



## RESEARCH ARTICLE

## Moderating Students' Attitudes between Communication, Creation and Information Skills with Perceived Digital Competency

Norfadzilah Abdul Razak<sup>1\*</sup>, Giri Seriandi<sup>2</sup>, Mien Mien<sup>3</sup>, Ahmad Farees Faizal<sup>4</sup>, Joyce Goh Xin Yin<sup>5</sup>, Lew Zi Lim<sup>6</sup>, Vikneswaran A/L Nathan<sup>7</sup>

<sup>1</sup> Institute Business Excellence, Universiti Teknologi MARA, Shah Alam, Selangor

<sup>2,3,4,5,6,7,8</sup> School of Management and Marketing, Taylor's University, Malaysia

---

**ARTICLE INFO**

Received: May 22, 2024

Accepted: Jun 20, 2024

---

**Keywords**

Digital Competence  
 Communication Skills  
 Information Skills  
 Creation Skills  
 Perceived Digital  
 Competence Attitude

---

**ABSTRACT**

The rise of digital freelancing platforms has facilitated the growth of the gig economy since the coronavirus disease (COVID-19) outbreak. Majority employees encountered significant challenges, such as retrenchment, layoffs, and firm closure. Numerous individuals were involved in the gig economy after the pandemic, as the transition require the digital skills to meet the employment demand. Rapid technological advancement is perceived to provide more benefits than disadvantages, as demonstrated by the drastically increased number of digital workers in Malaysia. The Malaysian workforce currently prefers to work in the gig economy, which has been trending due to higher job accessibility and flexibility continuously. Thus, preparing the university students with digital competency is important to prepare skilled worker to continuously contribute to the gig economy. However, there are several challenges to create awareness and upskilling the digital competenc among university's students. The digital competency is becoming a necessary skill set in the modern era, which has changed the education and employment landscape. The research aims to predict the communication, creation, and information skills effect on perceived digital competence with moderating of student's attitude. There were 435 sample from local university were participated and the data collected continued to analyze structural equation models (SEMs) using Smart PLS. The measurement and structural model analysis results demonstrate that people's perceptions of their level of competence in the digital realm are significantly influenced by their attitude, information skills, communication, and creative skills. The findings indicates the direct relationship between information, creation, and communication skills has supported perceived digital competence. However, the moderating of attitude does not moderate the relationship. The finding implies that the Malaysian Higher Learning Education including private or local universities, have to take action and strategize ways to upskill and re-skill students' digital skills to prepare them with the digital skills for the employment demand.

---

**\*Corresponding Author:**

sarxan\_cafarov@mail.ru

---

## 1.0 INTRODUCTION

Digital transformation is shaking up every industry, and education is no exception, though our motivations differ. They are the primary driver that makes digital transformation essential for teaching and learning, targeting to prepare students with high competence, particularly in digital skills. There has been an emphasis on the importance of digital competence, given the shift of the industrial revolution 4.0. A large sum of organizations are seeking to employ individuals with high digital competence, as this enables them to achieve operational efficiency in their workflow further. However, there have been different contexts and definitions that define digital competencies, where it does not only look into the technical aspects of an individual but their attitude in adapting to the digital mindset.

The ability to efficiently use IT tools and resources is known as digital competence. Various contexts and definitions describe one's ability to utilize IT, and digital competencies are mentioned as one of them. Over the last few years, we have shown how crucial it is to be digitally competent due to the high demand for a technically savvy, skilled and literate workforce. Technological advancement and interconnected work environment are the two most significant contributors to the high demand. In addition, the COVID-19 pandemic has increased how people adapt and utilize technology as the Internet world has been integrated with different pillars of everyday life, such as education, work, civic responsibility, and health. On top of that, the pandemic has significantly boosted the growth of digital transformation, where industries have quickly transitioned into technological-focused working processes (Martzoukou et al., 2020).

The benefits of being digitally competent include enabling businesses to run their operations seamlessly, where manual work is reduced as billable hours will be automated, allowing businesses to focus their output on core tasks instead. This results in higher efficiency in productivity and an increase in business. For employees, being digitally competent reduces the risk of unemployment and increases their future job prospects. Employees are more likely to earn higher salaries, allowing for a higher career growth acceleration. Rennocks (2022) highlights the significance of equipping people with digital competency to facilitate business success. Research suggests that the dimensions of developing digital competence include information literacy, communication skills, and digital content creation skills. Information literacy is recognizing, locating, obtaining, storing, organizing, and analyzing digital data and content to determine its relevance and purpose for educational tasks. Communication skills are knowledge-sharing in digital environments, sharing resources, and working with peers through digital technologies. Lastly, creation skills are creating and editing digital content, producing artistic and media content, programming, and applying intellectual property (IP) rights and licenses (Garzón Artacho et al., 2020). However, there has been a discussion on the different components that describe digital competence, which focuses on technological savviness, the skill set to use technology, and the digital mindset. The definition of digital mindset includes the attitudes and behaviours seen as critical aspects of becoming digitally competent. According to Bawden, information, skill-based and digital literacies are correlated to more general aspects such as the sociocultural perspective of literacies, organized behaviours, and human behaviours within the information society.

However, not all students possess the same level of digital competency. Students have varied digital experiences depending on their background characteristics, competencies, attitudes and perceptions of digital skills. According to Le et al. (2022), more than familiarity with technology is needed for success in learning; having the right competencies and attitudes is equally essential. To address these disparities, higher education institutions should provide targeted support and resources to help underprivileged students develop the necessary digital skills and access the technology they need to succeed in online and blended learning environments (Hussain & Nauman, 2023). By identifying the

strength of digital skills, particularly in information, creation, and communication skills, this study might predict their perception and test whether positive or negative attitudes could influence their perception of perceived digital competencies. All students thrive in the digital age while maintaining a well-rounded educational experience. Hence, this research predicts the role of student's attitudes in the relationship between communication skills, creation skills, information skills and perceived digital competence among university's students.

## **2.0 DIGITAL COMPETENCY**

Digital competency consists of many subcategories according to the nature of the development of knowledge and skills, including creation skills that develop more as a result of individual practice. Moreover, the creation process often requires collaboration, creation, programming knowledge application, and skills which can help strengthen communication in the digital world (Kallas & Pedaste, 2022). Digital competence is generally accepted as the ability of a person to use information technology skills and knowledge in his/her routine of work or career (Inamorato dos Santos et al., 2023). The skills that are required to use information technology are information skills, creation skills, and communication skills. Information technology skills and literacy are said to be vital to the transformation to the digital world, but such skills impact the digital competence of the users (Barboutidis & Stiakakis, 2023). Moreover, creation skills in information technology are used to develop new software and are essential in information technology innovation and expansion (Huu, 2023). As such, these skills are tested to find if they are related to digital competency.

### **2.1 Information skill**

Information skills are one of the areas that make up digital competence. Information literacy is one of the numerous literacies: library, computer, and media (Smestad et al., 2023). Information literacy involves reading skills and understanding how digital technology functions and how to use it effectively, which includes critical thinking and assessment of information, familiarity with technology and devices, ability to navigate through the Internet, and a good understanding of issues that are associated with digital technology and data privacy (Smestad et al., 2023). These skills are now seen as essential in the increasingly digital world, which is necessary to navigate and use the online environment successfully.

### **2.2 Creation skill**

Creation skills play an essential role in all areas of life, allowing individuals to create new content digitally. Creation skills play a massive role in creating digital materials, programming digital content and communicating in the digital world (Ferrari, 2013). The more creative skills, such as creating digital materials and content, the more understanding the individual has of the digital world (Lijie Hao, Kun Tian, Chin Hai Leng, Umi Kalsum Mohd Salleh, Shigang Ge & Xinliang Cheng, 2024). Researchers have often found that creative skills are needed to generate original and valuable ideas for innovative products, services, or procedures that have the potential to be beneficial for organizations (van Laar et al., 2020).

### **2.3 Communication skill**

Communication skills refer to the ability to access digital information effectively and clearly through the digital world. Good communication skills encompass various aspects of conveying messages accurately. As digital technologies have become primary tools for communication, communication skills are closely related to digital competence (Zhao, Llorente & Gomez, 2021). The critical and certain use of information technology for communication is digital competence. Communication is

part of information and communication technology (ICT), a skill related to digital competence and the digitization of higher education institutions. Communication skills are vital in utilizing digital platforms to convey messages and interact in the digital world. Digital competence has five components, which also include communication and collaboration. Collaboration and communication are viewed as the users' capacity to use ICT in a crucial, safe, and innovative way to achieve a variety of goals (Guillen-Gamez & Fernandez, 2020).

## 2.4 Perceived digital competence

Perceived digital competence has described and defined practical user skills, which involves information literacy to have a better understanding of digital skills. Digital competence is a specialized competence with applications of digital technologies for learning, and it is essential to apply it (Pedaste et al., 2023). Digital competence is a set of skills to use technology effectively for daily activities to improve productivity, learning, and performance (Zhao et al., 2021). European Commission defined digital competence as the use of information society technology for communication, fun, and business that was supported by information and communication technology for information retrieval, evaluation, storage, production, exchange of information, and collaboration networks via the Internet (Zhao et al., 2021). Digital competence is considered the necessary skill for effective development in both social and academics that will prepare students for future professional lives (Leví-Orta et al., 2020). In the education context, students' ability to use technology for accessing, acquiring, and evaluating gathered information and their ability to produce and communicate information from technology were considered digital competence (He & Li, 2019). Moreover, students' perceived digital competence is reflected in their information and communication technologies (ICT) basic knowledge and skills that are used to perform ICT-related tasks (Tzafilkou et al., 2022). Therefore, this study proposes that:

H1: Information skill has a significant relationship with perceived digital competence.

H2: Creation skill has a significant relationship with perceived digital competence.

H3: Communication skill has a significant relationship with perceived digital competence.

## 2.5 Attitude

Ajzen (2011) defined attitude as the acquired tendency to access an object, product, or service as favourable and adverse or favourable and unfavourable to facilitate adaptation to the environment (Anshu et al., 2022). Attitude is also defined as an acquired state that influences an individual's choice of personal action as a learning outcome (Kim et al., 2018). It refers to evaluating individuals on other individuals, events, or phenomena around them based on three attitudinal bases: affective, cognitive, and behavioural (Alahmed et al., 2017). Studies found that a well-planned process of communication skill learning leads to positive attitudes of an individual (Panczyk et al., 2019). Analyzing attitudes toward communication skills is essential due to the close relationship between individuals' attitudes and behaviour in social situations (Skodova et al., 2018). An individual attitude toward communication skills will influence the perception regarding the importance of the skill (Badaam et al., 2022).

Moreover, attitude also plays a vital role in creating information skills. The attitude of someone's willingness to explore new concepts and perspectives can lead to innovative and creative problem-solving (Ramdani et al., 2022). A positive attitude, adaptability, and curiosity toward technology can enhance individuals' creative potential and openness to exploring new ideas (Bukharbaeva & Sergeeva, 2020). As for information skills, people with a proactive attitude to seek and utilize

information tend to develop more vital information skills (Gottwald et al., 2023). Additionally, digital competence includes collaboration and sharing information. Furthermore, studies confirmed that digital competence is measured in terms of attitude, knowledge, and use of technologies (Kallas & Pedaste, 2022). Students' attitudes toward the usefulness of digital technology in learning influence how much they use digital devices.

Moreover, attitude towards technology influences cognition and behaviour as people with positive perceptions of technologies show that technologies are fun and satisfying (Kim et al., 2018). Therefore, an attitude that values collaboration and sharing information can facilitate the development of information skills in a digital context (van Laar et al., 2020). Positive attitudes toward technology have also been proven to improve student's capacities to engage with the application of digitalization in learning (Chen, Gao & Wang, 2023). Hence, it is crucial to consider the intervention of attitudes toward digital technologies that created students's engagement in the learning process (Hamalainen et al., 2021). Bergdahl et al. (2020) mentioned student's attitudes. While active participation in digital skills may be beneficial for some students, it is important to consider the potential drawbacks as well. Research by [James, Zhang, Li, Ziegelmayr, & Calderon, \(2022\)](#) suggests that excessive reliance on digital tools and technology can lead to decreased critical thinking skills and reduced ability to concentrate for extended periods of time. In addition to James et.al, (2022), students may become dependent on digital devices for learning, which could hinder their ability to engage in traditional forms of learning and communication effectively. Therefore, while digital skills may benefit, it is important to consider the potential negative impacts on student learning and academic performance. Therefore, this study proposes that:

H4: Attitude moderates the relationship between information skill and perceived digital competence.

H5: Attitude moderates the relationship between creation skills and perceived digital competence.

H6: Attitude moderates the relationship between communication skills and perceived digital competence

### 3.0 METHODOLOGY

The relationship between information, creation, and communication skills and perceived digital competence was investigated in this field study. Subsequently, the moderating effect of students' attitudes on the relationship was examined. A purposive sampling technique was employed to reach 435 students from local Malaysian universities who participated in this survey. The majority of the students were aged between 20-25 years old (n = 354, 78%), followed by 26 to 30 years old (n= 81, 22%). The instruments were adapted from Van Laar, et.al, (2019). In order to gather information regarding demographics, communication skills, creation skills, and information skills with perceived digital competence. All the items used a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree). The data collected was further analyzed using the Structural Equation Model (SEM) using Partial Least Square (PLS). By using this approach, measurements and structural model are applied to test the hypothesis and confirm the result.

When analyzing the reflective measurement model, the model applies a construct that reflects a particular phenomenon to develop a reflecting indicator. The rationale for this is that it can be expanded or contracted without changing the meaning of the construct (Rossiter, 2007). Coltman et al. (2008) and Edwards and Bagozzi (2000) found that the flow of causality typically occurs from the concept to the indicators. According to Urbach and Ahlemann (2010), indicators of reflective measures are considered to be an indication of the constructs. In the model, the constructs are presented as the reflective measurement model. The data collection has been further analyzed to

assess the indicator's reliability, as well as its internal consistency, convergent and discriminant validity (Sarstedt et al., 2014).

The structural model shows how the independent variable and dependent variables are connected. To test ideas, a structural model finds the paths coefficient and hypothesis testing of the factors that predict to associate with dependent variables. In addition, the coefficient ( $\beta$ ) can determine what percentage of exogenous change can be attributed to latent variables (Backhaus et al., 2002). R square is a phrase that has been made equal, and its number can be between 0 and 1. Following the results of Backhaus et al. (2002), no official statement about the  $R^2$  threshold numbers is acceptable.

#### 4.0 RESULTS

This section presents the results of the study. The research model was developed based on the reflective measurement model, as depicted in Figure 1. The Structural Equation Model (SEM) applied measurement and structural model. The measurement model aims to analyze the convergent validity based on the AVE (average variance extracted) and the discriminant validity based on the heterotrait-monotrait (HTMT) ratio of correlations. According to recent research, the AVE should have a minimum value of 0.50, which indicates that a construct accounts for at least half of the variance in its components (Guenther, Guenther, Ringle, Zaefarian, and Cartwright, 2023). Nevertheless, when there are just two indicators for a construct, AVE is invalid; in this scenario, AVEs greater than 0.50 would always be achieved in PLS-SEM, and researchers should be aware of this possibility.

The table above tabulates the result of the reliability and validity test. The constructs of attitude (CR=0.949, AVE=0.824), communication skills (CR=0.951, AVE=0.795), creation skills (CR=0.947, AVE=0.9) information skills (CR=0.961, AVE=0.658) and perceived digital competence (CR=0.947, AVE=0.782) has reached the recommended threshold values, which is greater than 0.7 for the composite reliability value (CR) and more than 0.5 for the average variance extracted (AVE) (Sarstedt, et.al, 2014). The result of the analysis confirmed that all the items are highly reliable and applicable to further the structural model analysis.

**Table 1: Construct reliability and validity**

Variables	Composite Reliability (CR)	Average Variance Extracted (AVE)
Attitude	0.949	0.824
Communication Skills	0.946	0.815
Creation skills	0.947	0.901
Information Skill	0.961	0.658
Perceived Digital Competence	0.947	0.782

In Table 2, shows the factor loading for each item measurement specifically the arrows that connect the specific variable to its related indicators. These connections are important because the analysis show how much a factor contributes to its recognized independent variable (IV). According to Guenther, et.al, (2023) that the factor loadings must be higher than 0.7 proven that the items of variables have high internal consistency which explained the high reliability testing. The result also shows a strong and significant link between the variables.

**Table 2: Factor loading**

Variables	Factor Loading	Variables	Factor Loading
Attitude1	0.913	Information2	0.801
Attitude2	0.898	Information3	0.844
Attitude3	0.909	Information4	0.806
Attitude4	0.912	Information5	0.813
Communication1	0.891	Information6	0.701
Communication2	0.924	Information7	0.815
Communication3	0.907	Information8	0.841
Communication4	0.889	Information9	0.840
Creation2	0.950	Information10	0.840
Creation3	0.947	Information11	0.876
Information1	0.707	Information12	0.852
Information13	0.792	PerceivedDigital3	0.892
PerceivedDigital1	0.882	PerceivedDigital4	0.892
PerceivedDigital2	0.895	PerceivedDigital5	0.861

Furthermore, the HTMT ratio is used to analyze the discriminant validity of the constructs. The fundamental principle of the HTMT approach is that the values must be less than either the 0.90 liberal or 0.85 conservative criterion (Henseler, Ringle, & Sarstedt, 2015). These thresholds indicate that the average indicator correlation across different constructs is substantially smaller than the average correlation within the constructs. There are two ways to use HTMT to assess discriminant validity: (1) as a criterion or (2) as a statistical test. For the test criteria, discriminant validity issues are present if the HTMT is greater than the value of 0.85 (Kline, 2011) or 0.90 (Gold, Malhotra & Segars, 2001). According to Henseler, Ringle, and Sarstedt (2015), the second test is to compare the null hypothesis ( $H_0: HTMT \geq 1$ ) to the alternative hypothesis ( $H_1: HTMT < 1$ ). If the confidence interval has a value of 1, this means there are problems with discriminant validity. Hence, the result From Table 3, the discriminant validity test, shows that the data is not redundant as the value of discriminant validity is not greater than 0.85 ( $< 0.85$ ). The results reveal that HTMT.85 is more likely

to indicate a lack of discriminant validity, an expected finding considering the criterion's lower threshold value.

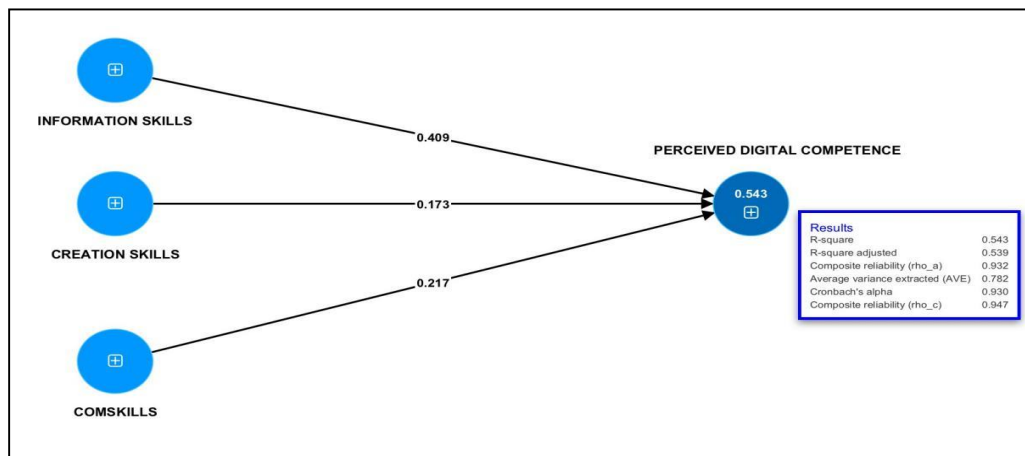
**Table 3: Heterotraitmonotrait ratio of correlation (HTMT)**

Variable	1	2	3	4
1. Attitude				
2. Communication Skills	0.702			
3. Creation skills	0.647	0.823		
4. Information Skill	0.758	0.840	0.783	
5. Perceived Digital Competence	0.755	0.719	0.691	0.746

In structural model analysis, it is very important to look at the estimated relationships within reflective measurement models. These relationships hold significance as they showcase an item's absolute contribution to its designated independent variable (IV). R Square ( $R^2$ ) is a crucial criterion for assessing the structural model results (Chin, 2009). The analysis results focus on the R-Square ( $R^2$ ) values in explaining dependent variables in the structural model (Sharma, Sarstedt, Shmueli, Kim, & Thiele, 2019). Table 4 shows 54.3 per cent ( $R^2 = 0.543$ ), and the adjusted R Square was 0.539 per cent, which is perceived digital competence explained by information, creation, and communication skills. After the intervention of attitude as moderation, the R-Square value increased to 0.605, with information, creation, and communication skills accounting for 60.5% of perceived digital competence. Other factors explained 39.5% of perceived digital competence.

**Table 4: R Square value analysis**

R Square BEFORE Moderation		R Square AFTER Moderation	
R Square	Adjusted R Square	R Square	Adjusted R Square
0.543	0.539	0.605	0.599



**Figure 1. Structural model before moderation**



The structural model analysis found that the beta values of information skill ( $\beta = 0.247$ ), creation skill ( $\beta = 0.111$ ) and communication ( $\beta = 0.154$ ) have a positive relationship with perceived digital competence. The hypotheses testing of H1 to H3 were supported as the t-values of information skill (t-value = 3.847), creation skill (t-value = 2.011) and communication (t-value = 2.841) were more significant than 1.96 with the p values was greater than 0.05 as shown in Table 5 below.

**Table 5: Structural model analysis**

Relationship	Beta Value	SE	P-Value	Result
Information skill-> Perceived Digital Competence	0.247	0.064	0.000	H1 : Supported
Creation skill-> Perceived Digital Competence	0.111	0.056	0.045	H2 : Supported
Communication skill-> Perceived Digital Competence	0.154	0.062	0.013	H3 : Supported

Information skills have a positive relationship towards perceived digital competency. The result explained that it has become increasingly important in today's digital age. With the abundance of information available online, it is crucial to possess the skills to effectively search, evaluate, and utilize digital information (Audrin & Audrin, 2022). Perceived digital competency refers to an individual's self-perception of their ability to use digital tools and technologies (Zulkifli et al., 2023). This perception can significantly impact how people engage with digital information and technology. As technology continues to advance, it is essential for individuals to continually develop and enhance their information skills and digital competency to navigate the digital landscape effectively (Murray et al., 2022). This can involve staying updated on the latest digital tools, understanding how to assess digital information for reliability critically, and developing the skills to communicate and collaborate using digital platforms.

In addition, creation skills have a positive relationship towards perceived digital competency. The result explained that individuals with solid creation skills tend to have a higher perceived digital competency (Zhang et al., 2021). This suggests that the ability to create digital content, such as graphics, videos, or written material, is closely linked to how competent an individual feels in using digital tools and technologies (Syahrin et al., 2023). This correlation highlights the importance of fostering creative skills and developing digital competencies (Lijie Hao et al., 2024). As organizations and individuals strive to thrive in an increasingly digital world, cultivating a combination of creation skills and digital competency will be crucial for success. (Karsenti et al., 2020).

Moreover, communication skills have a positive relationship towards perceived digital competency. The result explained that individuals with strong creation skills tend to have a higher perceived digital competency. Effective communication skills contribute to increased confidence and proficiency in utilizing digital tools and platforms (Aldahhan & Razak, 2023). This correlation suggests that individuals adept at expressing themselves, articulating ideas, and engaging in meaningful dialogues are likelier to feel comfortable and capable in their digital interactions (Musid et al., 2023). To further enhance perceived digital competency, it is essential to continue communication skills alongside the adoption of digital technologies. In today's increasingly digital world, the importance of communication skills in shaping perceived digital competency cannot be overstated (van Laaret. al, 2020). As technology continues to evolve and become more integrated into our daily lives, effectively communicating and engaging in meaningful dialogues becomes a

critical component of digital proficiency (Autry & Berge, 2011). Building on strong communication skills enhances an individual's confidence in digital tools and fosters a deeper understanding of leveraging digital tools for effective communication (Jamali & Krish, 2021). Therefore, students must prioritize the development of communication skills in tandem with adopting digital technologies, as this holistic approach will ultimately lead to a more well-rounded and proficient digital competency (Qureshi, Khan, Raza, Imran, & Ismail, 2021).

However, with attitude intervention as a moderating variable, the t-values were less than 1.96, and the p-values were more significant than 0.05, indicating that attitude does not moderate the relationship between communication skills, creation skills, information skills and the dependent variable, perceived digital competence. Hence, The results shown in Figure 3 concluded that H4, H5, and H6 were not supported. From the result as shown in Table 6, highlight the student's attitude is not a moderating variable for this study.

**Table 6: Moderating analysis**

Relationship	Beta Value	SE	P-Value	Result
Attitude x Information Skill -> Perceived Digital Competence	-0.092	0.058	0.128	H4: Not Supported
Attitude x Creation skill -> Perceived Digital Competence	0.082	0.063	0.211	H5:Not Supported
Attitude x Communication Skill -> Perceived Digital Competence	0.006	0.065	0.935	H6: Not Supported

One possible explanation is that students were not interested in learning new things or investigating applications that did not interest them. Some factors that could lead to students losing interest in what they are studying include overly distracting notifications, poorly planned learning activities, and an imbalance of technology resources (Bergdahl et al., 2018a). According to Salmela-Aro et al. (2016), social pressure to be online can lead to stress, tiredness, and feelings of inadequacy in students. While it is true that active participation in digital skills can bring benefits to some students, it is essential to acknowledge the potential drawbacks of overreliance on digital tools. Research by Yadav, Yadav, Punjabi, Sankhla, & Shukla, (2022) points out that excessive screen time and engagement with digital devices can lead to decreased physical activity levels among students, negatively affecting their overall health and well-being. Constant exposure to digital devices may also increase eye strain and other physical health issues.

Furthermore, some educators argue that an overemphasis on digital skills may lead to a neglect of essential non-digital skills (Raghuram et al., 2019). Traditional forms of learning, such as reading physical books and engaging in face-to-face discussions, are still crucial for developing well-rounded academic abilities (Polat et al., 2022). By focusing primarily on digital skills, students may take advantage of the opportunity to cultivate critical interpersonal and communication skills essential in the professional world. Another issue is the potential for digital skills to exacerbate student inequalities (Hass et al., 2023). Not all students have equal access to technology and digital resources, and an emphasis on digital skills in education could widen the gap between students with access to the latest technologies and those who do not have access.

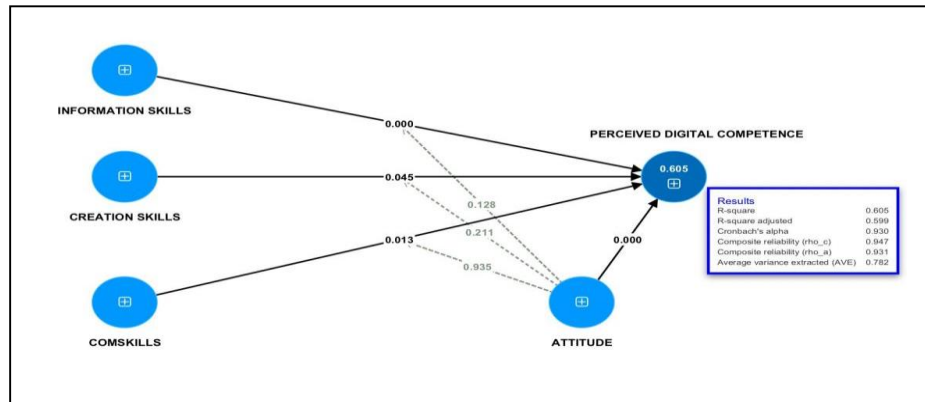


Figure 2: Structural model after moderation

## 5.0 CONCLUSION

This study aims to understand better the influence of soft, information, creation, and communication skills on the perceived digital competencies with the moderating effect of attitude and to evaluate a proposed research model. The data was analyzed to determine whether the hypothesis tested the relationship between independent, dependent, and moderator variables. The result has shown that communication and information skills significantly positively influence perceived digital competence, but creation skills do not. In addition, the result indicated that attitude does not moderate the relationship between each soft skill and the perceived digital competencies. However, attitudes are positively significant in the relationship towards perceived digital competencies. In summary, especially in the era of the Fourth Industrial Revolution, digital capabilities play a vital role in shaping students' careers by providing students with diverse skills that are highly relevant to this technology-driven world. Since students can adapt to various employment roles, this expands their job options.

Therefore, students must engage effectively in learning and embrace digital technologies to enhance their employability and career prospects. In addition, information skills and communication skills are crucial for students' digital competencies in their future careers. Information skills enable students to access up-to-date information critically, conduct in-depth analysis, and interpret the data to make decisions. Communication skills enable students to craft and deliver clear messages to the audience on digital platforms. These two skills enable students to process information effectively and to express and present themselves, thereby enhancing job performance by using digital technologies. Therefore, student attitudes toward digital competencies are critical to student career success as they have significant implications for individuals, organizations, and society today.

To address the potential drawbacks of excessive reliance on digital tools and technology, educators and institutions can implement strategies to promote balanced digital skills usage among students (Garlińska et al., 2023). One approach is incorporating digital literacy and critical thinking skills development into the curriculum. By teaching students how to evaluate the credibility of online sources and how to use digital tools effectively, educators can help students develop a more discerning approach to digital technology (Emidar et al., 2023). Another strategy is to promote a balanced use of digital and traditional learning methods. This can include setting guidelines for when and how digital tools should be used in learning and encouraging students to engage in offline activities that promote cognitive engagement and concentration. Additionally, providing support and resources for students struggling with digital skills or experiencing negative impacts from excessive technology use can help mitigate the potential drawbacks (Zhang, 2023).

Furthermore, creating a supportive and inclusive learning environment where students feel comfortable expressing preferences for different learning styles can help mitigate the negative impact of excessive digital reliance. Educators can provide diverse learning opportunities catering to various learning preferences, including digital and non-digital options (Omar et al., 2023). By implementing these strategies, educators and institutions can help students develop a balanced approach to digital skills usage, ensuring that they reap the benefits of digital technology while minimizing potential negative impacts on their learning.

This study has several limitations that need to be addressed in future studies. One of the major flaws of the study is the use of students of different ages, majors, genders, and digital skills. The backgrounds of these students may indicate differences in their previous and current digital experiences. This study did not investigate contextual variation associated with these different backgrounds because the goal was to explore a model that would fit all college students. However, group-specific comparisons using partial least squares might be used to investigate differences in future studies. Secondly, the degree of a student's perceived digital competencies needs to accurately reflect the actual level of the student's digital abilities, including knowledge and abilities. Third, this scenario might be biased since our sample comes from universities. It would be better to expand the sample size to enhance the generalizability of the study. In future studies, it might include students from other colleges. This study focuses on soft, communication, information, and creative skills to investigate their impact on perceived digital competencies moderated by college students' attitudes towards mastering digital technologies.

### Author's contribution

N.F.A.R contributed in conducting data collection and guide to conduct the analysis using Smart PLS. G.S, M.M, A.F, J.G, LZ and V.N contributed to analyze and writing the base of manuscript and preparing final write-up for final submission.

### Acknowledgment

This work was supported by the Universiti Teknologi MARA, Selangor, under Grant UCS(600-UiTMSEL(PI5/4)(047/2022).

### REFERENCES

- Ab Hamid, M. R., Sami, W., & Mohmad Sidek, M. H. (2017). Discriminant Validity Assessment: Use of Fornell & Larcker criterion versus HTMT Criterion. *Journal of Physics: Conference Series*, 890, 012163. <https://doi.org/10.1088/1742-6596/890/1/012163>
- Alahmed, M. I., Yusof, A., Saidon, A., Borhannudin, A., & Prihadi, K. (2017). Moderation role of attitude on the relationship between participation in competitive sports and academic performance of student-athletes in Saudi Arabia. *IFMBE Proceedings*, pp. 58, 19–24. [https://doi.org/10.1007/978-981-10-3737-5\\_5/COVER](https://doi.org/10.1007/978-981-10-3737-5_5/COVER)
- Aldahhan, A., & Razak, N. A. (2023). Literature Review of Using Digital Platforms in Enhancing Undergraduate Students' Communicative Competence. *Journal for ReAttach Therapy and Developmental Diversities*, 6(10s (2)), 1153-1160.
- Anshu, K., Gaur, L., & Singh, G. (2022). Impact of customer experience on attitude and repurchase intention in online grocery retailing: A moderation mechanism of value co-creation. *Journal of Retailing and Consumer Services*, p. 64, 102798. <https://doi.org/10.1016/J.JRETCONSER.2021.102798>

- Audrin, C., & Audrin, B. (2022). Critical factors in digital literacy in learning and education: a systematic literature review using text mining. *Education and Information Technologies*, 27(6), 7395-7419.
- Autry Jr, A. J., & Berge, Z. (2011). Digital natives and digital immigrants: getting to know each other. *Industrial and commercial training*, 43(7), 460-466.
- Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & health*, 26(9), 1113-1127.
- Backhaus, K. B., Stone, B. A., & Heiner, K. (2002). Exploring the relationship between corporate social performance and employer attractiveness. *Business & Society*, 41(3), 292-318.
- Badaam, K. M., Shaikh, S. M., & Badaam, M. (2022). Assessment of Attitude of First Year Medical Undergraduate Students Towards Communication Skills Training: A Cross-sectional Study. *Journal of Clinical and Diagnostic Research*, 16(5), 5-08. <https://doi.org/10.7860/JCDR/2022/53468.16313>
- Barboutidis, G., & Stiakakis, E. (2023). Identifying the Factors to Enhance Digital Competence of Students at Vocational Training Institutes. *Technology, Knowledge and Learning*. Retrieve from: <https://doi.org/10.1007/s10758-023-09641-1>.
- Bergdahl, N., Nouri, J. & Fors, U. (2020). Disengagement, engagement and digital skills in technology-enhanced learning. *Education Information Technology*, 25, 957-983 (2020). <https://doi.org/10.1007/s10639-019-09998-w>
- Bukharbaeva, A. R., & Sergeeva, L. V. (2020). Clip thinking of Generation Z: Methods of developing students' creative potential. *RUDN Journal of Studies in Literature and Journalism*, 25(4), 787-796. <https://doi.org/10.22363/2312-9220-2020-25-4-787-796>
- Chen, F., Gao, Y., & Wang, X. (2023). Exploring the role of TESOL and digital technology in attitudinal change and sustainable learning for students of higher education. *BMC psychology*, 11(1), 320.
- Chin, W. W. (2009). Bootstrap cross-validation indices for PLS path model assessment. In *Handbook of partial least squares: Concepts, methods and applications* (pp. 83-97). Berlin, Heidelberg: Springer Berlin Heidelberg.
- Coltman, T., Devinney, T. M., Midgley, D. F., & Venaik, S. (2008). Formative versus reflective measurement models: Two applications of formative measurement. *Journal of Business Research*, 61(12), 1250-1262.
- Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods*, 5(2), 155-174.
- Emidar., Indriyani, V., & Ningsih, A G. (2023, July 6). The Effect of Digital Literacy and Writing Skills on The Skills of Developing Teaching Materials for Prospective Teacher Students. <https://doi.org/10.31851/jmksp.v8i2.11457>
- Ferrari, A. (2013). DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe. European Commission. *JRC Scientific and Policy Reports*. doi:10.2788/52966
- Garlińska, M., Osial, M., Proniewska, K., & Pręgoska, A. (2023, March 25). The Influence of Emerging Technologies on Distance Education. <https://doi.org/10.3390/electronics12071550>
- Garzon Artacho, E., Martínez, T. S., Ortega Martin, J. L., Marin Marin, J. A., & Gomez Garcia, G. (2020). Teacher training in lifelong learning—The importance of digital competence in encouraging teaching innovation. *Sustainability*, 12(7), 2852.
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of management information systems*, 18(1), 185-214.
- Gottwald, V., Davies, M., & Owen, R. (2023). Every story has two sides: evaluating information processing and ecological dynamics perspectives of focus of attention in skill acquisition. *Frontiers in Sports and Active Living*, 5. <https://doi.org/10.3389/FSPOR.2023.1176635>
- Guenther, P., Guenther, M., Ringle, C. M., Zaefarian, G., & Cartwright, S. (2023). Improving PLS-SEM use for business marketing research. *Industrial Marketing Management*, pp. 111, 127-142.

- Guillen-Gamez, F. D., & Fernandez, M. J. M. (2020). Prediction of Factors That Affect the Knowledge and Use Higher Education Professors from Spain Make of ICT Resources to Teach, Evaluate and Research: A Study with Research Models in Educational Technology. MDPI. *Education Science*, 10(10), 276. <https://doi.org/10.3390/educsci10100276>
- Guenther, P., Guenther, M., Ringle, C. M., Zaefarian, G., & Cartwright, S. (2023). Improving PLS-SEM use for business marketing research. *Industrial Marketing Management*, 111, 127-142.
- Hamalainen, R., Nissinen, K., Mannonen, J., Lämsä, J., Leino, K., & Taajamo, M. (2021). Understanding teaching professionals' digital competence: What do PIAAC and TALIS reveal about technology-related skills, attitudes, and knowledge? *Computers in Human Behavior*, 117, 106672. <https://doi.org/10.1016/J.CHB.2020.106672>
- Hass, D., Hass, A., & Joseph, M. (2023). Emergency online learning & the digital divide: An exploratory study of the effects of COVID-19 on minority students. *Marketing Education Review*, 33(1), 22-37.
- He, T., & Li, S. (2019). A comparative study of digital informal learning: The effects of digital competence and technology expectancy. *British Journal of Educational Technology*, 50(4), 1744-1758. <https://doi.org/10.1111/BJET.12778>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of The Academy Of Marketing Science*, 43, 115-135.
- Huu, P. T. (2023). Impact of employee digital competence on the relationship between digital autonomy and innovative work behaviour: a systematic review. *Artificial Intelligence Review*. Retrieve from: <https://doi.org/10.1007/s10462-023-10492-6>.
- Inamorato dos Santos, A., Chinkes, E., Carvalho, M. A. G., Solórzano, C. M. V., & Marroni, L (2023). The digital competence of academics in higher education: Is the glass half empty or half complete? *International Journal of Educational Technology in Higher Education*, 20(1). Retrieve from: <https://doi.org/10.1186/s41239-022-00376-0>
- Jackman, J A., Gentile, D A., Cho, N., & Park, Y. (2021, March 11). Addressing the digital skills gap for future education. <https://doi.org/10.1038/s41562-021-01074-z>
- Jamali, M., & Krish, P. (2021). Fostering 21st-century skills using an online discussion forum in English for specific purposes. *Malaysian Journal of Learning and Instruction*, 18(1), 219-240. <https://doi.org/10.32890/mjli2021.18.1.9>
- James, T. L., Zhang, J., Li, H., Ziegelmayer, J. L., & Villacis-Calderon, E. D. (2022). The moderating effect of technology overload on the ability of online learning to meet students' basic psychological needs. *Information Technology & People*, 35(4), 1364-1382.
- Kallas, K., & Pedaste, M. (2022). How to Improve the Digital Competence for E-Learning? *Applied Sciences*, 12(13). <https://doi.org/10.3390/app12136582>
- Karsenti, T., Poëllhuber, B., Parent, S., & Michelot, F. (2020, January 1). What is the Digital Competency Framework? <https://doi.org/10.18162/ritpu-2020-v17n1-04>
- Kim, H. J., Hong, A. J., & Song, H. D. (2018). The Relationships of Family, Perceived Digital Competence and Attitude, and Learning Agility in Sustainable Student Engagement in Higher Education. *Sustainability*, 10(12), 4635. <https://doi.org/10.3390/SU10124635>
- Levi-Orta, G., Sevillano-García, L., & Vázquez-Cano, E. (2020). An evaluation of university students' latent and self-perceived digital competence in the use of mobile devices. *European Journal of Education*, 55(3), 441-455. <https://doi.org/10.1111/EJED.12404>
- Lijie Hao, Kun Tian, Chin Hai Leng, Umi Kalsum Mohd Salleh, Shigang Ge & Xinliang Cheng. (2024). The effect of project-based learning and project-based flipped classroom on critical thinking and creativity for business English course at Higher Vocational Colleges. *Malaysian Journal of Learning and Instruction*, 21(1), 159-189. <https://doi.org/10.32890/mjli2024.21.1.6>

- Martzoukou, K. Fulton, C., Kostagiolas, P., Lavranos, C. (2020). 'A study of higher education students' self-perceived digital competencies for learning and everyday life online participation', *Journal of Documentation*, 76(6), pp. 1413–1458. doi:10.1108/jd-03-2020-0041.
- Murray, M., Pérez, J., & Fluker, J. (2022, January 1). Digital Literacy in the Core: The Emerging Higher Education Landscape. <https://doi.org/10.28945/4957>
- Omar, M K., Ruzaidi, D U A., Puad, M H M., & Jusoh, R. (2023, June 25). How Digitalized are School Students? Determining Digital Competencies and Motivation Factors in Using Technology for Learning. <https://doi.org/10.6007/ijarped/v12-i2/17382>
- Pallister, B. (2023). What is Correlational Research Design? Innovolo Group. Retrieve from: <https://innovolo-group.com/market-research-terminology/market-research-glossary-c/what-is-correlational-research-design/>
- Panczyk, M., Iwanow, L., Zarzeka, A., Jaworski, M., & Gotlib, J. (2019). Communication skills attitude scale: a translation and validation study in a sample of registered nurses in Poland. *BMJ Journals*, 9(5), e028691. <https://doi.org/10.1136/BMJOPEN-2018-028691>
- Pedaste, M., Kallas, K., & Baucal, A. (2023). Digital competence test for learning in schools: Development of items and scales. Elsevier. *Computers and Education*, Vol 203. <https://doi.org/10.1016/j.compedu.2023.104830>
- Polat, E., Hopcan, S., & Arslantas, T K. (2022, May 20). The Association between Flipped Learning Readiness, Engagement, Social anxiety, and Achievement in Online Flipped Classrooms: a Structural Equational Modeling. <https://doi.org/10.1007/s10639-022-11083-8>
- Qureshi, M. I., Khan, N., Raza, H., Imran, A., & ismail, F. (2021). Digital Technologies in Education 4.0. Does it Enhance the Effectiveness of Learning? A Systematic Literature Review. *International Journal of Interactive Mobile Technologies (IJIM)*, 15(04), pp. 31–47. <https://doi.org/10.3991/ijim.v15i04.20291>
- Raghuram, S., Hill, N S., Gibbs, J L., & Maruping, L M. (2019, January 1). Virtual Work: Bridging Research Clusters. <https://doi.org/10.5465/annals.2017.0020>
- Ramdani, Z., Hadiana, D., Amri, A., Warsihna, J., Widodo, W., Chandra, D. T., & Sopandi, E. (2022). The Mediating Role of Attitude in the Correlation between Creativity and Curiosity Regarding the Performance of Outstanding Science Teachers. *Indonesian Journal of Science Education*, 11(3), 412–419. <https://doi.org/10.15294/jpii.v11i3.37272>
- Rennocks, S. (2022) What are Digital Skills & Why are they important?, LinkedIn. Available at: <https://www.linkedin.com/pulse/what-digital-skills-why-important-rto-managing-director/> (Accessed: October 7 2023).
- Rossiter, J. R. (2007). Toward a valid measure of e-retailing service quality. *Journal of Theoretical and Applied Electronic Commerce Research*, 2(3), 36-48.
- Salmela-Aro, K., Moeller, J., Schneider, B., Spicer, J., & Lavonen, J. (2016). Integrating the light and dark sides of student engagement using person-oriented and situation-specific approaches. *Learning and Instruction*, 43, 61-70.
- Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair Jr, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of family business strategy*, 5(1), 105-115.
- Sharma, P., Sarstedt, M., Shmueli, G., Kim, K. H., & Thiele, K. O. (2019). PLS-based model selection: The role of alternative explanations in information systems research. *Journal of the Association for Information Systems*, 20(4), 4.
- Skodova, Z., Bánovcinova, L., & Bánovčínová, A. (2018). Attitudes towards communication skills among nursing students and its association with a sense of coherence. *Kontakt*, 20(1), e17–e22. <https://doi.org/10.1016/J.KONTAKT.2017.09.014>
- Smestad, B., Hatlevik, O. E., Johannesen, M. & Ogrim, L. (2023). Examining teacher's digital competence dimensions: A systematic review pre- and during Covid-19. *Heliyon*, 9(6). <https://doi.org/10.1016/j.heliyon.2023.e16677>

- Syahrin, S., Almashiki, K., & Alzaanin, E. (2023, January 1). The Impact of COVID-19 on Digital Competence. <https://doi.org/10.14569/ijacsa.2023.0140156>
- Tzafilkou, K., Perifanou, M., & Economides, A. A. (2022). Development and validation of students' digital competence scale (SDiCoS). *International Journal of Educational Technology in Higher Education*, 19(1), 1–20. <https://doi.org/10.1186/S41239-022-00330-0/TABLES/7>
- Urbach, N., & Ahlemann, F. (2010). Structural equation modeling in information systems research using partial least squares. *Journal of Information Technology Theory and Application (JTITA)*, 11(2), 2.
- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. *SAGE*, 10(1). <https://doi.org/10.1177/2158244019900176>
- Yadav, A., Yadav, K., Punjabi, P., Sankhla, M., & Shukla, J. (2022). Analysing the effect of lockdown on physical activity, screen time, and emotional wellbeing among young medical students of india during the COVID-19 pandemic. *Journal of Medical Education*, 21(1).
- Zhang, W. (2023, March 1). Does the Use of Electronic Devices in-class Cause Distractions to Students in high school?. <https://doi.org/10.54254/2753-7048/2/2022646>
- Zhang, Y., Llorente, A M P., & Sánchez-Gómez, M C. (2021, July 1). Digital competence in higher education research: A systematic literature review. <https://doi.org/10.1016/j.compedu.2021.104212>
- Zhao, Y., Llorente, A. M. P., & Gómez, M. C. S. (2021). Digital competence in higher education research: A systematic literature review. *Computers & Education*, 168, 104212.
- Zulkifli, I Z., Mohammad, N H., Sarkam, N A., & Razi, N F M. (2023, May 17). Examining Digital Literacy Towards ICT Among Students Based on Demographic Profile: A Descriptive Analysis Approach. <https://doi.org/10.6007/ijarped/v12-i2/17125>