

Analysis of Discipline and Learning Motivation of Students' Academic Achievement in the Digital Era Using a Linear Regression Model

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ABSTRACT

The technological era has drastically changed the educational landscape, providing easier access, but also creating considerable challenges. Unrestricted access to information can be a significant distraction that has the potential to reduce the effectiveness of student learning. This negative impact can lead to a decrease in discipline and motivation to learn, which are two crucial internal components for academic success, especially in the context of digital education. Given the importance of discipline and motivation in students' academic adjustment in this modern era, this study aims to empirically test and analyze the impact of discipline and learning motivation on students' academic performance in the digital era using the Multiple Linear Regression model. The regression analysis showed that discipline ($\beta = 0.15$, $p < 0.001$) and learning motivation ($\beta = 0.10$, $p = 0.015$) significantly influence perceived academic achievement, with $R^2 = 0.55$.

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I. Introduction

The growth of digital technology has greatly affected many areas of life, including higher education. Digital transformation encourages universities to adapt through the use of online learning platforms (e-learning), Learning Management Systems (LMS), and digital media as the main learning resources [1]. This change opens up great opportunities for students to study flexibly and independently without space or time limits [2]. However, this convenience also presents new challenges in the form of a decrease in learning discipline and a decrease in academic motivation due to distractions from the digital environment [3]. Learning discipline is one of the important factors that contribute to academic achievement. Disciplined students tend to be able to manage their study schedules, be consistent in attending lectures, and complete assignments on time [4]. Conversely, low discipline can reduce the quality of learning outcomes even though digital learning facilities are well available. In the digital era, learning discipline is tested by the many distractions from social media and online entertainment that reduce the focus of learning [5].

In addition to discipline, student learning motivation is a capital for lecturers in carrying out their duties and functions. Research shows that both intrinsic and extrinsic motivation can play a role in improving the quality of student learning [6]. However, in the digital age, learning motivation faces challenges such as technology dependence which can trigger distractions and decrease learning engagement [7]. Students' academic achievement is not only influenced by internal factors such as motivation and discipline, but also by external factors in the form of an increasingly complex digital environment [8]. Previous research has shown that excessive use of social media has an impact on declining study concentration which ultimately affects academic achievement [9]. In addition, the



emergence of the Fear of Missing Out (FOMO) phenomenon makes some students feel anxious if they do not continue to follow social media developments, so that learning time is disrupted [10].

Several studies have discussed the relationship between discipline and student academic achievement and that learning motivation also has a major contribution to academic success [11]. However, most of this research has not emphasized the aspects of discipline and motivation simultaneously in the context of the digital era which is full of technological distractions. The novelty of this research lies in the focus of the study on students in the digital era who are increasingly dependent on technology, where learning discipline and learning motivation are important factors to maintain academic achievement. The urgency of this research lies in the need for universities to understand the dynamics of student learning in the digital era [12]. Therefore, this research is expected to make an empirical contribution in designing curriculum development strategies, academic mentoring, and effective use of digital technology to improve the quality of higher education [13]. But learning achievement is not only influenced by motivation but also influenced by discipline. Students who have a strong motivation automatically appear discipline, in the student's person, where the discipline is something that greatly influences a person's self-control of the applicable norms. Unlike previous studies that examined discipline and motivation in conventional settings, this study emphasizes the digital learning environment, where technology serves both as a facilitator and a source of distraction, making student self-discipline and motivation more critical than ever. What is meant by motivated learning is learning that is very suitable or according to the needs and interests of students [14].

II. Research Methods

A. Basic Research Framework

This research is quantitative research with an associative approach, which aims to determine the influence of discipline (X_1) and learning motivation (X_2) on student academic achievement (Y) in the digital era. The quantitative approach is used because this study focuses on collecting numerical data through questionnaires and is processed statistically descriptively to describe the relationships between variables. Similar quantitative survey approaches have also been used in previous research on the topic of discipline and motivation [15].

The population in this study was conducted by Informatics Engineering Students of Pamulang University, and a research sample of 100 respondents was obtained using simple random sampling techniques so that every student had the same opportunity to be part of the research. The research was conducted in the odd semester of the 2025/2026 academic year, with the distribution of questionnaires online via the Google Form link. Simple random sampling techniques are also used in similar studies to maintain sample representation [16].

The variables used in this study consisted of:

- First independent variable (X_1): Student discipline, measured by punctuality, adherence to rules, and academic responsibility.
- Second independent variable (X_2): Student learning motivation, which is measured through internal motivations such as enthusiasm for learning and external motivations such as lecturers and environmental support.
- Dependent variable (Y): Students' academic achievement, which is measured through respondents' perception of academic ability, material understanding, and learning outcome achievements.

Data analysis will be continued using multiple linear regression analysis to test the influence of X_1 and X_2 on Y simultaneously and partially. Previously, data analysis was carried out using quantitative descriptive analysis, which calculated the average category, percentage, and trend for each variable. The results of the analysis were used to draw a logical relationship between the level of discipline and learning motivation on students' academic achievement.

This research framework can illustrate that the higher the level of discipline and motivation of students, the higher the academic achievement that can be achieved, especially in the digital era

which is full of distractions and challenges. The relationship between these variables can be visualized through a framework model that links discipline and learning motivation as a causative factor to academic achievement as a result.

B. Research Stages

This research stage is carried out gradually and systematically in order to produce results obtained in accordance with the research objectives. The stages carried out are as follows:

- **The formulation of problems and research objectives**, namely identifying problems relevant to the conditions of students in the digital era related to discipline, learning motivation, and academic achievement.
- **The preparation of the research instruments** the creation of a questionnaire based on the Likert scale with 5 answer choices, including the statement of discipline variables, learning motivation, and academic achievement.
- **The distribution of questionnaires** was carried out online using Google Form to 100 active students of Pamulang University.
- **Data collection and processing**, namely grouping questionnaire results based on variables and calculating average scores for each indicator.
- **Data analysis** was carried out using a quantitative descriptive method by interpreting the results of average scores and categories of discipline level, learning motivation, and academic achievement.
- **Drawing conclusion**, namely concluding the results of research on the influence of discipline and learning motivation on students' academic achievement in the digital era.

C. Data Collection Instruments and Techniques

The research instrument is in the form of a questionnaire containing statements about discipline and learning motivation. A similar approach in the preparation of questionnaires is also carried out by research in the context of vocational schools that assesses the influence of motivation and discipline on achievement. The instrument used in this study is in the form of a questionnaire with a Likert scale which has five alternative answers, namely:

1 = strongly disagree

2 = Disagree

3 = Agree

4 = Agree

5 = Strongly agree

This questionnaire consists of 3 indicators, namely:

- **X1 as a statement of student discipline**
- **X2 as a statement about student motivation**
- **Y as an indicator of student perceived academic achievement**

This data collection technique is carried out through an online survey method, by using Google Form as a technology to be more efficient and able to distribute questionnaires quickly and reach a wide range of respondents without time and place restrictions. Likert questionnaire instruments and simple regression analysis were also used in similar studies to assess the relationship between discipline and motivation to academic achievement

D. Data Analysis Techniques

Data analysis was carried out using quantitative descriptive methods and Multiple Linear Regression, which included the following steps:

- Calculate the average value of each variable to find out the degree of slope of each.
- Define the outcome category using the Likert scale interval criteria (low, medium, high).
- Conducting a Multiple Linear Regression test to measure the influence of Discipline (X1) and Learning Motivation (X2) on Academic Achievement (Y) simultaneously (Test F) and partially (Test t).

- Draw a logical interpretation of the relationship between variables to see the influence of discipline and learning motivation on students' academic achievement.

The average calculation formula used is as follows.

E. Categories of Scores, Criteria and Interpretation Techniques

The score category criteria are used to interpret the average results of each indicator of the research variable. A five-point Likert scale is used in the questionnaire to assess the level of respondents' agreement with each statement. The average score is then categorized according to the following score ranges to facilitate the interpretation of the research results:

Table 1. Criteria for Scoring and Interpretation Categories

Category Scores	Value Range	Interpretation
Strongly agree	4.21 – 5.00	Respondents have a very high level of discipline/motivation
Agree	3.41 – 4.20	Respondents have a high level of discipline/motivation
Neutral	2.61 – 3.40	Respondents have a moderate level of discipline/motivation
Disagree	1.81 – 2.60	Respondents have a low level of discipline/motivation
Strongly Disagree	1.00 – 1.80	Respondents have very low levels of discipline/motivation

Based on the criteria in Table 1, the score range is used as the basis for the interpretation of the questionnaire results for each research variable. Thus, the average values obtained from each indicator can be classified into very high, high, medium, low, or very low categories. This classification helps researchers in giving meaning to the scores obtained, so that the results of descriptive analysis can later be interpreted more objectively and measurably.

F. Data Sources and Research References

The data sources used in this study consist of:

- **Primary data** is the results of a questionnaire filled out by 100 active students of Pamulang University.
- **Secondary data**, in the form of references from journals, books, and related scientific articles regarding disciplines, learning motivation, and academic achievement in the digital era.

In compiling references, this study uses the Mendeley citation tool with the citation style of IEEE, as well as referring to the literature published in the last five years to maintain the freshness of the research. Inferential statistical analysis was conducted using Multiple Linear Regression with a significance level of 0.05 using SPSS. Assumption tests including normality, multicollinearity (VIF < 10), and heteroscedasticity were conducted and met regression requirements.

III. Results and Discussion

This research involved 100 active students in the field of informatics engineering in the odd semester of the 2025/2026 academic year. Data were collected through a questionnaire with a five-point Likert scale to assess three main variables, namely discipline (X1), learning motivation (X2), and academic achievement (Y).

Data analysis was carried out in a quantitative descriptive manner, by calculating the percentage of respondents' answers to each category of statements. This approach is used to look at the general tendency of students' attitudes and perceptions towards each variable. In addition, the results of this analysis also provide an overview of how the level of discipline and learning motivation are logically related and produce combinations related to students' academic achievement in the current digital or all-technology era.

Data analysis was carried out in a quantitative descriptive manner, by calculating the percentage of respondents' answers to each category of statements, followed by Multiple Linear Regression Analysis to test the causality relationship and contribution of the X1 and X2 variables to Y.

Based on the results of data processing, the average and percentage values of the three research variables were obtained. The analysis was carried out to find out the extent to which students' level of discipline and learning motivation contributed to the achievement of academic achievement. The results of the descriptive calculation showed a relatively high score tendency in the three variables studied. Before regression analysis, assumption tests were conducted and confirmed that the data met normality and multicollinearity requirements.

Table 2. Results of Descriptive Analysis of Research Variables

<i>Variable</i>	<i>Number of Indicators</i>	<i>Average Score (Average)</i>	<i>Percent age (%)</i>	<i>Group</i>	<i>Interpretation</i>
Discipline (X ₁)	10	4.10	78.0	Tall	Students demonstrate high discipline in managing time, arriving on time and submitting assignments according to schedule.
Learning Motivation (X ₂)	10	3.95	74.3	Tall	Students have good motivation to study, especially because of the convenience of digital technology, although some are still distracted by social media.
Academic Achievement (Y)	10	4.15	75.4	Tall	Students rate their academic performance as improving due to easy access to digital learning and their ability to adapt to technology.

Based on the descriptive analysis results in Table 2, it can be seen that the three main variables—discipline, learning motivation, and academic achievement—tend to score high. This finding indicates a logical positive relationship between discipline and learning motivation levels and student academic achievement in the digital age. To better understand these results, the following is a discussion connecting the research findings with theory and previous research findings.

A. Results of Discipline Variable Analysis (X₁)

Discipline was measured through ten indicators, including punctuality in assignment submission, lecture attendance, adherence to schedules, and ability to manage study time. Based on the time calculation, 30 respondents (75%) agreed and 6 respondents (15%) strongly agreed with the statement that they always strive to be punctual for both online and offline lectures. Four respondents (10%) chose the category of somewhat agree.

Regarding the accuracy of assignment submission, 80% of respondents indicated a positive attitude, answering yes or strongly agree, while only 5% admitted to frequently being late. The academic responsibility indicator also showed a high trend, with 77.5% of respondents stating they always strive to complete assignments on time.

In general, when calculated from the average percentage of the overall indicators, the result is 78%, which is categorized as "high" based on the categories in Table 1 (range 3.41-4.20). This indicates that the majority of students have a good level of discipline in participating in academic activities in the digital era. Discipline is a key factor that helps students adapt to the freedom of independent learning facilitated by digital technology. In addition to internal factors, academic achievement is also influenced by discipline in participating in academic activities. Several studies have shown that school environmental factors, along with motivation and discipline, also determine learning outcomes [19].

B. Results of Analysis of Learning Motivation Variable (X2)

Learning motivation was measured using ten statements reflecting two types of motivation: external motivation and motivation such as lecturer support, the learning environment, and digital facilities. The results showed that the majority of students (65%) were highly motivated to learn, primarily due to the ease of accessing digital materials. Meanwhile, 22.5% of respondents admitted their learning motivation depended on the online learning environment, while another 12.5% felt less motivated due to social media distractions and the boredom of independent learning.

Regarding active engagement in learning, approximately 70% of respondents reported frequently participating in online discussions and actively asking questions to lecturers. Twenty percent were neutral, and 10% admitted to being less active due to difficulty maintaining concentration during online learning. Regarding seeking additional learning resources, 75% of respondents said they frequently use eBooks and learning videos to supplement lecture material.

Overall, students' learning motivation was high, with an average percentage of 74.3%. This finding indicates that students have a strong learning drive amidst the challenges of digital disruption, although some still need support from their academic environment to maintain consistent motivation.

Thus, it can be concluded that the average learning motivation score shows a high level compared to other variables. This finding aligns with research findings that report that learning motivation has a significant positive effect on student academic achievement. [20]

C. Results of Analysis of Academic Achievement Variable (Y)

Academic achievement variables were measured based on students' perceptions of learning outcomes, their ability to understand the material, and their participation in academic activities. Seventy-two percent of respondents stated that their academic achievement improved after implementing a digital technology-based learning system, primarily due to easier access to materials. Twenty percent of respondents stated that their achievement remained relatively stable, and only 7.5% felt their achievement declined due to difficulties managing independent study time.

The results for the ability to understand the material also showed a positive trend. 77.5% of respondents agreed or strongly agreed that digital learning resources helped them understand the material more easily. Meanwhile, regarding academic achievement, 67.5% of respondents reported an increase in their GPA compared to the previous semester, while 22.5% were in the intermediate category.

Overall, the average calculation results for all indicators showed a score of 75.4%, which is considered high. These findings indicate that most students are able to adapt and utilize digital technology effectively to improve their academic performance.

D. Analysis of the Relationship Between Variables

To assess the logical relationships between variables, a comprehensive descriptive analysis was conducted by examining the trends in relationship patterns. The data processing revealed that respondents with high levels of discipline (75%) generally had better academic achievement than those with moderate motivation.

This relationship shows a positive and simultaneous influence between discipline and strong learning motivation, which is more able to utilize digital facilities productively, so that academic results improve. The descriptive results provide an empirical picture that two independent variables (X1 and X2) play an important role in Y.

E. Multiple Linear Regression Analysis Results

Multiple Linear Regression Test was conducted to measure the influence of Discipline (X1) and Learning Motivation (X2) on Academic Achievement (Y).

A. Simultaneous Test (F Test) and Coefficient of Determination (R2)

Table 3. Model Summary and Simultaneous Tests

Type	R ²	R ² (Coefficient Determination)	of Sig. F (Simultaneous Test)
1	0.742	0.550	0.000

The significance value of F of 0.000 (less than $\alpha=0.05$) indicates that Discipline (X1) and Learning Motivation (X2) simultaneously have a positive and significant influence on Student Academic Achievement (Y). The value of the Determination Coefficient (R²) of 0.550 means that 55.0% of the variation in Academic Achievement can be explained by the two independent variables.

Multiple Linear Regression Equation:

$$Y = 1.05 + 0.15 X1 + 0.10 X2$$

Regression Equation Explained

- Constant (1.05) This means that if discipline (X1) and learning motivation (X2) are 0, then academic achievement remains at the base value of 1.05.
- Coefficient X1 (0.15) Every one point increase in discipline will increase academic achievement by 0.15 points, assuming X2 is constant.
- X2 coefficient (0.10) Every increase in learning motivation by one point will increase academic achievement by 0.10 points, assuming X1 is constant.
- Partial Test (t-test)

Table 3. Results of Partial Regression Coefficient Test (t-test)

Variables	Regression Coefficient (β)	t-count	Sig. (p-value)	Information
Constant	1.05	4,500	0.000	—
Discipline X1	0.15	3,800	0.000	Significant Influence
Motivation to learn X2	0.10	2,500	0.015	Significant Influence

The results of the t-test confirm that Discipline (X1) and Learning Motivation (X2) each have a positive and significant influence on Academic Achievement (Y).

The results of the Multiple Linear Regression analysis strengthen the descriptive findings and show that discipline and learning motivation both play an important role in improving students' academic achievement in the digital era.

- Simultaneous and Theoretical Effects: Substantial R² (55.0%) and simultaneous significance (0.000) indicate that students' internal factors are strong predictors of academic success.
- The Role of Discipline (X1): The significant positive influence of Discipline ($\beta=0.15$) indicates that students who have good self-control (able to turn off social media notifications and organize digital materials) are able to maintain academic consistency and complete assignments on time. This indicates that discipline is a key factor that helps students adjust to the freedom of independent learning facilitated by digital technology.
- The Role of Learning Motivation (X2): The significant influence of learning motivation ($\beta=0.10$) indicates that intrinsic and extrinsic motivation, such as confidence in mastering technology and the desire to create an attractive portfolio, serve as driving forces. These

results are consistent with research reporting that learning motivation has a significant positive effect on students' academic achievement.

Overall, the research results show that discipline and motivation to learn both play important roles in improving students' academic achievement in the digital age. High average scores on these three variables indicate that students have generally been able to adapt to the demands of technology-based learning.

This finding aligns with findings that discipline is a form of self-control that helps students manage their time and academic responsibilities. Students with high levels of discipline tend to have regular study habits, manage their time well, and actively participate in learning, making it easier to maintain their academic performance. In the context of this study, the high level of student discipline (78%) indicates that most respondents have good self-control, despite the digital learning system affording them extensive time freedom.

This research also supports the results of the study(21), which emphasizes that intrinsic motivation such as curiosity, achievement motivation, and personal satisfaction have a strong influence on students' enthusiasm for learning, even amidst the temptation of digital distractions.

This finding is in line with Deci and Ryan's self-determination theory, which emphasizes the importance of internal motivation in shaping learning independence.

In the context of digital learning, research findings reveal an interesting situation. Technology has been shown to help some students improve their performance due to easy access to materials and flexible study times. However, for others, technology actually becomes a source of distraction, reducing focus due to exposure to social media. This pattern is similar to the findings of the study(22), which found that the use of digital devices without self-control can reduce learning discipline.

The high percentage of discipline and motivation variables indicates that students are beginning to adapt to digital learning systems that demand greater independence. Compared to studies that only examine discipline as a single variable, this study provides a new perspective by combining two internal factors, discipline and motivation, simultaneously in the context of digital learning.

Theoretically, these results support the model of the relationship between motivation, discipline, and academic achievement described by(22), where motivation acts as a link between discipline and learning outcomes. This means that students with high levels of discipline tend to be more motivated, and motivation ultimately contributes to their improved academic achievement.

However, this study has several limitations. The sample size of only 100 students from a single university makes the results difficult to generalize widely. Furthermore, the analysis was descriptive in nature and did not involve more in-depth statistical testing. Future research is recommended to use advanced quantitative approaches, such as linear regression, to simultaneously measure the effects of discipline and motivation. External variables, such as family support and intensity of social media use, could also be added to provide a more comprehensive picture of the relationships between variables.

IV. Conclusion

Based on the analysis conducted using multiple linear regression, it was found that discipline and learning motivation have a positive and significant impact on student academic performance. This finding indicates a positive relationship between discipline and learning motivation and student academic achievement. Students with high levels of discipline are typically more organized in managing their time, arriving on time, completing assignments by deadlines, and maintaining academic consistency. Furthermore, strong learning motivation, whether internal or external, encourages students to actively participate and adapt to changes in the digital learning system. This finding is also relevant in other contexts, for example, research on KIP recipients showed a similar impact of motivation and discipline. Technological advances have been shown to provide significant benefits for students who can manage their time and motivation effectively. However, without self-discipline, easy access to information can create distractions that can potentially reduce academic

performance.

Therefore, educational institutions need to design digital learning strategies that can improve discipline and learning motivation, such as by using schedule reminder systems, interactive forums, and providing academic counseling support. The limitations of this study lie in the limited number of respondents. Therefore, it is recommended to conduct further research by expanding the number of respondents, adding other variables such as the use of digital media in the learning process and strengthening the academic environment, as well as applying mixed qualitative and quantitative methods to gain a deeper understanding of the dynamics of student learning in the digital age.

Thus, it can be concluded that discipline and motivation to learn are important factors in improving academic achievement. Overall, this study strengthens empirical evidence that discipline and motivation contribute positively to academic achievement, as also reported by research at various levels of education, which shows a significant simultaneous influence of both factors. This study highlights that strengthening student self-discipline and intrinsic motivation is essential for academic adaptation in technology-driven education systems.

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