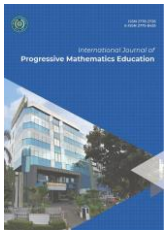

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Electronic Canva Module on Quadratic Function For Junior Hisch School Student

Soffi Widyanesti Priwantoro*[1], Rasyida Faiz[1], Syariful Fahmi [1]
Program Studi Pendidikan Guru Sekolah Dasar, Fakultas Keguruan dan Ilmu Pendidikan,Universitas Ahmad Dahlan, Daerah Istimewa Yogyakarta, 55162

*soffiwidyanesti@pmat.uad.ac.id

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Abstract

Background. The process of learning mathematics at SMP Muhammadoyah 9 Yogyakarta, especially in the eighth grade, faces several obstacles, including the stigma that mathematics is a difficult and boring subject and the absence of interactive electronis modules. Thus, this research aims to develop an electronic module using the Canva application on the topic of quadratic functions. This research uses the research and development type with the ADDIE model. Meanwhile, the subjects are the 9th-gradi students of class IX-E at SMP Muhammdiyah 9 Yogyakarta. The research activities include development starting from analyzing the learning process, the media used, the designing an electronic module followed by validatioan by experts in both content and media. The result of this research are as follows : 1) the average score from subject matter experts is 4.5 with a very good category; 2) the average score from media experts is 4.625 with a very good category; 3) while the student response result s from both small and large clases trial are 3.78 with a good category. Therefore, it can be concluded that the e;ectronic module with the help of Canva on topic of Quadratic function is suitbale for use in the learning process.

Keywords: Quadratic Function, Electronic Module, Canva

Abstrak

Latar Belakang. Proses pembelajaran matematika di SMP Muhammadiyah 9 Yogyakarta khususnya pada kelas VIII menghadapi beberapa kendala, antara lain masih adanya stigma bahwa matematika merupakan mata pelajaran yang sulit dan membosankan serta belum tersedianya modul elektronik interaktif. Oleh karena itu, penelitian ini bertujuan untuk mengembangkan modul elektronik menggunakan aplikasi Canva pada pokok bahasan fungsi kuadrat. Penelitian ini menggunakan jenis penelitian dan pengembangan (Research and Development) dengan model ADDIE. Subjek penelitian adalah siswa kelas IX-E SMP Muhammadiyah 9 Yogyakarta kelas IX-E. Kegiatan penelitian meliputi pengembangan mulai dari analisis proses pembelajaran, media yang digunakan, perancangan modul elektronik yang dilanjutkan dengan validasi oleh para ahli baik dari segi konten maupun media. Hasil penelitian ini adalah sebagai berikut: 1) skor rata-rata dari ahli materi sebesar 4,5 dengan kategori sangat baik; 2) skor rata-rata dari ahli media sebesar 4,625 dengan kategori sangat baik; 3) sedangkan hasil respon siswa pada uji coba kelas kecil dan kelas besar sebesar 3,78 dengan kategori baik. Oleh karena itu, dapat disimpulkan bahwa modul elektronik dengan bantuan Canva pada topik Fungsi kuadrat cocok digunakan dalam proses pembelajaran.

Kata Kunci : Fungsi Kuadrat, Modul Elektronik, Canva

1. Introduction

The Merdeka curriculum, which is currently in use, includes requirements that are in accordance with the current era, consisting of critical thinking skills. The teacher acts as a facilitator in merdeka curriculum, guiding students by adapting to thei requirements during the classroom learning process (Yani, 2023). Teaching materials that are suitable for each of these duties are required to ensure their effective execution. Anisah (2017) demonstrates in her research that the use of learning resources, such as module and the internet can bolster student leanring activities, thereby ensuring that the learning process is more student centered.

Teaching materials are one type of learning resourece that is utilized during the learning process (Tania, 2017). As part of the planning and evaluation of the learning process, teaching materials are any kind of the resources that are systematically created in accordance with the competencies that students will acquire (prastowo, 2013). Lestari (2013) states that there are two categories of teaching materials: printed and non-printes. For teaching resources that are not printed, like, radios, cassetees, and web-based or electronis resources. Sugiyarti,et all (2018) state that teachers must prepare for technology based classroom instruction in order to meet the expectations of the 21st century. Therefore, with these demands, it is only appropriate for teachers to start developing non-print teaching materials such as e-module.

The advantages of e-modules compared to printed modules are their ease of use and the ability to include content such as audio, video, animation and other features (Rahman, 2021). In addition, e-modules also contain materials and exercises presented in various formats that support the learing material (Noviyanita, 2019). The presentation of the e-module is innovated to enrich the learning experience by incorporating image, videos, audio, animations and linksw (Depdiknas, 2017). An e-modules has interactive characteristic, meaning it can generate feedback between learners and the provided teaching materials (Wirandika, et all., 2017)

To create an interactive e-module, you can use applications available on various platforms such as Canva, Book Creator, Microsoft Office, FLipBook Mkaer, and other applications. The canva application has become the choice of several teachers in creating e-modules because it has the main advantage of being accessible to teachers and students for free and without any limitations on offers or time (Switrayni, Wardhana, Irwansyah, & Aini, 2022). The Canva application is also connected to other platforms that have been used, such as Dropbox, Google Drive, and Google Classroom (Canva, 2024). In addition, the Canva application is one of the applications that is easy to use for designing and has attractive designs in the form of templates, features, and categories (Rohma & Sholihah, 2021; Puspita et al, 2021). E-modules with attractive designs will make the learning process more varied, thereby generating enthusiasm and interest among students (Rahma, 2019). One of the important subjects in education and made a mandatory subject by the government is mathematics (Mz, 2013). Meanwhile, quadratic functions are material that must be studied before other mathematics topics (Lasmi, 2017).

According to Julaeha & Kadarisma (2020), the materials on quadratic functions requires reasoning skills so that students can draw conclusions as problem-solving. In accordance with the demands of the 2013 curriculum as stated in Permendikbud No.21 of 2016, every student should possess skills and abilities in line with core competencies. One of the efforts that can be made to ensure that students have an interest in learning, understand concepts deeply, and can develop mathematical skills is by using learning media, which can include varied teaching materials (Nurdin,

et al., 2019). Therefore, it is necessary to create interactive learning materials in the form of e-modules to help students understand concepts in depth during the learning process.

However, the reality on the field does not align with the high educational demands, with several obstacles occurring during the learning process. Based on the interview with the IX-E grade mathematics teacher, Mr. Wibowo Ramadhiyanto, S.Pd., it was obtained that the learning is conducted face-to-face in the classroom with restrictions on gadget usage. This restriction is implemented because students often misuse gadgets for other purposes. The curriculum used in class IX-E is Merdeka curriculum. The teaching method used is conventional learning interspersed with cooperative learning. The teaching materials used by the students include government-issued textbooks, PowerPoint presentations, and worksheets containing questions without any accompanying material.

According to Aziz & Hidayati (2020) there are still many students who have low mathematical reasoning abilities, especially in the topic of quadratic functions. This is in line with the reality at school because, according to Mr. Wibowo, the teaching materials in the form of e-modules have never been used for classroom learning, which affects mathematical reasoning abilities, especially in the topic of quadratic functions. This is in line with the opinion of Nidiasari, Novaliyosi, & Pamungkas (2016) that one of the efforts to improve mathematical reasoning skills is by developing teaching materials, such as e-modules. Students' difficulties lie in the steps of graphing at the point of finding intersection points. This directly affects the next steps, resulting in low learning outcomes for the students. Here are the results of the questionnaire distributed to the students

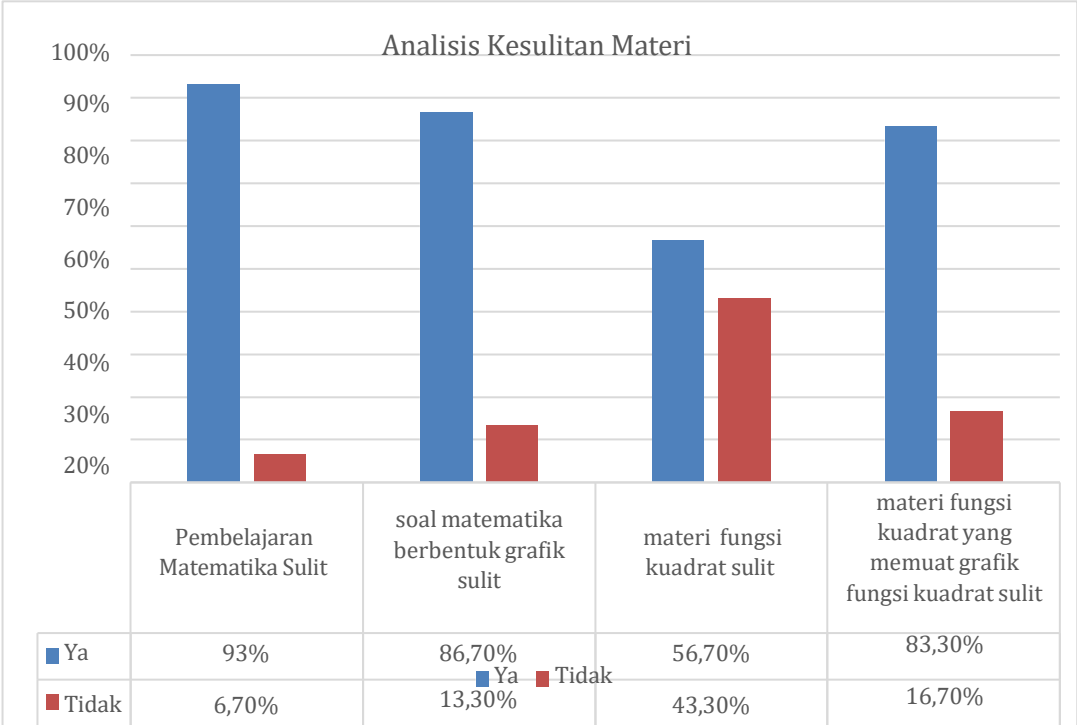

Figure 1. Analysis of the difficulties faced by the student

According to figure 1. 93.3% of the IX-E grade students agreed that mathematics is difficult. Then, the students' response regarding the difficulty of math problems in graphical form was that

86.7% of the students answered "yes." In the response to the analysis of material difficulty regarding the quadratic function, 56.7% of the students agreed that it is a difficult topic. Next, regarding the question about quadratic functions that include the graph of quadratic functions being difficult to understand, 83.3% of the student agreed. Then, to clarify the results of the material difficulty analysis through questionnaire responses from the students, the researcher also conducted personal interviews with several students. Out of the 5 students interviewed by the researcher, 4 children felt difficulty when solving problems on quadratic functions. According to them, the part that they found difficult was when drawing the function graph, especially finding the intersection points.

The questions about the analysis of the needs for teaching materials are as follows.

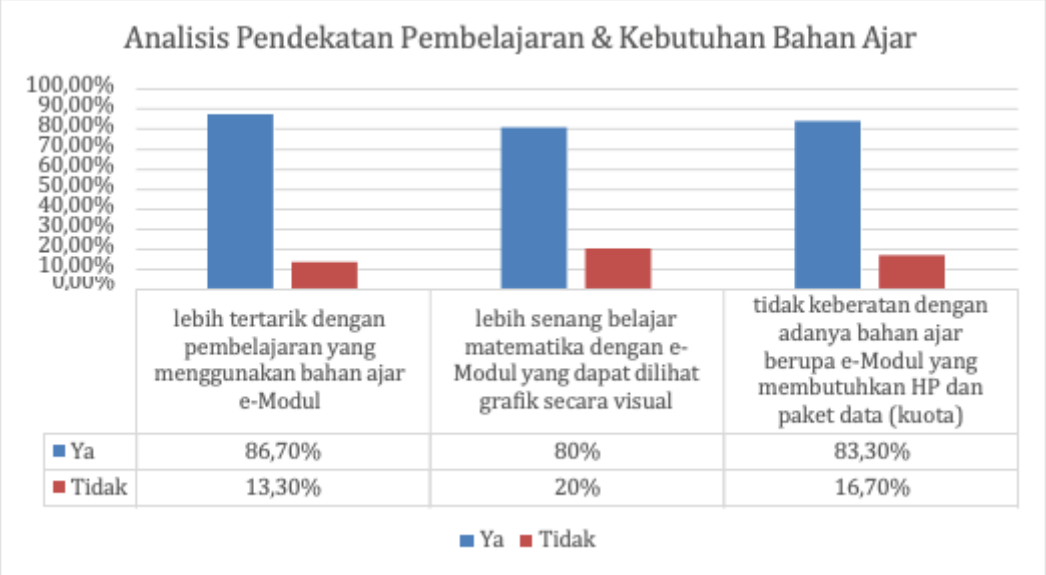

Figure 2. Analysis of Teaching materials needs

Based on Figure 2. the results of student responses regarding the analysis of teaching material needs, specifically the interest in using teaching materials in the form of e-modules, showed that 86.7% of students agreed with the statement. Then, the students' response to the statement "I prefer learning mathematics with e-modules that allow visual graphs (graphs can be accessed/moved)" showed that 80% of the students agreed with the statement. The statement regarding the use of gadgets and data packages in accessing e-modules, 83.3% of students do not mind this. After identifying the problems and solutions, the researcher is interested in developing a mathematics learning e-module that is expected to minimize students' difficulties in learning mathematics, especially on the topic of quadratic functions, by creating an e-module using the Canva application that contains detailed and engaging material.

2. Research Method

The research conducted is development research or Research and Development (R&D). The R&D research method is a research method that involves conducting research and development as well as testing, resulting in a specific product as a solution to the problems raised in the research (Zakariah & Afriani, 2020). The researcher using the ADDIE model development because this model has work procedures that align with the Research and Development (R&D) stage but with simpler and

more systematic procedures, thus producing more effective products (Piskurich, 2015). The stages of developing the ADDIE model are simpler compared to other model developments, making it easier to understand and apply. In addition, the ADDIE development model was indeed designed by Dick and Carry for learning systems (Mulyatiningsih, 2016).

According to Mulyatiningsih (2016) the ADDIE development model has 5 stages that must be carried out sequentially, namely:

1. Analysis

The analysis stage is the initial phase aimed at analyzing the needs in the learning process and gathering as much information as possible related to the product to be developed. The analysis conducted at this stage includes the analysis of student needs, curriculum analysis, and the analysis of student characteristics.

2. Design

At this stage the researchers begin to gather references that will later be used in developing the e-module. The design stage also includes the preparation of instruments in the form of product quality assessment instruments in the form of questionnaires. Then the assessment instrument will be validated by the expert of material and media.

3. Development

The information and references that have been obtained are then organized to produce a development product. The stages of its development are the preparation of the e-module, validation, and revision.

4. Implementation

The implementation stage was carried out by testing the developed e-module product on the IX-E grade students. The purpose of this stage is to determine the feasibility of the e-module product using the responses from students on the questionnaire provided after the e-module was previously tested.

5. Evaluation

The evaluation stage is a phase aimed at determining the feasibility of the e-module through summarization. The conclusion is based on the evaluation of the e-module at each stage of development (formative) from the validation results by subject matter experts, media experts, and student responses.

4. Finding and Discussion

From this research, the researcher produced teaching materials in the form of an interactive e-module on quadratic functions for ninth-grade junior high school students, developed using Canva. In the development of the teaching materials, the researcher went through 5 stages, which include Analysis, Design, Development, Implementation, and Evaluation.

Analysis

The analysis stage is the first phase carried out by researchers to identify products that meet the needs of learners, analyze the curriculum used, and the characteristics of the learners. This analysis stage serves as a pre-planning activity used as a reference in product development. Needs analysis is conducted to identify the needs of students during mathematics learning. From the results of interviews and the distribution of student questionnaires, several data were obtained that the researcher will use to develop a product to meet the needs of IX-E grade students. According to the interview results, it was found that mathematics is considered a complicated and boring subject by most students. In addition, the teaching materials used are less varied, as they still rely on textbooks, PPTs, and worksheets that only contain exercises, which adds to the boredom during learning. Mr. Bowo also believes that e-modules will be a great innovation to support mathematics learning in the classroom. Then one of the topics that is considered difficult is quadratic functions, especially when it comes to graphing quadratic functions. This is also evidenced by the daily test results of the students on the quadratic function material, where 25 out of 30 students are still below the Minimum Passing Grade (KKM). Meanwhile, in the curriculum analysis, the curriculum used is the Merdeka curriculum in phase D, with student learning outcomes being able to understand relations and functions, and differentiate nonlinear functions from graphs. for the analysis of student characteristics, a questionnaire was used with the following data results: 1) In the questionnaire regarding students' preference for learning that involves them, making the learning process active, 80% of the students agreed and 20% disagreed; and 2) Then, in the questionnaire regarding students' preference for learning mathematics, especially the quadratic function material, using teaching materials that display graphs visually and interactively, 80% of the students agreed and 20% disagreed.

Design

The next stage is the design stage. At this stage, the researcher collects information that will be used in developing the e-module. The information needed to develop the e-module includes the necessary elements and searching for material references. The following are the references used in the development of the e-module: 1) Andriani, F. (2018). Solatif (Active Student Solutions) Mathematics for Junior High School/Mts Grade IX. Sidoarjo: CV. Media Prestasi; 2)Gazali, W and Soedadyarmodjo. (2007). Calculus. Yogyakarta: Graha Ilmu; 3) Goldstein, L.J., Lay, D.C., & Schneider, D.I. (2001). Cálculo y sus aplicaciones (9.ª ed.). Nueva Jersey: Prentice Hall. And many other references. In addition, adding elements of the e-module such as cover, attendance, preface, table of contents, e-module identity, e-module usage instructions, concept map, learning materials, sample questions, practice questions, learning evaluation, glossary, bibliography, and about the author. In addition to planning product development, the researchers also prepared media expert instruments, material expert instruments, and student response instruments for the product to be developed.

Development

at the development stage, the e-module was prepared by creating a Canva account Then create the design according to the analysis and planning results from the previous stage. After the process of account setup and design is complete, it is followed by organizing the materials and elements in the e-module using the tools provided on Canva. To make the e-module interactive when used in learning, the researcher created explanatory videos uploaded to a YouTube account, several graphical visualizations in GeoGebra, and quizzes on Quizizz. The next step is to convert the e-module into a flipbook. The researcher used Heyzine connected with Canva. On the heyzine, a password, background music, and several links were added. Next is to conduct validation of the product that has

been previously created. The purpose of product validation is to provide an assessment of the product developed by subject matter experts and media experts. Here are the results of the feasibility assessment of the e-module in terms of content.

Table 1. Result of material experts validation

No.	Material experts	Score	Average	Category
1.	Dr. Burhanudin Arif Nurnugroho, M.Sc.	111	4,44	Very Good
2.	Wibowo Ramadhiyanto, S.Pd	114	4,56	Very Good
Total Average		112,5	4,5	Very Good

while here are the results of the e-module feasibility assessment in terms of media.

Table 2. Result of media experts validation

No.	Media Experts	Score	Average	Category
1.	Syariful Fahmi, M.Pd.	93	4,65	Very Good
2.	Wibowo R., S.Pd	92	4,6	Very Good
Total Average		92,5	4,625	Very Good

While the product is being validated by experts, the researchers revise the product according to the suggestions and feedback provided by the experts. This revision process is carried out before the product implementation stage for the students.

Implementation

The developed product was tested on the students of SMP Muhammadiyah 9 Yogyakarta Class IX-E. The purpose of conducting the trial is to obtain an assessment of the feasibility of the e-module as the developed product. In this activity, there are trial stages, namely small-scale trials and large-scale trials. The participants involved in the small class trial are a portion of the participants in the large class trial, which consists of 6 students. Meanwhile, the participants of the large-scale trial are all the students of class IX-E at SMP Muhammadiyah 9 Yogyakarta. Here are the results of student responses from the small group trial and the large group trial.

Table 3. Results of the calculation of student questionnaire response

No.	Results for	Score	Average	Category
1.	Small scale trials	84	3,81	Good
2.	Large scale trials	82,19	3,74	Good
	Total Average	83,09	3,78	Good

Evaluation

The final stage in development using the ADDIE model is the evaluation stage. At this stage, the researcher analyzes the results of the product trials that were conducted during the implementation phase. The purpose of the evaluation stage is to revise the developed product according to the assessments of experts and learners. The revision process is carried out several times until the developed product is deemed suitable for use. The first evaluation process is conducted before the trial with students, based on the validation results from subject matter experts and media experts.

Then, after conducting trials with the students, it will go through another evaluation phase and product revisions will be made if there are any inputs from the students.

Results and Discussion

After completing 5 stages in the emodul development process, the product overview is as follows.

Figure 3. illustration of the arrangement of the quadratic function module

From Figure 3. We will disscused about The front cover of the emodule is designed to be as attractive as possible. According to (Agustina, 2015), an attractive cover can increase students' reading interest. The components of the cover consist of: title, material title, title of the learning model used, title of the integration used, student identity, author's name, and target. The identity of the emodule consists of: title, educational unit, layout, software, and the name of Ahmad Dahlan University. The purpose of having an emodule identity is to recognize emodule and provide information about the emodule being compiled to the readers, such as the title, the name of the compiler, and so on. Safitri (2022) states

that the identity of a book has functions and purposes, namely to recognize a book and distinguish it from other books, and to provide information related to the book such as the title, author, publisher, and so on. There is a page on learning outcomes and objectives that contains the learning outcomes and objectives that students must achieve in studying the quadratic function material. Learning outcomes are the learning competencies that students must achieve at each phase (Setiawati et al., 2024). The concept map page contains the structure and material that will be included in the emodule. The benefits of concept maps are to assist teachers in preparing lessons, to help students understand the connections between the materials to be studied, and to make it easier for students to summarize the materials (Minan Chusni et al., 2018).

5. Conclusion

The results of the feasibility assessment of the e-module assisted by the Canva application on the quadratic function material for ninth-grade junior high school concluded that the e-module is suitable for use. This can be concluded through the results of the material expert validation, which received an average score of 4.5, falling into the very good category criteria, thus it can be said to be feasible. Then also through the results of media expert validation, which received an average score of 4.625, falling into the very good category, it can be said to be feasible. Assessment of student responses in the trial small class and large class trials obtained an average of 3.78, which falls into the good category criteria, so the e-module can be considered feasible.

The wonderful development of conva modul on quadratic function, give a good opportunity for future research in other mathematics materials. Research should consider the difficults materials according based on students' learning and teachers experiences. The collaboration between canva and learning experiences give a good opportunity for researcher to explore and develop a good mathematics modul in the future.

Author(s) Identity
Complate Name : Soffi Widyanesti Priwantoro
Email: soffiwidyanesti@pmat.uad.ac.id

Complate Name : Rasyida Faiz
Email: rasyida19000623@gmail.com

Complate Name : Syariful Fahmi
Email: syariful.fahmi@pmat.uad.ac.id

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