



Development of Canva-Based E-Modules to Improve Motivation and Learning Outcomes of Students on the Core Topic of Acids and Bases

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Abstract: This study is a Research and Development (R&D) project aimed at producing a Canva-based e-module that is valid, practical, and effective, and capable of enhancing students' motivation and learning outcomes in the subject of acids and bases. The model used is the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation. The research subjects consisted of 36 eleventh-grade students at State Senior High School 8 Bulukumba for the 2026/2027 academic year. The feasibility of the e-module was assessed based on three criteria: validity, practicality, and effectiveness. The research results indicate that: 1) the validity of the e-module, as assessed by two expert validators, received an average score of 3.56, falling into the "highly valid" category; 2) the practicality of the e-module in terms of the feasibility of implementation received a score of 1.86, falling into the "fully implemented" category; in terms of teacher feedback, it received an average of 93.54%, classified as "highly practical"; and the average student response score was 89.78, also classified as "highly practical," 3) The Canva-based e-module is considered effective based on the percentage of students' learning motivation, which increased from 62.85% to 87.15% –falling into the "very high" category –and student learning outcomes met the criteria for effectiveness, with a class mastery rate of 91.67%. This indicates that the Canva-based e-module is valid, practical, and effective in improving students' motivation and learning outcomes in acid-base material.

Keywords: Acids and bases; ADDIE development model; Canva-based e-module; Learning motivation; Learning outcomes.

Introduction

Education is a crucial aspect in developing high-quality human resources. As times change, the world of education continues to undergo changes and innovations, particularly with the advent of advances in information and communication technology. Digital transformation has driven the learning system toward a more flexible, interactive, and student-centered approach. The use of digital technologies such as e-learning, instructional videos, and interactive e-modules has become an effective solution for enhancing student

engagement and fostering independent learning (Purwasi et al., 2023).

The Merdeka Curriculum, within the context of education in Indonesia, represents the government's effort to improve educational quality through learning that is oriented toward student independence, creativity, and innovation. This curriculum encourages teachers to develop meaningful, contextual learning experiences and to utilize technology as an integral part of the learning process. However, the implementation of the Merdeka Curriculum in some schools still faces challenges, such as limited access to digital learning resources, a lack of teacher innovation in developing

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interactive teaching materials, and the continued dominance of teacher-centered learning models (Fauziyah et al., 2025).

Chemistry is a subject that requires innovative learning media due to its abstract nature and the high level of conceptual understanding it demands (Chang, 2004; Rosa, 2012). Many students find chemistry difficult to understand, particularly when it comes to acid-base concepts, which involve microscopic and abstract ideas. This results in low student motivation and poor learning outcomes. Learning motivation is the primary psychological factor that drives students to be active in the learning process and strive to achieve optimal academic goals. According to Zainudin (2022), learning motivation is related to intrinsic and extrinsic drives that influence students' readiness and intensity in engaging with learning and achieving high learning outcomes.

E-modules are electronic teaching materials designed using technology and interactive features to make learning content more engaging and easily accessible to students. According to recent research, the development of Canva-based e-modules can increase students' interest and independence in learning due to their attractive digital interface and activities, which are easy for students to navigate. A study by Novitasari et al. (2023) shows that Canva-based e-modules have proven to be effective and contribute to enhancing students' independent learning.

Based on observations and interviews with chemistry teachers at SMAN 8 Bulukumba, it was found that most students still exhibit low motivation to learn, particularly regarding material considered abstract and lacking in context. Teachers reported that students tend to lack focus during lessons and often express boredom with conventional teaching materials that rely solely on printed textbooks without multimedia. This passive attitude is reflected in the low frequency with which students ask questions, participate in discussions, and complete independent assignments outside of class hours. Meanwhile, Wi-Fi facilities at the school are adequate in each classroom, and smart TVs are already in use. Interview results also indicate that this low motivation impacts their learning outcomes. The average scores on daily quizzes and mid-semester evaluations are largely below the established Minimum Proficiency Criteria (KKM). Teachers noted that some students struggle to grasp learning concepts because the presented material lacks visual appeal and fails to spark a strong sense of curiosity among students. On that occasion, several teachers noted that the use of monotonous learning media with minimal interactivity causes students to become bored quickly. Teachers suggested that the development of e-modules based on design applications like Canva could serve as an alternative to increase students' interest in learning.

They view Canva-based e-modules as interactive, visually rich learning media that can be accessed via digital devices, making them well-suited to the needs of today's digital generation. Furthermore, teachers hope that by implementing Canva-based e-modules in the learning process, students' motivation to learn will increase due to the presentation of material that is more engaging, interactive, and easy to understand.

This finding aligns with preliminary research indicating that digital learning media, such as Canva-based e-modules, not only enhance students' cognitive development but also significantly boost their motivation to learn. In practical terms, teachers believe that students will be more motivated if their learning materials include strong visual elements, interactive features, periodic quizzes, and technology-based learning activities, thereby encouraging them to be more active in accessing and studying the material.

The Canva platform can be utilized to develop e-modules because it is an easy-to-use graphic design application that provides a variety of templates and engaging multimedia features. Canva-based e-modules allow for the creation of instructional materials that are not only informative but also aesthetically pleasing, interactive, and easily accessible to students. Previous research findings indicate that Canva-based e-modules are effective in enhancing student motivation and learning outcomes, and have received positive feedback from both teachers and students (Imansari et al., 2017; Rahmawati et al., 2025).

Given this potential and need, the development of a Canva-based e-module on acids and bases represents a relevant innovation to be implemented at State High School 8 Bulukumba. This development is also integrated with the Discovery Learning model, which aligns with the principles of the Merdeka Curriculum as it emphasizes independent learning activities, critical thinking, and concept discovery by students (Widyaningrum et al., 2023). Thus, it is hoped that the Canva-based e-module can enhance students' motivation and learning outcomes in understanding acid-base concepts through a more contextual, creative, and enjoyable learning experience.

Method

This study is a research and development (R&D) project aimed at producing a Canva-based e-module on acids and bases that is valid, practical, and effective in enhancing the motivation and learning outcomes of 11th-grade students at SMA Negeri 8 Bulukumba. The development model used is the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The research design

and method should be clearly defined. The study was conducted at State Senior High School 8 Bulukumba from February to May 2026. The research subjects included subject matter experts and media experts for the validity test; one chemistry teacher and 36 students from Class XI.1 for the practicality test; and 36 students from Class XI.1 for the effectiveness test.

Research instruments included an e-module validation sheet, a learning outcome test, a learning motivation questionnaire, a teacher response questionnaire, and a student response questionnaire. Data were analyzed using quantitative descriptive methods to determine the levels of validity, practicality, and effectiveness of the developed product. The effectiveness criteria were determined based on students' learning motivation and the achievement of learning outcomes as a class, with a minimum percentage of 80%.

Data analysis in this study employed qualitative data analysis techniques. Qualitative data analysis was conducted by revising the product based on corrections and feedback from media experts and subject matter experts. The feasibility of the Canva-based acid-base e-module media product within the Discovery Learning Model was assessed in terms of validity, practicality, and effectiveness. 1) Data Analysis of the Validity of the Canva-Based E-Module aimed to determine the validity score of the media assessment results provided by validators, consisting of media experts and subject matter experts. Data analysis of the validation results used descriptive analysis techniques, specifically descriptive statistics, by calculating the mean. 2) Data Analysis of the Practicality of Canva-Based E-Modules: This analysis aims to determine the practicality of the developed media by analyzing the implementation results of the Canva-based e-modules, as well as the responses from questionnaires administered to chemistry teachers and students who have used the media. 3) Data Analysis of the Effectiveness of the Canva-Based E-Module: This analysis of effectiveness is supported by data from the effectiveness components of the “,” namely the learning motivation questionnaire and the student learning outcome test.

Results and Discussion

The development process of the Canva-based e-module followed the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation.

Analysis Stage: The purpose of this stage is to obtain initial data for a preliminary analysis. This stage is conducted using data from observations and interviews with teachers and students, as well as a review of the instructional materials currently used by

chemistry teachers. The analyses conducted in this stage include a needs analysis—specifically, a curriculum analysis, followed by an analysis of instructional materials, a student analysis, and finally an analysis of learning content and objectives.

Design Phase: This phase aims to design a Canva-based e-module to improve students' learning outcomes and motivation. The result obtained from the design process is an initial Canva-based e-module prototype on acids and bases. The stages of designing the Canva-based e-module development product are: 1) Development of Instructional Materials and Tests; 2) Selection of Format; 3) Product Design.

Development Stage: This stage aims to transform the product design developed in the previous stage into a tangible product ready for use in learning. In this stage, the development process consists of two main steps: creating the product based on the initial design and validating the product through a team of experts to assess its feasibility and quality, which also serves as the basis for revisions based on the suggestions and feedback provided. A summary of the validity analysis results for the Canva-based e-module is presented in Table 1.

Table 1. Summary of the Validation Analysis of the Canva-Based e-Module

Aspect	Score	Category
Curriculum	4	Highly Valid
Accuracy of content	3.5	Very Valid
Content Presentation	3.13	Very Valid
Usability	3.67	Very Valid
Language	3.5	Very Valid
Appropriateness		
Graphics	3.63	Very Valid
Benefits/Uses of the e-Module	3.5	Very Valid
Total Average	3.56	Highly Valid
Feasibility %	89.00	Highly Feasible

Based on the validity analysis data in Table 1, the Canva-based e-Module learning media product received an overall average score of 3.56 across all aspects, with a percentage of 89.00. Therefore, it can be concluded that the developed product meets the criteria for being highly valid and highly suitable for use. Feedback, suggestions, and critiques from the expert validators were used as considerations for revising the Canva-based e-Module learning media so that it meets the established validity standards.

In addition to the assessment of the Canva-based e-Module product, a validity assessment was also conducted on its supporting tools, which included the validation of learning outcome tests, the validation of learning motivation questionnaires, the validation of teacher response questionnaires, and the validation of

student response questionnaires. The results of the expert assessment of the supporting tools for the Canva-based e-Module are presented in Table 2.

Table 2. Summary of the Validation Analysis of Supporting Materials for Canva-Based e-Modules

Validation Instruments	Aspect	Score	Average	Category
THB Instrument	a. Content	3.58	3.65	Highly Valid
	b. Construction	3.75		
	c. Language	3.63		
	% Feasibility	91.25		
Learning Motivation Questionnaire	a. Content	3.5	3.5	Highly Feasible Highly Valid
	b. Construction	3.5		
	c. Language	3.5		
	% Feasibility	87.5		
Teacher Response Questionnaire	a. Aspect Guidelines	3.5	5.58	Highly Feasible Highly Valid
	b. Survey Component Coverage Aspect	3.5		
	c. Language Aspect	3.75		
	% Feasibility	89.5		
Student Response Questionnaire	a. Aspect Guidelines	3.5	3.61	Highly Feasible Very Valid
	b. Survey Component Coverage Aspect	3.33		
	c. Language Aspect	4		
	% Feasibility	90.25		

Based on the validity analysis results, the developed instructional materials were deemed highly valid and highly suitable for use according to the experts' assessment. The validation results show that all components of the instructional module have met the criteria for validity, and feasibility and can be implemented in chemistry instruction. Additionally, the validators provided feedback, suggestions, and critiques that served as the basis for improvements. These revisions were applied to refine the instructional materials to align with the established validity standards.

Implementation Phase: The implementation phase is the fourth stage in the ADDIE development model. During this phase, the Canva-based e-module was applied within the discovery learning model, which had been validated by two expert validators and deemed valid and suitable for use in instruction. This phase was carried out over three sessions, each lasting 2×45 minutes, during the even semester of the 2026/2027 academic year at Bulukumba State High School 8, specifically in Class XI.1, which served as the respondent group to assess the practicality and effectiveness of the Canva-based e-module within the discovery learning model. The results of the practicality and effectiveness tests are presented as follows:

Practicality Test of the Canva-Based e-Module: The practicality of the developed Canva-based e-module was determined through an analysis of observation sheets on the implementation of learning using the

Canva-based e-module, a questionnaire for 11th-grade teachers, and a questionnaire for students in Class 11.1.

A summary of the analysis results regarding the implementation of learning using the Canva-based e-module is presented in Table 3.

Table 3. Summary of Observation Results on Learning Implementation Using Canva-Based e-Modules

Aspect	Average Score for Each Aspect	Category
Stimulus	2.00	Fully Implemented
Problem Identification	1.83	Fully Implemented
Data Collection	2.00	Fully Implemented
Data Processing	1.84	Fully Implemented
Verification	1.72	Fully Implemented
Drawing	1.78	Fully Implemented
Conclusions		
Total Average	1.86	Fully Implemented

Table 3 shows the results of the implementation of learning using Canva-based e-modules, which achieved an average score of across all aspects of implementation. This score falls within the "fully implemented" category because it lies in the interval $1.5 < M < 2.0$.

The assessment of teachers' responses to the Canva-based e-modules was conducted by two chemistry teachers from SMAN 8 Bulukumba who served as respondents. This assessment aimed to determine the level of practicality of using Canva-based e-modules in the learning process. The results of the data analysis of teachers' responses to the Canva-based e-module

learning media showed that 93.54% fell into the “very practical” category. Based on the established criteria, this indicates that teachers gave a very positive response to this learning medium; therefore, it can be concluded that this medium is considered very practical for use in the learning process.

The evaluation of Canva-based e-modules was not only conducted by teachers but also involved students as part of an effort to gain insight into the quality of the product. Student involvement in the evaluation was expected to provide more objective feedback regarding ease of use, clarity of content, and the module’s usefulness in the learning process. This study involved 36 students from Class XI.1 as respondents. Based on the analysis of the average percentage across all evaluation aspects, student responses to the Canva-based e-module reached 87.78%. This percentage indicates that the developed Canva-based e-module falls into the “very practical” category.

Testing the Effectiveness of the Canva-Based e-Module: Data on the effectiveness of the Canva-based e-Module learning medium was obtained through the distribution of a learning motivation questionnaire and a student learning outcome test. The results of the analysis of student motivation and learning outcomes include: a) Results of the Learning Motivation Analysis: The analysis results show that students’ learning motivation increased after using the Canva-based e-Module. The average learning motivation percentage increased from 62.85% to 87.15%, which falls into the “very high” category. This increase reflects that the use of the e-module positively contributed to students’ learning motivation. b) The learning outcome evaluation test was conducted to determine the extent to which the use of the Canva-based e-module was effective in improving students’ understanding of acid-base concepts. The test was administered after the entire learning sequence using the e-Module was completed. Analysis of the learning outcome test results for the acid-base material using the Canva-based e-Module showed that out of 36 students, 33 scored above the minimum passing score (75), resulting in an average class mastery rate of 91.67%. This percentage indicates that student learning achievement is considered effective because it has exceeded the established classical mastery standard of >80%. This proves that the use of Canva-based e-module learning media contributes positively to improving student learning outcomes.

The Evaluation phase aimed to assess the quality of the Canva-based e-Modules that had been developed by analyzing their validity, practicality, and effectiveness. The analysis results show that the e-Module received a validity score of 3.56, falling into the “highly valid” category, and a practicality score of 89, falling into the “highly practical” category. The practicality of the e-

Module is demonstrated by the results of observations of instructional implementation, teacher response questionnaires, and student response questionnaires, all of which fall into the “highly practical” category. Meanwhile, the effectiveness of the e-Module was evident from the increase in student motivation and learning outcomes, which fell into the “effective” category. Based on these results, the Canva-based e-Module was deemed valid, practical, and effective for use in teaching acid-base concepts. These results were obtained after a revision process based on feedback from expert validators, teachers, and students, who generally provided positive responses regarding the use of the e-Module in the learning process.

Discussion of Research Results

The development of the Canva-based e-module, integrated with the discovery learning model, aimed to enhance students’ motivation and learning outcomes. The developed product was evaluated by a team of experts and revised based on the feedback provided. The quality of the e-module was determined through three aspects: validity, practicality, and effectiveness. The development process of the Canva-based e-module is described as follows.

Canva-Based e-Module Development Process: The development of Canva-based e-modules utilized the ADDIE model, which includes the stages of analysis, design, development, implementation, and evaluation. Needs analysis indicated the need for innovative, student-centered digital instructional materials through the application of the discovery learning model. Subsequently, the e-modules were designed and developed using Canva and validated by a team of experts. The validated products were then implemented with 11th-grade students to assess their practicality and effectiveness. The evaluation results showed that the Canva-based e-modules met the criteria for validity, practicality, and effectiveness, making them suitable for use in teaching acid-base concepts.

Quality of the Canva-Based e-Module

Validity of the Canva-Based e-Module

Before the developed Canva-based e-module is implemented in the classroom, a validity test must first be conducted to ensure the e-module’s suitability prior to field implementation. To this end, an assessment instrument was developed to measure the e-module’s validity level, evaluate the product’s suitability, and identify its shortcomings (Humairah et al., 2024).

The validation results from two expert validators showed that the Canva-based e-module was rated as “highly valid” across all assessment aspects, including curriculum, content accuracy, presentation, usability, language appropriateness, graphics, and

benefits/usability. Overall, the e-module received an average score of 3.56, falling into the “highly valid” category, and a suitability percentage of 89.00%, falling into the “highly suitable” category. These results indicate that the Canva-based e-module is suitable for use in learning after revisions are made based on feedback and suggestions from the validators. The validation results of the Canva-based e-module in this study align with research conducted by Ramadhani et al. (2025), who reported average feasibility test results of 83.93% and 81.57%—both meeting the “highly valid” criteria. The Canva-assisted e-module on stoichiometry, which had been developed, was deemed suitable for use in learning according to the assessment. Another study conducted by Sandi et al. (2025), in which the validation results for the electron configuration material showed that the e-module received a high score of 90.58% from subject matter experts and 86.5% from media experts.

Practicality of the Canva-Based e-Module

The Canva-based e-module, having been validated, was then implemented with students in Class XI.1 at Bulukumba State High School 8 to assess its practicality through observations of instructional implementation, a teacher response questionnaire, and a student response questionnaire. The results of the analysis of instructional implementation showed an average M score of 1.86, which falls into the “fully implemented” category; thus, it can be concluded that the Canva-based e-module meets practical criteria and that all syntactic elements of the discovery learning model were effectively implemented in the learning process. The results obtained regarding the implementation of learning using the Canva-based e-module are consistent with the research conducted by Alifa et al. (2025), in which the implementation of learning using an e-module on acid-base material obtained an M value of 4.65, which falls within the “fully implemented” category. A similar study by Endarwati et al. (2025) found that the implementation of learning using RME-based e-modules received an M score of 1.75, which falls within the “fully implemented” category. Based on the results of the implementation observations, the Canva-based e-module in this study was found to be comparable to and fall within the same category as the results of previous research; thus, it can be concluded that the Canva-based e-module has met the criteria for practicality. The average implementation score falling within the “fully implemented” category indicates that the e-module is easy for teachers and students to use without encountering any obstacles during the learning process.

The results of the analysis of the teachers' questionnaire responses regarding the implementation of Canva-based e-modules using the discovery learning model in instruction showed an average percentage

across all aspects of 93.54%, which falls into the “very practical” category. The assessment of the practicality of the Canva-based e-module, based on teachers' responses, aligns with the findings of Ibrahim et al. (2025), who reported that teachers' responses to the e-module on chemical equilibrium fell into the “very practical” category with an average percentage of 92%. These results are supported by the research by Nasution et al. (2025), who found that the practicality of the media, as assessed by teachers, reached an average of 94.24, falling into the “very practical” category. These findings confirm that the Canva-based e-modules are considered easy to use, efficient, and aligned with learning needs, thereby effectively supporting teachers in delivering the material.

In addition to teacher responses, an analysis of student responses was also conducted to measure the practicality of the Canva-based e-modules. The results showed that the average percentage across all aspects reached 89.78%, falling within the “very practical” category. Several studies indicate that the Canva-based e-modules received positive responses from students, ranging from “good” to “very good.” A study by Sidabutar et al. (2025) noted that student responses to the use of e-modules reached 86.88%, falling into the “good” category. These results align with a study by Insyiroh (2023), which noted that student responses to the use of e-modules reached 96.7%, falling into the “good” category.

Effectiveness of Canva-Based e-Modules

The effectiveness of the Canva-based e-module was assessed through a learning motivation questionnaire and a test of students' learning outcomes based on the taught material. Students' learning motivation was measured based on six indicators: desire and willingness to succeed, drive and need to learn, future expectations, recognition in learning, engaging activities, and a conducive learning environment. The analysis results show that students' learning motivation increased from 62.85% before the use of the Canva-based e-module to 87.15% after the learning process, representing an increase of 24.31%. The largest increase occurred in the “desire and willingness to succeed” indicator, which rose by 34.49%, while the “drive and need to learn” indicator increased by 24.48%. These results indicate that Canva-based e-modules have a positive impact on enhancing students' learning motivation in chemistry instruction.

Various previous studies have demonstrated that Canva-based e-modules are effective in enhancing students' learning motivation. Ningtyas et al. (2025), in their study on hydrocarbons, showed that Problem-Based Learning (PBL)-based e-modules effectively increased learning motivation, achieving a high N-Gain

score. Similar results were also reported by Ibrahim et al. (2025) on the topic of chemical equilibrium, who found that STEM-PjBL-based e-modules received positive responses from students and supported an increase in learning motivation. Furthermore, Ndruru et al. (2026) revealed that Canva-based e-modules combined with active learning models can create more engaging learning experiences, thereby boosting students' motivation and participation in chemistry learning. Consistent with previous research, the results of this study indicate that the Canva-based e-module effectively enhances students' learning motivation across all measured indicators. This effectiveness is supported by the contextual and interactive presentation of the material, making the e-module suitable for use as a chemistry learning medium.

A learning outcome test was conducted to measure students' understanding of acid-base concepts after using the Canva-based e-module. The analysis results showed that the students' average score was 87.44, with a classical mastery rate of 91.67%, exceeding the established mastery threshold. Additionally, all learning objectives were achieved at the "mastered" level. These results indicate that the Canva-based e-module is effective in improving students' cognitive learning outcomes on acid-base material. These findings align with various previous studies showing that the use of e-modules in chemistry instruction can improve students' learning outcomes. Erlangga et al. (2024) reported that an interactive e-module on reduction and oxidation reactions yielded an N-Gain score of 0.813, classified as high. Furthermore, Nadia et al. (2023) found that e-modules based on multiple representations on the topic of salt hydrolysis effectively improved students' learning outcomes. Similarly, Utari et al. (2024) reported that their e-module achieved a high level of feasibility, received positive feedback from students, and supported the development of critical thinking skills, which correlated with improved learning outcomes.

Thus, it can be concluded that Canva-based e-modules on acid-base material are effective in improving students' cognitive learning outcomes, as reflected in the high percentage of learning mastery and the achievement of all learning objectives. Consequently, this medium is suitable for use as an innovative alternative in chemistry education to enhance the quality of students' learning outcomes.

Conclusion

Based on the results of this study, it can be concluded that the Canva-based e-module on acids and bases was successfully developed using the ADDIE model, which includes the stages of analysis, design,

development, implementation, and evaluation. The resulting e-module meets the criteria for validity, practicality, and effectiveness, with a validity score of 3.56 (highly valid), a learning implementation score of $M = 1.86$ (fully implemented), and received very positive feedback from teachers and students. Furthermore, the use of the Canva-based e-module has been proven to increase student motivation and learning outcomes, making it suitable for use as a learning medium for acid-base topics.

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