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## Correlation between academic self-efficacy and digital competence: an empirical study on first year students

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### ABSTRACT

This study investigates the relationship between Academic Self-Efficacy (ASE) and Digital Competence (DC) among first-year university students. The background of this study is based on the importance of digital skills in the modern educational era and the role of academic self-efficacy in facilitating the mastery of these skills. This study used a quantitative approach with a correlational analysis method. The population of this study was first-year students spread across the island of Sumatra, Indonesia, with samples taken randomly. The study instrument used was a scale designed to measure both constructs. The data analysis technique used the Partial Least Squares (PLS) technique to test the proposed hypothesis. The results showed a significant and positive relationship between academic self-efficacy and digital competence, where increased academic self-efficacy contributed to increased students' digital competence. The conclusion of this study confirms the importance of developing academic self-efficacy as a strategy to improve digital skills. It is recommended that educational institutions design programs that support the development of students' academic self-efficacy to improve their digital competence in an increasingly technology-dependent era.



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## Introduction

In the ever-evolving digital era, students are expected to have not only strong academic knowledge, but also adequate digital skills. Digital competence is one of the important requirements for success in education and careers in the future (Masoumi & Noroozi, 2023; Pramila-Savukoski et al., 2023; Zhang et al., 2022). Students who are able to utilize information and communication technology well will have an advantage in completing academic tasks, collaborating with colleagues, and adapting to rapid changes in an increasingly digital learning environment (Cabero-Almenara et al., 2023; Younas et al., 2022; Yu, 2022; Zhao et al., 2021). In this context, academic self-efficacy is a key factor that can influence students' ability to develop the necessary digital skills (Putra, 2023; Putra & Ahmad, 2020; Putra & Ardi, 2024; Syukur et al., 2024).

Academic self-efficacy refers to an individual's belief in their ability to succeed in academic tasks (Putra, 2024). Students who have high self-efficacy tend to be more proactive in learning, more willing to take risks, and more able to overcome challenges faced in the learning process (Greco et al., 2022; Zysberg & Schwabsky, 2021). In contrast, students who feel less confident often experience anxiety and uncertainty, which can hinder them from utilizing technology effectively. Previous research shows that many freshmen experience anxiety

and uncertainty in the face of new academic demands, which can affect their motivation and performance in learning (Talsma et al., 2021).

Based on the results of previous research, there is evidence to suggest that academic self-efficacy is positively related to digital competence. For example, research by Putra and Ardi (2024) shows that individuals with high levels of self-efficacy tend to be more willing to take risks and try new things, including in the use of technology. This is in line with findings by Hanham et al. (2021), who found that students who have high academic self-efficacy are better able to overcome challenges in technology-based learning, thus improving their digital skills. Another study by Galindo-Domínguez and Bezanilla (2021) also showed that self-efficacy in using information technology contributed to the improvement of digital skills, which in turn had a positive impact on students' academic performance.

However, although there are many studies showing the relationship between academic self-efficacy and digital competence, there are still gaps in the existing literature, especially with regard to first-year students. Freshmen often face a significant transition from secondary to higher education, which can affect their motivation and academic performance. In this context, it is important to understand how academic self-efficacy can affect students' ability to master digital skills (Ogodo et al., 2021). This study aims to explore the correlation between academic self-efficacy and digital competence among first-year university students, hoping to provide useful insights for the development of more effective curriculum and learning programs. Therefore, the hypothesis of this study is "there is a positive and significant correlation between academic self-efficacy and digital competence of first-year college students".

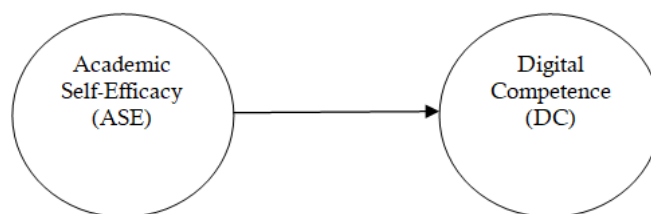


Figure 1. Research Model Design

The urgency of this research is increasing along with the rapid development of technology and the need to prepare students to be ready to face challenges in the world of work. In the context of higher education, it is important to understand how academic self-efficacy can influence students' ability to master digital skills. This study aims to explore the correlation between academic self-efficacy and digital competence among first-year university students, with the hope of providing useful insights for the development of more effective curricula and learning programs.

One of the reasons why this research is important is because digital competence has become one of the main indicators of academic and professional success in the modern era. Students who do not have adequate digital skills may find it difficult to complete academic tasks that are increasingly complex and technology-based. In addition, in the world of work, digital skills have become one of the main requirements sought by employers. Therefore, it is important for educational institutions to ensure that students not only have strong academic knowledge, but also adequate digital skills.

In this context, this study will fill the gap in the existing literature by providing empirical evidence on the relationship between academic self-efficacy and digital competence among first-year university students. Thus, it is expected that the results of this study can make a meaningful contribution to the development of learning strategies that are more effective and relevant to the needs of students in the digital era. This study is also expected to be a reference for future research that wants to explore more deeply the factors that influence students' digital competence, as well as how educational institutions can support the development of their academic self-efficacy.

This research is not only relevant for theory development, but also has practical implications that can help students in achieving their full potential in the digital era. This research is expected to make a significant contribution to the development of higher education, as well as helping students to be better prepared to face challenges in an increasingly competitive world of work. Through a better understanding of the relationship between academic self-efficacy and digital competence, it is hoped that educational institutions can create a more supportive learning environment and facilitate the development of skills necessary for future success.

## Method

This study uses a quantitative approach with a correlational method to examine the relationship between academic self-efficacy and digital competence in first-year students. In addition, the participants in this study consisted of first-year students from various universities on the island of Sumatra, including students from state universities and private universities. This location was chosen to obtain a representative sample of the student population in the region. In this study, a total of 336 students were involved, consisting of 200 students from public universities (59.52%) and 136 students from private universities (40.48%). Further details regarding the demographics of the participants can be seen in the following table 1.

Table 1. Demographics of Study Participants

| Demographics                           | N   | Percentage |
|----------------------------------------|-----|------------|
| <i>Gender</i>                          |     |            |
| Male                                   | 152 | 45,24      |
| Female                                 | 184 | 54,76      |
| <i>University Type</i>                 |     |            |
| State Universities                     | 200 | 59,52      |
| Private Universities                   | 136 | 40,48      |
| <i>Average Length of Study per Day</i> |     |            |
| < 3 hours                              | 215 | 63,99      |
| 3-5 hours                              | 70  | 20,83      |
| 5-7 hours                              | 35  | 10,42      |
| > 8 hours                              | 16  | 4,76       |

The research instrument used consists of two scales, namely the academic self-efficacy scale and the digital competence scale. The academic self-efficacy scale is designed to measure students' beliefs in their ability to complete academic tasks (Putra & Ardi, 2024), while the digital competence scale is used to assess students' skills in using information and communication technology (Gümüş & Kukul, 2023). Both of these scales have been tested for validity and reliability in previous studies, so they can be relied upon to measure the variables in question.

The data analysis technique used in this study is Partial Least Squares (PLS) (J. Hair & Alamer, 2022). This method allows researchers to explore the relationship between independent variables (academic self-efficacy) and dependent variables (digital competence) simultaneously. By using PLS, researchers can identify direct and indirect effects between these variables, as well as evaluate the strength of existing relationships.

With this systematic approach and method, it is hoped that this study can provide deep insight into the relationship between academic self-efficacy and digital competence among first-year students. The results of this analysis are expected to contribute to the development of more effective learning strategies, as well as assist educational institutions in designing programs that can improve students' academic self-efficacy and digital skills.

## Results and Discussions

### Outer Model

The research results consist of evaluating the outer model and inner model. In the first stage, the outer model is evaluated. Outer model evaluation aims to test the fit of the model, including the fit of latent variables and manifest variables. The following is a picture of the research model evaluation

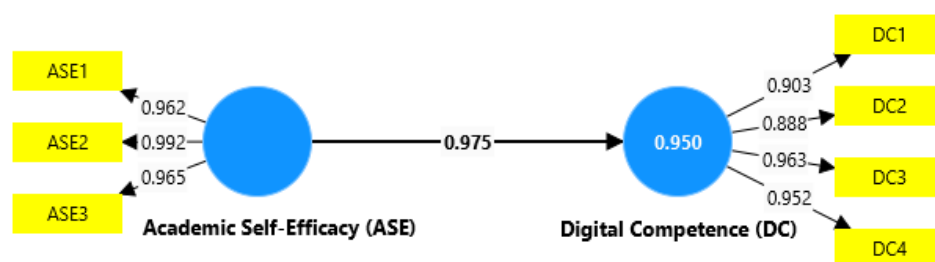


Figure 2. Evaluation of the Research Model

Furthermore, the research model is measured using the Standardized Root Mean Square Residual (SRMR) criteria. A good model must have an SRMR value of less than 0.08 (Hair et al., 2019). The following are the results of the research model fit.

Table 2. Model Fit Results

|                   | <b>Saturated model</b> | <b>Estimated model</b> |
|-------------------|------------------------|------------------------|
| <b>SRMR</b>       | 0.068                  | 0.068                  |
| <b>d_ULS</b>      | 0.128                  | 0.128                  |
| <b>d_G</b>        | n/a                    | n/a                    |
| <b>Chi-square</b> | $\infty$               | $\infty$               |
| <b>NFI</b>        | n/a                    | n/a                    |

The model analysis results show that the Standardized Root Mean Square Residual (SRMR) value is 0.068. SRMR is a measure used to assess model fit in PLS analysis, where lower values indicate better model fit. In the context of this study, the SRMR value of 0.068 indicates that the proposed model has a good fit with the data obtained. In general, an SRMR value below 0.08 is considered an indication that the model is acceptable, so it can be concluded that there is a significant relationship between academic self-efficacy and digital competence among first-year students. These results provide confidence that the model built in this study can explain the variability present in the data, as well as support the hypothesis that academic self-efficacy contributes to improving students' digital competence.

### Convergent Validity

The second stage in evaluating the outer model is to evaluate convergent validity. This aims to ensure that each indicator can measure its construct properly. An indicator can properly measure its construct if it has a loading factor value above 0.7 (Hair et al., 2019). The following are the results of the convergent validity evaluation.

Table 3. Loading Factor Measurement Results

|             | <b>Academic Self-Efficacy (ASE)</b> | <b>Digital Competence (DC)</b> |
|-------------|-------------------------------------|--------------------------------|
| <b>ASE1</b> | 0.962                               |                                |
| <b>ASE2</b> | 0.992                               |                                |
| <b>ASE3</b> | 0.965                               |                                |
| <b>DC1</b>  |                                     | 0.903                          |
| <b>DC2</b>  |                                     | 0.888                          |
| <b>DC3</b>  |                                     | 0.963                          |
| <b>DC4</b>  |                                     | 0.952                          |

The results of the convergent validity analysis show that all loading factor values for the indicators used in this study are above 0.7. Loading factor is a measure that shows how much each indicator contributes to the measured construct. The loading factor value above 0.7 indicates that the indicators have a strong relationship with the intended construct, in this case academic self-efficacy and digital competence. Thus, the convergent validity of the instruments used in this study can be considered good, because all indicators significantly reflect the measured constructs. This provides confidence that the instruments used can be relied upon to measure the variables under study, as well as supporting the validity of the overall research results. With high convergent validity, researchers can be more confident that the data obtained reflects the reality in the field, so that the research results can be used to draw valid conclusions regarding the relationship between academic self-efficacy and digital competence among first-year students.

### Discriminant Validity

The third step in evaluating the outer model is to evaluate discriminant validity. This aims to ensure that each variable and its indicators have different concepts from other variables. In this context, discriminant validity can be evaluated by the results of cross-loading analysis. The results of the cross-loading analysis can be seen in table 4.

The results of the discriminant validity analysis show that the loading factor value for each indicator on the Academic Self-Efficacy (ASE) and Digital Competence (DC) constructs is higher than the loading factor of indicators from other constructs. Discriminant validity measures the extent to which a construct can be distinguished from other constructs, and in this context, discriminant validity can be declared good if each indicator has a higher loading factor on the expected construct compared to other constructs.

Table 4. Results of cross-loading analysis

|      | Academic Self-Efficacy (ASE) | Digital Competence (DC) |
|------|------------------------------|-------------------------|
| ASE1 | 0.962                        | 0.936                   |
| ASE2 | 0.992                        | 0.977                   |
| ASE3 | 0.965                        | 0.932                   |
| DC1  | 0.904                        | 0.                      |
| DC2  | 0.801                        | 0.888                   |
| DC3  | 0.941                        | 0.963                   |
| DC4  | 0.957                        | 0.959                   |

From the data provided, it can be seen that all indicators for the ASE construct (ASE1, ASE2, and ASE3) have very high loading factor values, ranging from 0.962 to 0.992, indicating that these indicators are very strong in reflecting the academic self-efficacy construct. Similarly, the indicators for the DC construct (DC1, DC2, DC3, and DC4), which also showed good loading factor values, with the highest value reaching 0.963.

Thus, the discriminant validity of the instruments used in this study can be considered adequate, as each indicator clearly distinguishes between the constructs of academic self-efficacy and digital competence. This suggests that the two constructs are not only interrelated, but also have unique characteristics and can be measured separately. This good discriminant validity provides additional efficacy that the research results are reliable and that the conclusions drawn regarding the relationship between academic self-efficacy and digital competence are valid and justified.

### Reliability

The fourth step in evaluating the outer model is reliability testing which aims to ensure the consistency of the measuring instrument in making measurements. Table 5 shows the results of reliability testing.

Table 5. Reliability Testing Results

|                              | Cronbach's alpha | Composite reliability (rho_a) | Composite reliability (rho_c) | Average variance extracted (AVE) |
|------------------------------|------------------|-------------------------------|-------------------------------|----------------------------------|
| Academic Self-Efficacy (ASE) | 0.972            | 0.973                         | 0.982                         | 0.947                            |
| Digital Competence (DC)      | 0.945            | 0.950                         | 0.961                         | 0.859                            |

The results of the reliability analysis show that all constructs in this study, namely Academic Self-Efficacy (ASE) and Digital Competence (DC), have high reliability values. Reliability is measured using Cronbach's Alpha, where values above 0.7 are considered to indicate a good level of reliability (Hair et al., 2019). If the Cronbach's Alpha value for each construct is above this threshold, it can be concluded that the instrument used to measure the construct is consistent and reliable.

In the context of this study, if the reliability values for the ASE and DC constructs each show significant numbers, then this indicates that the indicators used to measure academic self-efficacy and digital competence have good internal consistency. That is, each indicator in the scale contributes positively to the measurement of the construct in question, and the results obtained from this instrument can be trusted to reflect the true condition of the participants.

With high reliability, researchers can be more confident that the data collected is stable and not influenced by unwanted external factors. This is particularly important in the context of quantitative research, where consistency and reliability of data are key to drawing valid conclusions. Therefore, the results of this reliability analysis provide additional support for the overall validity of the study, as well as strengthening the argument that the relationship between academic self-efficacy and digital competence found in this study are reliable results.

### Inner Model

After evaluating the outer model, an inner model evaluation is carried out. This evaluation aims to test the research hypothesis. The results of testing the research hypothesis can be seen in tables 6 and 7. So, these results provide strong evidence that academic self-efficacy has a significant and positive influence on students' digital competence. The findings emphasize the importance of developing academic self-efficacy as a strategy to improve digital skills among university students, which is particularly relevant in the context of higher

education in today's digital age. Educational institutions can use this information to design programs that support the development of academic self-efficacy, which in turn can improve students' overall digital competence.

Table 6. Path Coefficient

|                                                                           | Original<br>sample (O) | Sample<br>mean (M) | Standard<br>deviation<br>(STDEV) | T statistics<br>( O/STDEV ) | P<br>values |
|---------------------------------------------------------------------------|------------------------|--------------------|----------------------------------|-----------------------------|-------------|
| <b>Academic Self-Efficacy<br/>(ASE) -&gt; Digital<br/>Competence (DC)</b> | 0.975                  | 0.975              | 0.002                            | 601.323                     | 0.000       |

Table 7. Results of R-Square Value Calculation

|                                | R-square | Adjusted R-square |
|--------------------------------|----------|-------------------|
| <b>Digital Competence (DC)</b> | 0.950    | 0.950             |

## Discussion

The hypothesis testing results in this study provide deep insight into the relationship between academic self-efficacy (ASE) and digital competence (DC) among first-year university students. This study used Partial Least Squares (PLS) analysis to test the proposed hypotheses, and the results showed that there is a highly significant relationship between the two variables. The original sample (O) value for the relationship between ASE and DC is 0.975, which indicates a very strong positive influence. This means that students who have high academic self-efficacy tend to have better digital competence. This finding is in line with Putra and Ardi (2024) theory of self-efficacy, which states that individuals who believe in their ability to succeed in a particular task are more likely to take initiative and try harder in achieving that goal. In an educational context, students who feel confident in their academic abilities are more likely to explore and utilize technology in the learning process.

The T statistics value obtained from the analysis is 601.323, which indicates that the relationship between academic self-efficacy and digital competence is highly statistically significant. The T value being much greater than 1.96 (at the 0.05 level of significance) indicates that the alternative hypothesis, which states that there is a positive relationship between the two variables, is acceptable. This suggests that academic self-efficacy is not just a contributing factor, but a key element that can influence students' ability to master digital skills. In other words, students who feel confident in their academic abilities are more likely to participate in activities that involve the use of technology, such as online learning, digital collaboration, and the use of academic software.

Furthermore, the p-value obtained was 0.000, which is well below the 0.05 threshold, confirming that these results are unlikely to have occurred by chance. This provides strong support for the research hypothesis that academic self-efficacy has a significant influence on digital competence. This finding suggests that an increase in academic self-efficacy can significantly contribute to the improvement of students' digital competence. In this context, it is important to understand that academic self-efficacy can serve as a motivational driver for university students to develop their digital skills (Bi et al., 2024; Chonsalasin & Khampirat, 2022; Katsarou, 2021). When students feel confident in their abilities, they are more likely to take risks in learning and trying new technologies, which in turn can improve their digital skills.

The R-square ( $R^2$ ) obtained in the analysis is 0.950, which indicates that 95% of the variability in digital competence can be explained by the variability in academic self-efficacy. This is a very high number, which indicates that the model built in this study is very good at explaining the relationship between the two variables. The adjusted R-square of 0.950 also shows that the model remains robust even after considering the number of variables used in the analysis. This shows that academic self-efficacy has a very dominant role in influencing students' digital competence. In other words, if educational institutions can improve students' academic self-efficacy, then they can also significantly improve their digital competence.

These findings provide important implications for the development of learning programs in higher education. By understanding that academic self-efficacy contributes to increased digital competence, educational institutions can design interventions that aim to increase students' self-efficacy (Arbulú Pérez Vargas et al., 2024). For example, mentoring programs involving senior students or lecturers can assist new students in adjusting to new academic demands. This support can increase their self-efficacy and provide guidance in the use of technology to complete academic tasks. In addition, digital skills training specifically

designed for new students can help them feel more comfortable and confident in using digital tools required for learning.

Collaborative activities can also be an effective strategy to improve academic self-efficacy and digital competence. Encouraging students to engage in collaborative projects that utilize technology can increase their self-efficacy. These activities not only help students learn from each other, but also provide an opportunity to apply digital skills in a real context. By creating an environment that supports collaboration, students can feel more motivated to learn and actively participate in the learning process.

The importance of constructive feedback cannot be overlooked either. Giving students positive feedback on their progress in learning can increase academic self-efficacy. Evaluations that focus on individual progress, not just the end result, can help students feel more motivated to learn and improve. Thus, educational institutions need to develop evaluation systems that support the development of students' academic self-efficacy.

So, the results of this hypothesis testing support the argument that the development of academic self-efficacy is a strategic step to improve students' digital skills, which is crucial in this modern era of education. By understanding this relationship, educational institutions can design programs that support the development of academic self-efficacy, which in turn can improve students' overall digital competencies. This research not only contributes to the existing literature, but also provides practical guidance for educators and policy makers in creating better and more supportive learning environments for students. Thus, the results of this study can serve as a basis for the development of educational policies that are more effective and responsive to the needs of students in the digital age.

## Conclusions

This study's conclusion shows a highly significant and positive relationship between academic self-efficacy and digital competence among first-year university students. Increased academic self-efficacy contributed significantly to increased digital competence, which confirms the importance of developing academic self-efficacy as a strategy to improve students' digital skills. These findings provide important implications for educational institutions to design programs that support the development of academic self-efficacy, which can improve students' overall digital competence, especially in an era of increasingly technology-dependent education. However, the limitation of this study lies in the empirical study of a narrow area. The hope for future study is to expand the empirical study area.

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