



THE INFLUENCE OF SMARTPHONE USAGE, LEARNING PATTERNS, AND LEARNING CULTURE ON LEARNING MOTIVATION THROUGH SELF EFFICACY IN HIGH SCHOOL STUDENTS IN SAMARINDA CITY

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Abstract. In today's digital era, smartphones have become an integral part of everyday life, especially among students. In Samarinda City, smartphone usage among senior high school students is increasing, and this has a significant impact on their learning patterns and learning culture. In this context, it is important to understand how smartphone use, study patterns, and learning culture interact and influence students' learning motivation through self-efficacy. The purpose of this study was to determine the effect of smartphone use, study patterns, learning culture, and self-efficacy on learning motivation. This research was conducted at high schools in Samarinda City. The population in this study consisted of 1,640 grade 12 students. The sample was taken using a proportional random sampling technique, which amounted to 410 respondents. The data collection techniques used were questionnaires, interviews, and documentation. Data analysis uses CFA. Data were analyzed using descriptive and inferential statistical techniques. The model fit test uses SEM with the LISREL program. The results of this study are: (1) Learning patterns and learning culture have a positive and significant effect on learning motivation, while smartphone usage and self-efficacy have no effect on learning motivation., (2) Smartphone use, learning patterns, and learning culture affect self-efficacy., (3) The use of smartphones, learning patterns, and learning culture has no effect on learning motivation through self-efficacy. This study concluded that there is a significant influence of learning patterns and learning culture on learning motivation.

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INTRODUCTION

Learning motivation is a crucial factor in students' success in achieving educational goals (Urhahne & Wijnia, 2023) and serves as the foundation for effective learning (Sigalingging et al., 2023). Students with high learning motivation tend to be more diligent, active, and responsible in their learning, contributing to teaching innovation (Feng & Xiao, 2024). Conversely, low motivation can cause disinterest, passivity, and declining academic performance (Putri et al., 2023). In secondary education, fostering learning motivation is essential, as students are at a critical stage of developing character, habits, and independence in learning. However, in reality, the phenomenon of declining learning motivation among high school students remains a serious issue. Many students show low enthusiasm for learning, are easily distracted, and lack confidence in completing academic tasks. One of the main contributing factors is excessive smartphone use. According to APJII (2024), the smartphone usage penetration among adolescents aged 13–18 has reached 90.25%, making this age group highly vulnerable to the negative impacts of mobile devices, such as reduced focus, increased procrastination, and dependency on digital entertainment. Zulfa & Mujazi (2022) further explain that the high intensity of smartphone use reduces students' concentration during learning.

Several studies have demonstrated that excessive smartphone use can disrupt concentration and negatively impact academic achievement. Masood et al. (2020) and Rodríguez et al. (2020) report that uncontrolled smartphone usage hurts students' motivation and

mental health. Zhao et al. (2025) add that smartphone addiction increases academic procrastination by reducing self-control and self-efficacy. However, studies by Sulaiman & Shahid (2022), Baars et al. (2022), and Kim (2019) suggest that when used wisely, mobile technology can improve self-efficacy and learning motivation through self-regulated learning strategies and educational application-based independent study. Specifically, Kim (2019) explains that the use of mobile technology in learning not only fosters active student engagement but also enhances their academic confidence in app-based learning contexts.

Besides technology, learning patterns also affect student motivation. Approaches that match individual preferences can boost engagement and comfort during learning (Putri et al., 2023). Jiang & Zhang (2021) emphasize that matching teaching methods with learning styles is crucial for encouraging active participation. A positive learning culture—characterized by a supportive environment, academic discipline, and shared responsibility—has also been shown to enhance student motivation (Bećirović, 2023; Bektas et al., 2015). Although many studies have explored the roles of variables such as self-efficacy, smartphone use, learning styles, and learning culture on student outcomes, most of them have been conducted in isolation and at the higher education level. For instance, Wu et al. (2020) only examined the relationship between self-efficacy and motivation without considering learning culture factors. He & Zhang (2024) found that cultural orientation can strengthen the relationship between mindset and self-efficacy. However, their study did not directly address learning motivation and was not conducted among secondary school students. Liu (2020) and Kim (2019) focused on university students, whereas the combined effects of learning patterns, learning culture, and self-efficacy on high school students' learning motivation have not been investigated.

Therefore, this study seeks to fill that gap by examining the simultaneous influence of smartphone usage, learning patterns, and learning culture on learning motivation, mediated by self-efficacy, among high school students in Samarinda. Integrating these four variables into a single research model is expected to provide a more comprehensive understanding of the factors affecting students' learning motivation in the digital era. The study also considers the local conditions and sociocultural learning environment of secondary school students.

The research objectives include analyzing the effect of smartphone use on student learning motivation, identifying learning patterns that influence student learning motivation, examining the impact of learning culture on student learning motivation, and investigating the role of self-efficacy as a mediator in the relationship between these variables. The study's benefits include providing insight into the influence of smartphone use in the educational context, offering information on effective learning patterns and culture to increase learning motivation, and providing recommendations for educators and policymakers in designing better learning strategies.

RESEARCH METHODS

This research is an explanatory study that employs a quantitative approach, utilizing a survey method. Quantitative research is conducted to test predetermined hypotheses. The purpose of the research conducted was to determine the effect of smartphone use, study patterns, and learning culture on learning motivation through self-efficacy. The independent variables in this study are smartphone use, study patterns, and learning culture; learning motivation as the dependent variable; and self-efficacy as the mediating (intervening) variable. This study was conducted in senior high schools (SMA) in Samarinda City, including SMA Negeri 3, SMA Negeri 4, SMA Negeri 8, SMA Negeri 14, and SMA Negeri 16.

The population in this study was class XII students, totaling 1,562 students. Sampling in this study used proportional random sampling. The study included 410 respondents, determined using the Slovin formula. Data were collected from questionnaires that were administered directly to respondents on paper. Alternative answers are adjusted to the Likert Scale and presented as four options. Each answer will be given a score between 1 and 4 which can be explained as follows: Score 4 for the answer Always (SL), Score 3 for the answer Often (SR), Score 2 for the answer Rarely (JR), and Score 1 for the answer Never (TP), the consideration of



using four categories is that this can limit the variability of answers and reduce the ability to detect differences in attitudes that are not too striking. The research instrument blueprint is presented in [Table 1](#).

Table 1. Instrument Grid

No	Variable	Indicator	Total	Instrument Item	Total
1	Smartphone Usage (PS)	1. Knowledge about smartphones	1, 2		2
		2. Smartphone function	3, 4		2
		3. Advantages of smartphones	5, 6, 7		3
		4. Factors that influence the use of smartphones	8, 9, 10		3
		5. Relation to learning outcomes	11, 12, 13, 14, 15, 16, 17, 18		8
		6. Disadvantages of smartphones	19		1
2	Learning Pattern (PB)	1. Study preparation	1, 2		2
		2. Study preparation	3, 4, 5, 6, 7, 8		6
		3. Making schedules and notes	9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20		12
		4. Doing assignments	21, 22, 23, 24, 25, 26		6
3	Learning Culture (BB)	1. Environmental conditions	1, 2, 3, 4, 5		5
		2. Exercise	6, 7, 8, 9, 10		5
		3. Readiness/availability	11, 12, 13, 14, 15		5
4	Self Efficacy (ED)	1. Confidence in personal Abilities	1, 2, 3, 4, 5		5
		2. Having a leadership spirit	6, 7, 8, 9		4
		3. Emotional condition	10, 11, 12, 13, 14		5
5	Learning Motivation (MB)	1. Perseverance in learning	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15		15
		2. Tenacious in facing difficulties	16, 17, 18, 19, 20		5
		3. Interest and sharpness of attention in learning	21, 22, 23, 24, 25, 26		6

The lattice of this research instrument was prepared as a guideline for developing measuring instruments used to collect data on five main variables: Smartphone Usage (PS), Learning Patterns (PB), Learning Culture (BB), Self-Efficacy (ED), and Learning Motivation (MB). Each variable is translated into several more specific indicators, and then each indicator is measured through several statement items in the instrument. The preparation of this grid aims to ensure the representation of the constructs measured and maintain the validity of the instrument content. The preparation of this instrument grid adheres to the principles of creating effective research instruments, which include content validity, systematic construction, and the completeness of the aspects measured. Thus, the instrument developed is expected to accurately and reliably reveal data, enabling it to answer the problem formulation and achieve the research objectives.

The validity of the research instruments was tested using the Kaiser-Meyer-Olkin (KMO) method and Bartlett's Test of Sphericity to measure the suitability of the data for factor analysis. Details of the validity test results for each variable are presented in [Table 2](#). To assess the adequacy of the data for factor analysis, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity were conducted. Based on table 2 above, the KMO value for each variable is as follows: Smartphone Usage (PS) = 0.677, Learning Pattern (PB) = 0.687, Learning Culture (BB) = 0.692, Self-Efficacy (ED) = 0.659, and Learning Motivation (MB) = 0.735. KMO values above 0.60 indicate that the data are sufficient for factor analysis. Thus, all variables in this study met the recommended threshold. Furthermore, Bartlett's Test of Sphericity gave statistically significant results for all variables (PS: $p = 0.016$; PB, BB, ED, MB: $p = 0.000$), indicating that the correlation matrix is not the identity matrix. This indicates

that there are significant correlations among the items in each variable, which supports the suitability of the data for further factor analysis.

Table 2. Validity Test of Research Instruments

KMO and Bartlett's Test	Smartphone Usage (PS)	Learning Pattern (PB)	Learning Culture (BB)	Self Efficacy (ED)	Learning Motivation (MB)
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.677	0.687	0.692	0.659	0.735
Bartlett's Test of Sphericity	37.148	82.114	58.746	52.211	53.462
	Df	21	15	15	21
Approx. Chi-Square Sig	0.016	0.000	0.000	0.000	0.000

To ensure that the research instruments used met the standard requirements, reliability tests were conducted on each latent variable. The test results, which included the sum of factor loadings ($\sum$ SLF), Construct Reliability (CR), and critical factor loadings, are presented in [Table 3](#).

Table 3. Reliability Test of Research Instruments

Latent Variabel	$\sum$SLF	Construct Reliability (CR)	Critical Loading Factor	Decision
Smartphone Usage (PS)	4.57	0.89	0.7	Reliable
Learning Pattern (PB)	4.37	0.87	0.7	Reliable
Learning Culture (BB)	3.39	0.81	0.7	Reliable
Self Efficacy (ED)	2.85	0.81	0.7	Reliable
Learning Motivation(MB)	4,30	0,87	0.7	Reliable

The reliability of each latent variable is analyzed based on the Construct Reliability (CR) value and the number of Standardized Loading Factor ($\sum$ SLF). A construct is declared reliable if it has a CR value ≥ 0.70 and a loading factor for each indicator ≥ 0.70 . Based on the analysis results in table 3 above, all latent variables in this model show adequate reliability values. The Smartphone Usage variable (PS) obtained a CR value of 0.89 with a total SLF of 4.57, which indicates high internal consistency between its indicators. Similarly, the Learning Pattern (PB) and Learning Motivation (MB) variables each obtained a CR value of 0.87 with a total SLF of 4.37 and 4.30, respectively, indicating that the two constructs are considered reliable. In addition, the Learning Culture (BB) and Self-Efficacy (ED) variables also showed good reliability with a CR value of 0.81. Although the total SLF for these two constructs is relatively lower (3.39 for BB and 2.85 for ED), the loading factor value of each indicator still meets the minimum limit of 0.70, so that both constructs can still be declared reliable and suitable for further analysis.

The data were analyzed using the quantitative descriptive, using SEM. The stages of SEM analysis itself must go through at least five stages (Latan & Ramli, 2013), namely: 1) model specification; 2) model identification; 3) model estimation; 4) model evaluation; 5) model modification or re-specification. The data were analyzed using the quantitative descriptive, using SEM. The stages of SEM analysis itself must go through at least five stages (Latan & Ramli, 2013), namely: 1) model specification; 2) model identification; 3) model estimation; 4) model evaluation; 5) model modification or re-specification.

RESULTS AND DISCUSSION

The results of the structural model testing using standard coefficients are shown in [Figure 1](#). In this figure, you can see the relationship between variables and the path coefficient values that describe the strength and direction of influence between constructs in the research model.



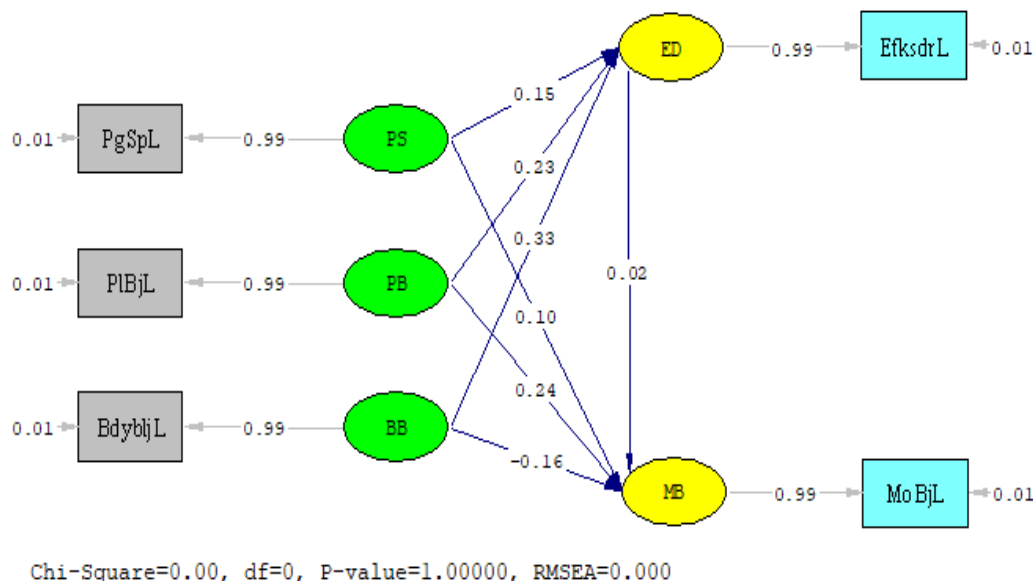


Figure 1. Research Structural Model Test Results (Standard Coefficient)

Based on the results of the SEM analysis shown in Figure 1, it is known that the model has an excellent fit, indicated by the Chi-Square value = 0.00, df = 0, P-value = 1.00000, and RMSEA = 0.000. This indicates that the data fits perfectly with the model built. The model examines the relationship between three exogenous constructs, namely PS (Smartphone Usage), PB (Learning Pattern), and BB (Learning Culture) to two endogenous constructs, namely ED (Self-Efficacy) and MB (Learning Motivation). The following is a description of the results:

1. Influence on Self-Efficacy (ED):
 - a. PS has a positive effect on ED with a standardized coefficient of 0.15.
 - b. PB has the strongest influence on ED with a coefficient of 0.33.
 - c. BB also contributes positively to ED with a coefficient of 0.10.
2. Effect on Learning Motivation (MB):
 - a. PS shows a positive effect on MB with a coefficient of 0.23.
 - b. BB also has a positive effect on MB with a coefficient of 0.24.
 - c. In contrast, PB has a negative effect on MB with a coefficient of -0.16, which indicates that high learning pattern can actually reduce the level of learning motivation.
 - d. Meanwhile, ED only has a very small effect on MB with a coefficient of 0.02, which indicates that self-efficacy is not the main predictor of learning motivation in this model.

The results of the structural model testing based on the t-value used to measure the significance of the relationship between latent variables in this study are shown in Figure 2.

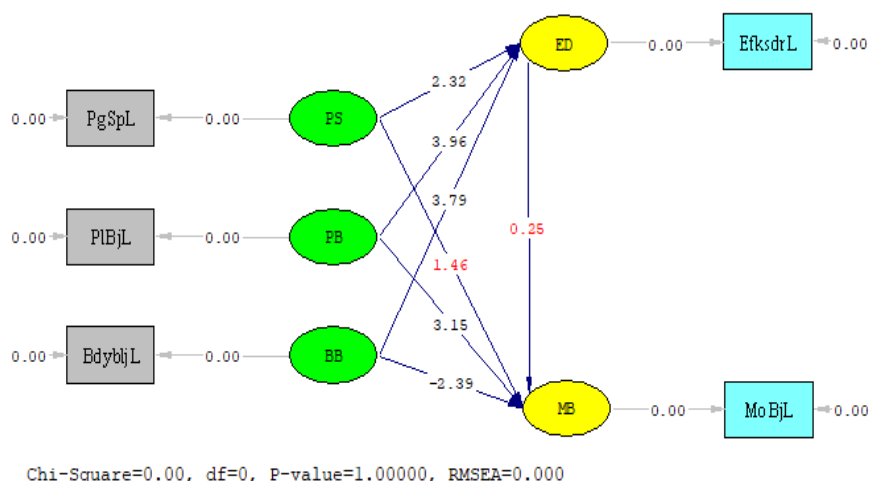


Figure 2. Research Structural Model Test Results (t value)

The path coefficients and t test values in [Figure 2](#) can be explained as follows:

1. Exogenous Variable Relationship to ED (Self-Efficacy)
 - a. PS → ED: The path coefficient is 2.32, indicating a positive relationship. This value indicates that an increase in PS will increase ED.
 - b. PB → ED: Path coefficient of 3.96, indicating a very strong positive relationship with ED.
 - c. BB → ED: Coefficient of 3.79, also showing a strong positive relationship with ED.
2. Exogenous Variable Relationship to MB (Learning Motivation)
 - a. BB → MB: Coefficient of -2.39, showing a negative relationship, meaning that an increase in PS decreases MB.
 - b. PB → MB: Coefficient 3.15, indicating a positive relationship with MB.
 - c. PS → MB: Coefficient 1.46, indicating a positive, but relatively weak relationship.
3. Relationship between Endogenous Variables
 - a. ED → MB: Coefficient of 0.25, indicating a direct positive effect of Self-Efficacy on Learning Motivation.

Overall, the model showed a very good fit to the data (Chi-Square = 0.00; RMSEA = 0.000; P-Value = 1.000), indicating that the model fits the data very well. There were no significant differences between the model and the empirical data. After testing the structural model, a hypothesis test was conducted to determine the direct and indirect effects between the latent variables studied. A summary of the hypothesis testing results is shown in [Table 4](#). The purpose of the research conducted was to determine the effect of smartphone use, study patterns, and learning culture on learning motivation through self-efficacy. The independent variables in this study are the use of smartphones, study patterns, and learning culture; learning motivation as the dependent variable; and self-efficacy as the mediating variable (intervening). Based on the research data analyzed, it can be discussed as follows:

1. The direct effect of smartphone usage on learning motivation

H1 is rejected because the calculated t value $(1.46) \leq 1.96$, so it can be concluded that the use of smartphones does not have a positive and significant effect on learning motivation. The existence of mobile learning technology has a positive impact on student engagement and learning outcomes ([Anuyahong & Pucharoen, 2023](#); [Coelhoso & Kalogeras, 2024](#); [Ibrahim, 2024](#); [Mbinda et al., 2024](#); [Pan & Mow, 2023](#); [Wei et al., 2023](#)), but challenges remain with infrastructure and cost pricing ([Minhas et al., 2024](#)). The use of smartphones among students can affect various aspects of learning, one of which is learning motivation. The use of smartphones for educational purposes significantly increases academic motivation for students ([Salsabillah & Rafsanjani, 2024](#); [Sulaiman & Shahid, 2022](#)).

Effective use can increase learning motivation by providing easier access to educational materials and resources, while uncontrolled use can distract and reduce learning focus. Using mobile learning and news apps can motivate better academic performance, while playing mobile games and engaging in other activities negatively impact performance ([Lin et al., 2021](#)). Excessive use of social networking sites creates cognitive impairment, which negatively impacts academic performance ([Masood et al., 2020](#)). Excessive intensity of smartphone usage leads to low discipline, motivation and learning achievement in students ([Irna, 2020](#); [Ye et al., 2022](#)), and is even associated with psychiatric, cognitive, emotional, medical changes, anxiety, extrinsic motivation and reduced emotional intelligence, where anxiety also affects tolerance and cultural and artistic competence ([Rodríguez et al., 2020](#); [Wacks & Weinstein, 2021](#)).

Some of the reasons why smartphone usage is not related to learning motivation include excessive smartphone usage can cause distractions that interfere with the learning process, thus reducing motivation, where not all content accessed through smartphones supports learning. While smartphones allow for social interaction, these interactions are often superficial and do not replace more meaningful face-to-face interactions in a learning context. High reliance on smartphones can reduce students' ability to learn independently, which in turn can decrease motivation. Each individual has a different way of learning. This suggests that the effect of smartphones on learning motivation can vary greatly depending on the individual.



Table 4. Results of Structural Model Test / Research Hypothesis Test

Description	Relationship Between Variables	Value t count	Standardized Coefficient			Hypothesis Test Conclusion
			Direct Effect	Indirect Effect	Total Effect	
Hypothesis 1	There is a positive direct relationship between latent variables PS and MB	1.46	0.10	-	0.10	H1 is rejected because the <i>absolute t</i> value $\leq$ 1.96 with a positive correlation between latent variables.
Hypothesis 2	There is a positive direct relationship between latent variables PB and MB	3.15	0.24	-	0.24	H2 is accepted because the <i>absolute t</i> value $\geq$ 1.96 with a positive correlation between latent variables.
Hypothesis 3	There is a positive direct relationship between latent variables BB and MB	-2.39	-0.16	-	-0.16	H3 is accepted because the <i>absolute t</i> value $\geq$ 1.96 with a positive correlation between latent variables.
Hypothesis 4	There is a positive direct relationship between latent variables PS and ED	2.32	0.15	-	0.15	H4 is accepted because the <i>absolute t</i> value $\geq$ 1.96 with a positive correlation between latent variables.
Hypothesis 5	There is a positive direct relationship between latent variables PB and ED	3.96	0.23	-	0.23	H5 is accepted because the <i>absolute t</i> value $\geq$ 1.96 with a positive correlation between latent variables.
Hypothesis 6	There is a positive direct relationship between latent variables BB and ED	3.79	0.33	-	0.33	H6 is accepted because the <i>absolute t</i> value $\geq$ 1.96 with a positive correlation between latent variables.
Hypothesis 7	There is a positive direct relationship between latent variables ED and MB	0.25	0.02	-	0.02	H7 is rejected because the <i>absolute t</i> value $\leq$ 1.96 with a positive correlation between latent variables.
Hypothesis 8	There is an indirect relationship between PS and MB variables through the intervening variable ED	-	0.10	0.003	0.103	H8 is rejected because the <i>absolute value of the indirect effect</i> (0.0198) < direct effect (0.03)
Hypothesis 9	There is an indirect relationship between PB and MB variables through the intervening variable ED	-	0.24	0.0046	0.2446	H9 is rejected because the <i>absolute value of indirect effect</i> (0.0495) < direct effect (0.33)
Hypothesis 10	There is an indirect relationship between BB and MB variables through the intervening variable ED	-	0.16	0.0066	0.1666	H10 is rejected because the <i>absolute value of indirect effect</i> (0.0308) < direct effect (0.39)

*) Note: out of 10 hypotheses, 5 hypotheses were accepted and 5 hypotheses were rejected.



2. The direct effect of learning patterns on learning motivation

H2 is accepted because the calculated t value $(3.15) \geq 1.96$ with a positive correlation between latent variables, so it can be concluded that learning patterns have a positive and significant effect on learning motivation. Learning patterns refer to the ways or methods individuals use to acquire, process, and store information. Learning patterns have a statistically significant direct relationship with achievement motivation among school students (Manzanares et al., 2017; Putri et al., 2023). Studies show that students' motivation and engagement increase when learning methods are tailored to their learning styles or preferences, while other studies highlight that applied learning experiences and visual learning styles also contribute to increased motivation and engagement (Toyama & Yamazaki, 2020).

3. The direct effect of learning culture on learning motivation

H3 is accepted because the calculated t value $(2.39) \geq 1.96$, with a positive correlation between latent variables, so it can be concluded that learning culture has a positive and significant effect on learning motivation. A positive learning culture can encourage individuals to be more active and enthusiastic in the learning process (Edwar et al., 2024; Wang, 2023). A positive learning environment, characterized by strong teacher-student relationships and fair practices, improves student collaboration, motivation and overall academic success (Romdiah & Dja'far, 2024; Su, 2024; Yoshimoto, 2023). In addition, a strong academic culture can also positively influence students' desire to learn more, development of learning strategies, and engagement in class, which contributes to their achievement and success (Afrilia et al., 2024; Cayubit, 2021).

4. The direct effect of smartphone usage on self-efficacy

H4 is accepted because the calculated t value $(2.32) \geq 1.96$ with a positive correlation between latent variables, so it can be concluded that smartphone usage has a positive and significant effect on self-efficacy. Smartphones can be an effective tool for learning and communicating, thereby increasing individual confidence. For example, easy access to information and various educational applications can increase knowledge and skills (Akuratiya, 2024; Kim & Park, 2019; Moeung, 2024). Smartphone usage is associated with increased student self-efficacy (Razzaq et al., 2018). As smartphone usage time increases, academic self-efficacy tends to decrease (Kang & Park, 2018), excessive smartphone usage can also lead to negative impacts, such as social media addiction and feelings of anxiety. Uncontrolled smartphone usage can reduce face-to-face social interactions, which are important for building confidence and self-efficacy. Smartphone addiction has a negative correlation with self-esteem and self-efficacy, with stress levels and mental health as parameters (Lee, 2017).

5. The direct effect of learning patterns on self-efficacy

H5 is accepted because the calculated t value $(3.96) \geq 1.96$ with a positive correlation between latent variables, so it can be concluded that learning patterns have a positive and significant effect on self-efficacy. Students who use active learning patterns tend to have higher self-efficacy than students who use passive learning patterns. Active learning increases student self-efficacy, which leads to improved academic achievement, especially for students from underrepresented minority groups (Ballen et al., 2017; Kuchynka et al., 2021; Kustyarini, 2020). This is because active learning patterns allow students to be more involved in the learning process, thus increasing their confidence in their academic abilities (Supnoon & Chonchaiya, 2024). Students who have high self-efficacy tend to take more risks in learning, are more motivated to overcome challenges, and are better able to manage stress related to learning.

6. The direct effect of learning culture on self-efficacy

H6 is accepted because the calculated t value $(3.79) \geq 1.96$ with a positive correlation between latent variables, so it can be concluded that learning culture has a positive and significant effect on self-efficacy. Learning culture includes various factors, such as social support, trust in the learning process, and student involvement in learning activities. A positive learning culture enhances students' engagement with innovative learning techniques, increasing their participation and effectiveness in educational practices (Riyat et al., 2024). A positive and



supportive school culture, characterized by supportive teaching staff, collaborative peers and access to resources, has a significant impact on students' academic motivation (Wang, 2023). School culture is significantly correlated with increased student motivation, thus fostering a motivational climate that supports academic achievement (Liu, 2023). A positive learning environment not only increases motivation but also strengthens students' belief in their abilities.

7. The direct effect of self-efficacy on learning motivation

H7 is rejected because the calculated t value $(0.25) \leq 1.96$, so it can be concluded that self-efficacy does not have a positive and significant effect on learning motivation. Although students with high levels of self-efficacy are more likely to engage in deeper and more sustained learning, the direct effect of self-efficacy on academic achievement is not significant (Wu et al., 2020). Although self-efficacy can be influential, external factors such as social pressure, family conditions, and an unsupportive learning environment can hinder students' motivation to learn. Each individual has different backgrounds, experiences and characteristics, which can affect how their self-efficacy affects learning motivation. Some students may have high self-efficacy but remain unmotivated for personal or situational reasons.

8. The indirect effect between smartphone usage variables on learning motivation through the intervening variable of self-efficacy

H8 is rejected because the absolute value of the indirect effect $(0.003) < \text{the direct effect } (0.10)$, so it can be concluded that the use of smartphones has no effect on learning motivation through the intervening variable of self-efficacy. Smartphones provide easy access to information and learning resources. Students who use smartphones to study may feel more competent in completing tasks, which in turn may increase their self-efficacy. Thus, the use of smartphones can affect students' learning motivation indirectly through self-efficacy. The use of smartphones has no effect on learning motivation through the intervening variable of self-efficacy can be caused by the following factors: Excessive smartphone usage can result in distraction, reduce focus on learning, and decrease overall learning motivation. Not all content accessed through smartphones is useful for learning. Irrelevant or low-quality content can reduce learning motivation, even smartphone dependence increases learning fatigue among students (Chen et al., 2023). Furthermore, external factors such as learning environment, social support, and psychological conditions can also affect learning motivation, so the relationship between smartphone usage and learning motivation can be insignificant.

9. The effect of the indirect relationship between learning patterns on learning motivation through the intervening variable of self-efficacy

H9 is rejected because the absolute value of the indirect effect $(0.0046) < \text{the direct effect } (0.24)$, so it can be concluded that learning patterns have no effect on learning motivation through the intervening variable of self-efficacy. Some studies show that self-efficacy can mediate the relationship between learning motivation and academic performance, while other studies show that self-efficacy does not have a significant direct effect on academic performance, so it is not always an effective intervening variable in the relationship between learning patterns and learning motivation.

Recent research shows that effective study patterns can increase learning motivation (Zimmerman, 2000). In other words, if students use effective study patterns, they will feel more confident in their abilities, which will have a positive impact on their motivation to study. In some cases, study patterns may not have a significant effect on motivation to learn through self-efficacy. Some reasons that might explain this phenomenon include: Social environment, parental support, and other external factors can directly affect motivation to learn, regardless of the study pattern applied. Stress, anxiety or other psychological factors may affect self-efficacy and motivation to learn, thus obscuring the expected relationship. Each individual has different characteristics and needs, so the same study pattern may not produce the same effect on all students. Not all learning patterns applied by students can be considered effective. If students use less effective study patterns, this may reduce their self-efficacy and motivation to learn.

10. The effect of the indirect relationship between learning culture variables on learning motivation through the intervening variable of self-efficacy

H10 is rejected because the absolute value of the indirect effect (0.0066) < the direct effect (0.16), so it can be concluded that learning culture has no effect on learning motivation through the intervening variable of self-efficacy. Learning culture can contribute to increasing student self-efficacy. Students who engage in a positive learning culture tend to feel more confident and capable of facing academic challenges. High self-efficacy, in turn, contributes to increased learning motivation. In other words, learning culture exerts an indirect influence on motivation to learn through self-efficacy. Learning culture is more likely to influence motivation to transfer training with high self-efficacy and low resistance to change (Islam, 2019). Motivation has a significant positive impact on academic achievement, with self-efficacy playing a strong role in the relationship (Hardianto et al., 2024).

Some studies show that learning culture has no direct influence on learning motivation through self-efficacy, while other studies show that motivation and self-efficacy can be influenced by different cultural factors and learning environments. The cultural environment influences the choice of learning strategies and their interactions (Gruber & Kurahashi-Friedmann, 2024). Although there is an expected relationship between learning culture, self-efficacy and learning motivation, there are several reasons why learning culture may not have a significant effect on learning motivation through self-efficacy: Each individual has unique characteristics that can affect learning motivation. There are many other factors that can affect learning motivation, such as social support, educational policies, and emotional factors. If these factors are not taken into account, the expected relationship may not be seen.

CONCLUSIONS AND SUGGESTIONS

The findings of this study can be concluded that learning patterns, learning culture, and self-efficacy have a positive and significant effect on learning motivation, while the use of smartphones has no effect on learning motivation. The use of smartphones, learning patterns, and learning culture affect self-efficacy. The use of smartphones, learning patterns, and learning culture have no effect on learning motivation through self-efficacy. Recommendations that can be made for further research development include broader and varied data collection with the use of more comprehensive survey methods and in-depth interviews with students, parents, and teachers can provide a clearer picture of the factors that influence learning motivation. To increase learning motivation, it is recommended that students are taught how to use smartphones effectively and build their self-efficacy. Further research is needed to dig deeper into other factors that can influence learning motivation in this digital era. As such, it is important for educators and parents to support students in developing the necessary skills to use smartphones as learning aids. This includes providing education on time management, technology skills and effective study strategies.

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