

Factors Influencing Students' Efforts to Develop Personal Digital Competence

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Abstract: This paper focuses on investigating the factors influencing students' efforts to develop personal digital competence. Based on the European Commission's DigComp 2.0 framework, the study proposes a model of factors affecting students' motivation and effort in developing their digital skills. Survey data from a Vietnamese university reveal five positively associated factors: digital communication and collaboration (most influential), digital problem solving, interest, information and data literacy, and satisfaction. The findings suggest that both individual initiative and institutional support are essential. Differences in student effort were also found by academic program, academic year, and exposure to digital devices.

Keywords: Digital Competence, DigComp 2.0 framework, Efforts, Motivation.

I. INTRODUCTION

In the context of the rapidly advancing Fourth Industrial Revolution, the world is witnessing the explosive growth of the digital era. Technology is regarded as a key factor in shaping and developing new modes of production for organizations and enterprises. The significant progress in science and technology has created numerous career opportunities, while also posing considerable challenges for the workforce. Against this backdrop, reforming education, particularly higher education has become an inevitable trend. Consequently, higher education must place greater emphasis on equipping students with digital competencies, with the aim of cultivating a workforce capable of adapting to and thriving in today's dynamic and unpredictable labor market.

Gilster (1998) first introduced the idea of digital competence, which he described as the capacity to comprehend and use information from a variety of digital sources. Digital competence is not confined merely to an understanding of technical functions, nor is it limited to the efficient use of digital resources. According to the European Union's DigComp framework, digital competence encompasses not only the ability to use technology but also the capacity to solve problems, communicate, create digital content, and ensure information security in digital environments. According to the European Commission (2019), "Digital competence involves the confident, critical and responsible use of digital technologies for learning, work, and participation in society. It includes information and data literacy, communication and collaboration, digital content creation (including programming), safety (including digital well-being and cyber security), intellectual property-related skills, problem-solving, and critical thinking." Notably, during the outbreak of COVID-19 across most countries, education systems underwent rapid transformations, further amplifying the demand for digital competence among university students (Toquero, 2020).

In the context of an increasing disparity in digital competence among individuals during the digital transformation process, the need for a unified competence framework has become apparent. Such a framework is essential for defining and assessing relevant skills to help

measure and enhance individuals' digital competencies. Among the widely adopted frameworks is DigComp, developed by the Joint Research Centre of the European Commission. In 2016, the DigComp 2.0 version was introduced, comprising five key domains: (1) Communication and collaboration; (2) Information and data literacy; (3) Digital content creation; (4) Problem-solving; and (5) Safety in digital environments. However, according to Cabezas & Casillas (2020), the majority of students today still lack the requisite level of digital competence. Therefore, it is crucial to implement measures aimed at strengthening these competencies. One of the most influential factors in the development of digital competence is students' intrinsic motivation. This study focuses on identifying the factors that influence students' efforts to develop their personal digital competence. Based on the research findings, the authors propose several recommendations for both students and educational institutions to promote and enhance students' motivation in developing digital competence.

II. OVERVIEW OF EFFORT AND ITS INFLUENCE ON THE DEVELOPMENT OF DIGITAL COMPETENCE

Effort is derived from motivation; when learners possess motivation toward a specific goal, they are inclined to exert effort to attain that goal. Motivation can be defined as the internal drive that stimulates cognitive processes, emotions, and behaviors aimed at satisfying desires and needs to accomplish certain tasks or achieve specific objectives. According to Matsumoto (2009), motivation refers to the exertion of effort in the pursuit of a goal. Furthermore, motivation serves as a critical factor in fostering the development of knowledge and competencies, thereby exerting a significant influence on individual academic performance (see Williams-Pierce, 2011).

Motivation is a multifaceted construct shaped by various factors that collectively contribute to enhancing learners' effectiveness. However, within the context of this study, motivation is defined as a driving force that influences cognition, emotions, and behaviors aimed at fulfilling desires and needs to achieve a certain level of satisfaction. Numerous factors affect the formation of motivation, including attitudes,

self-confidence, goals, level of engagement, environment, and personal values.

Learning motivation has a significant impact on academic outcomes. Chen et al. (2014) suggest that a decline in learners' academic performance may stem from a lack of motivation. Students who lack motivation tend to exhibit poor performance in achieving their learning goals (Awanbor, 2005). Active student engagement in the learning process is regarded as an indicator of learning motivation (Taormina & Gao, 2013). Therefore, in the teaching process, activities that promote intellectual development and cultivate critical thinking can be employed to stimulate students' learning motivation. Additionally, attitudes or interest toward learning can enhance the practice of digital competencies among learners in educational institutions, leveraging it as an effective learning method.

There are several notable studies examining the influence of motivation on the development of students' digital competencies. For example, the study by Reinhard Bernsteiner and colleagues (2020) found that even short-term exposure to new technologies and related skills can significantly stimulate students' interest in pursuing further education in these areas. Additionally, the research by Omar et al. (2022) identified the extent to which factors such as attitudes, skills, and knowledge affect motivation as the dependent variable. However, this study only utilized Pearson's correlation coefficient (r) to examine the overall level of influence and did not develop a model to evaluate the specific impact of each factor on the effort to develop digital competencies.

In Vietnam, there is currently limited research on digital competencies in general and on the effort to develop digital skills in particular. Some notable research includes the study by Nguyen Thi Thu Thuy and colleagues (2022), which investigated factors influencing digital skills and adaptability of students amid digital transformation at Ho Chi Minh City University of Technology and Education. Their findings indicated that behavioral factors, individual traits, and instructors significantly influence these outcomes. Based on this, the authors proposed four solutions to enhance students' digital skills and adaptability in the digital context.

Furthermore, drawing on the work of Zhao et al. (2021) and referencing the European Digital Competence Framework, Nguyen Ngoc Nam and colleagues (2023) developed a framework to explore the digital competencies of students at Hue University. However, in this study, the factor of effort was not clearly addressed. The research was limited to data collection, evaluation, and analysis, without proposing recommendations to improve students' digital competencies.

III. RESEARCH MODEL AND HYPOTHESES

3.1 Hypothesis

The study by Omar et al. (2022) analyzed the overall impact of various digital skills on students' personal efforts, including the assessment of the influence of skills such as information searching, filtering, evaluation, critical thinking development, and management of digital content on students' effort to develop digital competencies. Therefore, we propose the following hypothesis:

H1: Information and data competency positively influences students' motivation to develop digital competencies.

According to Vuorikari et al. (2022), communication and collaboration competencies in digital environments include skills such as interacting, sharing, and cooperating through digital technologies, as well as demonstrating courteous behavior in cyberspace. Based on this, we propose the following hypothesis:

H2: Communication and collaboration competencies in digital environments positively influence students' motivation to develop digital competencies.

The study by Zhao et al. (2021) indicates that digital content creation competency encompasses skills such as creating and developing digital content; awareness of copyright and licensing for editing digital content; and programming skills. Additionally, Nguyen Ngoc Nam and colleagues (2023) assessed creativity competency through the level of understanding and ability to use specialized applications and tools, basic theories related to intellectual property laws, and other relevant factors. Based on these findings, the third hypothesis is proposed as follows:

H3: Digital content creation competency positively influences students' motivation to develop digital competencies.

The study by Tran Duc Hoa and Do Van Hung (2021) suggests that digital safety competency includes skills such as proficiency in managing digital footprints, protecting personal information, and recognizing risks. Furthermore, Omar et al. (2022) examined the overall impact of various digital skills on students' personal effort. Based on these insights, we propose the following hypothesis:

H4: Digital safety competency positively influences students' motivation to develop digital competencies.

According to Zhao et al. (2021), digital problem-solving ability encompasses the capacity to recognize problems and demands in online settings. The study by Nguyen Ngoc Nam and colleagues (2023) also addresses the assessment of creativity through adaptability, resolving digital challenges, and the ability to select appropriate services and devices according to needs. Based on this foundation, we propose the following hypothesis:

H5: Digital problem-solving competency positively influences students' motivation to develop digital competencies.

According to Dang Doan Phi Hung and colleagues (2022), satisfaction is a subjective perception of learners regarding educational methods. The level of satisfaction serves as evidence that the methods are appropriate and successful in promoting cognitive engagement in learning. Therefore, to achieve student satisfaction, the educational environment must enhance students' learning experiences, improve teaching processes, and refine both self-assessment and formal evaluation procedures. Omar et al. (2023) define satisfaction as a factor influencing students' learning motivation. According to Matsumoto (2009), motivation is understood as the effort to pursue a set goal. Based on these foundations, we propose the following hypothesis:

H6: Satisfaction positively influences students' motivation to develop digital competencies.

According to Ainley (2006), interest is defined as an emotional state representing the learner’s active engagement in the learning experience, arising from stimuli, impulses, or positive personal enthusiasm. O’Keefe et al. (2017) argue that interest, motivation, and engagement are closely interrelated. Therefore, we propose the following hypothesis:

H7: Interest positively influences students' motivation to develop digital competencies.

3.2 Research Model

The research model comprises seven groups of factors influencing the effort to develop students’ digital competencies. These seven groups are measured by 54 observed variables. The survey items corresponding to each observed variable are assessed using a 5-point Likert scale (ranging from "Strongly Disagree" to "Strongly Agree"). Additionally, four demographic factors are included: gender, academic year, faculty of study, and duration of exposure to digital devices.

TABLE 1: Description of Variables in the Model

Description of Variables
Information and Data Literacy (IDL)
IDL1: I am proficient in using information and communication technology (ICT) to search for, identify, select, evaluate, process, store, cite, and communicate information.
IDL2: I utilize specialized search tools (e.g., Google Scholar, WolframAlpha...) and advanced search features.
IDL3: I can determine what type of information is available on which sources, thereby constructing effective search strategies based on this knowledge.
IDL4: I analyze and evaluate information, data sources, and digital content, verifying the validity and currency of the information retrieved.
IDL5: I employ various methods and tools to manage and store information, data, and digital content for easy access.
IDL6: I have my own strategies for organizing, structuring, and retrieving information and data.
IDL7: I am satisfied with the results of my information searches.
IDL8: I am able to identify key concepts and keywords that describe my information needs.
Communication and Collaboration (CMC)
CMC1: I communicate and interact through various digital devices and applications (SMS, Email, Messenger, Zalo, online meeting platforms, etc.).
CMC2: I participate in social networks, forums, and online communities to share knowledge, multimedia content, and information.
CMC3: I use digital technologies and media to collaborate in group work.
CMC4: I use collaborative tools to plan, implement, and share progress on activities and projects.
CMC5: I am familiar with digital etiquette and norms in online environments.
CMC6: I stay informed and conscious of ethical considerations when using the Internet.
CMC7: I remind family and friends about the basic norms of online behavior.
CMC8: I know how to create and manage public, personal, and professional profiles on social media platforms.
CMC9: I am able to manage multiple digital identities depending on goals or contexts.
CMC10: I can use digital platforms to conduct buying and selling activities.
CMC11: I can use digital platforms for financial transactions such as money transfers and bill payments.
Digital Content Creation (DGC)
DGC1: I use a variety of tools and software to create multimedia content in different formats (text, images, audio, video, etc.).
DGC2: I can use different media and methods to present ideas creatively.
DGC3: I am capable of editing, refining, enhancing, and integrating existing resources to generate relevant new content and knowledge.
DGC4: I have a basic understanding of intellectual property laws and content licensing when working with digital technologies.
DGC5: I can customize, modify software applications, settings, and devices when necessary.
DGC6: I am proficient in using specialized software relevant to my field of study.
Safety in digital environments (SFT)
SFT1: I understand the risks associated with using digital tools and devices.
SFT2: I take measures to protect my devices and multimedia content.
SFT3: I maintain data security and safeguard my privacy.
SFT4: I am aware of the health risks related to technology use.
SFT5: I prevent and avoid both physical and mental health threats when using the Internet and multimedia devices.
SFT6: I am aware of both the positive and negative environmental impacts of technology use.
SFT7: I implement basic measures to save energy, recycle outdated devices, and protect the environment.
Digital Problem Solving Competence (PRB)
PRB1: I am familiar with using digital devices and can identify potential technical issues.
PRB2: I resolve everyday technical problems.
PRB3: I can evaluate and choose appropriate tools, devices, or services to complete tasks and meet my needs.
PRB4: I stay updated on emerging and innovative technologies by using them.
PRB5: I actively participate in digital creativity events and workshops, as well as multimedia and digital projects.
PRB6: I understand the importance of continuously improving and updating my digital competences, and I support others in developing theirs.
Satisfaction in Digital Environments (STF)
STF1: I feel satisfied when learning activities are conducted using technology.
STF2: Digital competence helps me find the information I want to know.
STF3: I feel happy when digital learning takes place smoothly.
STF4: Learning activities that involve technological applications require me to think carefully in order to complete them.
STF5: Using digital competence makes it easier for me to communicate in work-related contexts with learners or colleagues.
Interest in Digital Technologies (INT)
INT1: I enjoy learning new skills for using digital applications.
INT2: I am not hesitant to ask instructors how to use technological applications introduced in class.
INT3: I am consistently encouraged by my instructors to learn how to use technology.
INT4: I am willing to participate in training courses to develop digital skills.
INT5: My school promotes the use of digital competence in teaching.
INT6: My school places importance on investing in the development of digital platforms for teaching purposes.

Effort to Develop Digital Competence (EFF)

- EFF1: I strive to master and understand how to use digital applications in learning and work.
- EFF2: I actively participate in learning activities that involve digital applications or technology.
- EFF3: I adapt well to digital-based learning and working environments.
- EFF4: I consistently reflect from multiple perspectives on the benefits of using digital applications in learning and work.
- EFF5: I support my peers in enhancing their understanding of and interest in using digital applications.

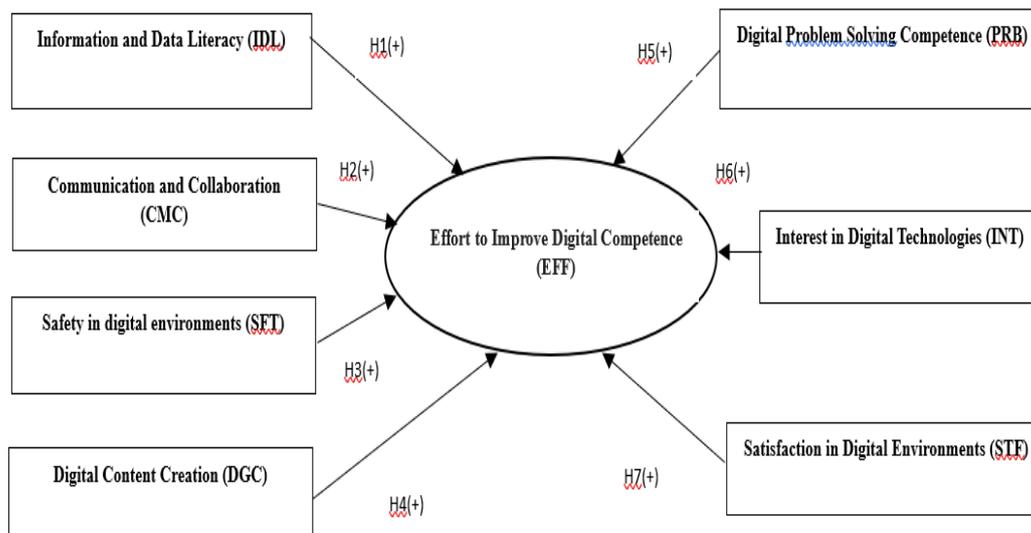


Figure 1. Proposed Research Model.

3.3 Research Data

Firstly, according to Hair (2006), to ensure effective Exploratory Factor Analysis (EFA), a minimum of 5 observations per variable is required. In this study, with 54 observed variables, the minimum sample size should be $5 \times 54 = 270$ observations. Additionally, Tabachnick et al. (1991) asserted that to achieve optimal results in regression analysis, the sample size must exceed $50 + 8p$, where p is the number of variables.

In this study, we conducted an official survey of over 300 students at the Banking Academy of Vietnam, representing most majors. The data collection period was from February 5, 2024, to April 5, 2024, yielding 300 valid questionnaires and 5 invalid ones. Thus, the dataset of 300 records satisfies both conditions: exceeding 270 observations required for EFA and surpassing 114 needed to develop a linear model.

IV. RESULTS AND DISCUSSION

Table 2 shows a notable gender imbalance among students in the economics faculties. Out of 495 survey responses, 191 (63.7%) were female, while 109 (36.3%) were male. The majority of respondents were first-year and third-year students, accounting for 36% and 38.67% of the data, respectively. Additionally, 57.67% of the surveyed students reported having more than six years of exposure to digital devices, whereas only 1.67% indicated that they had been exposed to digital devices for approximately one year or less.

First, we conducted Exploratory Factor Analysis (EFA) and reliability analysis to preliminarily validate the measurement scales. The results in Table 3 show that the

Cronbach’s Alpha coefficients for all scales are greater than 0.9. Additionally, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.948, which is above the threshold of 0.5, and the significance value (Sig.) is 0.000, which is less than 0.05; therefore, the EFA results are acceptable. Moreover, seven factors were extracted with eigenvalues greater than 1, accounting for a cumulative variance of 84.784%, which exceeds the 50% threshold, indicating that these seven factors explain 84.784% of the total variance in the data. Furthermore, the rotated factor matrix shows that each variable has a single loading without overlap across factor groups, suggesting the absence of problematic variables that could negatively affect the subsequent model.

TABLE 2. Characteristics of the Observed Sample.

Characteristics		Freq.	Pct. (%)
Sex	Male	109	36.3
	Female	191	63.7
	Total	300	100.0
Year of Study at University	Third-year student	116	38.7
	Second-year student	36	12.0
	First-year student	108	36.0
	Fourth-year students and beyond	40	13.3
	Total	300	100.0
Duration of Exposure to Digital Devices	1-3 years	75	25.0
	3-6 years	47	15.7
	< 1 year	5	1.7
	> 6 years	173	57.7
	Total	300	100.0

TABLE 3: Results of Exploratory Factor Analysis.

Scale, Items, Cronbach α and Factor loading (given in parentheses)
<p>1. Effort to Develop Digital Competence (EFF), $\alpha = 0.952$ EFF1: I strive to master and understand how to use digital applications in learning and work. (0.912) EFF2: I actively participate in learning activities that involve digital applications or technology. (0.928) EFF3: I adapt well to digital-based learning and working environments. (0.927) EFF4: I consistently reflect from multiple perspectives on the benefits of using digital applications in learning and work. (0.921) EFF5: I support my peers in enhancing their understanding of and interest in using digital applications. (0.889)</p>
<p>2. Information and Data Literacy (IDL), $\alpha = 0.969$ IDL1: I am proficient in using information and communication technology (ICT) to search for, identify, select, evaluate, process, store, cite, and communicate information. (0.613) IDL2: I utilize specialized search tools (e.g., Google Scholar, WolframAlpha...) and advanced search features. (0.603) IDL3: I can determine what type of information is available on which sources, thereby constructing effective search strategies based on this knowledge. (0.718) IDL4: I analyze and evaluate information, data sources, and digital content, verifying the validity and currency of the information retrieved. (0.671) IDL5: I employ various methods and tools to manage and store information, data, and digital content for easy access. (0.652) IDL6: I have my own strategies for organizing, structuring, and retrieving information and data. (0.703) IDL7: I am satisfied with the results of my information searches. (0.659) IDL8: I am able to identify key concepts and keywords that describe my information needs. (0.654)</p>
<p>3. Communication and Collaboration (CMC), $\alpha = 0.978$ CMC1: I communicate and interact through various digital devices and applications (SMS, Email, Messenger, Zalo, online meeting platforms, etc.). (0.890) CMC2: I participate in social networks, forums, and online communities to share knowledge, multimedia content, and information. (0.855) CMC3: I use digital technologies and media to collaborate in group work. (0.868) CMC4: I use collaborative tools to plan, implement, and share progress on activities and projects. (0.854) CMC5: I am familiar with digital etiquette and norms in online environments. (0.813) CMC6: I stay informed and conscious of ethical considerations when using the Internet. (0.853) CMC7: I remind family and friends about the basic norms of online behavior. (0.805) CMC8: I know how to create and manage public, personal, and professional profiles on social media platforms. (0.858) CMC9: I am able to manage multiple digital identities depending on goals or contexts. (0.771) CMC10: I can use digital platforms to conduct buying and selling activities. (0.788) CMC11: I can use digital platforms for financial transactions such as money transfers and bill payments. (0.790)</p>
<p>4. Digital Content Creation (DGC), $\alpha = 0.955$ DGC1: I use a variety of tools and software to create multimedia content in different formats (text, images, audio, video, etc.). (0.674) DGC2: I can use different media and methods to present ideas creatively. (0.739) DGC3: I am capable of editing, refining, enhancing, and integrating existing resources to generate relevant new content and knowledge. (0.765) DGC4: I have a basic understanding of intellectual property laws and content licensing when working with digital technologies. (0.838) DGC5: I can customize, modify software applications, settings, and devices when necessary. (0.800) DGC6: I am proficient in using specialized software relevant to my field of study. (0.779)</p>
<p>5. Safety in digital environments (SFT), $\alpha = 0.962$ SFT1: I understand the risks associated with using digital tools and devices. (0.772) SFT2: I take measures to protect my devices and multimedia content. (0.880) SFT3: I maintain data security and safeguard my personal privacy. (0.853) SFT4: I am aware of the health risks related to technology use. (0.786) SFT5: I prevent and avoid both physical and mental health threats when using the Internet and multimedia devices. (0.853) SFT6: I am aware of both the positive and negative environmental impacts of technology use. (0.772) SFT7: I implement basic measures to save energy, recycle outdated devices, and protect the environment. (0.837)</p>
<p>6. Digital Problem Solving Competence (PRB), $\alpha = 0.960$ PRB1: I am familiar with using digital devices and can identify potential technical issues. (0.869) PRB2: I resolve everyday technical problems. (0.843) PRB3: I can evaluate and choose appropriate tools, devices, or services to complete tasks and meet my needs. (0.871) PRB4: I stay updated on emerging and innovative technologies by using them. (0.858) PRB5: I actively participate in digital creativity events and workshops, as well as multimedia and digital projects. (0.842) PRB6: I understand the importance of continuously improving and updating my digital competences, and I support others in developing theirs. (0.851)</p>
<p>7. Satisfaction in Digital Environments (STF), $\alpha = 0.969$ STF1: I feel satisfied when learning activities are conducted using technology. (0.857) STF2: Digital competence helps me find the information I want to know. (0.816) STF3: I feel happy when digital learning takes place smoothly. (0.871) STF4: Learning activities that involve technological applications require me to think carefully in order to complete them. (0.873) STF5: Using digital competence makes it easier for me to communicate in work-related contexts with learners or colleagues. (0.847)</p>
<p>8. Interest in Digital Technologies (INT), $\alpha = 0.981$ INT1: I enjoy learning new skills for using digital applications. (0.836) INT2: I am not hesitant to ask instructors how to use technological applications introduced in class. (0.798) INT3: I am consistently encouraged by my instructors to learn how to use technology. (0.871) INT4: I am willing to participate in training courses to develop digital skills. (0.859) INT5: My school promotes the use of digital competence in teaching. (0.871) INT6: My school places importance on investing in the development of digital platforms for teaching purposes. (0.862)</p>
<p>KMO = 0.948; Sig. Bartlett's = 0.000; Cumulative = 84.784%</p>

After the factor analysis, to examine how the seven factors $X_1; X_2; X_3; X_4; X_5; X_6; X_7$ influence students' effort to develop digital competencies (identifying which factor has the strongest and weakest impact), the model was further analyzed

using linear regression with the Ordinary Least Squares (OLS) method.

TABLE 4: Results of Multiple Regression Analysis.

Variable	Beta Coefficient	t-test value	Sig.	Variance Inflation Factor (VIF)
X ₁	0.144	2.195	0.029	4.041
X ₂	0.392	6.517	0.000	3.379
X ₃	0.040	0.800	0.424	2.363
X ₄	0.085	1.634	0.103	2.511
X ₅	0.220	5.002	0.000	1.803
X ₆	0.117	2.731	0.007	1.722
X ₇	0.187	3.745	0.000	2.335
R-square	91.650			0.687
Adjusted R-square				0.680
F-test value				91.650
Durbin-Watson statistic			0.000	2.795

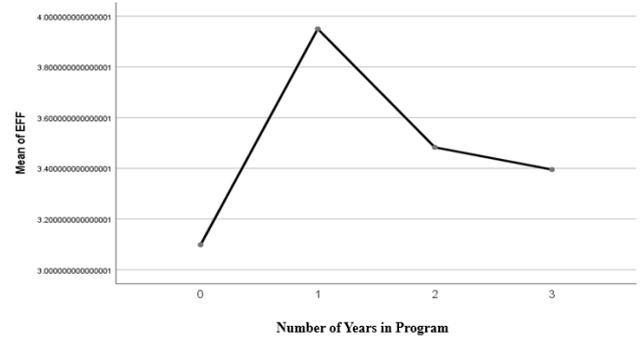
The regression analysis results show an adjusted R^2 of 0.68, indicating that the independent variables $X_1; X_2; X_3; X_4; X_5; X_6; X_7$ explain 68% of the variance in the effort to develop digital competencies (Y). Additionally, the F-test yields a very high value (91.650) at a 95% confidence level, demonstrating that the linear regression model with these variables is appropriate for both the sample data and the population. The analysis further indicates no violations of the assumptions of normality of residuals, homoscedasticity, first-order autocorrelation, and no multicollinearity among the variables.

In addition, we conducted tests to compare students' effort in developing digital competence according to their personal characteristics. According to the data, effort was not significantly different between genders. However, differences were found in effort according to Academic Program, years in the program, and duration of exposure to digital devices (Table 5). Specifically, the results of the mean scores on the EFF scale indicated that students from the Faculty of Information Technology and Digital Economy, the Faculty of Banking, and the Faculty of Finance demonstrated the highest level of effort in developing digital competence (Figure 2).

TABLE 5: Comparison of Students' Effort in Developing Digital Competence by Personal Characteristics.

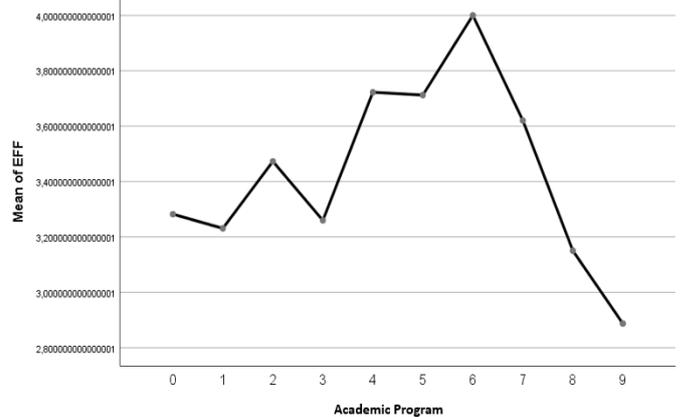
	Sex	Academic Program	Number of Years in Program	Duration of Exposure to Digital Devices
P Description	0.626 No significant difference	0.000 There is a significant difference	0.018 There is a significant difference	0.000 There is a significant difference

Second-year students showed higher effort in developing digital competence compared to students in other years (Figure 3). Moreover, students who have been exposed to computers for less than one year exhibited greater effort than the other groups (Figure 4).



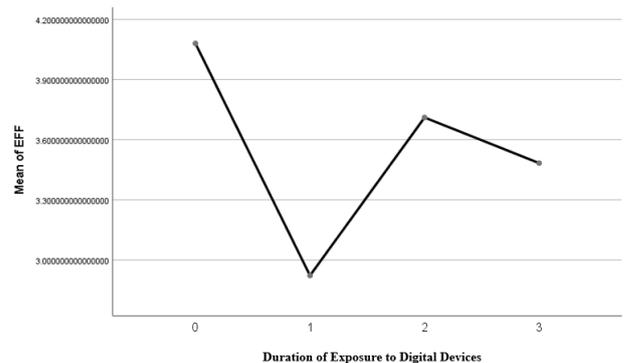
Legend: 0 – First-year; 1 – Second-year; 2 – Third-year; 3 – Fourth-year or above.

Figure 2. Mean EFF Scale Scores of Student Groups by Years of Study.



Legend: 0 – Banking; 1 – Finance; 2 – Accounting – Auditing; 3 – Business Administration; 4 – International Business; 5 – Information Technology and Digital Economy; 6 – Foreign Languages; 7 – Business Law; 8 – Economics; 9 – Others.

Figure 3. Mean EFF Scale Scores of Student Groups by Academic Program.



Legend: 0 – Less than 1 year; 1 – 1 to 3 years; 2 – 3 to 6 years; 3 – More than 6 years.

Figure 4. Mean EFF Scale Scores of Student Groups by Duration of Exposure to Digital Devices.

V. CONCLUSION

The research findings indicate that five factors positively influence students' efforts in developing digital competence. Among these, digital communication and collaboration exerts the strongest impact, followed by digital problem solving, interest, information and data literacy, and satisfaction. Based on these results, several recommendations can be made for both students and universities to support the development of students' digital competence. Specifically, students should

take initiative in exploring and improving their digital skills, engage in discussions with instructors, peers, and colleagues during the process of learning and developing digital competence, and seek clarification when facing difficulties in applying these skills. For universities, it is essential to take a proactive and innovative approach in organizing workshops, seminars, and collaborations with external experts to encourage student engagement. Integrating digital competence skills into various academic courses can also help students understand and apply the knowledge in practical contexts. Additionally, the study reveals significant differences in students' efforts to develop digital competence based on field of study, years of enrollment, and duration of exposure to digital devices. However, this research has certain limitations. The study, which may have limited generalizability, only included pupils from one Vietnamese institution. Broader and more diverse samples in future studies could lead to more effective recommendations for fostering and improving students' digital competence.

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