DEVELOPMENT OF E-MODULE SETS-BASED APPROACH ASSISTED WITH FLIP HTML5 MEDIA TO IMPROVE INDEPENDENT LEARNING AND LEARNING KNOWLEDGE OUTCOMES ON CHEMICAL EQUILIBRIUM MATERIAL

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Abstract. The lack of utilization of resources is the main factor for the low level of student learning independence, yet in reality, teachers still struggle to connect chemical concepts with everyday life contexts. The SETS approach-based e-module is an innovation in enhancing students' learning independence and learning outcomes. This study aims to determine the validity and practicality of the developed chemistry learning module. This research and development was carried out to produce an e-module product based on the SETS approach assisted by flip HTML5 on chemical equilibrium material that is valid, practical, and effective in increasing independent learning and student knowledge learning outcomes. The development model used is a 4D model which consists of 4 phases, 1) Define, 2) Design, 3) Development, and 4) Disseminate. The purposive sampling technique was used as a sampling technique, namely students of class XI MIPA 1 at SMAN 10 Banjarmasin. Data collection techniques included questionnaires (validation sheets, product practicality, product effectiveness) and learning achievement tests. The results showed that the e-module: (1) is very valid with an average percentage of 90.98%, (2) is very practical, based on readability tests, response questionnaires, and observation sheets with an average score of 4.34, and (3) is effective in increasing learning independence and knowledge learning outcomes in terms of the N-gain learning independence of 0.45 in the medium category and the N-gain of knowledge learning outcomes of 0.71 in the high category. Based on the results obtained, it can be concluded that e-modules based on the SETS approach assisted by HTML5 flip media are appropriate for use in chemistry learning, especially in chemical equilibrium material.

Keywords: development, science, environment, technology, independent learning, learning outcomes

INTRODUCTION

Learning in the 21st century is not only focused on knowledge acquisition but also on efforts to enhance students' skills in the learning process (Kareem et al., 2022).The demand for mastering 21st-century skills is influenced by the development of existing technology and science. Making changes to the curriculum is an effort to meet these demands (Martinez, 2022). This is because the curriculum is like a guidebook that helps teachers know what and how to teach students.

The Free Curriculum policy issued by the Ministry of Education and Culture is a development from the 2013 Curriculum. This policy is expected to improve learning outcomes (Jojor & Sihotang, 2022). The characteristics of the Free Curriculum are the development of student characters with the independent, critical, creative, noble-moraled, faithful, devout, mutual cooperation, and global diversity Pancasila learner profile. One of the independence expected from students in the learning process is learning independence.

Published by Chemistry Education Study Program Universitas Lambung Mangkurat
pISSN: 2086-7328, eISSN: 2550-0716. Indexed SINTA (Rank 3), IPI, IOS, Google Scholar, MORAREF, BASE, Research Bib, SIS, TEI, ROAD and Garuda.

Received : 03-08-2024, *Accepted* : 09-02-2024, *Published* : 23-04-2024

Learning independence is a key component for students to take responsibility in learning, enabling them to take initiative, diagnose learning styles, analyze lesson materials, and independently assess their learning experiences (Yuliati & Saputra, 2020).Learning independence also affects students' learning motivation because when learning independence is established, both online and offline learning systems would not be obstacles (Carter et al., 2020). The success of a student in learning lies in their learning independence, as each student has different levels of learning independence (Astuti, 2022; Dradkh, 2018).Learning independence is not merely students learning independently, but rather students learning through self-awareness.

Learning independence is one of the internal factors that affect students' learning success. This means that students' ability to understand and interpret material relates to the formation of learning independence (Winarti et al., 2022).Mushthofa et al., (2021), findings regarding the phenomenon of students' study habits approaching exams show a low level of learning independence among students. The success of students who study regularly is certainly different from those who only study when exams are approaching. Students with high learning independence are more prepared when facing exams, while low learning independence makes students unprepared, leading to a tendency to cheat during exams such as cheating (Syahrani, 2022).

Initial analysis conducted at SMAN 10 Banjarmasin revealed that 81.8% of students still face difficulties in understanding chemistry lessons, one of which is because chemistry learning is not linked to everyday life and only 53.5% of students study chemistry independently at home. Many students find it difficult to understand some formulas used during lessons and when applying chemistry material to everyday life because it involves memorization, complex concepts, and calculations using formulas. Chemical equilibrium is a material taught in class XI. Marfu'ah & Astuti (2022), findings show that students have difficulty understanding learning materials on chemical equilibrium. However, understanding chemical equilibrium is very important and essential because it serves as a prerequisite for understanding the next concept.

The underutilization of teaching materials that encourage learning motivation and the lack of practice in overcoming difficulties that arise during independent learning are two factors causing the low level of students' learning independence (Yunita & Hamdi, 2019).E-modules become a solution for teachers to develop teaching materials that suit students' needs. Efforts that can be made in developing e-modules include involving students with more dynamic, effective, and enjoyable learning information. In addition, e-modules need to present content in a more attractive and communicative way with good text and image and video animation delivery. Students will be interested in learning information presented by teachers because of the aesthetic appeal of e-modules. E-modules can also be used for self-study and provide opportunities for students to review unclear information during class (Logan et al., 2021).Compared to printed books, adopting e-modules can also minimize the use of paper during the learning process (Sendari et al., 2019).

The use of e-modules as teaching materials is supported by the Data from the Indonesian Internet Service Providers Association/ Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) (2022), which reveals that in 2022, the highest internet users were in the age group of 13-18 years at 99.16%, and the most frequently used device was smartphones, accounting for 89.03%. Based on this data, students tend to use the internet on smartphones in their daily lives, making teaching material development accessible through smartphones very suitable for current learning.

E-modules are a form of supporting teaching materials for students' independent learning systematically arranged and provided in electronic format (Fadieny & Fauzi, 2021).E-modules can be combined with several models or approaches that support the development of teaching materials. One of them is e-modules combined with the Science, Environment, Technology, and Society (SETS) approach. The SETS approach is a learning approach that includes science, technology, environment, and society components(Purwanto et al., 2020). The main topic in this approach focuses more on daily experiences, allowing students to connect previous knowledge with current situations. The SETS approach will cultivate a constantly updated learning environment that allows students to become more professional in thinking, scientific mastery, and interpersonal skills.

The development of e-module based on the SETS approach is a solution to problems in enhancing students' learning independence and knowledge learning outcomes (Sinaga, 2023; Rusli, 2018). The SETS-based e-module developed would be packaged using flip HTML5 pages. This allows for the creation of content with animated displays, images, videos, background music, and flip sounds when played (Rahima & Putra, 2022). The aim of this development research is to develop an e-module based on the SETS approach assisted by flip HTML5 on chemical equilibrium material that meets the criteria of being valid, practical, and effective in enhancing students' learning independence and knowledge learning outcomes.

METHOD

The research conducted was a Research and Development study using the 4D development model. The research mechanism involved the following steps: (1) Definition (Define), (2) Design, (3) Development, and (4) Dissemination, as shown in Figure 1.

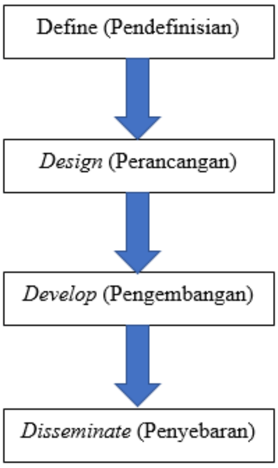


Figure 1. Stages of the 4D development model

The sampling technique used was Purposive Sampling based on specific assessment and characteristics. The purpose of using purposive sampling is to ensure that the samples taken meet the research objectives. The research subjects were students of SMAN 10 Banjarmasin, class XI MIPA 1, totaling 35 students for limited testing, 5 students of class XI MIPA 2 for small group testing, and 3 students of class XI MIPA 3 for individual testing. Data collection techniques included validation questionnaires for SETS-based e-module, readability questionnaires, response questionnaires, observation sheets on teachers' ability to use e-module, observation sheets on the implementation of learning, observation sheets on learning independence, and knowledge learning outcome tests.

Validity of the e-module

The validity of the e-module was based on the assessment results of 5 validators, consisting of 3 Chemistry Education lecturers from FKIP ULM, 1 Educational Technology lecturer from FKIP ULM, and 1 chemistry subject teacher from SMAN 10 Banjarmasin. The validation sheet refers to 4 aspect components, namely content, presentation, language, and media.

Practicality of the e-module

The practicality of the e-module was assessed by distributing questionnaires and observation sheets. The distributed questionnaires include readability and student response questionnaires. Meanwhile, the observation sheets used were observation sheets on teachers' ability to use the e-module and observation sheets on the implementation of learning assessed by three observers.

Effectiveness of the e-module

The effectiveness of the SETS-based e-module assisted by flip HTML5 was known based on the results of limited testing involving 35 students of class XI MIPA 1 SMAN 10 Banjarmasin Academic Year 2022/2023. This test was conducted before (pre-test) and after (post-test) learning using the e-module to determine the level of student learning independence and knowledge learning outcomes. Data on student learning independence were collected through questionnaires. Assessment of learning independence was based on five aspects: motivation, discipline, self-confidence, responsibility, and initiative. Meanwhile, knowledge learning outcomes are measured by providing test questions based on learning objectives to students.

RESULTS AND DISCUSSION

The research results presented below serve as evidence that the developed e-module has undergone various stages of testing, both from experts and its implementation, so that the e-module meets the criteria of being valid, practical, and effective in enhancing students' learning independence and knowledge learning outcomes. The advantages of the SETS-based e-module compared to other electronic modules are that students can better understand its application in everyday life. The research conducted uses the Research and Development method with the 4D model, which includes four phases. Based on the obtained research results and the methods used, they are presented as follows.

Define Phase

The first phase, Define, was conducted as the basis for the development of the e-module and research instruments based on the data obtained. It consists of front-end analysis (beginning-end), learner analysis (student analysis), concept analysis (concept analysis), task analysis (task analysis), and specification of objectives (formulation of learning objectives). The initial analysis was done by interviewing chemistry subject teachers and studying literature to identify problems related to the need for teaching materials. The results show that learning still depends on workbooks often used as task books, so when the workbooks are collected, students do not have other teaching materials to use for independent learning.

Student analysis is conducted by distributing questionnaires related to students' difficulties in understanding chemistry materials and what teaching materials students are interested in. The questionnaire results show that 81.8% of students face difficulties in understanding the material because it involves a lot of memorization and calculations. Based on observations, students tend to like teaching materials in the form of e-module because of their flexible and easy-to-use nature. The E-module would also be combined with a learning approach that is current and closely related to the environment to help students understand the material. The questionnaire results also reveal that only 53.5% of students admit to studying chemistry materials independently at home, indicating that learning independence is still low and efforts are needed to improve it (Rahayu & Aini, 2021).

Concept analysis involves interviewing chemistry subject teachers to determine the materials to be used in the development of teaching materials. The results show that the equilibrium material is chosen because it is at the end of the semester, with time allocation possibly insufficient, so the chemical equilibrium e-module would help students learn independently without relying on classroom learning. In addition, this material is important for students to understand because it is a prerequisite for studying materials in the following semester, such as acids and bases, salt hydrolysis, buffer solutions, and others.

Task analysis was conducted to determine the tasks needed to meet the learning outcomes in the lesson plan (RPP) and syllabus in use. For class XI SMAN 10 Banjarmasin, the 2013 Curriculum is applied, so task analysis is based on Basic Competencies in the syllabus. Learning objectives analysis was done by summarizing the results of concept analysis and task analysis. The results show that the e-module is structured with six learning objectives.

Design Phase

The second phase, Design, involved creating the chemical equilibrium e-module (draft I) in the design phase by preparing test and non-test instruments, selecting media, and selecting forms. This e-module was designed using the SETS approach to facilitate students' understanding of the presented material because the SETS approach is contextual and closely related to the environment. In its implementation, the e-module used flip HTML5 in the form of a website so that it can be used on smartphones, both android or iPhones. In addition, the e-module can be used anytime and anywhere because it is in electronic format. The flip effect and animated videos add to the attractiveness of the e-module. The stages in the SETS approach are as follows:

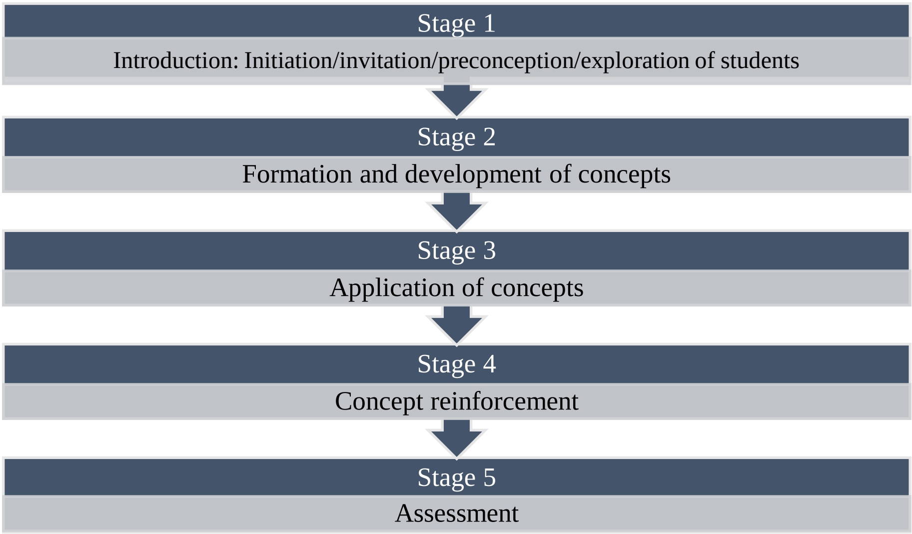


Figure 2. Stages of the SETS approach

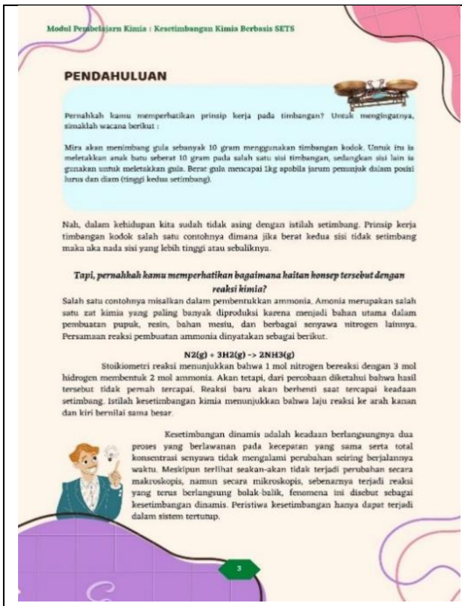
The introductory stage in the SETS approach includes initiation, invitation, preconception, and exploration. Initiation involves engaging and inviting students to focus on learning and discuss issues present in society. Invitation focuses students' attention. This is followed by providing preconception, which connects an event or students' prior knowledge with the learning topic to be studied. And exploration, where a teacher can assign homework or ask questions that connect abstract ideas with real-life situations to stimulate discussion or capture students' interest.

In the concept formation stage, teachers can use observation methods, experiments, discussions, and other methods to build or construct students' knowledge to determine the correct ideas. The discussion method is chosen to be implemented because besides the influence of teachers, peer influence would encourage students' desire to learn, which is one of the characteristics of learning independence. To guide students in finding the correct ideas at this point, the teacher can provide instructions to support explaining the concept.

In the concept application stage, students analyze issues or solve problems using the ideas they have previously learned. Students are also required to apply these concepts in everyday life, especially involving science, the environment, technology, and society. The application concept of SETS is not only in the form of material presentation but also test questions so that students can further analyze the relationship between chemical equilibrium and life.

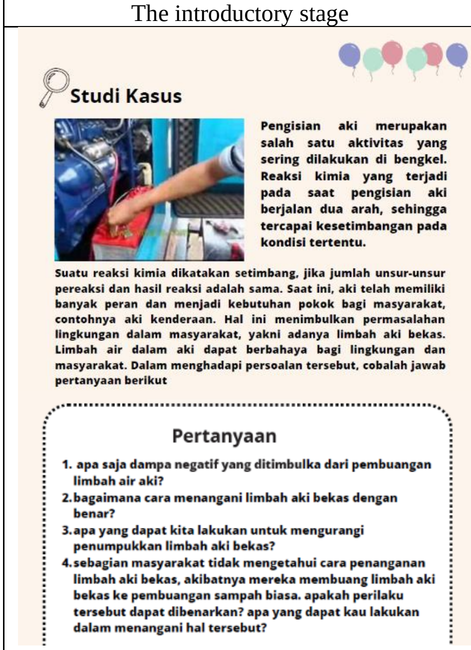
The concept reinforcement stage is conducted so that students do not make mistakes in understanding the correct concepts in the previous stages. This is because the concept formation stage may lead to misconceptions of knowledge. At this stage, the teacher confirms students' understanding of the material by asking questions directly during the learning process. Answers that are not accurate would be evaluated immediately so that students' misconceptions do not persist in the next material.

The evaluation stage is used to evaluate the level of achievement of goals and student learning outcomes. This evaluation can take the form of cognitive, affective, and psychomotor ability tests, as well as observations of behavior and reactions to SETS components. Below is the design of the SETS-based e-module.

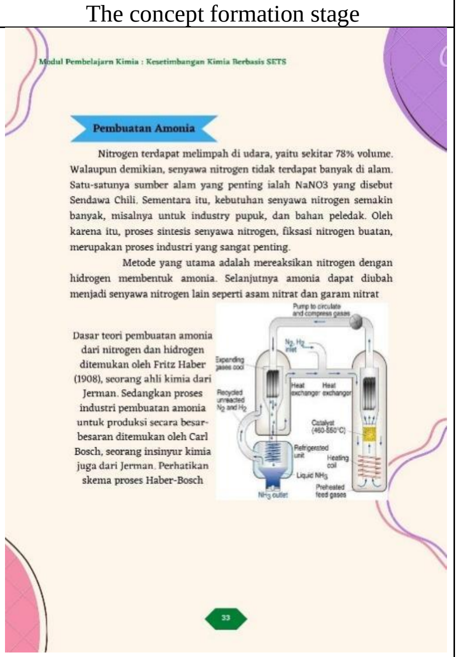


The introductory stage

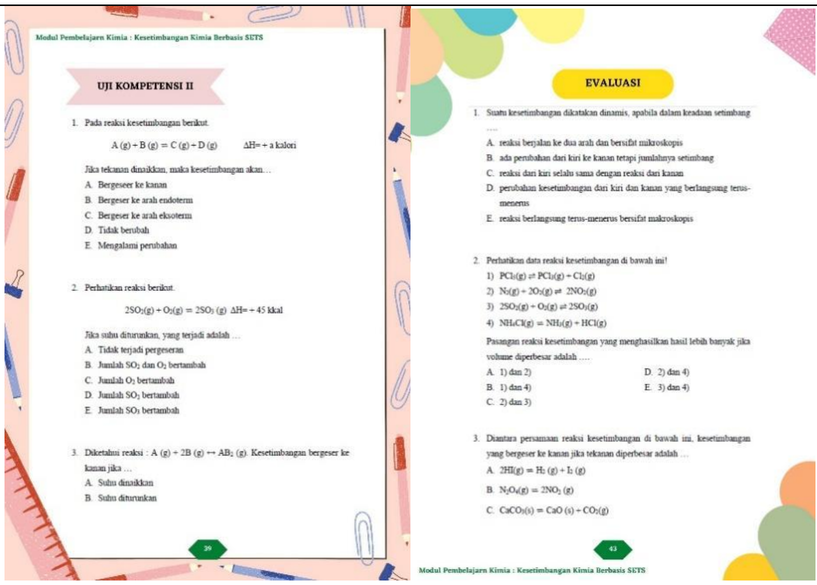
The concept formation stage



The concept application stage



The concept reinforcement stage



The evaluation stage

Figure 3. Design of the SETS-based e-module

Development Stage

The third stage of development is the development stage from draft I through expert appraisal and field testing. The field testing consists of (1) individual testing, (2) small group testing, and (3) limited testing. Product revisions are made after the validation process, and after each testing process is completed, resulting in the e-module product on the topic of chemical equilibrium. The development stage is conducted with the e-module being tested for its validity, practicality, and effectiveness in improving students' self-directed learning and knowledge learning outcomes.

Validity of the e-module

The e-module is validated by a team of validators to determine its validity before testing. The validator team would evaluate the feasibility of the e-module using validation sheets related to four feasibility elements: content, presentation, language, and media. The results of this validation are shown in Table 1.

Table 1. Validation results of the e-module by experts

Assessment Aspect	Validator					Total	Percentage	Description
	I	II	III	IV	V			
Content	60	64	67	72	70	333	88,80%	Very valid
Presentation	60	70	72	74	73	349	93,06%	Very valid
Language	56	64	62	65	63	310	88,57%	Very valid
Media	32	36	39	40	40	187	93,50%	Very valid
Average						**294,75**	**90,98%**	**Very valid**

From the data, it is known that the average validation percentage is 90.98%. Based on this percentage result, the SETS-based chemical e-module assisted by flip HTML5 on the topic of chemical equilibrium is already very valid and suitable for use. The results of the assessment of the validity aspect of the content feasibility are shown in Figure 4.

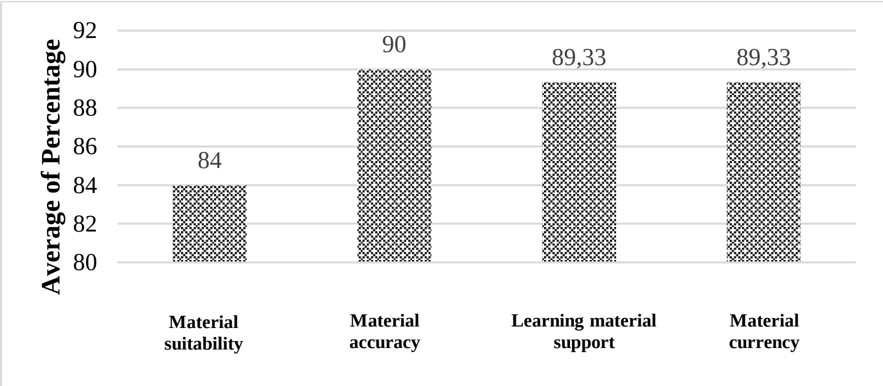


Figure 4. Graph of content feasibility assessment

Content feasibility aspect relates to the validation of material feasibility within the e-module. The content feasibility aspect has four assessment indicators. The first indicator contains suitability of the material with content which has two assessment items, namely completeness of the material and depth of the material. The second indicator contains material accuracy which has four assessment items, namely accuracy of concepts and definitions, examples, questions, and illustrations to enhance students' understanding.

The third indicator contains learning material support which has six assessment items, namely reasoning, relevance, communication, application, attractiveness, and encouragement to seek further information. The fourth indicator contains material currency which has three assessment items, namely suitability of material with the development of chemical science, images, and actual illustrations, as well as currency of references. The assessment results show that the e-module has fulfilled the content feasibility aspect seen from the average validity of 88.8%, categorized as very valid. The results of the presentation feasibility aspect assessment are shown in Figure 5.

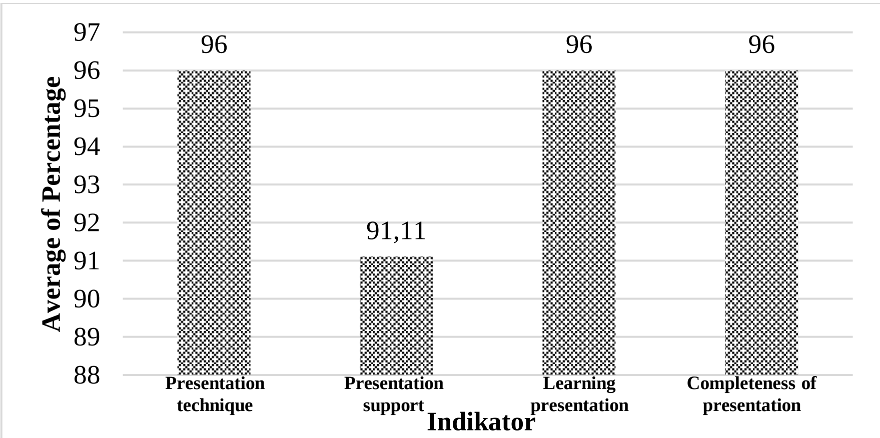


Figure 5. Graph of presentation feasibility assessment

Presentation feasibility is a method for presenting information that facilitates the use of the e-module. The presentation aspect is one of the considerations in selecting instructional media because instructional media must be able to attract the interest and attention of learners, so the media must be presented in a structured and organized manner(Prayuda & Miftahurrizqi, 2018).

The presentation feasibility aspect has 4 assessment indicators. The first indicator contains presentation techniques which have 2 assessment items, namely the consistency of presentation systematics and the fluency of presentation in the e-module. The second indicator contains presentation support which has 9 assessment items, namely preface, e-module characteristics, table of contents, list of figures, list of videos, list of tables, bibliography, periodic system, and glossary. The third indicator contains learning presentation which has 1 assessment item, namely the presentation of material involving learners to be interactive and participatory. The fourth indicator contains completeness of presentation which has 3 assessment items, namely introduction, content, and conclusion. The e-module meets the presentation feasibility aspect with an average of 93.06%, categorized as very valid. The results of the assessment of the linguistic feasibility aspect are shown in Figure 6.

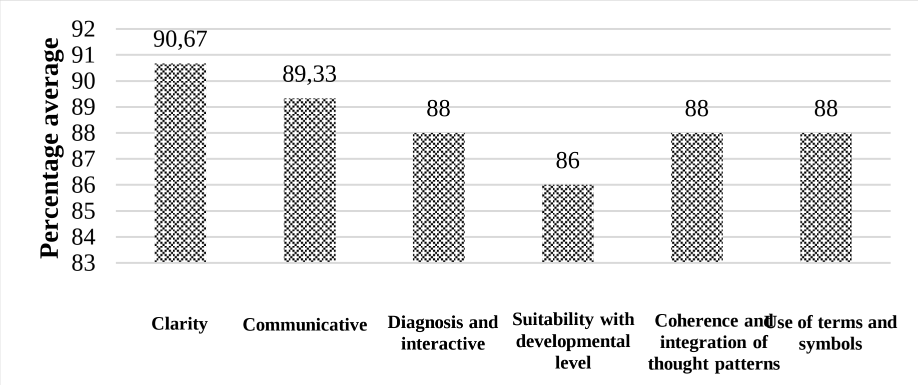


Figure 6. Graph of assessment of linguistic feasibility aspect

Linguistic feasibility is an assessment aspect that includes the grammar used in the e-module, clarity, communicative phrase features, and the suitability of sentence usage for student growth. The language feasibility aspect has 6 assessment indicators. The first indicator, clarity, has 3 assessment items: structural accuracy, sentence effectiveness, and term rigidity. The second indicator, communicative, has 3 assessment items: readability of message information conveyed in the e-module, accuracy of language use, and language rules. The third indicator, dialogic and interactive, has 2 assessment items: the ability to motivate messages or information and the ability to encourage critical thinking or language that can stimulate learners to ask further questions.

The fourth indicator, suitability with the developmental level of learners, has 2 assessment items: compatibility with the intellectual development level and compatibility with the emotional development of learners. The fifth indicator, coherence and integration of thought flow, has 2 assessment items: coherence and integration between learning activities and paragraphs. The sixth indicator, the use of terms, symbols, or icons, has 2 assessment items: consistency with the use of terms, symbols, or icons. The results show that the e-module meets the linguistic feasibility aspect with an average of 88.57%, categorized as very valid. The results of the assessment of the media feasibility aspect are shown in Figure 7.

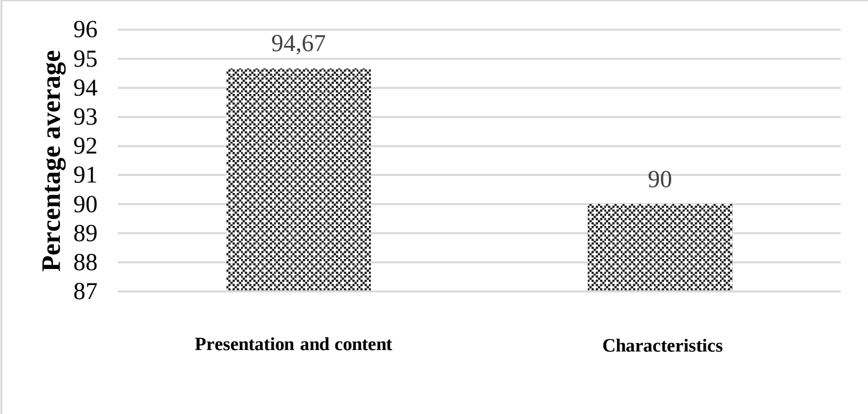
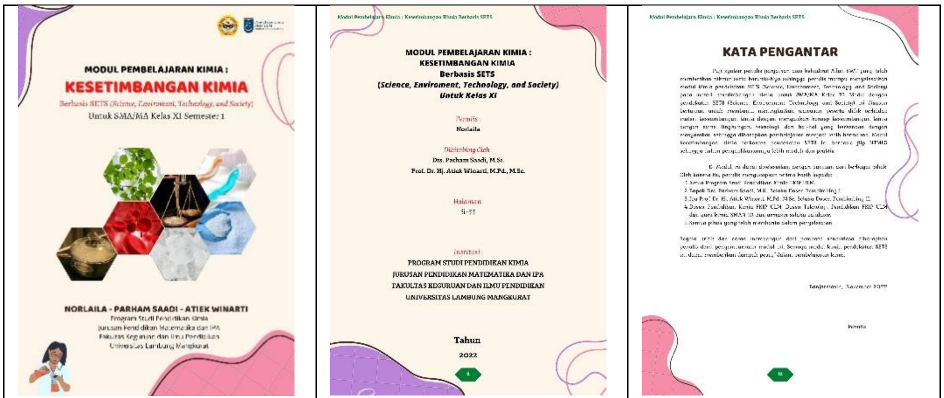


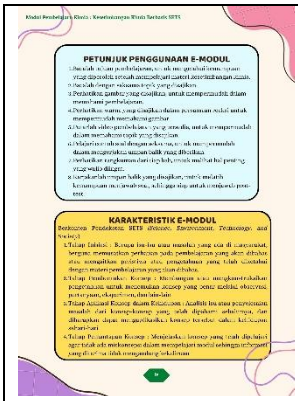
Figure 7. Graph of assessment of media feasibility aspect

Media feasibility is an assessment aspect regarding the appearance of media, which includes evaluations related to visual, audio, video, fonts, layout, and everything related to the appearance of the product. The assessment aspect of media in the development of the e-module is very crucial because it influences the appearance and attractiveness. Fadhilah et al., (2020), stated that the use of appropriate fonts, layouts, and illustrations makes the teaching materials used more attractive to read. Furthermore, the assessment aspect of media affects the clarity of the content presented and the proportional use of visuals, videos, text, colors, and spacing according to media development standards (Luthfi et al., 2021).

The media feasibility aspect has two assessment indicators. The first indicator contains appearance and content, which has six assessment items: compatibility with color composition, illustrations and images, fonts, layout, videos, and usage instructions of the media. The second indicator, characteristics, has two assessment items: media usage and attractiveness. The e-module has fulfilled the media feasibility aspect with an average of 93.5%, categorized as very valid. Below is the appearance of the developed e-module as shown in the following image.



Cover	Identity of the e-modul	Foreword



Guide of the e-modul

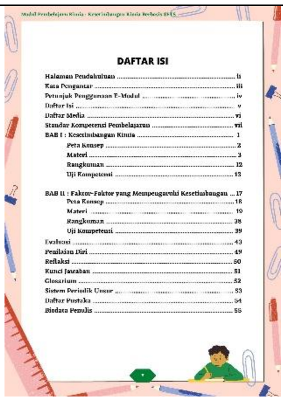
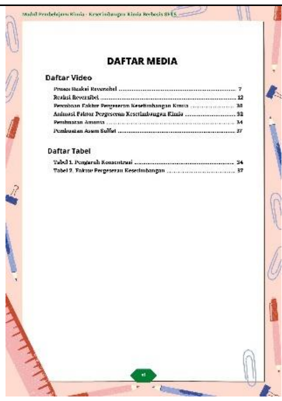
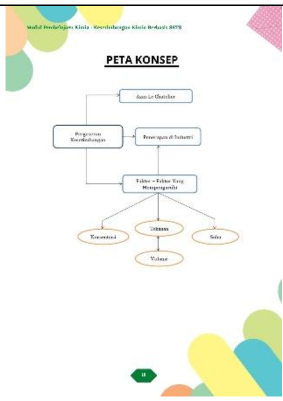


Table of content



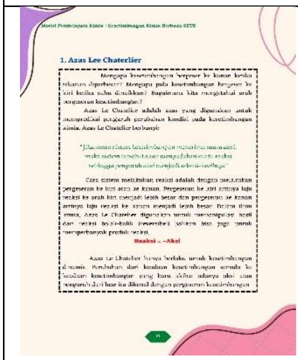
List of media

Indicator



Concept Map

Material 1



Material 2

Summary

Question

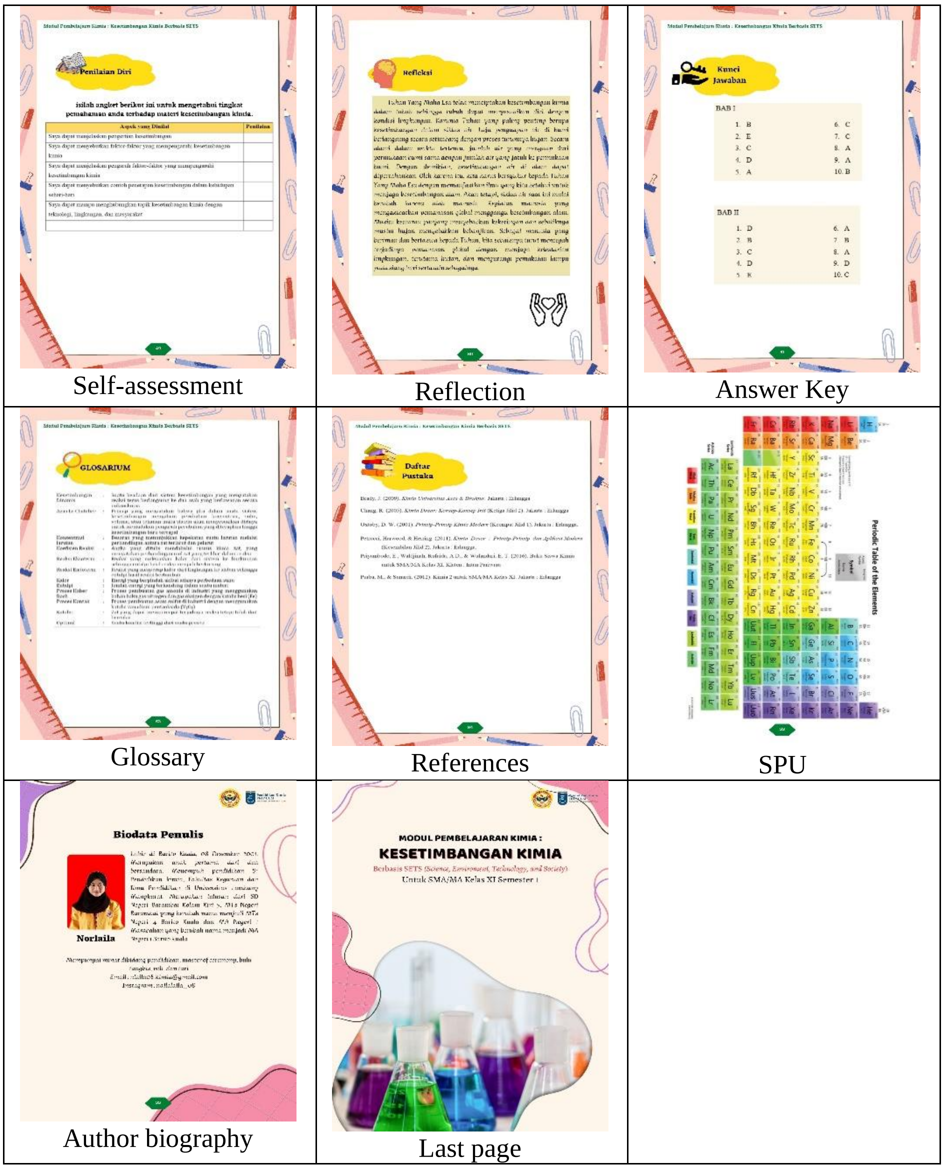


Figure 8. Display of the e-module

Practicality of the e-module

In addition to validity, the developed e-module must undergo testing to ensure its practicality level. This testing is done by distributing readability questionnaires and student response questionnaires, along with observation sheets on teachers' ability to use the e-module and observation sheets on the implementation of learning. The recapitulation of the results obtained from the practicality test is presented in Table 2.

Table 2. Recapitulation of practicality test

Component	Value	Description
Readability in individual testing	4,52	Very practical

Component	Value	Description
Readability in small group testing	4,48	Very practical
Student response	3,78	Practical
Teacher's ability to use the e-module	4,50	Very practical
Implementation of learning	4,42	Very practical
Average	**4,34**	**Very practical**

Table 2 shows that all components of practicality assessment are in the category of very practical with an average score of 4.34. Readability testing aims to measure whether the developed e-module can be read clearly. Readability testing of students on the e-module is conducted in the individual testing and small group testing stages. Individual testing is given to 3 students of class XI MIPA 3, with an average score of 4.52, which falls into the category of very practical. It is then continued in the small group testing stage, which consists of 5 students of class XI MIPA 2, with an average score of 4.48, also categorized as very practical. Documentation of the practicality test can be seen in Figure 9.

Individual Testing | Small Group Testing

Figure 9. Documentation of practicality test

Response testing aims to measure students' reactions to the developed e-module in terms of interest, content, and language. Based on the average score data obtained from the student response questionnaire, it is 3.78, categorized as practical.

Observation of teachers' ability to use the e-module aims to determine the practicality and ease of use of the developed e-module. The average score obtained is 4.50, categorized as very practical. The results of observation of the implementation of learning aim to determine whether teachers have taught correctly according to the steps of learning contained in the RPP. The score obtained is 4.34, categorized as very practical.

Effectiveness of the e-module

Pre-test and post-test learning tests are conducted to see how effective the use of the e-module is in improving students' self-learning abilities and knowledge learning outcomes. Student self-learning is done using a questionnaire based on aspects of self-learning, namely discipline, confidence, motivation, initiative, and responsibility. Table 3 shows the results of the student self-learning questionnaire.

Table 3. Results of student self-learning questionnaire

No.	Self-Learning Aspect	Use of Learning Media		N-Gain	Category
		Before	After		
1	Discipline	49,43	71,43	0,43	Medium
2	Confidence	48,00	69,94	0,42	Medium
3	Motivation	49,90	74,48	0,49	Medium
4	Initiative	46,97	68,46	0,40	Medium
5	Responsibility	52,57	75,62	0,48	Medium
	Average	**49,37**	**71,98**	**0,45**	**Medium**

There was an increase in student self-learning from the use of the SETS-based e-module assisted by flip HTML5 on chemical equilibrium, where it increased from 49.37 to 71.98. This shows that this e-module is effectively able to improve students' self-learning abilities.

From this data, the N-gain result is 0.45, indicating a medium improvement category. Medium self-learning means that students can control their behavior during the learning process, but not all aspects of self-learning are mastered (Susanti & Ritonga, 2022). Another factor is that in its implementation, the e-module was only used for 2 meetings, so it was less effective in improving students' self-learning abilities.

The aspect with the lowest increase is the initiative aspect at 21.49. This is because students still rely on teacher guidance in learning using the SETS-based e-module assisted by flip HTML5. Meanwhile, the aspect with the highest increase is motivation. This is because the e-module is structured using the SETS approach, which is close to the students' environment, thus able to attract students to read it.

The learning outcome test instrument underwent validity and reliability testing before being tested on students. Validity results V>0.8 in the very valid category and reliability of 0.74 in the high category, making the test instrument valid and reliable to use.

Then, the testing was conducted on 35 students of class XI MIPA 1 SMAN 10 Banjarmasin. Table 4 shows the percentage of students' knowledge learning outcomes in each indicator based on pre-test and post-test results.

Table 4. Student knowledge learning outcomes on each indicator

No.	Indicator of the Question	Achievement Level (%)	
		Pre-test	***Post-test***
1	Explaining the definition and characteristics of dynamic equilibrium	12,85	57,14
2	Explaining the definition and characteristics of irreversible and reversible reactions	48,57	88,57
3	Explaining homogeneous and heterogeneous equilibrium	91,43	100,00
4	Explaining the effect of catalysts on equilibrium	91,43	100,00
5	Predicting the direction of equilibrium shift based on Le Chatelier's principle	8,57	51,43
6	Analyzing the effect of changes in concentration, pressure, temperature, and volume on equilibrium shift	43,26	86,12
	Average	**41,71**	**83,24**

The average student learning outcomes at the pre-test stage were 41.71 in the fairly good category, and at the post-test stage, they were 83.24 in the very good category. This means that learning with the SETS-based chemistry e-module helps students better understand the concept of chemical equilibrium. This is in line with

Zakaria et al., (2021), findings that the implementation of the SETS approach significantly improves student learning outcomes. The average N-gain from student knowledge learning outcomes is high, at 0.71. These research results indicate an increase in self-learning in line with the increase in student knowledge learning outcomes. This picture depicts the documentation of the effectiveness test.

Effectiveness testing

Figure 10. Effectiveness test documentation

The SETS-based e-module produced has advantages compared to other studies, namely, the ease of access to the e-module in electronic form, allowing students to access it anytime and anywhere, equipped with attractive supporting features including images and videos, complete and clear microscopic depiction, and relevant context to the chemical equilibrium material. This study also measures the effectiveness of the e-module in improving high school students' self-learning and learning outcomes in chemical equilibrium material.

CONCLUSION

The research results show that the development of SETS-based e-module through the 4D development model consisting of 4 phases, namely 1) Define, 2) Design, 3) Development, and 4) Disseminate. The SETS-based e-module is valid with a validity result of 90.98% in the very valid category, practicality result of 86.80% in the very practical category, and effectiveness result seen from the improvement in self-learning categorized as medium with an N-gain of 0.45, and in knowledge learning outcomes obtaining an N-gain of 0.71 categorized as high. Based on these results, the SETS-based e-module can be a learning resource in improving students' self-learning and learning outcomes.

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