ENHANCING SELF-REGULATED LEARNING IN VOCATIONAL SCHOOLS: A DIGITAL MODULE WITH MOTIVATIONAL AND METACOGNITIVE FEATURES

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Abstract

This study explores the development and implementation of a digital learning module designed to enhance self-regulated learning (SRL) in vocational schools by integrating motivational regulation and metacognitive prompts. Self-regulated learning is crucial for students in vocational education, as it helps them take control of their learning process, set goals, monitor their progress, and adapt strategies for improvement. However, vocational students often face challenges in managing their learning autonomously due to a lack of motivation and metacognitive awareness. To address these challenges, the digital module developed in this study incorporates motivational strategies to sustain student engagement and metacognitive prompts to encourage reflection on their learning strategies, fostering a deeper understanding and better retention of skills. The module was designed using a user-centered approach, with features such as interactive exercises, self-assessment tools, and feedback systems that provide both intrinsic and extrinsic motivation. The motivational regulation component aims to encourage persistence and positive attitudes toward learning, while the metacognitive prompts guide students in planning, monitoring, and evaluating their learning strategies. The study utilized a quasi-experimental design involving vocational students from different schools to evaluate the effectiveness of the digital module. Preliminary results show that students who interacted with the digital module demonstrated higher levels of self-regulation, motivation, and academic performance compared to those who did not use the module. Furthermore, students reported greater confidence in their ability to monitor and improve their learning strategies, suggesting that the combination of motivational and metacognitive features can significantly support self-regulated learning. This study contributes to the growing body of research on digital learning tools for vocational education and highlights the importance of incorporating both motivational and cognitive strategies to enhance students' learning experiences. It also provides insights into the potential of technology to bridge the gap in self-regulation skills among vocational students, offering implications for further development of digital learning interventions aimed at fostering lifelong learning skills.

INTRODUCTION

Changes in the development of the times are so fast, requiring each individual to improve the quality and optimization of soft skills. Vocational school education must also be more innovative and creative in preparing vocational school graduates to face challenges and opportunities [1]. Global challenges demand more than just technical skills. The world of work requires individuals to have critical, problem-solving, and self-learning abilities because it is very relevant to adapt to a modern and competitive environment [2]. Self-Regulated Learning *(SRL)* is a crucial ability that needs to be possessed by students, especially students in vocational schools who are prepared to face the world of work [3]. *SRL* is a process where students can set learning goals, organize the learning process, and monitor their learning outcomes. This ability leads students to be responsible for their success, especially in an environment that is constantly changing and requires them to be able to adjust [4]. Vocational school students will be better prepared to enter the modern work environment by having *SRL* abilities that shape students to adapt to changes and advances. Therefore, schools must prepare for appropriate learning. Instructional design that directs students to have *SRL* skills is needed to prepare students to adapt well. Learning design that develops self-regulation in students is essential to prepare them to adapt. Research results show that students with good *SRL* tend to overcome academic challenges because students will be able to manage time, determine learning strategies, and maintain emotions [5]. In another study, integrating *SRL* in learning increased students' engagement in learning as a whole [6]. Learning design that focuses on metacognitive strategies and motivational regulation effectively encourages students to be active in self-reflection and goal setting and increases students' awareness of the learning process, including increasing intrinsic motivation [7]. Innovation in developing learning designs and providing media that integrate metacognitive strategies and motivational regulation is needed to prepare vocational students for self-regulated learning. Some previous development research has discussed media development, instructional strategies, and the use of motivational regulation and metacognitive prompts to improve self-regulated learning. Still, much discussion has yet to be related to media integrating *SRL* applied to vocational schools, especially in the fashion sector. Therefore, researchers developed learning media in digital modules that integrate motivational regulation and metacognitive prompts as one of the media options to help teachers and vocational schools in the fashion sector improve the self- regulated learning ability of vocational school students.

METHODS

a. Design Research

This research is a learning media development using the ADDIE development model. This development

comprises Analysis, Design, Development, Implementation, and Evaluation [8]. This model was chosen because it has systematic and flexible steps for developing effective learning products [9]. In the initial stage analysis, identifying learners' learning needs, goals, and characteristics is the basis for designing relevant and targeted learning solutions [8]. The stage is to identify problems and learning needs in vocational schools, especially in the fashion sector. The second stage is designing learning objectives and strategies based on analyzing learning needs. In the third stage, media products were developed and tested by media experts and material experts, and there were limited trials for users. The fourth stage is implementing learning products designed for students in 1st-grade fashion vocational schools. The fifth stage is evaluation, which measures the effectiveness of media products in their application in the learning environment and the impact of media use on learning problems [8].

b. Media Validity Test

Two tests were carried out to assess this module: the feasibility and practicality tests. Researchers involved media and material experts who were university lecturers for the feasibility test. Meanwhile, to test the practicality, researchers conducted a small group trial to get direct feedback on the practicality of using the module from the user's side [10]. The feasibility assessment by media and material experts was used to determine their responses and input on the media, and then revisions and improvements were made according to the experts' suggestions. Furthermore, researchers calculated the weight of the responses and calculated the score. Media expert assessment criteria include screen design appearance, ease of use, multimedia principles, and benefits. The material expert assessment criteria include introduction, content, learning, summary, questions, and exercises. Calculation of the percentage score of the feasibility of media products by experts using the formula:

$$Eligibility\ Procentation = \frac{Total\ Score}{Maximum\ Score}\ x\ 100\%$$

The results of the category percentage process from the interpretation of the feasibility calculation are shown in Table 1.

Table 1. Media Eligibility Criteria

No	Value	Category
1	86% - 100%	Very valid
2	71% - 85%	Valid
3	56% - 70%	Quite valid
4	41% - 55%	Less valid
5	25% - 40%	Invalid

The lowest criterion score for measuring module feasibility is 25% invalid, and the highest criterion score

is 100% very valid. Assessment of practicality by users in small group trials of 15 vocational students in the fashion field. Researchers distributed questionnaires to students after finishing studying the module. The trial was conducted to obtain direct feedback from users regarding the practicality of using the media with the criteria of interest in learning, benefits, and ease of use with measurements using a Linkert scale [11]. This data is used to improve the media by paying attention to student responses to learning experiences. The calculation of the percentage score of the practicality of media products by users uses the formula:

The percentage category of the feasibility calculation interpretation is shown in Table 2.

Table 2. Media Practicality Criteria

No	Value	Category
1	86% - 100%	Very practical
2	71% - 85%	Practical
3	56% - 70%	Quite practical
4	41% - 55%	Less practical
5	25% - 40%	Impractical

The lowest criterion score for measuring module is 25% impractical category, and the highest criterion score is 100% very practical category.

c. Media Effectiveness

Measuring the effectiveness of student media by giving self-regulated learning *(SRL)* measurement questionnaire with categories of planning ability, management of learning strategies, and self-evaluation carried out before and after students use digital modules, then measuring the percentage of self-regulated learning *(SRL)* improvement. The results of measurements before and after using digital module products are calculated using the percentage gain score to see if there is a level of improvement in the use of digital modules [12].

$$g\% = \frac{Post\text{-}test\ Score - Pre\text{-}test\ Score}{Maximum\ Score - Pre\text{-}test\ Score} x\ 100\%$$

Where the post-test score is the score after using the media product, the pre-test score is the score before using the media product. The maximum score is the maximum possible score on the questionnaire. The criteria for interpreting the digital module effectiveness test are shown in Table 3.

Table 3. Interpretation of Effectiveness Criteria

Judging Criteria	value
Highly	g ≥ 7%

Moderate	3% ≤ g < 7%
Low	g < 3%

Interpretation of effectiveness criteria with value g < 3% is low, 3% ≤ g < 7% is moderate, and g ≥ 7% is Highly.

RESULT AND DISCUSSION

Researchers developed digital modules using the ADDIE development model, with the following stages of digital module development:

a. Analysis

The initial stage in the development of this module is to analyze the problems and learning needs that exist in fashion vocational schools, specifically related to student learning independence and self-regulated learning abilities in students in fashion vocational schools in Indonesia. In this study, the researcher conducted interviews with five teachers. The data from the interviews stated that learning in vocational schools is carried out for three years, with the achievement of vocational essential content learning in the first year and strengthening vocational competence in the second and third years. The learning carried out in the second and third years is more filled with project learning activities; the problems that teachers often face in this learning could be more optimal for students participating in practical learning at school due to a lack of independence in students. Students are still very dependent on instructions given by the teacher; students have yet to be able to make project plans and complete projects independently without teacher assistance. The limited time and number of learning hours, as well as the diverse learning abilities of students, cause guidance and work on vocational learning projects to not run optimally. Researchers also gave a questionnaire measuring learning independence to 100 students in fashion vocational schools, with the results of 65% of students having low learning independence, measured from the categories of planning ability, management of learning strategies, and self-evaluation.

b. Design

The researcher developed an instructional design based on the learning problem analysis results. Considering the previous analysis, the researcher chose the alternative of providing learning resources as a digital module to support the learning process, accommodating the limited learning time and students' diverse abilities. This digital module allows students to self-regulated learning—those who prioritize themselves. So, available learning resources can support those who need to deepen their understanding of the material. Additionally, students who can complete vocational tasks more quickly are also facilitated to study the following material independently [6]. In the initial design phase, the researcher identified the learning outcomes for vocational competencies and determined the learning content by detailing the tasks

and teaching materials to ensure alignment with the learning objectives and the school curriculum. The content specification of this digital module is related to fashion pattern- making for 1st-grade students in fashion vocational schools. In the design phase of this Digital Module, the researcher integrated Motivational Regulation and Metacognitive Prompts as inseparable components at the beginning and end of each learning activity. These elements are incorporated into the module to foster self-regulated learning *(SRL)* in vocational students. The Motivational Regulation Prompt consists of motivational statements that guide the nature of learning, learning goals, and the objectives to be achieved, encouraging learners to recognize the importance of learning [13]. The Metacognitive Prompt in this module is designed to help vocational students develop awareness, regulate their thinking processes, and cultivate their ability to manage their learning strategies independently [14]. Research findings indicate that students who score high on assignments tend to have stronger self-efficacy and a more remarkable ability to regulate their learning independently than those who score lower on assignments [15]. Development

The development stage is to develop digital modules with vocational material for fashion sub-materials for linking fashion patterns by design. Researchers developed modules with the help of the Flip PDF Corporate application to organize digital modules to be interactive by adding images, videos, and interactive quizzes. In preparing the material and content of the module, researchers used Microsoft Word, Canva and Camtasia applications. In the process of making images used the Adobe Illustrator application.

At the stage of preparing the content of the digital module material, the author developed a module with vocational material in the fashion field. The module contains an introduction, instructions for using the module, and the core of the module, which consists of learning activities consisting of 4 sessions of learning activities, practice questions, practical tasks, summaries, and summative test questions. The following process is to create images and videos according to the content needs.

In the next stage, the author inserted Motivational Regulation and Metacognitive Prompts in the early stages of the module, which contained goal-setting and learning-planning prompts. Prompts to strengthen personal values are inserted on the middle page of the module or at the end of learning sessions 1 and 2. On the exercise page, monitoring and checking understanding prompts are inserted. At the end of each learning activity, progress evaluation prompts and self-evaluation prompts are inserted. Prompts to identify difficulties, emotion management prompts, and prompts to strengthen perseverance are inserted at the end of the third and fourth learning sessions. Reflection prompts are inserted at the end of the module after students complete the learning activity session. In the next stage, researchers assembled the draft module using the Flip PDF Converter application into a digital module to continue the process of feasibility testing and practicality testing of the module.

c. Implementation

At the implementation stage of this digital module, researchers conducted trials in three phases, namely preliminary testing, small group testing, and field testing.

Preliminary Testing

This initial testing stage aims to identify fundamental problems in the developed media; this trial involves media experts and material experts. Researchers provide instruments to media and material validators to find out their responses to the feasibility of the media. Input and suggestions from experts were used to revise and improve the quality of the module. After going through several stages of revision, experts continued the final assessment of the feasibility of the module. The next step is to calculate the weight of each module assessment response and calculate the average value and score range. The results of media expert feasibility assessment data processing (Table 4) with an average result of 98% very valid and very good categories to use. The results of the material expert assessment data (Table 5) with an average result of 88% very valid and good categories to use.

Table 4. Media expert eligibility score

No	Assessment Aspect	Expert Value	Max Value	%
1	Display screen design	62	65	95%
2	Ease of Use	30	30	100%
3	Multimedia Principles	48	50	96%
4	Usability	40	40	100%

The results of media expert feasibility assessment data processing (Table 4), display screen design aspect of 95%, ease of use aspect of 100%, multimedia principles aspect of 96% and usability aspect of 100%.

Table 5. Content expert eligibility score

No	Assessment Aspect	Expert Value	Max Value	%
1	Introduction	19	20	95%
2	Content	39	45	87%
3	Learning	35	40	88%
4	Evaluation and feedback	30	35	86%

The results of the material expert assessment data (Table 5) shown Introduction 95%, Content 87%, Learning 88% and Evaluation and feedback 86%.

Small Group Testing

At this stage, the media is tested on a small group of users or students. The aim is to get direct feedback from users regarding interest in learning, media quality, ease of use, and usefulness. The data from this

small group trial was used to improve the media. The researcher conducted the test on 15 vocational school students at the first level. Students were given a digital module and asked to study it. After that, students were given a questionnaire to assess the module's practicality and to see students' responses to the learning experience.

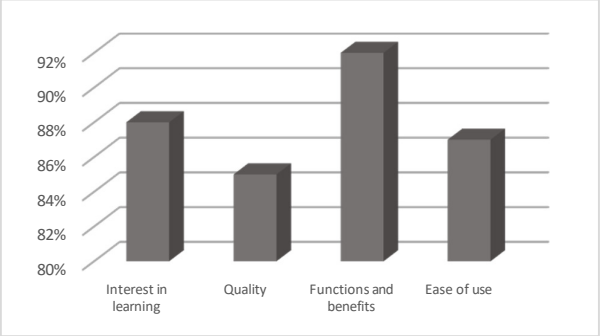

Figure 1. Practical value

Practicality data from the small group trial (figure 1) shows that the digital module is very practical to use, with criteria for interest in learning at 88%, media quality at 85%, functions and benefits at 92%, and ease of use at 87%, a total average of 88% with a very practical category.

Field Testing

Researchers conducted a field trial on a larger group of users in a regular class of 36 students. This stage aims to assess the effectiveness of digital modules in improving self-regulated learning. Self-regulated learning measurement data before and after the application of the module are compared to measure the effectiveness of digital modules in improving self-regulated learning. Data from the measurement of the effectiveness of the use of digital modules (Figure 2) shows an increase in self-regulated learning ability (*SRL*) with an average percentage of improvement value of 35% with a moderate category.

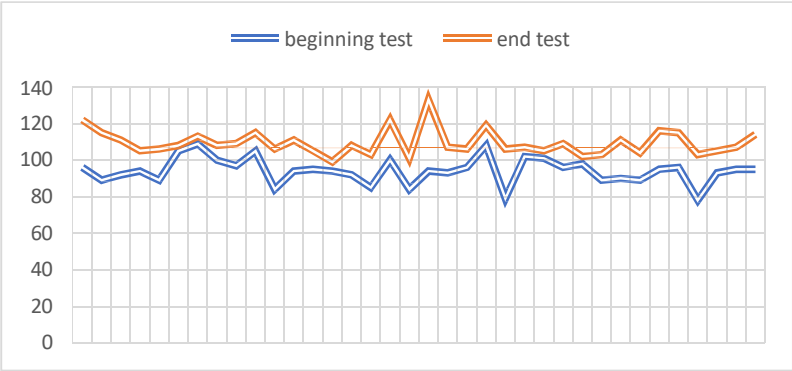

Figure 2. *SRL* Improvement Percentage

d. Evaluation

The evaluation implementation in developing this digital module uses formative and summative

assessment. Formative evaluation is carried out by evaluating and revising based on the findings in each development process step, namely at the analysis, design, development, and implementation stages. Meanwhile, a summative evaluation is carried out after module implementation to measure overall effectiveness. Formative evaluation aims to identify problems and learning needs. Formative evaluation starts by analyzing learning problems and needs; the assessment is carried out to ensure that the material and module design developed are appropriate and on target. At this initial evaluation stage, teachers assisted researchers in identifying learning problems; researchers also made direct observations in the classroom to discover the actual field conditions. At the stage of determining learning objectives and materials, researchers involve vocational teachers to ensure that the learning objectives and materials to be presented are on target. Design evaluation focuses on improving the quality of the module. Design evaluation is carried out on planning, module content, module flow, interface design, and clarity of instructions designed. At this evaluation stage, material experts and media experts are involved. Researchers made improvements based on suggestions from media experts related to the module's appearance, which was adjusted to the learning characteristics in vocational schools. Improvements to the module based on suggestions from material experts in the form of (a) improvements to the alignment of material at the stages of each section that is sustainable between one material and another, (b) other improvements related to grammar and packaging of material that should be adapted to the characteristics of users. The step to ensure that the module can be appropriately used by users is evaluation in small group testing, which involves several students or users to obtain feedback to identify errors, improve module content, and assess the readability, clarity, and attractiveness of the module. The feedback obtained from the user side is: (a) the use of the module is quite easy, (b) improving the appearance of the module to attract users, (c) using simpler language and according to user characteristics. Further evaluation was carried out at the implementation stage; at this stage, the module was tested in an actual class. Findings In the implementation process, some students have difficulty determining the learning objectives and strategies to be carried out; there is a need for more specific and simple instructions to help students. At this stage, the module can be used by users well in fashion vocational students; in some, to avoid boredom in learning, there needs to be space in the module to provide a break. Overall, the module also provides benefits in helping students learn vocational practice subjects. The summative evaluation was conducted by analyzing the module's effectiveness after use. The implementation of digital modules was carried out for 6 months. It was carried out in stages to ensure that students could follow the stages of planning learning goals, organizing learning strategies, and conducting evaluations independently. Based on SRL measurement data using the module, there was an increase of 35%, with a moderate category. Observation results show that growing and developing SRL in students requires a long time and a

repetitive pattern. Motivation regulation and metacognitive prompts applied in the module are enough to direct students to follow the stages of SRL, starting from planning learning goals, managing strategies, and evaluating independently. Still, repetition and experience are needed, as well as the impact of positive benefits that can be felt and realized by students so that self- regulated learning will grow from themselves as a form of awareness of learning needs. Support from school officials by providing an environment that supports students' independent learning also greatly supports the success of this program.

CONCLUSION

This study demonstrates the potential of integrating motivational regulation and metacognitive prompts within a digital learning module to enhance self-regulated learning (SRL) in vocational schools. The findings suggest that students who used the digital module showed improved levels of motivation, engagement, and self-regulation, which are critical for success in vocational education. The combination of motivational strategies and metacognitive support provided students with the tools to take greater ownership of their learning, improve their problem-solving skills, and reflect more effectively on their progress. The results underline the importance of interactive learning tools that not only deliver content but also encourage students to actively manage their learning processes. By fostering a more student-centered approach to education, these tools help bridge gaps in learning autonomy, a common challenge in vocational education settings. The digital module's ability to motivate students and support their metacognitive awareness allows them to enhance their skills independently, a critical factor in preparing them for the workforce. Furthermore, the study highlights the value of technology in vocational education, demonstrating that digital platforms can play a key role in addressing the challenges faced by vocational students, such as low motivation and limited metacognitive skills. As educational institutions continue to evolve, the integration of such digital modules can offer a scalable solution to support students' development, making learning more adaptive, personalized, and effective. In assumption, this research provides valuable insights into the role of motivational and metacognitive features in improving self-regulated learning in vocational schools. Future developments should focus on refining these digital tools, exploring their long-term impact on students' academic and career success, and adapting them to meet the evolving needs of diverse vocational education settings. This is expected to help students realize their learning needs and train them in planning, studying, managing strategies, and evaluating the learning process independently. It is hoped that this *SRL* ability can shape the character of vocational school students who are able to adapt to all existing changes. This digital module can be used to strengthen student character, especially in training independence through innovative learning approaches. The need for a sustainable implementation pattern and support from the school is needed to form an independent

learning environment, so that students gain experience and know the positive impacts felt in the learning process so that they can foster self-regulation of students' learning needs.

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