The Relationship among Academic Self-Efficacy, Academic Resilience, and Academic Flow: The Mediating Effect of Intensity Using Learning Management System

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Abstract—**University students can have low academic flow when using a Learning Management System (LMS). Three variables are predicted to correlate with the academic flow (FA) of students who use LMS: academic self-efficacy (ASE), academic resilience (AR), and LMS use intensity (LMSI). This study looks at the link between academic self-efficacy, academic resilience, LMS use intensity, and academic flow among university students who use LMS. This study employs a quantitative approach, using correlational approaches and path analysis. Furthermore, 740 Indonesian university students who used LMS participated in this study. This study used the partial least squares-structural equation model (PLS-SEM) to analyze data. This study found that academic resilience and LMS use intensity are both positively and significantly associated with academic flow in university students who use LMS. Furthermore, the current research results show that academic self-efficacy is not directly related to academic flow among university students. Aside from that, the study's findings imply that LMS usage intensity is a deciding variable for academic flow among university students who use LMS and that it can control the link between academic self-efficacy, academic resilience, and academic flow. Academic resilience and LMS use intensity must be considered when improving university students' academic flow using LMS.**

Keywords— **Flow academic; academic self-efficacy; academic resilience; Learning Management System (LMS)**

I. INTRODUCTION

Ideally, the learning system should be based on digital technology in the current era of digital technology. A digital-based learning system has been implemented in Indonesia, especially during the COVID-19 pandemic [1], [2]. This learning system is effective because it can be used in all conditions. Digital innovations in the form of digital technology, according to Kalolo [3], are particularly significant for improving student learning experiences and revolutionizing teaching.

A learning management system (LMS) is a form of learning material used in a digital-based learning system. LMS is website- or mobile-based software that is employed to manage the learning process [4]. Universities in Indonesia use the LMS to manage student learning processes [5]. Lecturers can use the LMS to share information related to the learning process with students [6]–[8]. Furthermore, collecting assignments and assessing university student

learning activities can be done on the LMS. Lecturers can also use LMS to distribute learning materials to students [9]. Therefore, students can access learning materials in the LMS to understand them well.

Digital-based learning systems have the potential to be problematic for university students as well. One issue is university students' low academic flow into digital-based learning [10]. Our survey proves that from 2021 to 2023, 500 university students studied using LMS. According to the survey findings, 356 people (71.2%) have a low academic flow, 100 people (20%) have a medium academic flow, and 44 people (8.8%) have a solid academic flow. This means that 400 students (80%) have problematic academic flow. This condition occurs because university students find using an LMS in learning complex [11], [12]. This condition can prevent students from understanding the subject matter, resulting in the potential for poor learning outcomes.

Academic flow (FA) refers to a person's level of attention or concentration when studying and performing academic tasks [13], [14]. Three indicators can explain university

students with high academic flow. First, students can concentrate on studying and performing academic assignments [15]. Second, students feel happy studying and doing academic assignments [16]. Third, students have intrinsic motivation for studying and doing academic assignments [17].

Academic self-efficacy (ASE), academic resilience (AR), and the intensity of accessing learning content are predicted to be determinant factors that influence students' academic flow levels [18]. Good academic self-efficacy is associated with good academic flow among university students. [19]. Likewise, university students with high academic resilience also tend to have high academic flow [20]. However, among these three factors, the intensity of accessing learning content is thought to be the most determining factor in university students' academic flow [21]. This means that the more frequently university students access the learning content provided by the lecturer, the higher their level of attention to the learning material will be. This situation tends to boost the intrinsic motivation and enjoyment of learning in university students and those who study using an LMS. The more often students access the LMS to study the learning material provided by the lecturer, the higher the level of university student attention to the learning material.

It is predicted that the intensity of LMS use will mediate the relationship between Academic Self-Efficacy (ASE) and Academic Resilience (AR) with academic flow [22]. Students with high self-efficacy and academic resilience tend to be more confident in their abilities and more motivated in the learning process. This condition is likely to increase their learning intensity. Ainiyah et al. [23] observed that students with solid academic self-efficacy and resilience study more diligently than those with low academic self-efficacy and resilience. This implies that university students with academic solid self-efficacy and resilience frequently use the LMS to master the learning content. The high intensity with which university students access the LMS to understand lecture material might raise students' attention to the lesson material, allowing them to absorb the learning material better. Based on theoretical studies and previous research, seven hypotheses (H) can be developed in this research, namely:

- H1: ASE positively and significantly correlates with LMSI in university students.
- H2: AR positively and significantly correlates with LMSI in university students.
- H3: LMSI is positively and significantly correlated with FA among university students.
- H4: ASE is positively and significantly correlated with FA in university students.
- H5: AR is positively and significantly correlated with FA in university students.
- H6: ASE is positively and significantly correlated with FA in university students, with LMSI as mediation.
- H7: AR is positively and significantly correlated with FA in university students, with LMSI as mediation.

This paper examines the link between academic self-efficacy, academic resilience, LMS usage intensity, and academic flow among university students. Furthermore, this paper explains how the level of LMS is used as a mediator in the correlation between academic self-confidence, academic resilience, and academic progress in students. This study is essential because it examines the determinant factors that correspond with academic flow among university students who use an LMS. Previous research conducted by Mao et al. [22] focused solely on the correlation between academic flow, academic self-efficacy, and academic resilience in university students. In our study, the role of LMS use intensity was a moderating variable of novelty.

II. MATERIAL AND METHODS

A. Research Design

A quantitative approach was used in this research by applying correlational methods and path analysis. Correlational methods are used to examine the relationship between variables [24], [25]. Next, path analysis is used to identify the independent variable's direct, indirect, and total influence on the dependent variable [26].

This study investigates the link between academic self-efficacy, resilience, LMS use intensity, and student academic flow. This study also examines the effect of LMS use intensity on influencing the link between academic self-efficacy, academic resilience, and academic flow among students. The independent factors in this study are academic self-efficacy, academic resilience, and LMS use intensity, whereas academic flow is the dependent variable. Furthermore, LMS usage intensity is a mediating variable because it influences the link between academic self-efficacy, resilience, and flow.

B. Participants

This survey included 740 Indonesian university students who used LMS to complete their studies. Table 1 shows the demographics of this research respondent.

TABLE I
DEMOGRAPHICS OF RESEARCH PARTICIPANTS

Category	Frequency	Percentage
Gender		
Male	346	46.76
Female	394	53.24
Type of University		
State-owned University	417	56.35
Private University	323	43.65

C. Research Instrument

This study's tools included the Academic Self-Efficacy Scale, Academic Resilience Scale, LMS Use Intensity Scale, and Academic Flow Scale. The development of research instruments begins with a search for literature on research variables. Next, we review each variable notion and split it into variable indications. These variable indicators serve as the foundation for developing the statements in each research instrument. Table 2 shows an outline of the research tools.

TABLE II
OUTLINE OF RESEARCH INSTRUMENTS

Instrument	Indicators Variable	Reference
Academic self-efficacy Scale	1. Students have confidence in their learning abilities, especially when faced with challenging material. 2. Students strongly believe in their learning ability 3. Students believe in their ability to learn even in difficult situations	[27], [28]
Academic resilience Scale	1 Perseverance 2 Reflecting and adaptive Help-seeking 3 Enthusiasm for learning	[29], [30]
LMS Use Intensity	1. Duration of use 2. Frequency of use	[31]
Academic Flow Scale	1. Absorption 2. Enjoyment 3. Intrinsic motivation	[14], [32]

The Academic Self-Efficacy, Academic Resilience, and Academic Flow scales have four possible solutions. The response "Strongly Agree" received a score of 4, "Agree" received a score of 3, "Disagree" received a score of 2, and "Strongly Disagree" received a score of 1. Furthermore, the LMS intensity scale provides four alternate replies. The response "Always" received a score of 4, "Often" received a score of 3, "Rarely" received a score of 2, and "Never" received a score of one. Next, the research instrument's validity and reliability were assessed. Confirmatory factor analysis (CFA) is used to assess the research's validity. An instrument can be considered valid if it has an average loading factor value above 0.7 and good reliability if it has a Cronbach's alpha value (CAV) above 0.7 [33]. Table 3 displays the results of the validity and reliability tests of the study instrument using CFA.

TABLE III
VALIDITY AND RELIABILITY TEST RESULTS OF RESEARCH INSTRUMENTS

Instruments	Average Loading Factor	Cronbach's Alpha Value (CAV)
Academic Self-Efficacy Scale	.941	.936
Academic Resilience Scale	.916	.936
LMS Use Intensity (LMSI)	.876	.700
Flow Academic Scale	.883	.860

Based on Table 3, all instruments are valid and reliable, so they can be used to collect research data.

D. Data Collection and Data Analysis

The Google Form application was used to collect research data, which was then distributed to university students across Indonesia. Furthermore, this study's data is analyzed statistically using the partial least squares-structural equation model (PLS-SEM). PLS-SEM analysis involves two stages: outside model evaluation and inner model evaluation. [33]Each variable is coded for data analysis. Academic Self-Efficacy (ASE), Academic Resilience (AR), Learning Management System Intensity (LMSI), and Academic Flow (FA) are all coded terms.

III. RESULTS AND DISCUSSION

A. Inner Model

The inner model evaluation assesses convergent validity, discriminant validity, and model dependability. Figure 1 shows the results of the outer model examination.
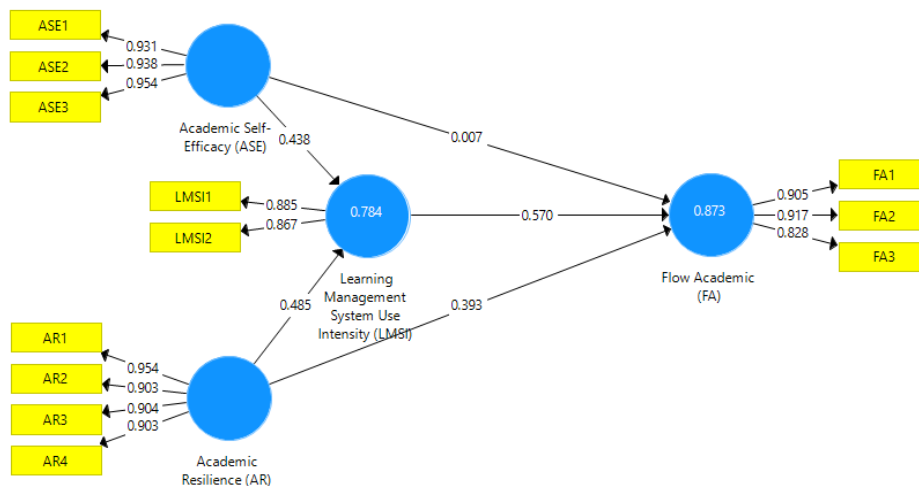

Fig. 1 Outer model evaluation

B. Convergent Validity

The convergent validity test is a method to reveal how strong the relationship is between indicator variables and their constructs. If the factor loading exceeds 0.7, the indicator is valid for measuring the construct [33]. Table 4 shows the results of the convergent validity test. Table 4 demonstrates that all the research variables' indicators have loading factor values greater than 0.7 [33]. This signifies that all variable indicators are valid for assessing the construct and may be used during the hypothesis testing step.

TABLE IV
CONVERGENT VALIDITY TEST RESULTS

Variable	Factors/ Indicators	Loading Factor	AVE	Information
Academic Self-Efficacy (ASE)	ASE1	.931	.886	Valid
	ASE2	.938		Valid
	ASE3	.954		Valid
Academic Resilience (AR)	AR1	.954	.840	Valid
	AR2	.903		Valid
	AR3	.904		Valid
	AR4	.903		Valid
LMS Use Intensity (LMSI)	LMSI1	.885	.768	Valid
	LMSI2	.867		Valid
Flow Academic (FA)	FA1	.905	.782	Valid
	FA2	.917		Valid
	FA3	.828		Valid

C. Discriminant Validity

The discriminant validity test assesses conceptual differences between variables. The Fornell-Lacker criteria are used to assess the discriminant validity of research variables. A variable can be sufficiently differentiated from other variables if it has a more excellent Fornell-Lacker value and differs from the Fornell-Lacker values of other variables [34]. Table 5 shows the results of the discriminant validity test for the research variables.

TABLE V
DISCRIMINANT VALIDITY TEST RESULTS (FORNELL-LACKER CRITERIA)

Variable	AR	ASE	FA	LMSI
Academic Resilience (AR)	.917			
Academic Self-Efficacy (ASE)	.840	.941		
Flow Academic (FA)	.885	.819	.884	
LMS Use Intensity (LMSI)	.853	.845	.911	.876

D. Reliability

Reliability testing aims to evaluate the reliability of research variables. A variable is deemed trustworthy if its CAV value and composite reliability value above 0.7[33]. The results of the research variable reliability test can be seen in Table 6.

TABLE VI
RELIABILITY TEST RESULTS FOR RESEARCH VARIABLES

Variable	CAV	rho_A	Composite Reliability
Academic Self-Efficacy (ASE)	.936	.936	.959
Academic Resilience (AR)	.936	.939	.955
LMS Use Intensity	.698	.700	.869
Flow Academic (FA)	.860	.869	.915

Table 6 shows all variables with CAV and Composite Reliability values above 0.7. This means that all variables have good reliability and can be continued for hypothesis testing.

E. Inner Model

Inner model evaluation is carried out to create a simultaneous influence of the independent variable on the dependent variable in an analytical model [35]. The R-squares value is used to evaluate the simultaneous effect. Next, hypothesis testing is also carried out to evaluate the inner model. Hypothesis testing uses the bootstrapping method with SmartPLS 4.0 software.

F. R-Square

The R-squared value is used to assess the simultaneous influence of independent factors on the dependent variable. Table 7 shows the results of the simultaneous influence analysis of the research model.

TABLE VII
R-SQUARE VALUE

	R Square	Adjusted R Square
LMS use intensity (LMSI)	.784	.783
Flow Academic (FA)	.873	.872

Table 7 shows that the R-squares value of LMS use intensity is 0.784, meaning that 78.4% of LMS use intensity can be explained by academic self-efficacy and resilience. Furthermore, the r-squares value of academic flow is 0.873, meaning that around 87.3% of students' academic flow can be explained by academic self-efficacy, resilience, and LMS use intensity.

G. Hypothesis testing

The bootstrapping approach is used to test hypotheses with SmartPLS 4.0 software. A hypothesis is accepted if its t-statistic value is more than 1.96 and the probability values (p-values) are less than 0.05 [33]. The outcomes of assessing the seven study hypotheses indicate that hypothesis 4 (H4) cannot be accepted. This shows no substantial relationship exists between academic self-efficacy and academic flow among university students. Table 8 shows the details of the hypothesis test outcomes.

TABLE VIII
HYPOTHESIS TEST RESULTS

	Original Sample	M	STDEV	T-statistic	P Values
Direct Effect					
Academic Self-Efficacy -> LMS use Intensity (H1)	.438	.440	.058	7.565	.000
Academic Resilience -> LMS use Intensity (H2)	.485	.482	.057	8.579	.000
LMS use Intensity -> Flow Academic (H3)	.570	.575	.044	12.879	.000
Academic Self-Efficacy -> Flow Academic (H4)	.007	.005	.032	.212	.832
Academic Resilience -> Flow Academic (H5)	.393	.389	.033	12.025	.000
Indirect Effect					
Academic Self-Efficacy -> Flow Academic (H6)	.250	.253	.039	6.325	.000
Academic Resilience -> Flow Academic (H7)	.276	.277	.037	7.405	.000

Academic flow is the level of university student attention or concentration in learning [36]. Students at a university with a strong academic flow have a high degree of focus on studying, love learning, and are intrinsically motivated to learn. Ideally, students who use an LMS should have a smooth academic flow. This university student's academic flow level is thought to be related to academic self-efficacy, resilience, and LMS use intensity.

The first hypothesis (H1) of this research can be accepted. This shows a positive and significant relationship between academic self-efficacy and the intensity of LMS use. High academic self-efficacy in university students is characterized by the high level of confidence students have in themselves in meeting academic demands [27], [37]. Adapting to digital-based learning methods is one of the important academic requirements for today's students. Those who have strong academic self-efficacy tend to study more carefully [38], [39]University students with solid academic self-efficacy regularly use the LMS to study learning materials. As a result, the stronger the student's academic self-efficacy in digital-based learning, the greater the intensity with which the university student uses the LMS to grasp the learning content.

The second hypothesis (H2) of this research is also accepted. This means a positive and significant correlation exists between academic resilience and LMS intensity. University students with high academic resilience are characterized by the ability to adapt well to academic demands [40], [41]. Current academic demands are that university students must be able to adapt to digital-based learning systems, especially LMS. Students with good resilience tend to be enthusiastic about learning, so they often access the LMS to study learning materials [42].

The third hypothesis (H3) of this research is acceptable. This means that the more frequently university students access the LMS to study learning material, the higher the university student's attention to learning [43], [44]. In the LMS, information and learning materials are available [45], [46]University students can access it anytime and anywhere. University students who frequently access the LMS to search for information and lecture material tend to pay close attention to learning so they can understand the material well. LMS use intensity can be said to be a determining factor that influences academic flow. This is indicated by the H3 t-statistic value of 12.879.

The fourth hypothesis (H4) of this research cannot be accepted. This means that academic self-efficacy does not correlate with academic flow. Even though university students have a high belief in their ability to learn, it is still possible that they will need to be more attentive when learning. The results of this research reject the findings of Pantu [47], who concluded that academic self-efficacy correlates with a person's academic flow.

This is different from academic, which does not correlate with academic flow. The fifth hypothesis (H5) shows that academic resilience is positively and significantly correlated with academic flow in university students. This means that the higher a university student's ability to survive and adapt to educational demands, the higher the level of student attention to learning material [48].

The sixth and seventh hypotheses (H6, H7) can also be accepted. This suggests that LMS use intensity can operate as a moderator in the association between academic self-efficacy, academic resilience, and academic flow. Previously, the findings of this study revealed that academic self-efficacy was not associated with academic flow. However, after being mediated by the intensity of LMS use, academic self-efficacy can influence academic flow. This means that high academic self-efficacy will increase university students' learning intensity when using the LMS. This high intensity of using LMS can increase academic flow for university students [49], [50]. Apart from that, the correlation between academic resilience and academic flow can be direct and mediated by LMS use intensity. However, academic resilience is more significantly and directly correlated with academic flow.

IV. CONCLUSIONS

Academic self-efficacy, academic resilience, and LMS use intensity are anticipated to impact the academic flow of university students who study using LMS. Based on the findings of this research, there is no relationship between academic self-efficacy and academic flow. On the other hand, academic self-efficacy can influence academic flow when mediated by LMS use intensity. As a result, the intensity with which an LMS is used can moderate the link between academic self-efficacy, resilience, and flow. We also concluded that the intensity of LMS use is the most important determinant of academic flow for university students who use LMS. We encourage university students to use the LMS to obtain information and learning resources more frequently. This will increase academic flow, leading to a better grasp of the learning content.

Furthermore, the limitation of this research is that it only identifies a few variables that influence academic flow in students. Therefore, future studies are likely to find more elements that affect students' LMS use intensity and academic flow.

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