara, H. R. P., & Samsul Bahri. (2020). Efektivitas Pembelajaran Google Classroom Terhadap Kemampuan Penalaran Matematis Siswa. *Jurnal Pemikiran dan Penelitian Pendidikan Matematika (JP3M)*, *3*(1), 62–70. https://doi.org/10.36765/jp3m.v3i1.254

Sinaga, M. S., & Rakhmawati, F. (2022). *Desain Buku Saku Matematika Berbasis HOTS Kelas X Sebagai Media Pembelajaran*. *06*(02), 1301–1314.

Sugianti, Y. H. R. &. (2020). *Penelitian Pengembangan Model ADDIE & R2D2*.

Syafira Masnu'ah, Nyanyu Khodijah, E. S. (2022). Analisis Kebijakan Pendidikan Islam Dalam Undang-Undang No. 20 Tahun 2023 (SISDIKNAS). *MODELING*, *9*(1).

Thaus Sugihilmi Arya Putra. (2022). *Pendidikan Kunci Utama Kemajuan Bangsa*. Kementerian Keuangan Republik Indonesia.

Utami, R. W., & Wutsqa, D. U. (2017). *Analisis Kemampuan Pemecahan Masalah Matematika dan Self-Efficacy Siswa SMP Negeri di Kabupaten Ciamis An Analysis of Mathematics Problem-solving Ability and Self-Efficacy Students of Junior High School in Ciamis Regency*. *4*(2), 166–175.

Zahra, A. (2021). *Perancangan Panduan Anatomi untuk Ilustrasi Buku Anak-Anak di Indonesia*.