

The Impact of Investment in Digital Training on Competency Development: A Study on a Sample of Employees at Djillali Liabes University

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Abstract

This study aims to analyze the impact of investment in digital training on competency development in academic contexts, focusing on the dimensions of digital training: digital infrastructure, digital training and development, and digital educational resources, and their role in enhancing employees' technical, professional, and personal competencies. The study was conducted on a random sample of 50 employees at the Faculty of Economic Sciences, Djillali Liabes University, using a specially designed questionnaire.

The study adopted a descriptive-analytical methodology to analyze the data and test the hypotheses using SPSS version 26. The findings revealed positive and statistically significant relationships between investment in digital training and competency development. Digital training and development, along with digital educational resources, showed the most substantial impact, while the effect of digital infrastructure was limited. The results confirmed that digital training significantly enhances technical and professional competencies, and digital educational resources contribute to the improvement of technical and personal competencies.

The study recommended improving digital infrastructure, designing specialized digital training programs, increasing the use of digital educational resources, and implementing an integrated strategy that combines these dimensions to achieve comprehensive competency development.

Keywords Digital training, competencies, digital infrastructure, digital educational resources

JEL Classification: J24, M53, L86

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1. Introduction.

In the context of the accelerating digital revolution, digital technologies have become an essential element in developing all sectors, especially higher education. Universities worldwide face increasing challenges to adapt to changes in the labor market (Westerman, Bonnet, & McAfee, 2014), making digital training a necessity for enhancing competencies and achieving sustainable development. Digital transformation contributes to improving the quality of education by adopting modern technologies that provide a flexible and modern learning environment, helping universities adapt to the requirements of the era and increase their international competitiveness (Redecker & Punie, 2017; Westerman et al., 2014). The use of digital technologies in education also enhances teaching effectiveness and increases universities' ability to provide advanced educational services. The importance of digital training is particularly evident in the higher education sector, as it plays a pivotal role in developing employees' academic and professional skills (Agostino & Costantini, 2022). Digital training helps enable employees to use technological tools efficiently in performing their daily tasks, such as time management, task organization, and effective communication (Mishra & Koehler, 2006). Investment in digital infrastructure, such as high-speed internet networks and e-learning systems, contributes to providing an integrated educational environment, which positively reflects on employee productivity and competencies (Mishra & Koehler, 2006). Additionally, digital educational resources, such as e-books and interactive content, represent a rich source that supports self-learning and contributes to developing critical thinking and personal competencies (Kim & Bonk, 2006).

Digital training is not just a technological technique, but a comprehensive strategy aimed at improving competencies in modern work environments. Digital transformation works to enhance academic processes through innovative technologies that support the quality of education and management of administrative processes. It also contributes to developing technical competencies by improving skills related to the use of advanced tools and programs. Moreover, digital training plays a role in developing leadership and management skills, as digital training helps improve employees' leadership and creative abilities, which enhances their productivity and innovation (Westerman et al., 2014).

1.1 Problem Statement:

From the above, we can pose the following problem: What is the impact of investment in digital training on competency development in university contexts?

1.2 Study Divisions:

To answer the posed problem, the study was divided into two main sections:

Theoretical Framework: Addresses the literature related to digital training and its dimensions, in addition to competencies and their types, then discusses digital training and its role in enhancing competencies.

Practical Framework: Consists of a study of a sample of 50 employees in the Faculty of Economic Sciences at Djillali Liabes University, using a questionnaire designed based on previous studies to analyze the role of digital training in competency development.

1.3 Study Objectives:

- Analyze the impact of digital training in its various dimensions (digital infrastructure, training, educational resources) on competency development.
- Present a practical model that can be applied in academic institutions to improve the work environment and increase employee productivity.
- Contribute to bridging the knowledge gap about the relationship between digital training and competency development in university work environments.

2. Theoretical Framework of the Study:

2.1. Definition of Digital Training:

Digital training refers to the organized efforts made by institutions to develop an educational or professional environment that relies on modern technologies to enhance individuals' digital skills and competencies. Digital training aims to enable individuals to use technological tools efficiently and effectively, contributing to improving their job performance and developing their technical, professional, and personal skills. This concept includes a wide range of activities, including investment in digital infrastructure, providing specialized training programs, and making interactive digital educational resources available.

According to [Redecker & Punie \(2017\)](#), digital training is one of the fundamental pillars of digital transformation in institutions, as it enables individuals to easily access digital resources and contributes to promoting innovation and achieving institutional goals. Digital training involves integrating modern technologies such as high-speed internet networks, e-learning systems, and advanced devices to support academic and professional processes.

[Westerman et al. \(2014\)](#) indicated that digital training enhances operational efficiency by improving coordination between different processes and increasing the speed of decision-making. This approach is essential for improving productivity and promoting institutional innovation, making it one of the critical elements in institutions seeking to compete in modern work environments. Moreover, digital training enables individuals to adapt to accelerating technological changes, contributing to enhancing their job flexibility.

Additionally, [Boyatzis \(1982\)](#) confirms that digital training is not limited to developing technical skills related to the use of digital tools but extends to developing critical thinking skills, innovation, and collaborative work. Through digital learning environments, individuals are empowered to work in integrated teams, use data efficiently, and leverage technology to analyze problems and find innovative solutions.

2.2. Dimensions of Digital Training:

a. Digital Infrastructure:

Digital infrastructure includes all the basic technological components that enable institutions to create an educational or professional environment based on digital technologies. This infrastructure includes high-speed internet networks, modern computers, and e-learning management systems. According to [Redecker & Punie \(2017\)](#), digital infrastructure contributes to improving access to educational resources, which enhances individual productivity and facilitates the implementation of academic and administrative processes. [Westerman et al. \(2014\)](#) also pointed out that the presence of a strong digital infrastructure enables institutions to improve operational efficiency and comprehensively develop their processes.

b. Digital Training and Development Programs:

Digital training includes providing workshops and training courses aimed at enabling individuals to use digital technologies efficiently. According to [Mishra & Koehler \(2006\)](#), continuous training plays a pivotal role in enhancing individual efficiency, enabling them to keep pace with rapid technological changes and develop their technical skills. This type of training is considered necessary in academic institutions to improve the academic and professional competencies of employees, which positively reflects on their performance and productivity.

c. Digital Educational Resources:

Digital educational resources include a variety of tools that support self-learning and effective interaction. Among these resources are e-books, educational videos, and interactive platforms. According to [Kim & Bonk \(2006\)](#), these resources contribute to improving critical

thinking and communication between individuals, as well as providing a rich learning environment that offers opportunities for interaction and exchange of ideas. Additionally, Agostino & Costantini (2022) indicated that digital educational resources enhance individuals' personal competencies by providing customized educational content that supports different learning needs.

2.3. Definition of Competencies:

Competencies refer to an integrated set of skills, knowledge, and abilities that enable individuals to perform their tasks efficiently and effectively in dynamic and changing work environments. Competencies are considered a multidimensional concept covering technical, professional, and personal aspects, making them the basis for achieving excellence and creativity at work. According to Boyatzis (1982), competencies are a combination of abilities ranging from technical skills related to task execution and specialized knowledge, to personal skills such as critical thinking, collaboration, and effective communication.

Competencies also demonstrate individuals' ability to adapt to continuous changes in work environments. Agostino & Costantini (2022) pointed out that digital challenges require new skills that enable individuals to leverage technology in performing their daily tasks efficiently. Spencer & Spencer (1993) also emphasized that competencies are not just independent skills, but an integrated system of knowledge and behaviors that enable individuals to achieve sustainable results in complex work environments.

According to Weinert (2001), competencies can be classified into two main categories:

Core Competencies: Represent general abilities and knowledge needed by all individuals to achieve good performance, such as critical thinking, continuous learning, and problem-solving.

Specific Competencies: Include abilities related to specific tasks in specific fields, such as technical competencies related to the use of digital tools.

2.4. Dimensions of Competencies:

a. Technical Competencies:

Technical competencies refer to the skills and knowledge that enable individuals to use tools and technology effectively to achieve job objectives. Agostino & Costantini (2022) indicated that technical competencies include the use of software, technology applications, and digital data management. Redecker & Punie (2017) also confirmed that technical competencies enable individuals to interact effectively with the digital environment and execute tasks quickly and accurately.

b. Professional Competencies:

Professional competencies include skills related to creativity, productivity, and the ability to solve problems in the work environment. According to Spencer & Spencer (1993), professional competencies are the fundamental factor that enhances institutional performance. Mishra & Koehler (2006) also confirmed that individuals who acquire strong professional competencies can quickly adapt to modern work requirements, especially in academic contexts.

c. Personal Competencies:

Personal competencies include abilities that enable individuals to interact positively with their colleagues and work efficiently within multidisciplinary teams. According to Kim & Bonk (2006), these competencies include critical thinking, effective communication, and flexibility in adapting to changes. Mishra & Koehler (2006) showed that personal competencies are enhanced through digital educational resources that support interactive learning.

2.5. Importance of Digital Training Dimensions in Enhancing Competencies:

Theoretical literature indicates a close relationship between digital training and competencies, where digital training is considered an essential tool for developing competencies in

educational and professional contexts. According to [Redecker & Punie \(2017\)](#), digital training, through investment in digital infrastructure and continuous training, can develop individuals' technical capabilities and enhance their productivity. [Mishra & Koehler \(2006\)](#) also showed that digital training programs contribute to improving academic and professional competencies, enabling individuals to deal with complex technological tasks efficiently.

The dimensions of digital training are considered interconnected elements that work in an integrated manner to enhance competencies of various types (technical, professional, and personal). Through systematic investment in these dimensions, academic and professional institutions can achieve tangible improvements in overall performance, which positively reflects on productivity, adaptation to changes, and competitiveness.

a. Infrastructure and Its Role in Enhancing Technical Competencies:

Digital infrastructure includes the foundation upon which academic and professional processes are based, such as internet networks, modern devices, and learning management systems. This infrastructure contributes to improving access to technological resources and enhancing the efficient use of digital tools. According to [Redecker & Punie \(2017\)](#), institutions that invest in advanced infrastructure facilitate their employees' improvement of technical competencies, such as using specialized software and data analysis.

b. Training and Development as a Key Factor for Professional Competencies:

Digital training plays a fundamental role in enabling employees to adapt to technological changes, leading to improved professional competencies. [Mishra & Koehler \(2006\)](#) indicate that continuous training programs enhance individuals' ability to deal with digital tools efficiently, which reflects on their job performance.

Digital workshops and training courses also help develop skills such as creativity and problem-solving. Institutions that adopt advanced training programs achieve higher flexibility in facing changes, as employees become more capable of dealing with increasing professional challenges and changing requirements.

c. Digital Educational Resources and Their Impact on Personal Competencies:

Digital educational resources, such as e-books, educational videos, and interactive platforms, contribute to improving individuals' personal competencies, such as critical thinking, collaboration, and effective communication. According to [Agostino & Costantini \(2022\)](#), these resources support self-learning, providing individuals with the opportunity to develop their skills according to their personal and professional needs.

Digital resources also work to facilitate knowledge exchange between individuals by providing participatory learning environments. For example, interactive platforms contribute to improving communication skills and enhancing the ability to work in teams, which are essential skills in modern work environments ([Kim & Bonk, 2006](#)).

d. Integration Between Dimensions to Enhance Productivity and Competitiveness:

- Productivity: [Westerman et al. \(2014\)](#) showed that institutions that invest in digital training dimensions, especially digital infrastructure and training programs, achieve higher productivity by facilitating task execution and reducing the time required to complete them.
- Flexibility: Digital training allows institutions to quickly adapt to technological changes by enabling their employees to acquire new skills, which reduces resistance to change and enhances overall performance.

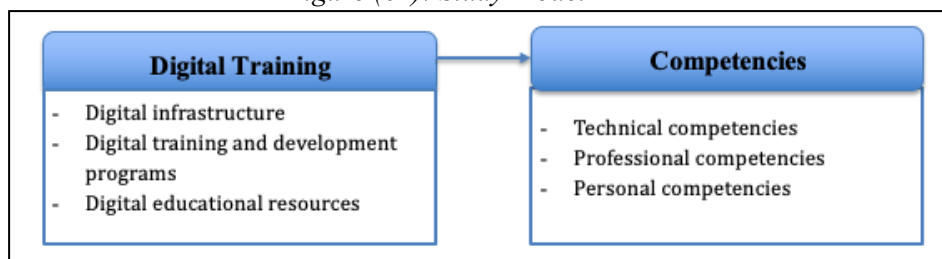
- Competitiveness: According to [Redecker & Punie \(2017\)](#), investment in digital training enables institutions to maintain their competitive position in the market, as the competencies required to face future challenges are enhanced.

The dimensions of digital training work in an integrative manner to enhance individuals' technical, professional, and personal skills, making it a strategic tool for achieving institutional development. Institutions that invest in these dimensions not only benefit from improving individual efficiency but also extend to achieving institutional flexibility, higher productivity, and sustainable competitiveness in digital work environments.

3. Study Methodology and Procedures:

3.1. Study Model and Statistical Hypotheses:

Figure (01): Study Model



Source: Prepared by the researchers

This diagram highlights the integrated role that digital training plays in enhancing and developing competencies through investment in infrastructure, training, and the provision of digital educational resources.

Statistical Study Hypotheses:

Main Hypothesis: There is a statistically significant effect of investment in digital training on competency development.

3.2. Study Limitations:

- Objective Limitations: The study was limited to identifying the impact of investment in digital training on competency development from the perspective of employees belonging to Djillali Liabes University - Sidi Bel Abbes
- Human Limitations: The study was limited to a random sample of 50 university employees.
- Spatial Limitations: The study tool was applied at Djillali Liabes University - Sidi Bel Abbes
- Temporal Limitations: The study was applied during November 2024.

3.3. Study Methodology:

The descriptive analytical method was relied upon, where the current situation was described and analyzed accurately by collecting data related to digital training and its dimensions (digital infrastructure, training, educational resources) and competencies (technical, professional, personal), then analyzing the relationship between the two variables (digital training and competencies) and testing the impact of digital training on competency development.

3.4. Study Tool:

To conduct the study and achieve its objectives, we designed a questionnaire that combines the study variables by referring to previous studies with modification and adaptation of phrases according to the Algerian environment. The following table shows the division of the questionnaire and the number of phrases that totaled 30 phrases related to study variables and 4 phrases related to general data of respondents, as well as showing the references relied upon in determining the phrases.

Work was done according to the five-point Likert scale, which is consistent with the nature of the study, and whose weights range from 1 to 5.

Table (01): Study variables and axes with references relied upon in building the questionnaire

Variable	Dimensions	Number of Statements	References Used
Investment in Digital Training	Digital Infrastructure	05	(Agostino & Costantini, 2022; Bates, 2000; Kim & Bonk, 2006a; Moreira-Choez et al., 2024)
	Training and Development	05	(Bates, 2000; Moreira-Choez et al., 2024; Redecker & Punie, 2017; Zhao et al., 2021)
	Digital Educational Resources	05	(Mishra & Koehler, 2006; Moreira-Choez et al., 2024; Redecker & Punie, 2017)
Competency Development	Technical Skills	05	(Ferrari & Punie, 2013; Kim & Bonk, 2006b; Rodafinos et al., 2024)
	Professional Competencies	05	(Redecker & Punie, 2017; Trilling & Fadel, 2009)
	Personal Competencies	05	(Ferrari & Punie, 2013; Trilling & Fadel, 2009)
Total		30 statements	

Source: Prepared by the researchers

3.5. Statistical Programs and Tools Used for Analysis:

To achieve the study objectives and answer the posed problem, the Statistical Package for Social Studies (SPSS) version 26 was relied upon. A set of statistical tools was also used to analyze the data extracted from the questionnaire, and these tools included the following:

- Descriptive Statistics: Arithmetic means, standard deviations, and percentages were used to describe data characteristics and analyze sample responses. These statistics helped provide a comprehensive picture of the extent of the studied phenomenon and its distribution within the sample.
- Reliability Test (Cronbach's Alpha): The reliability coefficient "Cronbach's Alpha" was used to verify the consistency and stability of the study tool.
- Validity Test (Correlation Analysis): To measure the degree of compatibility of questionnaire questions with the main study dimensions, correlation coefficients were used. This test aims to ensure that the items measure the dimensions they were set to measure.
- Correlation Matrix: To study the strength and direction of the correlation relationship between the two variables and between the dimensions of digital training and each type of competency.
- Linear Regression Analysis: To analyze the causal relationship between the independent variable (dimensions of digital training) and the dependent variable (competency development), multiple linear regression was applied to measure the combined effect of all dimensions of digital training on competencies comprehensively.

3.6. Testing the Study Tool:

The tool's reliability was tested using Cronbach's Alpha coefficient, and the following table shows the results:

Table (02): Reliability test for the study tool with its various dimensions (Cronbach's Alpha coefficient)

Variable	Dimensions	Reliability Coefficient
Investment in Digital Training	Digital Infrastructure	0.828
	Training and Development	0.812
	Digital Educational Resources	0.787
	Technical Skills	0.901
Competency Development	Professional Competencies	0.910
	Personal Competencies	0.832
Overall Questionnaire		0.957

Source: Prepared by the researchers based on SPSS version 26 outputs

It is clear from the table that the value of the reliability coefficient Cronbach's Alpha for the questionnaire items reached 0.957, indicating that the questionnaire has high reliability. Also, the various axes exceeded the reliability coefficient value of 0.7, which is considered a good acceptance rate, indicating that all items are correlated and show strong internal consistency. Hence, the study tool can generally be described as stable and with a high degree of reliability.

The questionnaire was built from previous studies with translation of phrases and changing the context of the study in a new field study, and therefore it was necessary to measure validity to verify that the new axes are internally correlated and that the phrases measure the concept correctly. The following table shows the results of the validity test:

Table (03): Internal validity test for the study tool with its various dimensions (correlation coefficient)

Dimensions	Statement 01	Statement 02	Statement 03	Statement 04	Statement 05
Digital Infrastructure	0,703**	0,848**	0,859**	0,789**	0,648**
Training and Development	0,760**	0,789**	0,820**	0,761**	0,713**
Digital Educational Resources	0,828**	0,692**	0,751**	0,711**	0,698**
Technical Skills	0,901**	0,948**	0,898**	0,890**	0,572**
Professional Competencies	0,871**	0,850**	0,848**	0,884**	0,833**
Personal Competencies	0,702**	0,904**	0,787**	0,840**	0,676**

Source: Prepared by the researchers based on SPSS version 26 outputs

** : Means that the values are significant at the 0.01 significance level.

The internal validity of the research tool was measured using the Pearson Correlation coefficient to analyze the correlation of each statement within each axis with the total sum of the axis. It was observed that most values showed a strong correlation between the statements and the

axes to which they belong, where correlation values ranged between 0.572 and 0.948, and thus all statements achieved an acceptable correlation ($R > 0.3$). These results reflect the consistency of statements within each axis with the concept being measured, confirming the quality of the research tool design and its consistency with the desired objectives.

4. Presentation and Analysis of Study Results:

4.1 Analysis of Sample Responses:

To understand sample reactions towards study axes related to digital training investment dimensions and competency development dimensions, arithmetic means and standard deviations were calculated for employee opinions. The following table summarizes the obtained results:

Table (04): Arithmetic Means and Standard Deviations for Employee Responses

Variable	Dimensions	Mean	Standard Deviation	Score
Investment in Digital Training	Digital Infrastructure	2,544	0,823	Disagree
	Training and Development	2,632	0,774	Neutral
	Digital Educational Resources	2,936	0,727	Neutral
Competency Development	Technical Skills	2,848	0,872	Neutral
	Professional Competencies	3,136	0,872	Neutral
	Personal Competencies	3,232	0,731	Neutral

Source: Prepared by the researchers based on SPSS version 26 outputs

The scores were calculated by determining the categories for the arithmetic mean using the following formula: $\frac{5-1}{5} = 0.8$, to calculate the category length, with the scores defined as follows:

Table No. (05): Likert Scale Agreement Levels with Specified Mean Ranges

Agreement Level	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Weight	1	2	3	4	5
Range	[1 – 1,79]	[1,80 – 2,59]	[2,60 – 3,39]	[3,40 – 4,19]	[4,20 – 5]

Source: Prepared by the researchers.

Based on Table (04), we can draw the following conclusions:

- Analysis results indicate that employees tend to be dissatisfied with the quality of digital infrastructure, with a mean of 2.544, suggesting that currently available digital services and resources do not adequately meet employee expectations. The standard deviation of 0.823 shows moderate dispersion in responses, indicating varying opinions among employees regarding digital infrastructure quality.
- The training and development dimension achieved a mean of 2.632, reflecting a neutral stance among employees regarding the effectiveness of provided training and development programs. While results didn't show clear rejection of these programs, the neutrality indicates room for improvement. The standard deviation of 0.774 reflects relative stability in employee opinions with moderate variation.
- Digital educational resources achieved a mean of 2.936, reflecting a neutral stance leaning towards positive regarding the availability of digital educational resources.

The standard deviation of 0.727 indicates relatively stable employee opinions about this dimension, suggesting their appreciation of these resources, while noting potential for improvement to better meet employee needs.

- Technical skills dimension reached a mean of 2.848, indicating a neutral stance leaning positive regarding the development of employees' technical skills. The standard deviation of 0.872 shows moderate variation in employee opinions, suggesting differences in technical skill development levels among them.
- Professional competencies achieved a mean of 3.136, reflecting a neutral stance leaning positive regarding the development of employees' professional competencies. The standard deviation of 0.872 indicates moderate dispersion in responses, reflecting slight diversity in viewpoints.
- Personal competencies dimension showed the highest mean at 3.232, indicating a clear positive trend toward the development of employees' personal competencies, such as critical thinking and effective communication. The standard deviation of 0.731 reflects limited variation in opinions and relative stability among employees.
- Results indicate that employees tend toward neutrality in most dimensions, with a positive inclination in personal competencies which recorded the highest mean. Conversely, results showed decreased satisfaction with digital infrastructure, achieving the lowest mean, reflecting an urgent need for improvement in this area.
- Most standard deviations were low to moderate, indicating relative stability in opinions and no significant variation among employees.

2.4. Correlation Analysis:

Pearson's correlation coefficient was used to examine the relationship between independent and dependent variables, to measure the strength and direction of these relationships, and to check for potential multicollinearity issues between independent variables to ensure model quality.

Table (06): Correlation Matrix Between Variables and Dimensions

	Digital Infrastructure	Training & Development	Digital Educational Resources	Investment in Digital Training	Technical Skills	Professional Competencies	Personal Competencies	Competency Development
Digital Infrastructure	1	**0.666	**0.542	**0.856	**0.629	**0.541	**0.581	**0.620
Training & Development		1	**0.712	**0.908	**0.846	**0.714	**0.676	**0.796
Digital Educational Resources			1	**0.851	**0.785	**0.779	**0.655	**0.791
Investment in Digital Training				1	**0.860	**0.772	**0.729	**0.840
Technical Skills					1	**0.869	**0.737	**0.931
Professional Competencies						1	**0.869	**0.973
Personal Competencies							1	**0.915
Competency Development								1

Source: Prepared by the researchers based on SPSS version 26 outputs

** : Values are significant at 0.01 significance level.

The results showed a positive relationship between the dimensions of investment in digital training (digital infrastructure, training and development, digital educational resources) and competency development. The relationship between digital infrastructure and competency development was of moderate strength (0.620), with a greater impact on technical skills (0.629), indicating the role of infrastructure in enhancing the use of digital tools. Training and development had the strongest effect (0.796), especially on technical competencies (0.846), emphasizing the importance of equipping employees with the skills to use technology efficiently. Additionally, digital educational resources showed a strong relationship with competency development (0.791), particularly with professional competencies (0.779).

Investment in digital training has a very strong positive relationship with competency development (0.840). This highlights the importance of an integrated strategy that includes digital infrastructure, training, and digital educational resources to improve technical, professional, and personal competencies, thereby enhancing employee efficiency and supporting institutional performance.

3.4 Testing Study Hypotheses

Multiple linear regression was used to test the main hypothesis and examine the impact of digital training investment dimensions (digital infrastructure, training and development, digital educational resources) on competency development. The following table shows the results extracted from SPSS.

Table (07): ANOVA Analysis

Source of Variance	Sum of Squares	Degrees of Freedom	Mean Squares	Fisher Statistic (F)*	Significance Level (Sig)
Regression	21.941	3	7.314	44.241	0.000
Residuals	7.604	46	0.165		
Total	29.545	49			

Source: Prepared by researchers based on SPSS version 26 outputs

- The results of the Analysis of Variance (ANOVA) indicated strong statistical significance for the regression model, with a significance value (Sig = 0.000), which is less than 0.05. This suggests a statistically significant relationship between the independent variables (digital infrastructure, training and development, digital educational resources) and the dependent variable (competency development).
- The Fisher statistic ($F^* = 44.241$) reflects the quality of the model in explaining variations in competency development.
- Out of the total variance (29.545), the model explained 21.941 of the variations, while 7.604 remained unexplained, reflecting other factors outside the model. This indicates that investment in digital training plays a significant role in competency development.

Table (08): Study Model Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	T-Statistic (T)*	Significance Level (Sig)	Tolerance	Variance Inflation Factor (VIF)
	(B)	Standard Error	(Beta)				
Constant	0.347	0.250	//	1.388	0.172	//	//
Digital Infrastructure	0.101	0.095	0.107	1.063	0.294	0.547	1.829
Training and Development	0.412	0.121	0.411	3.396	0.001	0.382	2.615
Digital Educational Resources	0.471	0.115	0.441	4.106	0.000	0.485	2.061

Source: Prepared by researchers based on SPSS version 26 outputs

- The regression analysis results indicated that the model is free from the issue of multicollinearity among the independent variables. The variance inflation factor (VIF) values were less than 5, and the tolerance values were higher than 0.2 for all independent variables. This suggests the independence of the variables and that multicollinearity does not significantly affect the model's accuracy. This enhances the reliability of the results and confirms the validity of the independent variables in explaining changes in the dependent variable.
- From the table above, the multiple regression equation can be formulated as follows:

$$y = 0.347 + 0.101X_1 + 0.412X_2 + 0.471X_3$$

Where y represents competency development, and X_1 , X_2 , and X_3 represent the dimensions of the digital training investment variable (digital infrastructure, training and development, digital educational resources), respectively.

- The model demonstrated strong statistical significance overall, with $*(Sig = 0.000)$ and $(F = 44.241)**$, indicating that the independent variables (digital infrastructure, training and development, digital educational resources) can explain a significant portion of the variation in competencies. However, the impact varied among these dimensions, with digital educational resources and training and development having the strongest effects, while the impact of digital infrastructure was limited.
- The results showed that the impact of digital infrastructure on competency development was weak and not statistically significant ($B = 0.101$, $Sig = 0.294$). Nevertheless, improving digital infrastructure (such as internet networks and computers) is a fundamental requirement, but on its own, it is insufficient to significantly enhance competencies. This suggests that institutions may need to focus on investing in digital infrastructure in a way that indirectly increases productivity when accompanied by effective training or on optimizing the utilization of this infrastructure through other factors such as training and digital resources.
- Training and development had a statistically significant and strong effect on competency development ($B = 0.412$, $Sig = 0.001$). This reflects that investment in digital training programs significantly enhances employees' technical, professional, and personal skills. Training is considered an effective tool for improving human resource efficiency, which positively impacts institutional performance.
- Digital educational resources were the most influential factor with strong statistical significance in competency development ($Sig = 0.000$, $B = 0.471$). This indicates that investing in digital learning platforms, such as e-books and interactive videos,

greatly contributes to improving professional and personal competencies. From an economic perspective, providing digital educational resources offers a relatively low-cost and effective learning environment that enhances knowledge and skill development among employees, ultimately leading to a higher return on investment in human capital.

4. Conclusion:

The theoretical study demonstrates that digital training represents a comprehensive strategy aimed at enhancing technical, professional, and personal competencies. Investment in digital infrastructure, training and development, and digital educational resources are among the key components of digital training. These elements work synergistically to support individuals and institutions in adapting to technological transformations, thereby improving individuals' productivity and efficiency in digital work environments. Previous studies, such as those by [Redecker & Punie \(2017\)](#), [Mishra & Koehler \(2006\)](#), and [Agostino & Costantini \(2022\)](#), have highlighted the significance of these dimensions in achieving competitiveness and institutional innovation.

Digital training is not limited to enhancing technical skills related to the use of digital tools; rather, it extends to developing critical thinking and effective communication skills. This approach contributes to improving institutional performance and operational flexibility, making digital training an essential tool for achieving sustainable development in academic and professional institutions.

The field results indicate that investment in digital training plays a crucial role in developing competencies across various dimensions. This was demonstrated through the study of the impact of the three aspects of digital training investment (digital infrastructure, training and development, and digital educational resources) on technical, professional, and personal competencies.

The study suggests that investment in digital training across its different dimensions can be an effective strategy for enhancing competencies, particularly when investment in digital infrastructure, training, and digital educational resources is combined. This underscores the importance of developing integrated strategies to improve human resource efficiency in academic environments, thereby contributing to competitiveness and sustainable development.

Recommendations:

- To achieve a sustainable positive impact of digital training in developing technical, professional, and personal competencies, enhancing institutional performance efficiency, and based on the findings of this study, the following recommendations can be made:
- Enhancing digital infrastructure by investing in internet networks, modern devices, and technological infrastructure development.
- Designing digital training programs and offering specialized workshops to enhance technical and professional skills, focusing on employee needs.
- Increasing the use of digital educational resources by providing digital learning platforms and expanding e-libraries to support self-learning.
- Implementing an integrated strategy by combining infrastructure, training, and digital resources to ensure comprehensive competency enhancement.
- Developing professional and personal competencies by promoting critical thinking, creativity, and effective communication through interactive and group activities.
- Conducting regular evaluations to assess the impact of digital training and refine strategies based on research and feedback.
- Raising awareness of digital training culture by promoting the importance of digital training.

- Strengthening partnerships and collaborations with technology institutions and specialized companies to support digital training programs.

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