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The Effect of Self-Regulated Learning Modules on Academic Procrastination and Critical Thinking Skills of Primary School Teacher Education Students of UNS

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Abstract. This research aims to determine the effect of the self-regulated learning module on academic procrastination and critical thinking abilities among college students in the PGSD (Primary School Teacher Education) program at Universitas Sebelas Maret (UNS). This study follows an experimental design with a quasi-experimental approach. The research population comprises students enrolled in the PGSD program at UNS, with a sample size of 67 students. The sample group was divided into an experimental class and a control class. The experimental class consisted of 34 students from class 2E, while the control class comprised 33 students from class 2F. Content validity assessment using Aiken's V confirmed the validity of all research instruments were valid. The reliability of the instruments, as measured by Cronbach's Alpha coefficient, indicated their reliability, with a coefficient value of 0.833 for the academic procrastination scale and 0.713 for the critical thinking test. The hypothesis testing employed a Manova Test for Multivariate Analysis. The results demonstrate a significant simultaneous effect of self-regulated learning modules on academic procrastination and critical thinking skills among PGSD students at UNS, with a significance value (Sig.) in the Multivariate Test of 0.000, which is less than 0.05. These research findings can positively impact students by enhancing their understanding and application of self-regulation in learning—a crucial skill to develop. Moreover, the outcomes of this experimental research can motivate students to invest more effort in improving the quality of their learning experiences, leading to a reduction in academic procrastination levels and an enhancement of critical thinking skills.

Keywords: Academic Procrastination, Critical Thinking, Self-Regulated Learning

1. Introduction

College students are young adults who are in a transitional period, socially, intellectually, or physically (S. Nurjan, 2020). Students are required to be able to adapt to new patterns of life and social expectations as they progress in their intellectual, socio-emotional, and physical development (Özer & Saçkes, 2011). In this context, adjustment includes managing time for assignments, class schedules, and adapting to the new campus environment. This adjustment is particularly crucial for students in the initial stages, such as freshmen during their first and second semesters. Considering the developmental characteristics of an early-level student, students, they are in the transitional phase from adolescence to Emerging Adulthood. This is a time when young adults gain the freedom to make decisions for themselves and, consequently, bear more responsibilities. As students, they have a responsibility as students to complete academic assignments. These assignments play a significant role in enhancing students' understanding and mastery of the material presented. However, one common challenge students face is the tendency to delay their assignments in an academic context, which is commonly referred to as academic procrastination. Academic procrastination is often attributed to a lack of self-regulation, leading to negative impacts on students' well-being and academic performance (Cornelis et al., 2023).

Ideally, as students in tertiary institutions, students are expected to demonstrate productive behavior, such as promptly completing various academic assignments promptly (S. Nurjan, 2020). However, not all students do their assignments immediately. Many students often delay

doing assignments for various reasons. The tendency to procrastinate is also called procrastination or, in Latin, it is called "*procrastinare*." The results of the questionnaire on December 7, 2022, showed that 90.9% of PGSD (*Pendidikan Guru Sekolah Dasar*/Primary School Teacher Education) students at Universitas Sebelas Maret (UNS) admitted that they often procrastinated doing coursework, and 81.8% of 11 students preferred to do assignments close to the submission deadline.

1.1. Problem Statements

The problem addressed in this research is related to students, the younger generation, who are required to adapt to their intellectual, socio-emotional, and physical development. This adaptation is particularly crucial for new students who must learn to manage their time effectively for assignments and adjust to lecture schedules. However, it is observed that students frequently delay their assignment submissions, leading to a failure of self-regulation, which, in turn, negatively impacts their well-being and academic achievement. It's important to note that not all students immediately engage in their assignments, as many of them tend to postpone their work for various reasons. This research aims to encourage students need to cultivate a productive attitude towards completing various tasks.

Research has consistently revealed that academic procrastination is a prevalent issue among students, particularly at the university level. Almost every student occasionally procrastinates in one or more of their academic subjects, and approximately every field second student procrastinates regularly. The findings indicate that around 95% of students procrastinate on their educational assignments, with more than 70% of them procrastinating on a baseline level, and about 20% reporting chronic procrastination (Amin, 2019). One of the primary factors contributing to this phenomenon is internal factors, as (Wirajaya, 2020) explained that academic procrastination is closely linked to various affective, cognitive, and motivational aspects of students. These functions, when actively and organized systematically organized towards goal attainment, can help minimize the likelihood of students' academic procrastination. Motivation can be categorized into two types: internal and external motivation, driven by personal interest or enjoyment in a task, and exists within the individual. In contrast, external motivation, which offers tangible rewards that encourage individuals to act (Ilmiani et al., 2021). Conversely, when these three functions face issues, it leads to the emergence of procrastination, characterized by reluctance followed by delays.

The existence of a relationship between cognition and a person's behavior is in line with Albert Bandura's social cognitive theory, which views human behavior as influenced by personal, namely a person's cognitive or mental activities. These activities involve assessing and making connections with events to acquire new knowledge. Bandura positated that a person's behavior is not automatic or reflexive; rather, it is a response to a cognitive framework that results from the interaction between a person and their environment. While observing the behavior of others, individuals learn to imitate or emulate that behavior, sometimes using others as role models. In this broader context, the model doesn't have to be a live person; it can also be observed in videos or footage shown (Etkin, 2018).

The ability to regulate cognitive functions in the learning process is known as self-study. This is a learning process is observed through students' thinking and behavior and is oriented towards achieving specific goals. Independent learning is an activity undertaken by an individual with the freedom to determine and manage the materials, time, location, and use of the necessary learning resources (Azizah & Nasrudin, 2021). Individuals who can effectively self-regulate their learning have full control of himself over planning and organizing their learning activities. The higher a person's ability to self-regulate, the lower their tendency to engage in academic procrastination (F. Hanifah & D. Rusmawati, 2019).

The process of self-regulation in learning involves students progressing through systematic stages, emphasizing careful planning in each phase of learning phase. This structured approach not only reduces the tendency to procrastinate but also helps students enhance their problem-solving skills (Rahmawati and FM Alaydrus, 2021). These problem-solving skills are closely related to critical thinking skills. In the era of Big Data, it is essential to familiarize and adapt students need to be familiarized with and adjusted to critical thinking skills, which involve

comparing various conditions, thinking analytically, and drawing conclusions to solve problems effectively (Gusmawan DM, N. Priatna, 2021). This approach aligns with the learning framework developed by the Partnership for 21st Century Learning, emphasizing that students must master one of the 4C skills, namely critical thinking, to be successful in both work and life (Zubaidah, 2020).

Individuals who can think critically are better equipped to succeed in the digital era, as it requires a willingness to adapt to changing conditions, as well as being smart, meticulous, and the ability to approach problems with intelligence, precision, and objectivity to arrive at the truth (Sitohang, 2019). Critical thinking is a vital factor in all subjects in the learning process, particularly in physics (Sarjono, 2017). The systematic and logical thinking process inherent in critical thinking is indispensable in learning physics learning, which often involves problem-solving. In line with the findings presented by Husnah (2017), the contribution of the level of critical thinking significantly correlates with physics learning outcomes, contributing up to 82.7%. Students with strong critical thinking skills in their physics studies learn how to approach situations logically and objectively, fostering a habit of self-awareness (Alatas, 2018).

Several factors affect a person's critical thinking skills, one of which is the use of strategies and tactics (setting tactics and strategies) (Zubaidah, 2020; Ennis, 1996). The indicators of employing tactics and strategies are closely related to an individual's ability to make decisions and take action (Suciono, W, Rasto, 2021). This implies that effective decision-making and determining a person's actions requires readiness and self-regulation.

Previous research conducted by Gusmawan et al. (2021) found a positive correlation between self-regulated learning self-regulation and critical thinking skills. Additionally, research conducted by Noviyanti et al. (2019) demonstrated that individuals with high abilities to regulate their learning activities tend to have a lower tendency toward academic procrastination. While previous research on self-regulation in learning has primarily focused on studying the relationship between self-regulation and academic procrastination, as well as the correlation between self-regulation and critical thinking skills. Meanwhile, this research takes an experimental approach to investigate the impact of implementing self-regulated learning activities in the form of modules on students' levels of academic procrastination and critical thinking abilities.

This research is significant because academic procrastination and critical thinking skills are internal factors that can influence students' academic achievements. Academic procrastination can significantly hinder learning achievement (Ramadhan and Winata, 2018) and often serves as a rationalization for rationalizing academic failure among students (Wahidah, 2020). Conversely, proficiency in critical thinking is one of the internal factors that support students in achieving high academic results or learning outcomes. Research conducted by Suroto (2021) has demonstrated a relationship between critical thinking and academic performance. One effective strategy to minimize academic procrastination and enhance students' critical thinking skills is through appropriate regulation or self-regulation in learning appropriately.

Based on the aforementioned description of the background described above, this research entitled "The Effect of Self-Regulated Learning Modules on Academic Procrastination and Critical Thinking Skills of PGSD of UNS Students at UNS" was carried out.

1.2. Related Research

The first relevant study, titled "The Impact of Independent Learning Training on Academic Procrastination in Students of SMP Negeri 33 (Public Junior High School 33) Semarang," was conducted by Hanifah and Rusmawati (2019). This experimental research involved two sessions, each lasting 240 minutes, with 29 students who were in the control class. The results of an Independent T-Test showed a p-value of 0.007 ($p < 0.05$), indicating a significant average difference between the experimental class that received self-regulation training and the control class that did not. The training also had a substantial effect, reducing the level of academic procrastination among students who were in the experimental class by 76%.

The second relevant study, "Differences in Students' Ability to Think Critically in Mathematics During the Independent Learning Process," was conducted by (Gusmawan et al. (2021). The research findings demonstrated significant differences in students' mathematical critical thinking skills based on their self-regulated learning categories, including high, medium, and low. This study serves as a valuable reference for understanding the relationship between critical thinking skills and self-regulated learning.

The third relevant research, "Analysis of Factors Influencing Students' Critical Thinking Skills in Studying Economics in the Era of Revolution 4.0," was conducted by (Suciono et al. (2021). This study identified self-strategies as one of the indicators influencing an individual's critical thinking, which is part of the self-regulated learning indicators.

The fourth relevant research, "Self-regulated Learning-based Digital Module Development to Improve Students' Critical Thinking Skills," was carried out by Kusmaharti and Yustitia (2022). This research falls under the category of research is development research, where the researchers developed a self-regulated learning module to enhance the critical thinking skills of elementary school students. The overall findings indicated the validity of the developed module and its effectiveness in supporting students' critical thinking skills.

The most recent relevant research, "Effects of Self-Regulated Learning and Procrastination on Academic Stress, Subjective Well-Being, and Academic Achievement in Secondary Education," was conducted by (García-Ros et al. (2022). This study employed an associative quantitative research approach, with self-regulated learning as the variable X1, academic stress as the variable Y1, subjective well-being as the variable Y2, academic achievement as the variable Y3, and academic procrastination as a moderating variable. The results highlighted the importance of independent learning in reducing procrastination and stress, ultimately leading to increased academic achievement and enhanced self-well-being among students.

This research differs from the aforementioned studies primarily in terms of its subject group, focusing on prospective elementary school teacher students. Additionally, it employs experimental research with a quasi-design and incorporates critical thinking variables. This type of research follows a quantitative research methodology to assess the effect of a self-regulated learning module on the academic procrastination and critical thinking abilities among prospective elementary school teacher students.

1.3. Research Objectives

The objectives of this research are: (1) to assess the effect of self-study modules on academic procrastination among PGSD students at UNS; (2) to examine the effect of self-regulated learning modules on the critical thinking skills of PGSD students at UNS; (3) to investigate the effect of self-regulated learning modules on academic procrastination and critical thinking skills simultaneously among PGSD students at UNS. The expected outcome of this research is to provide valuable insights into the effect of self-study modules on academic procrastination and critical thinking skills. This research aims to enhance students' understanding of self-regulation in learning, emphasizing its importance for practical application. Additionally, it is hoped that the results of this experimental study will motivate students to exert greater efforts in improving the quality of their learning, ultimately leading to a reduction in academic procrastination levels and an enhancement of critical thinking skills.

2. Theoretical Framework

2.1. The Nature of Self-Regulated Learning

Self-regulation is a learning process in which individuals manage their emotions, behavior, and attitudes to achieve an optimal level of stimulation for effective learning. Within the classroom, self-regulation of behavior is of paramount importance to maintain the continuity of the learning process, including adhering to class rules and attentively listening carefully to the teacher's explanations. (Hafnidar et al., 2021).

The Self-Regulated Learning (SRL) model is a significant learning approach that enhances students' motivation and academic performance. This process necessitates students learning how to independently plan, monitor, and evaluate their learning. However, it's essential to recognize that only a minority of students excel in this regard. Independent learning is a process that aids students in managing their thoughts, behavior, and emotions to effectively assess their own learning experiences (Surya & Aulina, 2020).

The term "self-regulated learning" has its origins in Bandura's social cognitive theory, which posits that individuals attempt to self-regulate themselves (self-regulated) to behave so that the condition impact on their behavior to influence their environment. This theory underscores the interplay and causal relationships between personal attributes, behavior, and the environment have a causal relationship and influence each other.

Psychologists have varying perspectives on explaining self-directed learning. Independent learning is often associated with intrinsic motivation and strategic planning. The connection between academic autonomy, academic motivation, and academic achievement cuts across different grade levels and subjects (El-adl & Alkharusi, 2020). Meanwhile, Zimmerman defines self-regulated learning as a process where learners autonomously engage in learning activities produced by employing thoughts, strategies, emotions, and behaviors to attain their objectives. Self-regulated learning encompasses the systematic approach students use systematically to direct their emotions, thoughts, and actions toward their goals. It can be described as (a) a purpose-driven approach to learning tasks, (b) metacognition that leverages self-awareness to guide and adapt strategic approaches in the learning process, (c) motivation driven by the pursuit of meaningful accomplishments, and (d) strategical goal-setting, implementation, and modification of actions to manage one's learning (Bakhtiar & Hadwin, 2022).

Self-regulated learning provides students with the freedom and flexibility for students to be able to manage their learning effectively in a manner that maximizes learning outcomes are maximized (Putra, Arini, and Sudarma 2019). Soerjoatmojo (2019) asserts that individuals with self-regulation can help evaluate the effectiveness of their behavior, exercise control over their actions, and maintain motivation toward achieving their defined goals. A self-regulated learner establishes their goals, formulates plans to achieve them, employs strategies that they believe will aid in reaching those goals, and continually monitors their learning activities to assess the effectiveness of their behaviors (Raković et al., 2022).

In summary, self-regulation in learning encompasses an individual's ability to be able to plan, control, and evaluate their learning behavior with the aim of achieving their learning goals.

2.2. The Nature of Academic Procrastination Behavior

Academic procrastination is very common among students, especially among fresh persons, where some students occasionally delay their involvement in one or more subjects, and roughly half of students often engage in procrastination. Procrastination can be defined as an activity that holds importance to an individual, despite the potential negative consequences outweighing the positive ones. Procrastination, whether it takes the form of delaying tasks or delays in starting and completing assignments, has become commonplace in everyday life (Hailikari et al., 2021).

Jannah and Muis (2014) assert that academic procrastination pertains to delaying responses to lecture assignments and other academic tasks. This delay is reflected in behaviors such as opting for more enjoyable activities, postponing the commencement of assignments, creating a time gap between planned and actual performance and planning, and there are delays in doing and submitting assignments after the deadline. Academic procrastination is often linked to student laziness (Ilyas & Suryadi, 2017). Hanifah and Rusmawati (2019) argue that procrastination is a common behavior practiced by many individuals and that it involves deliberately delaying tasks while engaging in other activities unrelated to academic assignments (Noviyanti, Yusmansyah, 2019).

In summary, based on these perspectives, procrastination can be characterized as an individual's tendency to postpone tasks, while academic procrastination refers to a person's

inclination to avoid and delay doing academic assignments, resulting in delayed work completion and late submission of assignments.

2.3. The Nature of Critical Thinking Skills

Critical thinking is defined as an independent and disciplined learning process that demonstrates excellence in thinking within a specific type or field of critical thinking. "Critical thinking" is gradually gaining importance in our education system due to its constructivist approach, contributing to the education of individuals who are constructive, creative, and productive. Such individuals possess traits such as independent thinking, a scientific mindset, a broad worldview, and a strong personality (Arisoy & Aybek, 2021).

Prameswari et al. (2018) assert that critical thinking is a complex process involving logical thinking logically through systematic and scientific methods. It includes activities such as problem recognition and efforts to solve the problems, synthesis, analysis, evaluation, and concluding. These activities are geared toward making sound and reasonable decisions. Agustin and Pratama (2021) describe critical thinking skills as the mental processes that enable students to evaluate and analyze information comprehensively, objectively, and in-depth. Critical thinking is also viewed as a form of thinking that seeks to compare some information, can conclude with various pieces of information, draw conclusions based on multiple considerations, and achieve clarity in evaluating the insights gained from this thought process (Rahmawati & Alaydrus, 2021).

Based on some of the perspectives of these experts, it can be synthesized that understand critical thinking is a coherent and systematic mode of thinking that considers reason, evidence, and context, aimed at making informed decisions and solving problems.

3. Method

3.1. Research Design

This research employs a quasi-experimental design due to the difficulty in controlling all the variables external to the study, making it unfeasible to use a true experimental design. According to Sugiyono (2018), one of the characteristics of quasi-experimental research is the presence of a control group, although this group cannot fully control other variables that may impact the research's course. The research. The research design follows an uneven control group design, involving the random selection of two groups: the experimental class and the control class. Before the treatment, both classes underwent an initial test. Subsequently, the learning process in the experimental class was facilitated using the self-regulated learning module carried out in the experimental class, while the control class experienced the learning process in the control class was carried out without any treatment.

3.2. Respondents

The sampling method employed in this research is probability sampling. This technique ensures that the sample selection process is objective and random, offering an equal opportunity for each member of the population had the same opportunity to be selected as a research sample (Abdurahman et al., 2011). In the context of quasi-experimental research with pre-post tests, the control group design involves a cluster technique, specifically cluster random sampling. This technique focuses on group randomization rather than individual subjects (Azwar, 2013). It was chosen because the population is relatively homogeneous, and subject selection is class-based rather than individual-based. The research participants are students of PGSD UNS, aged 19 to 20 years, at the second-semester 2 level. Students were placed into population classes (2A, 2B, 2C, 2D, 2E, and 2F) based on their homogeneous or similar average abilities, rather than their ranks. Azwar (2013) mentions that the advantage of cluster sampling offers advantages in terms of efficiency, cost, and time compared to random strata and simple random sampling. The research sample comprises two classes: Class 2E, consisting of 34 students as the experimental class, and Class 2F, consisting of 33 students as the control class.

3.3. Data Collection

Data collection techniques are used to obtain information for problem-solving, and the quality of data collection can significantly affect research results (Sugiyono, 2018). There are three methods employed for data collection in this research: the use of a critical thinking test instrument, an academic procrastination scale instrument, and documentation.

3.3.1. Critical Thinking Test

The test collection technique involves using written questions to assess students' knowledge or test-specific aspects (Yuliawati, et al., 2022). This research employs both pre-tests and post-tests. The post-test aims to determine whether there were differences in the level of critical thinking skills after the treatment in the experimental class. The form of the critical thinking test consists of nine description questions based on the indicators of critical thinking skills, with the subject matter focusing on force and motion. An analytical rubric (Holistic Scoring Rubric) is used to evaluate the responses, assessing various components separately. The rubric has been modified and adapted to align with the indicators of critical thinking skills indicators.

The rubric was then modified and adapted to the indicators of critical thinking score is calculated using skills.

The calculation of the value of critical thinking used the following formula:

$$\text{Score} = \frac{\text{the obtained score}}{\text{the total score}} \text{ x } 100$$

Ermayanti and Sulisworo (2016) categorized students' critical thinking scores as follows:

Table 1. Critical Thinking Value Categories

No.	Obtained scores	Category
1	81.25< x ≤100	Very high
2	71.50 < x ≤ 81.25	High
3	62.50 < x ≤ 71.50	Fair
4	43.75 < x ≤ 62.50	Low
5	0 < x ≤ 43.75	Very low

3.3.2. The Scale of Academic Procrastination Research

The research scale is a data collection technique that involves distributing written statements or sets of questions to respondents (Sugiyono, 2018). The use of a scale-type research instrument was intended to measure the level of student academic procrastination before and after the treatment. The research scale used was a Likert scale with five available answer options. There were 18 items on the academic procrastination research scale, comprising both favorable and unfavorable items. Respondents could choose the answer options based on their own circumstances. The calculation of the score for each instrument item ranged from the most negative level to the most positive level. The procrastination scale consisted of 18 items, with 10 favorable items and 8 unfavorable items related to academic procrastination indicators. Each statement on the procrastination scale had a scoring guide as listed below:

Table 2. Scoring Guide for the Procrastination Research Scale

Statements	**Scores**			
	Strongly disagree	Disagree	Agree	Strongly disagree
Favorable	1	2	3	4
Unfavorable	4	3	2	1

The calculation of the academic procrastination scale category used the following formula:

Table 3. Formulas for Scoring Categories of the Academic Procrastination Scale

$\mu \leq -1.5\sigma$	Very Low
$-1.5 < \mu \leq -0.5\sigma$	Low
$-0.5 < \mu \leq +0.5\sigma$	Fair
$+0.5 < \mu \leq +1.5\sigma$	High
-1.5σ	Very high

Source: Azwar (2019)

Description:

μ = Theoretical mean

σ = Population standard deviation

Based on the formula, the scale of academic procrastination in this research can be categorized through the following table:

Table 4 The Category of Academic Procrastination Score

$x \leq 32$	Very Low
$32 < x \leq 41$	Low
$41 < x \leq 50$	Fair
$50 < x \leq 59$	High
$59 < x$	Very high

3.4. Data Analysis

This research used a quasi-experimental type because it is difficult to control all variables outside the study, making it not possible to use a true experimental design. The population of this research consisted of second-semester PGSD students of UNS in 2022. The research design employed a nonequivalent control group design, involving two randomly selected classes (R), namely the experimental class and the control class. Prior to implementing the self-regulated learning module treatment in the experimental class, a pretest was administered in both classes (experimental and control). The research sample included 67 students, with 2E totaling 34 students as the experimental class and 2F class totaling 33 students as the control class. The instruments used were the academic procrastination scale and critical thinking tests. Content validity was assessed using Aiken's V. Expert judgment was employed for item assessment, assigning values from 1 (very irrelevant) to 5 (very relevant). The reliability test utilized Alpha Cronbach. Pre-testing encompassed normality testing using the Kolmogorov-Smirnov test, homogeneity assessment via the Levene test, homogeneity of covariance analysis through the Manova Multivariate Test, and a balanced T-test. Hypothesis testing was performed using the multivariate analysis Manova test with the assistance of SPSS version 25.

Data analysis involved tabulating and grouping data based on respondents' data and the variables used, performing calculations, displaying data for each variable, and testing hypotheses (Sugiyono, 2015). This process occurred after collecting all the research data from the respondents. Subsequently, data analysis was carried out by calculating descriptive statistics using SPSS version 25 software on Windows 10. The data analysis in this research comprised two types: the prerequisite test for data analysis and hypothesis testing.

3.4.1. Data Analysis Prerequisite test

The prerequisite analysis test was conducted before the hypothesis test. This prerequisite test included a data normality test and a homogeneity test. The steps for testing the prerequisites for data analysis were as follows.

3.4.2. Pretest Data Balance Test

The pretest data balance test was performed to determine whether there were differences in the average pretest results between the experimental class and the control class before the delivery of the self-regulated learning module in the experimental class. The pretest data

balance test utilized the Independent Sample T-Test with the assistance of SPSS version 25. The pretest data can be considered to have no significant average difference between the experimental class and the control class if the significance value (Sig.) > 0.05. Conversely, the pretest data is considered to have a significant average difference if the significance value (Sig.) < 0.05.

3.4.3. Data Normality Test Per Variable

The normality test is a component of the data analysis prerequisites that assesses the normality of the data and whether the data follows a normal distribution. The normality test employed the Kolmogorov-Smirnov Normal test using SPSS version 25. The data can be considered normally distributed if the Sig value is > 0.05 (V. W. Sujarweni, 2015).

3.4.4. A Homogeneity Test

The homogeneity test is one of the prerequisites for parametric test analysis, examining differences between two or more classes or groups with different subjects or resources in each class (Budiyono, 2016). The homogeneity test was analyzed using Levene's test with SPSS version 25 at a significance level of 0.05. If the Sig value is > 0.05, it indicates that the variances of the population data are homogeneous.

3.4.5. Hypothesis Testing

Hypothesis testing is conducted after completing the prerequisite analysis tests, which include the normality test and homogeneity test. The research hypothesis was tested using multivariate analysis with the assistance of the SPSS version 25 software. Sarwono (2013) stated that multivariate analysis is an analytical technique used to analyze a dataset with multiple variables.

Based on the number of variables under study, the hypothesis testing in this study employed the Manova test. The Manova test is a parametric analysis used to calculate the significance test of mean differences simultaneously or jointly between groups for two or more dependent variables (Sarwono, 2013). The decision criterion for the Manova test is as follows: if the significance value (sig.) < 0.05, then Ho (null hypothesis) is rejected, indicating a significant difference between groups. There are two outputs from the Manova test:

Test Hypotheses 1 and 2

In the test of the effect between variables or between subjects individually, the test uses the Between-Subjects Effects with the criteria of a significance value (sig.) > 0.05 for accepting Ho and a significance value (sig.) < 0.05 for rejecting Ho.

Hypothesis Test 3

In the effect test between subjects or variables simultaneously, it employs Multivariate Tests. The decision criterion uses a significance value. If the significance value (sig.) > 0.05, then Ho is accepted, and if the significance value (sig.) < 0.05, then Ho is rejected.

3.5. Validity and Reliability

3.5.1. Content Validity

The validity test aims to determine the validity of an instrument, with the assumption that the data used accurately represents the object. In this research, internal validity in the form of content validity is employed. Content validity tests are used to assess the extent to which the items in the research instrument can effectively represent the components of the content of the object under investigation and measure the intended behaviors (Azwar, 2016). The validation of the content in the procrastination scale instrument and the critical thinking test involved expert judgment and consultations with experts regarding constructs, materials, and language. Five experts provided judgments on the procrastination scale, while three experts assessed the critical thinking test. Content validity was assessed using Aiken's V. Item evaluation involved assigning values ranging from 1, indicating "very irrelevant," to 5, indicating "very relevant" (Azwar, 2016). Content validity employs Aiken's V statistics as follows:

$$V = \frac{\sum s}{n(c-1)} - 1$$

Where:
s = r – lo
lo = Lowest validity assessment number (in this case 1)
c = The highest validity assessment number (in this case 5)
r = Number given by an appraiser
n = Number of experts evaluating

Source: Azwar (2016)

3.5.2 Reliability Prerequisite Test

The prerequisite reliability test is conducted after the instrument is deemed valid and before the reliability test. Reliability prerequisite tests include:

a) Critical Thinking Test
1) Description Level of Difficulty Test
The level of difficulty of a question item is determined by the number of respondents who answered the question item correctly among all respondents (Budiyono, 2015). The difficulty level index can be formulated as follows:

$$P = \frac{\bar{S}}{S_{maks}}$$

Where:
P = Difficulty level index
$\bar{S}$ = Average item score
S_{maks}= Maximum score for one item

The range of difficulty level values is 0 ≤P ≤1, with a higher P value indicating lower test difficulty. Criteria for a good item in terms of the level of difficulty are 0.30 ≤P ≤0.70.

Source: Budiyono (2015)

2) Description Discrimination Test Description Power Test

Budiyono (2015) states that the discrimination power of questions is considered good if a group of respondents or students answers more question items correctly compared to a less capable group. The analysis of the discrimination powers of essay questions involves calculating the correlation coefficient of item scores with the total score.

$$D_1 = r_{pbis} = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{n\sum X^2 - (\sum X^2)(n\sum Y^2 - (\sum Y)^2)}}$$

Where:
X = Item score
Y = Total score

An item is considered to have good discriminating power if its discrimination index is equal to or greater than 0.30 (D≥0.30).

Source: Budiyono (2015)

3) Academic Procrastination Scale

The internal consistency index is used to calculate the discrimination power index of research instruments in the form of scales or questionnaires. The formula used to calculate the internal consistency for item i is the product correlation formula from Karl Pearson as follows:

$$r_{xy} = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{(n\sum X^2 - (\sum Y^2)\,(n\sum Y^2 - (\sum Y)^2)}}$$

Where:
rxy = internal consistency index of item i
n = number of subjects
X = score of item i
Y = total score
Source: Budiyono (2015)

If the internal consistency index for item i is less than 0.30, then that item must be discarded.

4) Reliability Test

Reliability refers to the consistency and stability of respondents' answers to questions or statements related to questionnaire constructs, which are the dimensions of a variable presented in the form of a questionnaire (W. Sujarweni & Utami, 2019). Reliability testing aims to ensure that respondents provide consistent answers when completing the scale. In this study, reliability testing for the descriptive and scale test instruments in this study used Cronbach's Alpha technique. The Cronbach's Alpha technique was chosen because it can be used to determine the reliability of instruments in the form of scales or descriptive tests. The reliability formula using Cronbach's Alpha is as follows:

$$r_{11}\left(\frac{n}{(n-1)}\right)\left(1-\frac{\sum\sigma_i^2}{\sigma_i^2}\right)$$

Where:
r_{11} = reliability of the instrument being assessed
n = number of questions
$\sum o_{i^2}$ = total variance in scores for each item
o_{i^2} = Total variance

The reliability coefficient indicates whether an instrument is reliable. An instrument with a reliability coefficient result of 0.70 or higher ($r_{11} \geq 70$) is considered reliable and suitable for research or measurement purposes (Budiyono, 2015).

4. Findings

4.1. Description of Research Data

The results of the instrument validity test, using Aiken's V index, indicated that all research instruments were valid. The minimum value for the critical thinking instrument, with a rating of 3 and a category 5 number, was 0.92, while the minimum value for the scale instrument, with a rating of 5 and a category 5 number, was 0.80. The reliability of the scale and test was calculated using the SPSS 25 program, resulting in a coefficient value of 0.833 for the academic procrastination scale, and 0.713 for the critical thinking test. These statistical results demonstrate that these tools are reliable and can be used in the research phase.

Measurement of the academic procrastination scale was conducted in each class was carried out before the treatment, using the self-regulated learning module in the experimental class, and after the application of the self-regulated learning module in the experimental class. The pretest results for the academic procrastination scale in the control class (2F) showed an average score of 42. The pretest for the experimental class pretest (2F) revealed an average score, indicating that students' academic procrastination was 43. All classes were categorized as having moderate procrastination tendencies.

Additionally, based on the critical thinking pretest data in both classes, the average critical thinking pretest score for students in the experimental class students was 61.22, while the average critical thinking score for students in the control class students was 61.30. The pretest results of the pretest test for both classes showed no significant difference, allowing for the continuation of the treatment in the experimental class.

The implementation of the self-regulated learning module was implemented in the experimental class for three sessions, with a time allocation of 3 x 50 minutes. The post-test was administered after completing the processing of the self-regulated learning module. The results of measuring the academic procrastination scale in the experimental class indicated an

average academic procrastination score of 39, falling into the low academic procrastination category. This contrasted with the results of the measurement of the academic procrastination scale measurement in the control class, where the average score for student academic procrastination was 43.

The posttest results for critical thinking in the experimental class had an average of 82.61 with very high achievements while in the experimental class, it showed an average score of 82.61, representing very high achievement. In contrast, the experimental class had an average score of 75 .24, categorizing it as achieving a high level of critical thinking.

4.2. Prerequisite Test

The Kolmogorov-Smirnov normality test indicated that the academic procrastination pretest data in both classes had a significance values (Sig.) of 0.200 > 0.05. Similarly, the critical thinking data in the experimental class had a significance value (Sig.) of 0.200 > 0.05, and the control class had a value of 0.175 > 0.05. Therefore, it can be concluded that the overall pretest data were normally distributed overall. The post-test data results for critical thinking and academic procrastination in both the experimental and control classes also showed normal distribution, as the significance values (Sig.) were greater than 0.05. Specifically, the significance value for posttest academic procrastination and critical thinking in each class was 0.200 > 0.05.

The SPSS output of the Levene test indicated that the pretest data for academic procrastination in both the experimental class and the control class were homogenous, with a significance value (Sig.) in the "Based on Mean" column of 0.465 > 0.05. Similarly, the critical thinking pretest data in the experimental class and the control class displayed homogeneity, as the significance value (Sig.) in the "Based on Mean" column was 0.243 > 0.05. The posttest homogeneity test for posttest data in critical thinking and academic procrastination in both the experimental and control classes also yielded homogeneous results, with a significance values (Sig.) in the "Based on Mean" column greater than 0.05. Specifically, for the academic procrastination variable, the Sig. was 0.702 > 0.05, and for the critical thinking variable, it was sig. 0.398 > 0.05.

The results of the Covariance Matrix Homogeneity test revealed a significance value (Sig.) of 0.919 > 0.05, indicating that the variance matrix of the procrastination variable and critical thinking skills in each class was homogeneous.

The SPSS output of the t-test for academic procrastination t-test balance showed a Sig. (2-tailed) value of 0.355, and the Sig. (2-tailed) for critical thinking was 0.953, both of which were greater than 0.05. These results indicated that there was no significant difference between the average scores of the procrastination scale and the pretest critical thinking scores in the two classes.

Hypothesis testing

Table 5. The Results of the Manova Test

Multivariate Tests						
Effects		Value	F	Hypothesis df	Error df	Sig
Classes	Pillai's Trace	0.240	10.101b	2.000	64.000	0.000
	Wilk's Lambda	0.760	10.101b	2.000	64.000	0.000
	Hotelling's Trace	0.316	10.101b	2.000	64.000	0.000
	Roy's Largest Root	0.316	10.101b	2.000	64.000	0.000

Based on the output of the Multivariate tests in the "Classes" column, "Wilk's Lambda" showed a Sig value of 0.000 < 0.05. As the decision criteria, if the Sig. < 0.05, it indicates that the average scores for academic procrastination and critical thinking were different between the experimental class and the control class. Therefore, the hypothesis stating that there was an effect of self-regulated learning modules on academic procrastination and critical thinking skills simultaneously was accepted.

5. Discussion

5.1. The Effect of the Self-Regulated Learning Module on Academic Procrastination

The results of this test indicate that there was an effect of self-regulated learning modules on student academic procrastination. The effect of self-regulated learning modules on academic procrastination suggests that individuals with higher self-regulation abilities in learning tend to exhibit lower tendencies toward academic procrastination. This implies that one of the factors contributing to academic procrastination is a low level of self-regulation in learning.

Self-regulation in learning or self-regulated learning, can be understood as the effort to control various aspects of thoughts and attitudes manifested in behavior to achieve specific goals. Implementing independent learning using modules is beneficial for enabling students to create learning plans at each stage, record progress, and identify areas that require improvement in the learning process. This includes setting learning goals or targets, employing appropriate learning strategies, managing time effectively, adapting to the learning environment, monitoring progress, and conducting assessments (Brenner, 2022).

The initial and primary stage of implementing self-regulated learning through modules involves setting targets or learning objectives. Goal setting is akin to a stimulus in Behaviorism Theory. According to Thorndike (cited in Mardiyani, 2022), learning is the connection between perceiving a stimulus and responding with action. To reach set goals, a stimulus must trigger a response. Students are required to establish specific and realistic learning goals to build self-confidence in their ability to achieve them. Research by Steel et al. (2001) indicates that setting learning goals, according to several studies, correlates with a reduction in procrastination.

Another crucial aspect of self-regulated learning is the analysis of learning strategies. After setting individual learning goals, students are directed to analyze appropriate strategies to achieve them. The choice of a learning strategy significantly affects students' learning activities. The selection of an appropriate strategy can make it easier for students to achieve their goals, preventing them from perceiving assignments as overly challenging. This factor is widely considered to contribute to academic procrastination behavior (Fauziah, 2016).

Lenggono and Tentama (2020) state that one of the primary indicators of academic procrastination is delays in completing assignments. In addition to planning learning activities, including setting goals and analyzing the use of learning strategies, self-regulation modules also instruct students in time management. Students set specific timeframes for completing each learning activity to minimize task delays. Effective time management is a crucial factor influencing academic achievement and reducing learning delays (Eladl & Polpol, 2020).

Sandra and Djalali (2013) assert that academic procrastination often results from ineffective time management. Good time management can help students avoid feeling stressed, anxious, or unable to concentrate due to looming assignment deadlines.

The process of active cognition and behavior involves continuous monitoring of understanding by recording completed or pending activities based on the set plans within the module. Students have the option to adjust their learning strategies if the initial implementation does not align with their predetermined study plan and timeframe. According to Schunk (2012), monitoring activities help individuals determine whether they have effectively applied procedural and declarative knowledge to the material they are studying. It helps them evaluate their understanding of the materials, assess the effectiveness of their chosen strategy, and adapt or switch to more suitable strategies when necessary. Seeking assistance from the social environment plays a crucial role in this process. Newman (2008) revealed that students engaged in self-regulated learning tend to seek help when facing learning difficulties and recognize the need to seek assistance within their social environment. Seeking help contributes to the development of self-efficacy (Schunk, 2012), in contrast to the factors causing academic procrastination, which is associated with low self-efficacy. Lower self-efficacy in task completion is linked to higher levels of academic procrastination (Venanda, 2022).

The effect of self-regulated learning on academic procrastination aligns with the Temporal Motivation Theory (TMT). Steel (2007) posits that temporal motivation theory comprehensively explains academic procrastination, considering components such as cognitive strategies, intrinsic motivation, and individual beliefs in task completion. As per Steel et al. (2001),

procrastination is a common and detrimental form of self-regulation failure that has yet to be fully understood.

The use of modules as a learning tool empowers learners to take a central role in learning, known as Student-Centered Learning. Students using self-regulated learning modules engage progressively in managing information, strategizing, time management, monitoring, and self-reflection throughout their academic assignments. A systematically designed medium for regulating individual student learning, in the form of self-regulated learning modules, can diminish tendencies toward academic procrastination. This approach aligns with Skinner's paradigm in behavioral theory, which encourages the development of assistive tools to modify behavior as a result of the learning process (Junaidi, 2019). Jones & Blankenship (2021) conclude that academic procrastination is not solely caused by ineffective study habits and time management but involves a complex interplay of behavioral, cognitive, and learner attitudes.

The results of this experimental research corroborate the findings of San et al. (2016), indicating that self-regulated learning components are related to procrastination in learning. Consequently, implementing self-regulated learning is essential to reduce procrastination levels among students. Hanifah and Rusmawati (2019) reported differences between the control class and the experimental class, which received self-regulated learning training. These findings are also consistent with those of Imawati and Sari (2021) in their research titled "The Effect of Self-Regulation on the Academic Procrastination of Class XII Students at SMA Negeri 11 Samarinda," which suggests that 64.7% of the variation in student academic procrastination is affected by self-regulation.

In conclusion, the application of self-regulated learning can serve as a strategy to reduce students' levels of academic procrastination. Modules are employed as tools to enable students to apply self-regulation in learning, facilitating the planning, monitoring, and evaluation of learning activities, ultimately leading to a reduction in the tendency to procrastinate when completing academic assignments (academic procrastination).

5.2. The Effect of Self-Regulated Learning Module on Critical Thinking Skills

The Ha2 test on the Test of Between Subjects (0.003 < 0.05) indicated that there was an average difference in critical thinking skills between the experimental class and the control class. These test results suggest that there was an influence of the self-regulated learning module had an effect on students' critical thinking skills. Self-regulated learning was identified as one of the supporting factors for an individual's capacity to think critically. The higher a person's ability to regulate their learning activities, the higher their level of critical thinking skills they had. Conversely, individuals with low self-regulation abilities tended to have lower levels of critical thinking skills.

Facione (2001) emphasized that self-regulation is one indicator of an individual's ability to think critically. Self-regulation involves individuals consciously monitoring their cognitive activities, such as their comprehension of learning materials, the outcomes of their learning efforts (particularly in applying analytical skills), and evaluation in assessing the conclusions drawn by others through questioning, confirming, validating, or correcting the results of reasoning results (Facione, 2011). This activity enables individuals to engage in self-correction. Rizki et al. (2019) pointed out that self-regulation comprises various categories, including motivation, time management, self-testing, concentration, the use of study aids, fostering positive attitudes toward learning, and concerns about learning performance. These factors play a significant role in shaping critical thinking. In line with this, Rositawati's research (2019) demonstrated that motivation and the learning environment, as the dominant supporting components of self-regulated learning, contribute to improved critical thinking. An individual's ability to self-regulate within the given environmental conditions is a valuable asset for optimizing the learning process (Noviyanti et al., 2019).

Ennis (1996) notated that the emphasis of critical thinking places emphasis on rationality, reflection, and processes for decision-making. These three aspects are closely related to the metacognitive role, which is a part of the elements of self-regulated learning's elements.

Metacognition highlights the process of understanding how to think by encompassing functional planning or preparation, self-monitoring, and evaluationg (Zaswita et al., 2013). Controlled and regulated metacognitive aspects significantly contribute to the development of critical thinking skills (Gurcay & Ferah, 2018). Learners actively contemplate their own learning processes at each stage, involving analysis, thorough monitoring, and evaluation of the obtained results achieved.

Self-regulated learning is a complex cognitive, motivational, and behavioral process of cognition, motivation, and behavior that gradually incorporates planning, actual execution, and reflective phases. According to Sholikhan & Kusnandi (2021), when students set learning goals, organize and control their learning activities, including motivation, cognition, and behavior, they engage in rational considerations, analyzing their potential personal skills, assessing the learning environment, studying available resources, as well as identifying weaknesses and strengths. When these mental activities are consistently performed, they contribute to the enhancement of students' critical thinking skills. (Arisoy & Aybek, 2021) revealed that employing cognitive strategies in goal achievement is a form of applying critical thinking.

Henderson and Cunningham (1994) asserted that Vygotsky's theory views self-regulated learning as a process involving the coordination of mental (cognitive) processes such as planning, integrating, and forming concepts (Schunk, 2012). Actively engaging cognitive aspects in every phase of self-regulated learning necessitates students to be able to think logically and systematically to attain their intended learning objectives. Mental activities within self-regulated learning encompass various thoughts, such as "What strategies should be applied to achieve learning goals?", "Why should I employ this strategy?", "What knowledge have I acquired in this lesson?", and "How can I enhance my subsequent learning activity?". Analysis and evaluation in the learning self-regulation process are core characteristics of critical thinking skills (Lelasari et al., 2021).

Students who can effectively regulate their learning activities through modules tend to be able to achieve their learning goals successfully. Self-regulated learning, when packaged within modules that cover planning, execution, and evaluation phases, requires students to exhibit independence in their thought processes. By regulating their own learning regulations, students process information, analyze and solve problems, and evaluate the outcomes of their thinking. This facilitates critical thinking so they can think critically (Rahmawati & Alaydrus, 2021). Moreover, the application of self-regulated learning using modules as tools encourages students to assume responsibility for problem-solving tasks in their assignments (Kusmaharti & Yustitia, 2022). This stage contributes to cognitive development by fostering logical and systematic thinking strategies, which are indicative of one's ability to think critically.

Each learning phase integrated into modules entails thinking skills that contribute to achieving the established learning objectives. This cognitive process encompasses the identification and interpretation of information, strategy analysis, problem-solving, and critical evaluation of arguments within the learning activities. These thinking skills represent various facets of critical thinking skills. Modules serve as a means of assessing students' learning materials and can enhance critical thinking skills (Kusmaharti & Yustitia, 2022). Self-regulated learning modules serve as independent study guides, both inside and outside the classroom, that enhance students' cognitive abilities (Fatmi et al., 2021). Learning tools that empower students to manage their own learning have been shown to improve student achievement and understanding (Ellianawati and Wahyuni, 2012).

Critical thinking skills, as an academic performance indicator, are not acquired instantaneously. The consistent application of learning regulation modules affects students' cognitive activities, involving in-depth thinking but in-depth about every step they take during their studies. The effect of self-regulated learning modules on critical thinking skills aligns with the research by Rahmawati and Alaydrus (2021), which revealed a significant average difference in critical thinking skills between the experimental class that implemented self-regulated learning and the control class that did not, with an average difference of 11.64. Miatun and Khusna (2020) demonstrated differences in critical thinking skills based on students'

levels of self-regulated learning of students. Kusmaharti and Yustitia (2022) affirmed that the level of critical thinking skills in the experimental class employing self-regulated learning modules exceeded that of the control class. Other findings supporting this study's results indicate a positive correlation between self-regulated learning and students' critical thinking skills, with self-regulated learning has a positive correlation by contributing to 43.2% of students' critical thinking skills (Roslinda et al., 2022).

In conclusion, the results of this study can offer benefits for improving students' critical thinking skills through the consistent application of self-regulation in learning activities. The use of learning regulation modules serves not only functions as a medium for planning learning activities but also affects student cognition in processing information processing, analysis, problem-solving, concluding information synthesis, and critical evaluation. The habit of applying self-regulated learning, assisted by module-based media, significantly contributes to the development of critical thinking skills, ultimately leading to improved academic achievement among students.

5.3. The Effect of Self-Regulated Learning Module on Academic Procrastination and Critical Thinking Skills Simultaneously

Based on the results of the Multivariate Tests with a significance value (Sig.) of 0.000 < 0.05, which indicated that the effect of self-regulated learning modules on academic procrastination and critical thinking occurred simultaneously, it aligns with the concept of Constructivism Theory. This theory emphasizes the independence of students in actively engaging in the learning with the process with a foundation of social conditioning. As stated by Syahrul (2020) the constructivist learning theory fosters student activity, allowing them to determine, shape, and contemplate everything they must learn, do, and produced. The implications of this theory in learning can assist students in developing academic outcomes related to attitudes, knowledge, and skills (Wardani, 2020). Additionally, the constructivist paradigm in learning underscores the role of media as a strategic aspect in realizing an optimal learning process (Karo-Karo and Rohani, 2018). The utilization of self-regulated learning is made more accessible through the use of modules, aiding students in recording and managing their learning activities. The module's role of the module as a medium can stimulate intrinsic motivation and foster interaction between students and their environment, ultimately enhancing learning productivity. Reducing procrastination and boosting critical thinking skills are among the academic outcomes shaped by the way of learning constructs of learning. This is the rationale behind the application of self-regulated learning self-regulation applied in the form of modules, which can simultaneously affect attitudes, behaviors, and skills.

Furthermore, self-regulated learning has three elements, namely metacognition, motivation, and behavior (Panadero, 2018). Metacognition involves monitoring and regulating one's thoughts or cognitions to enhance the learning process. For instance, when facing obstacles, individuals with strong metacognition will consider and adjust their learning strategy if they find it ineffective, while those with low metacognition may persist with the same strategy, even if it fails to achieve the desired outcome (Haeruddin et al., 2020)). This metacognitive adjustment is an integral part of the way a person can think critically. Magno (2010) stated that critical thinking. Magno (2010) posited that critical thinking is itself a product of metacognition.

The aspect of motivation is an integral part of self-regulation that permeates each phase of self-regulated learning. Strong motivation increases the likelihood of achieving goals. A robust drive to engage in learning activities contributes to reducing the tendency to procrastinate academic assignments (academic procrastination). Students with high motivation tend to exhibit lower levels of academic procrastination, making motivation is a variable capable of reducing academic procrastination levels (Yee & Lai, 2021). Moreover, motivation not only influences learners' beliefs regarding goal achievement but simultaneously also serves as a factor in an individual's level of a person's critical thinking. Research has demonstrated that the effective contribution of motivation effectively contributes to critical thinking skills by 11.5%, with a relative contribution of 56.3% (Lusiana, 2021).

The behavior exhibited by those who implement learning regulation differs from those who does not. The behavioral aspect underscores that students employing self-regulated learning

will continue to guide themselves through activities such as planning, selecting strategies, managing the social environment, seeking assistance, and self-evaluation. They maximize their study time is used as best as possible to optimize all their potential, all to achieve their objectives (Sholikhan and Kusnandi, 2021). This sequential planning and execution help prevent students from procrastinating when it comes to assigned tasks. Study results indicate that academic procrastination is influenced by low self-regulation in decision-making and implementation, underscoring the need for appropriate self-regulatory interventions (Mortazanajad., 2009).

The three elements of self-regulated learning, encompassing metacognition, motivation, and behavior, affects the thinking skills, attitudes, and behaviors that are displayed as a consequence of their interaction. Self-regulated learning is a significant component of Albert Bandura's social cognitive theory by Albert Bandura (1977), which posits a reciprocal relationship between cognition and behavior. Cognitive processes yield behavioral outcomes, and individuals continuously construct their knowledge through interactions with their environment (Wayudi & Santoso, 2020). The cyclical nature of self-regulated learning processes reflects the cognitive-social emphasis on reciprocal interactions among cognitive/personal, social, and environmental factors (Schunk, 2012). The key for students is to regulate the various social influences in their environment, making them an integral part of the self-regulation process (Schunk, 2012).

Academic procrastination, as a behavior, and critical thinking skills, as cognitive processes, resulting from the effect of self-regulated learning, belong to a cognitive-behavioral approach. Santrock (2011) explained that the cognitive-behavioral approach derives from cognitive psychology and behaviorism, focusing on the impact of thought on behavior and changing behavior change. Self-regulated learning and its influence on one's cognition and behavior also align with Information Management Theory, which associates self-regulation with metacognitive awareness (Schunk, 2012). To actively direct, organize, and monitor oneself to achieve goals, one must continue to regulate the social influences in their environment, effectively incorporating these influences into the self-regulation process (Schunk, 2012).

Abraham Maslow's Hierarchy of Needs theory posits five motives, arranged from the lowest level to the highest level: physiological needs, safety needs, needs for security, social needs, esteem needs, and self-actualization needs. Implementing this theory enhances motivation to strive to fulfill each need (Fatimah, 2018). The motivation to act stems from the desire to meet these needs (Schunk, 2012). The connection to the results of this study lies in the motivation to engage in activities aimed at fulfilling needs, which is closely related to self-regulated learning. Zimmerman contended that motivation is a fundamental component of all phases of self-regulated learning. This motivation is a crucial force driving individuals toward self-actualization, a need that compels students to diligently complete assignments promptly, improve academic performance, and grow as individuals. Achieving this requires well-planned efforts and effective self-regulation, ultimately enabling students to fulfill their self-actualization needs can be achieved.

In conclusion, the results of this study demonstrate that the effect of self-regulated learning modules on academic procrastination and critical thinking skills is simultaneously aligns with several learning theories, including constructivism theory, social cognitive theory, cognitive-behavioral theory, and Abraham Maslow's hierarchy of needs theory. The use of modules as tools for implementing self-regulated learning benefits students by enabling them to achieve maximum academic performance, encompassing knowledge, attitudes, skills, and behaviors such as enhanced critical thinking skills and reduced academic procrastination.

6. Conclusion

The results of the research findings and discussions can be concluded as follows: 1) There is an effect of the self-regulated learning module on the academic procrastination of PGSD students at UNS; 2) There is an effect of the self-regulated learning module on the critical thinking skills of PGSD students at UNS; 3) There is an effect of self-regulated learning modules on the academic procrastination and critical thinking skills of PGSD students at UNS simultaneously. The results of this research can have a positive impact on increasing students' understanding

and application of self-regulation in their learning process, which is crucial. Furthermore, the outcomes of this experimental research can motivate students to put more effort into enhancing the quality of their learning experiences, ultimately leading to a reduction in academic procrastination levels and an improvement in critical thinking skills. These research results can also encourage students to actively work towards reducing academic procrastination levels while simultaneously striving to enhance their critical thinking skills, which will significantly contribute to their academic success. Cultivating the habit of implementing self-regulated learning in every aspect of the learning process is a conscious effort that students can undertake.

Limitation

The limitation of this research is that the restriction to the primary school teacher education study program. Additionally, external variables that may affect the dependent variable could not be controlled by the researchers.

Recommendation

For future researchers, it is recommended that they explore other variables that may affect the academic procrastination and critical thinking skills of PGSD students at Sebelas Maret University. Other potential avenues for research could involve implementing various teaching models, media, or teaching materials within higher education settings.

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Conflict of Interest

There are no conflicts of interest associated with this research and the article publication of this article.

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