Digital Illiteracy and its Impact on Digital Transformation Maturity in Palestinian Public Universities

OHOUD KHATIB
Faculty of Economics and Business
Palestine Technical University – Kadoorie - PTUK-- Ramallah Branch
Ramallah, PALESTINE

Abstract: This study aimed to examine the impact of digital illiteracy among faculty members in Palestinian public universities on digital maturity levels. The data was analyzed using the descriptive and analytical approaches, and the study population consisted of 523 lecturers working in two different universities. A stratified sample of 226 lecturers was drawn and structural modeling was used to find the causal relationship between the dependent and independent variables. The independent variable is digital illiteracy and consists of three dimensions: critical thinking, communication, and data analysis, while as the dependent variable is digital transformation maturity, consisting of four dimensions: strategic maturity, organizational and personnel maturity, technological maturity, and data maturity. The results of the study showed that the digital illiteracy rate among Palestinian digital university lecturers was negative at 54%, which is a high indicator that threatens the maturity of digital transformation.

Keywords: Digital Illiteracy, Digital Maturity, Critical Thinking, Public Universities, Maturity Model.
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1 Introduction

Despite this vast word, there are many interfaces which interact and have an effect on one another. One of these interfaces is the virtual digital interface, in which contracting, processing, communication and agreements take place. Another interface is the realistic interface, whose affairs are facilitated through the virtual digital interface. What we must realize is, that the virtual digital interface is very complex and requires skills that are completely different from the skills used in the realistic interface, and that any difficulty in dealing with digital skills will inevitably affect the other interface. This means that digital knowledge, which is the opposite of digital illiteracy, is important for determining the necessary and appropriate destination of existing and accumulated knowledge through cyberspace, and through it, "employees with digital knowledge can identify, understand and use digital technology and facilities efficiently to identify digital tools." In addition, Digital literacy plays a major role in navigation and control, establishing and evaluating, comprehending, synthesizing and learning new skills, creating media expression, and communicating with others in the real world in order to facilitate positive social action. Digital learning for employees is critical as a source of expertise for sharing digital culture. Furthermore, individuals must be familiar with technological skills and possess advanced digital capabilities, along with the ability to define computer interfaces and computer networking skills". [1].

In this study, we will examine the impact of digital illiteracy on the level of digital transformation maturity in Palestinian public universities. Public universities were chosen in this study for two important reasons: the first of which is that employees in public universities serve until retirement which is the age of sixty years, meaning that technological innovation could be particularly challenging due to the fact that older employees usually lack the desire to master new technology and learn new things. The second reason is that public universities are usually the focus of innovation and their employees are expected to be pioneers of development in accordance to official government policies. Nevertheless, "digital literacy mechanisms provide a tremendous ability to analyze data, systematic use of innovations, development, and cooperation to build distinguished digital and knowledge capabilities" [2].

2 Literature Review **and Hypotheses Development**

The Corona pandemic and the paths of e-learning have proven the importance and inevitability of digital competence for every individual on the educational and social levels. Today[3], it is necessary to understand the role played by academics in universities in accelerating the wheel of digital transformation in universities, what capabilities they possess, and what skills they lack to put things in their real and realistic position to understand the obstacles to digital transformation in Palestinian public universities, which leads us to draw up efficient strategies to deal with the digitization of education away from dummy strategies. The extent of interest in digital illiteracy can be seen by reviewing the scientific studies published on this subject [4], which can be illustrated in fig [1]

1.2 Digital Illiteracy (DI):

The term Digital Illiteracy was used for the first time by Gilster (1997) [5] to describe the phenomenon of computer literacy, that is, the teaching of computer knowledge and its applications. The researchers did not agree on one specific definition for digital illiteracy, but they agreed that digital literacy goes beyond just using and applying the technical aspect to cognitive and behavioral aspects. Consequently, Gilster (1997) defined it as the ability to emphatically think critically and evaluate information more than the abstract ability to use technical and procedural skills. In his definition of digital illiteracy, he added a cognitive dimension, rather than only a procedural dimension [6].

It is also noted that other contributions were made by many researchers [7],[8],[9], in which they referred to the social dimension of digital literacy to enhance the sensitive moral behaviors required when dealing online. This simply means that he who carries a piece of diamond, can't keep it unless he realizes that it is not an ordinary piece of glass.

In contrast to digital illiteracy, digital competence is " the set of skills necessary to perform well in digital societies and to produce knowledge." [10], [11].

Digital literacy can be challenging to define, especially when narrowly defined, we notice that crucial elements are left out. For example, digital literacy is defined as: a set of skills or capabilities that must be available in digital users. However, in reality we notice a radical digital difference based

on the state of ability and inability, or possession and non-possession. In other words, to be more precise, we can say that people living in the northern hemisphere may possess devices and enjoy internet access, while as millions of people living in the southern hemisphere may not have these capabilities. Therefore, we cannot describe the digital literacy process as being easy or simple.

Digital literacy is "the awareness, attitude and ability of individuals to use digital tools and facilities appropriately, to identify, access, manage, integrate, evaluate, analyze and synthesize digital resources and create new information. It also involves communicating and influencing media statements and others in the context of specific life situations in order to enable constructive social action. At the same time, three elements must be present in the individual in order to have digital literacy. These elements are: digital competence, digital use, and digital transformation"[12]

UNICEF views digital literacy [16] as "a comprehensive term and an umbrella of related meanings, denoting the ability to use digital devices or software, the ability to consume and produce digital content, and to participate meaningfully in digital societies."

Digital illiteracy focuses on many skills that digital citizens must possess, such as: critical thinking, the ability to communicate and communicate through digital space, the ability to process and analyze data to serve the target being targeted, self-awareness, browsing and exploration, and the ability to solve problems. This study will concentrate on the following skills for academic lecturers in public universities: critical thinking, the ability to communicate and communicate through digital space, problem-solving, data processing and analysis, and browsing and exploration skills.

Literacy programs in higher education institutions aim primarily at preparing students to be responsible citizens and having productive careers." [13].

•Living, learning, and working in a digital society

• Collaborative project

• Include digital literacy in learning outcomes

• Include digital activities in the curriculum

1.1.2 Critical Thinking (CT): An important saying written by researchers about digital literacy is that digital literacy is "having ideas, not typing keys."

Critical thinking is about enhancing the ability to contextualize ideas [14] through the new concept of reading and writing (digitalization), in addition to enhancing the ability to understand the social effects arising from the use of digital media. This, of course, helps to add information and raise sensitivity to social phenomena. Critical thinking is "a directive and articulate process used in mental activities such as problem-solving, decision-making, persuasion, analysis, assumptions and conduct scientific research."[15] The results of digital awareness and digital literacy are usually related to enhancing personal skills in critical thinking in the form of deeper abilities to create, compose and deliver information in a participatory manner. It also contributes to increasing the maturity and depth of the learning process as a whole.

Critical thinking skills are considered one of the 10 essential skills for the twenty-first century," along with: solving complex problems, people management, quality control, cooperation with others, service orientation, creativity, negotiation, assessment, decision-making, and active listening. In 2020, [16] critical thinking skills ranked second among these ten skills. Critical thinking aims to conduct an examination of information and its sources before using it or participating in the dissemination of information to others. We can describe a person as being a "digitally literate person" when he/she possesses two types of skills: [17] technical and cognitive. Merely obtaining technical skills does not protect individuals from the negative effects of the digital world as can be noticed in Table [1].

Table [1]: Skills of a digitally literal person.

Technical Skills	***Cognitive Skills***
Appropriate selection of technologies • Finding information • Creating information •Communicating information	Know where to Find Information • Internet, U-Search, Database
Effective use of technologies • Collaborating • Communication	Evaluate Information • Reliability & Information Nee
	Using and Sharing Information • Citation & Plagiarism

Digital illiteracy addresses a set of subtle areas that can be highlighted, especially when drawing up specialized training programs in digital literacy. These subtle areas paved the path towards enhancing critical thinking skills, which are known today as [18] Meta literacy or "higher-order thinking skills." These skills enable understanding, analysis, and control of one's cognitive processes" as can be seen in Table [2]. Meta level analyses is defined as "broad surveys conducted in numerous companies in which the reported results are used to create a meta maturity model" [19].

Table [2]: Meta literacy Higher-order thinking skills.

Information Literacy	It refers to the ability to accurately identify the required information in addition to the ability to obtain it.
Digital Literacy	refers to the ability to use, find, evaluate, create, and communicate information and communication technologies.
Visual Literacy	refers to the ability to find, interpret, evaluate, use, and create images and visual media.
Media Literacy	refers to the ability to read critically and establish professional and academic connections in a number of media, particularly social media.
Trans literacy	refers to the interactive relationship between people "users" and technology, as well as their skills to interact across a range of media, devices and platforms.

2.1.2 The ability to communicate(C). The ability of the lecturer to deliver his educational content in a digital way does not mean providing file in Word or PDF format, but in a social collaborative simple way, avoiding indoctrination. Its first base is the formation of virtual communities via the internet, in a way that allows enriching the learning experience and increasing the level of participation in an attractive way [20]. Digital communication also refers to the ability to accurately define the field of research

specialization, evaluate information, serve the educational objective, and its suitability for the level and nature of learners. More challenging is the ability to integrate this information and deliver it in a manner that is transparent and accurate. Communication emphasis on creative self-expression using digital platforms, tools, styles, forms, and media is a necessity. The aim is to teach basic computer skills, such as "word processing and presentation software," not from a typographical aspect, [21] yet in terms of the ability to search for and select templates for various communication purposes (CV, cover letter, internal business letter, brochure). It allows the trainee to master communication skills, mechanisms and applications appropriate to the communication goal that he is looking for, while clarifying the ethical and legal aspects of using digital applications and platforms.

3.1.2 Data Processing and Analysis (PA)

Digital literacy refers to the acquisition and use of information and technologies. It includes attitudes, personal qualities and the ability to plan, apply and evaluate numerical actions in solving tasks in life. It also involves recognizing oneself as a digitally literate person and being able to reflect on one's own development of digital literacy [22].

Thus, Digital literacy briefly refers to a package of capabilities that require individuals to recognize, identify, evaluate, and use required information effectively.

A major focus is made on the skills and knowledge needed to understand how digital media and information are created. Digital literacy not only deals with how individuals interpret messages the individual's differently based on their values and perspectives, but it also aims to identify the influence of media on beliefs and behaviors and to explain how to make conscious decisions on ethical and legal issues related to accessing and using technology. This, of course, requires the individual's ability to synthesize communication and draw conclusions based on analyzing information collected from the internet, using a set of mechanisms, which include reading and writing skills, as well as software programs such as Excel, which enable researchers to organize and analyze digital data.

2.2 Digital Transformation Maturity

: Digital transformation is a phenomenon that is no longer considered an option for any organization, but has become an inevitable reality. Digital maturity measures how prepared an organization is to progress to further and more mature stages in digital transformation. Digital maturity models can be considered as descriptive models that describe the level of progress in an organization's digital transformation process, with a greater focus on long-term processes and results. It is more in depth than the standard models that define a specific result of quality. [23]

Digital transformation maturity requires a radical and deliberate change in the life cycle of organizations seeking to survive, and requires initiatives, projects and processes to enable organizations to reach qualitative leaps that will help improve performance indicators, such as service, cost, and quality. In pursuit of survival and continuous development, organizations must also rethink and carefully review their traditional functional structures and adopt an administrative reform approach. Through innovation and labor integration organizations will be more likely capable of responding to performance pressures and technological change. " [24] This transformation requires skills of extraction, exchange, analysis and transformation of information and data, through processes, relationships, products, etc. [25].

Digital maturity represents "the final stage of digital transformation, which companies strive to achieve. It leads to

significant improvements in the operation of the company with a significant increase in customer satisfaction. [26].

Thus, digital maturity represents "how organizations systematically prepare to adapt consistently to ongoing digital change" [27]. We can say that the more the organization integrates its strategy and human resources into digital technologies, the more this is described as greater digital maturity, and vice versa.

Despite the fact that measuring the level of digital maturity is not an easy process, the biggest trend is to measure the extent of maturity from multiple dimensions. These dimensions can be visualized in the form of Moodle to direct the compass towards the extent of engagement in digital transformation.

The broad concept of the digital maturity model is derived from the quality management maturity model inspired by Phillip Crosby's (1996) Quality Management Maturity Grid (QMMG) [28],

The maturity model is measured in general from four approaches: [29],

Metalevel: It refers to a wide range of surveys that have been conducted on a large number of companies and uses the results to create a meta-maturity model.

Development: It measures model maturity against the three theories of development (top-down approach (Baker et al., 2009)), bottom-up approach (Larman et al., 2011) and industry standards (CMM, PLM, SPICE, etc.) and the organizational silo approach

Application: Models are implemented and evaluated within real business contexts. Through this approach, the level of maturity is assessed by examining the real work systems and the reality of their implementation in the field.

Validation: It is used as a method to verify the validity and accuracy of the description of the maturity check model or the accuracy of its results.

Digital Maturity Model is practically the process of evaluating the level of digital transformation in a specific aspect of an organization, in order to obtain a comprehensive perspective of all aspects. In addition it measures the extent of integration and involvement in following digital developments in the field of industry in which an organization operates "operationally" and in the administrative and strategic areas "organizationally".

To assess the impact of digital illiteracy on the digital maturity of Palestinian public universities, this paper focuses on examining the impact of digital illiteracy among lecturers in Palestinian public universities, who are usually somewhat elderly, given the long career guaranteed by the civil service system for workers in the government sector. This keeps them away from continuing to engage in successive updates in the digital educational process. Thus, this paper adopts a model of digital maturity consisting of four dimensions.

1.2.2 Strategic Maturity (SM):

The digital strategy refers to the long-term, clear plan with specific features directed to achieve the goals of the organization, using digital technologies directed towards a four-fold goal (customers, systems, employees, and work).

In addition, it builds an integrated and interrelated relationship, based on two axes dimensions (a clear plan for information technology and a specific budget for information technology).

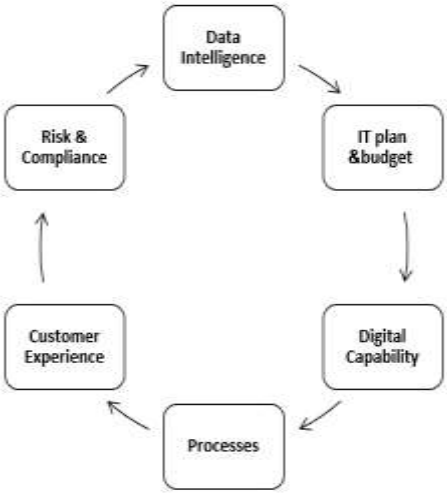
Digital maturity does not depend on merely acquiring digital devices and applications, but rather goes beyond it to be primarily an administrative decision and commitment, not only on the level of operational or tactical departments, yet in terms of conducting practical implementation on the ground. Such implementations deal with building a supportive culture, resisting expected change, completing the evaluation of the strategy and monitoring mistakes and lessons learned from them.

It is important to note that digital strategies should not overturn or contradict with traditional strategies within organizations, but rather they should adopt and mold with them organically [30].

Companies draw their strategies in the digital world with the aim of reaching to "a smart organization," [31] and in the industrial field this can be defined more by drawing the goal of reaching Industry 4.0 framework.

There are 6 indicators that determine how mature an organization's digital strategy is [32]

Figure 2: Digital Strategic maturity indicators



To examine the maturity of the organization's digital strategy, a numbered ascending scale from 0-100 degrees is used to obtain an evaluation of the overall degree reached by the organization. The higher the rate of the scale, the higher the evaluation of the digital maturity of the organization's strategy, and the higher the efficiency and effectiveness of its productivity. [33]

Table 3: digital strategic maturity score

Pre-Digital	0-20
Digitally Reactive	21-40
Digitally Purposeful	41-60
Digital Optimized	61-80
Digitally Strategic	81-100

2.2.2 Organization & People Maturity (O P M):

Digital Maturity of the organization and individuals refers to its high and rapid ability to respond and adapt to technological

trends and changes in particular, by focusing on creating or adding new value quickly enough to ensure that it maintains its competitive advantage or achieves a new competitive advantage based on two main factors: digital human resources and investment in new technology).

"Agility is the new currency of business."[33] It is the decisive factor in survival and competition. If you cannot respond to the environment quickly, it will take you out of its world. This can only be done by having the necessary tools to compete in the digital world, and possessing qualified and efficient human resources to enable dealing with maturity and professionalism.

Digital maturity is achieved when the organization allows administratively to achieve a high level of digital security through adoption and willingness, in order to make cultural changes that may be costly and cumbersome, and may require structural changes in human skills and sometimes in daily operational processes. Therefore, one of the most important and basic requirements for the success of digital maturity is that it be consciously adopted and aware of its importance and seriousness by workers [34].at all levels, through building human digital capabilities and the participation of workers in charting paths for desired changes and bridging strategic gaps.

3.2.2 Technologies Maturity (TM):

Technological maturity refers to the desire of an organization to enhance its dynamic capabilities and business model through changing and enhancing innovative technologies.

It cannot be said that there is a digital maturity without the events of development and maturity in the digital technologies on which the organization's basic work is based. Its production and service operations are based on their quality.

The technological maturity of the organization can be measured based on the extent of its integration in adopting innovations in the following areas: [35].

The Internet of Things (IoT)

Digitalization

Process Automation

Artificial Intelligence (AI)

Deep Learning

"Online" Group

4.2.2 Data Maturity (DM): Obtaining advanced technologies is very important, but data is the key to its work. Proper use of data in a targeted manner through coordination, creation and generation will lead to an increase in the volume of data, and this matter requires focus on its quality.

Data maturity refers to [36] " a measure of the extent to which an organization uses its data to achieve high levels of effectiveness and maturity in its own or purchased data". It must be fully integrated into decision-making processes and practices as a whole. The maturity and effectiveness of the data is measured in stages.

There are five levels of data maturity [37]:

Initial (immature) level: It has two characteristics

- Best practice activities are not implemented by the organization.
- Best practice tools are not available or not used.

Maturity level (repeatable): It describes a situation in which units of the organization are using the recommended processes and tools, while others are not.

Managed Maturity Level (Determined): The organization establishes a documented standard for performing the activity or activities that are continuously evaluated, and requires employees to use applicable tools effectively.

Monitored (Managed): "The process in question is created, tracked, and monitored. Recommended tools are in place and are used consistently across the organization"**.**

Continuous Improvement (Level Improvement): The activity is constantly re-evaluated, improved, integrated and tracked in the process**.** It can be based on the nine indicators that were previously adopted by **DAMA Data Management Book of Knowledge** DAMA International in 2009- as shown in figure 3.

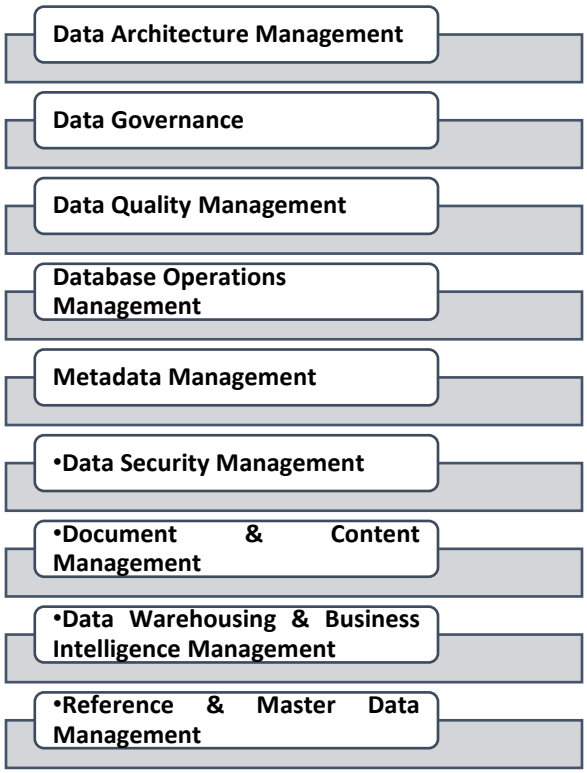


Figure 3: the nine indicators in data management

3. Methodology

The objective of this paper is to identify the impact of digital illiteracy on Digital Maturity Reality in Palestinian Public Universities. Thus, this paper proceeds from a major hypothesis:

H1: There is an impact of Digital Illiteracy on determining the level of Digital Transformation Reality in Palestinian Public Universities.

3.1. Sample and Data Collection

The study used the descriptive analytical method to examine the effect of the independent variable (Digital Illiteracy) on the dependent variable (Digital Transformation Maturity). The size of the study population was (523) lecturers, and the stratified sample, (226) lecturers, was considered representative of the study population. Table 4 represents sample characteristics.

Table 4. Sample Characteristics

	Count	**Percentage (%)**
Gender		
Male	304	58.12
Female	219	41.88
Age		
25-less than 35year	129	25
35- less than 45 year	183	35
45 year and more	211	40
University		
PTUK - Kadoorie	340	65
Al -Aqsa	183	35

3.2 Measure

The study relied on the Seven Likert scale (very high effect, high effect, somewhat high effect, neutral effect, somewhat low effect, low effect, very low effect).

The independent variable (Digital Illiteracy) consisted of three dimensions:

- Critical thinking(CT)
- Communication (C)
- Data Processing and Analysis (PA)

The dependent variable (Digital Transformation Maturity) consisted of four dimensions:

- Strategic Maturity (SM)
- Organization & People Maturity (O P M)
- Technologies Maturity (TM)
- Data Maturity (DM)

3.3 Data Analysis:

This study adapts structural equation modeling (SEM) to test the research hypotheses. Second-generation modeling (order) was used to study the model predictive ability and to explain the variance of endogenous variables [27].

The Variance-based partial least square structural equation modelling (PLS-SEM) was used in this case, whileas PLS-SEM estimated a study model with a large number of latent variables and indicators [28], and worked effectively on small sample size [29].

4. Result

In order to evaluate the research model, two analytical procedures were followed: the measurement evaluation (validity and reliability of the measures) and structural model evaluation (research hypothesis evaluation).

4.1. Measurement model evaluation

Results of internal consistency, convergent validity and discriminant validity are shown in table 4 for the first-order and the second-order construct recommended [29], [30], [31]. The result in table 5, indicates that the study instrument met the assumption of internal consistency reliability, convergent validity, and discriminant validity.

Table 5. Fornell-Larcker Criterion for first order construct

	SM	CO	CT	OPM	TM	DM	PA
SM	**0.751**						
CO	-0.387	**0.755**					
CT	-0.167	0.274	**0.819**				
OPM	0.681	-0.51	-0.158	**0.724**			
TM	0.504	-0.305	-0.224	0.643	**0.829**		
DM	0.511	-0.335	-0.361	0.532	0.701	**0.679**	
PA	-0.433	0.465	0.427	-0.405	-0.379	-0.487	**0.752**

Note: Diagonals in bold represent the square root of each construct AVE. Off-diagonal represent the constraint's correlation.

Table 6. Fornell-Larcker Criterion for second order construct

	DTM	DI
DTM	**0.695**	
DI	-0.549	**0.770**

Note: Diagonals in bold represent the square root of each construct AVE. Off-diagonal represent the constraint's correlation

4.2. Structural model evaluation

This evaluation helped to examine the structural model which estimates hypothesized paths between the constructs. According to the results in **figure 2,** there is a significant and negative relationship between Digital Illiteracy and Digital Transformation Maturity stage ($\beta = -0.549,\ t = 9.228$) which supported the paper hypothesis.

According to the result in table 7 of R^2 and Q^2 30.1% of variations in Digital Illiteracy can be explained by the construct of Digital Transformation Maturity stage (see Table 7).

Table.7 Assessment of Coefficient of determination and Predictive Relevance

Endogens variables	R^2	SSO	SSE	$Q^2 = 1 - SSE/SSO$
DTM	0.301	4520.00	4028.219	0.109

Note: SSO= Total Sum of Square; SSE= Sum of Square due to error

5. Conclusion

Structural modeling indicates that the impact of digital illiteracy on digital maturity in Palestinian universities has a negative impact, at a rate of up to 54%, and that this effect is so large that it clearly impedes progress on the ladder of digital maturity in Palestinian universities.

One must note that one of the two public universities in the study community relies mainly on technical education, which is more likely based on digital awareness.

These results indicate that digital maturity in all its dimensions (strategic, organizational, personnel, technological, and databased) will be unable to progress in digital transformation to another horizon, or to advance to a further degree in the process of digital transformation

due to the inability of the human element to deal with the culture of digitalization.

This effect can be seen by reviewing the demographic factors of the study sample, which show a rise in the ages of the study sample up to 40%. This category refers to lecturers who obtained higher degrees in theoretical studies and practiced technical skills within the limits and requirements of their working atmosphere. Despite this fact, they stand helpless in front of the speed of digital transformations in learning technologies, especially since it is based on self-learning and assistance on a personal level to a greater extent than reliance on planned training programs directed towards bridging the large digital gap in their qualifications and skills.

These categories must be viewed from two perspectives: the first dimension is the educational experience resulting from the length of the teaching period. The second dimension is the skills gap in keeping up with the hurricane of digital transformations, especially in the field of e-learning, which calls for efforts and strategies to bridge this gap.

This significant gap requires those in charge of human resources management and planning in universities to draw up a clear-cut treatment strategy with specific time frames in order to ensure bridging this gap. This is in terms of skill level, yet in terms of organizational culture, digital illiteracy is an unhealthy common phenomenon in higher educational institutions, which is leading universities to becoming rigid and inflexible organizations, rather than keeping pace with innovation and change.

Practical application of the study

This study demonstrates a two-dimensional model of the current state of digital maturity in universities affected by the degree of digital illiteracy among lecturers. It constitutes a compass for policy makers of digital transformation in universities -given this subtle strategic lens - to work on measuring and bridging the digital gaps in its teaching staff, in addition to adopting new standards for hiring lecturers that meet the requirements of digitalization.

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Fig 1: number of published studies on digital illiteracy between 2000-2020

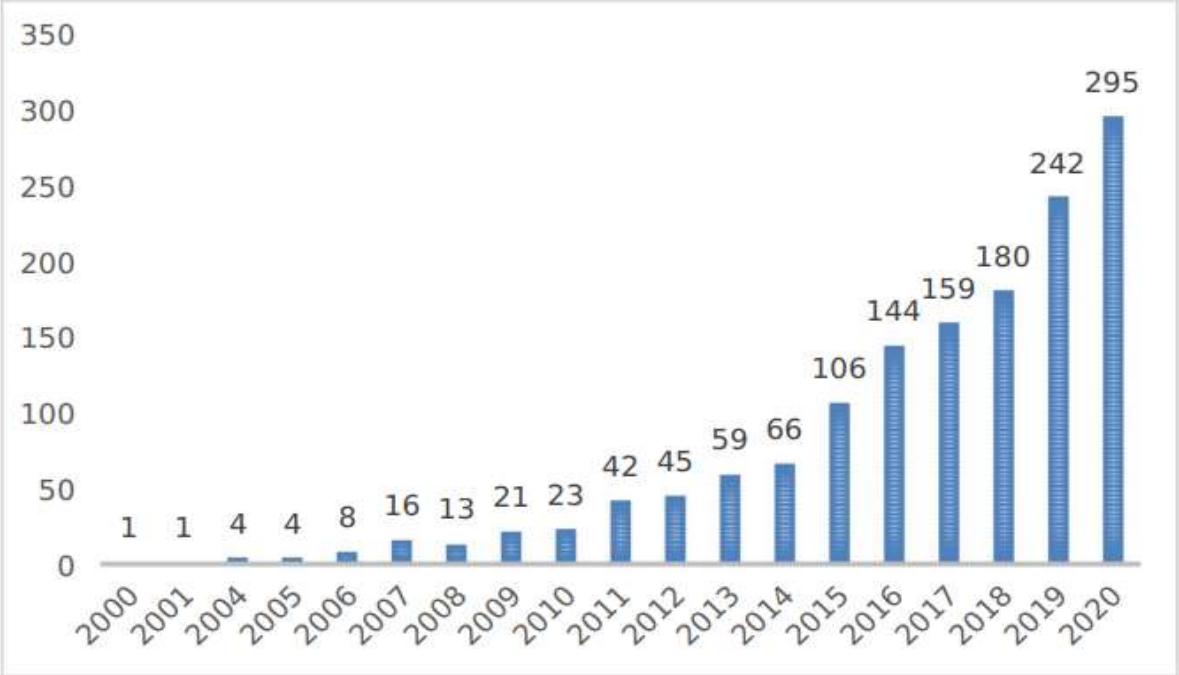

Figure 4: Structural model

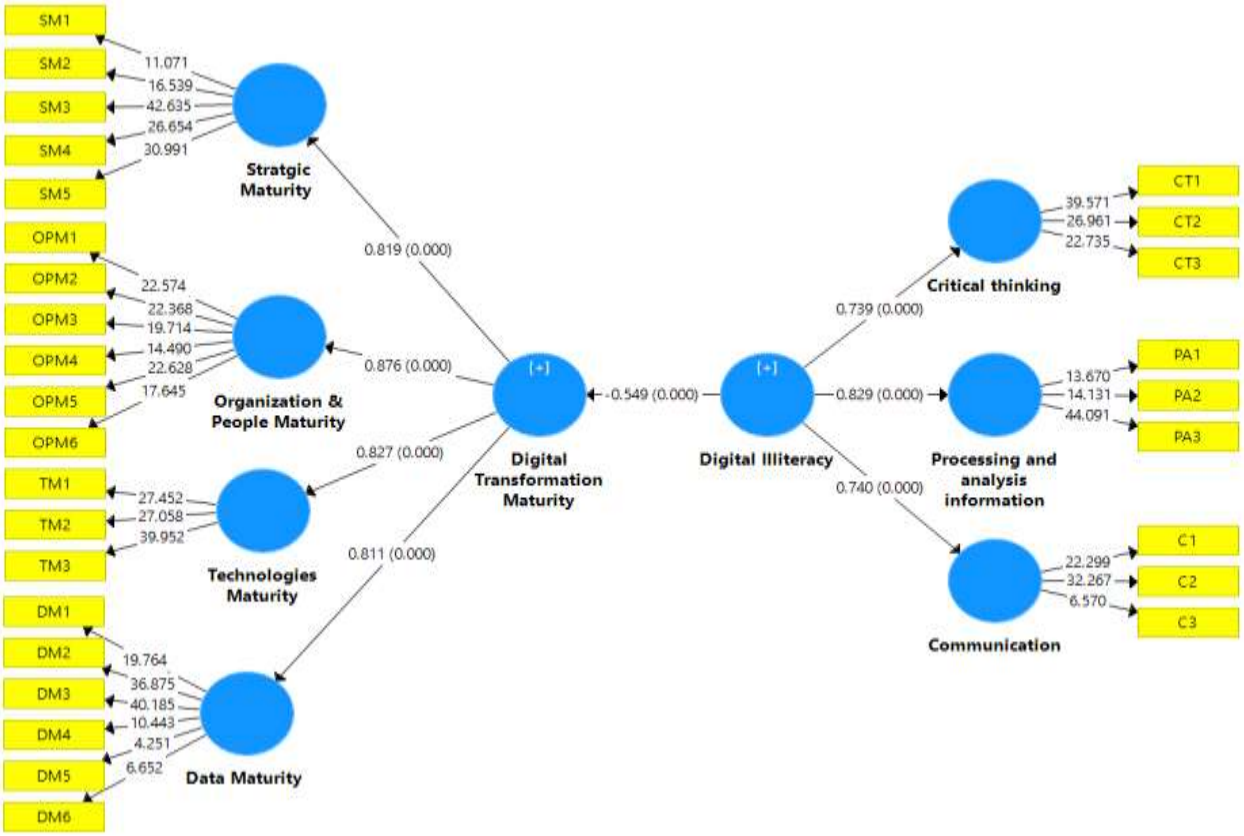

Table 8. Reliability measurement of constructs

Construct and indicators		**Outer loading**
First order construct		
SM	**Strategic Maturity (CA=0.805; CR=0.865; AVE=0.564)**	
SM1	The university drew a digital transformation strategy for the educational process	0.624
SM2	The university periodically verifies the conformity of educational outcomes with the digital strategy	0.708
SM3	Digital learning policies have been drawn up based on an educational team specialized in e-learning	0.823
SM4	The university has allocated a specialized team to pursue digital learning	0.783
SM5	An administrative unit for the digital strategy has been created at the university	0.798
OPM	**Organization & People Maturity (CA=0.818; CR=0.868; AVE=0.524)**	
OPM1	The university promotes a "supportive organizational culture" for digital transformation in the educational process	0.727
OPM2	The university takes periodic procedures to adjust the structure in line with the digitization of education	0.734
OPM3	The university allocates financial items in its annual budgets to update educational applications	0.704
OPM4	Lecturers are trained periodically on modern educational applications	0.689
OPM5	The university gives incentives to digital initiatives by lecturers	0.766
OPM6	The university participates with lecturers in improving the performance of digital learning	0.719
TM	**Technologies Maturity (CA=0.773; CR=0.868; AVE=0.688)**	
TM1	Digital technologies are efficiently employed in the educational process at the university	0.820
TM2	Education technologies are updated periodically	0.817

TM3	Educational indicators are identified for the educational technologies adopted at the university, commensurate with the digital goals	0.851
DM	**Data Maturity (CA=0.769; CR=0.831; AVE=0.462)**	
DM1	The level of data maturity is determined by tracking best practices(initial maturity)	0.711
DM2	The university follows the academic departments in terms of their commitment to use data instructions (Repeatability)	0.820
DM3	The university sets documented standards for the performance of educational activities (managed maturity).	0.844
DM4	The educational process data is monitored through the extent to which recommended tools are used (monitored maturity).	0.611
DM5	The Information Department submits periodic reports on compliance with data instructions	0.422
DM6	Lecturers are required to provide suggestions for improvement in the use of data in the educational process	0.573
CT	**Critical Thinking (CA=0.755; CR=0.859; AVE=0.670)**	
CT1	I assign students to research projects that enhance information literacy skills	0.837
CT2	Ask the students to rate the information they find online	0.816
CT3	Train the students to ask themselves questions about the reliability of different websites	0.803
CO	**Communication (CA=0.621; CR=0.795; AVE=0.570)**	
CO1	Help students how to search for templates for various communication purposes such as a resume	0.789
CO2	Ask students to express themselves creatively using digital platforms	0.861
CO3	Explain to the students the mechanisms for selecting the most appropriate applications to express the communicative objective	0.587
PA	**Processing and analyzing information (CA=0.607; CR=0.794; AVE=0.556)**	
PA1	Explain to the students the influence of the media on the interactions "beliefs and behaviors"	0.656
PA2	Clearly explain the mechanics of conscious decision-making on ethical issues related to technology	0.727
PA3	Explain to the students the differential impact of the information on their attitudes (values and perspectives).	0.858
Second order construct		
DTM	Digital Transformation Maturity (CA=0.844; CR=0.901; AVE=0.695)	
SM	Strategic Maturity	0.819
OPM	Organization **&** People Maturity	0.876
TM	Technological Maturity	0.827
DM	Data Maturity	0.811
DI	Digital illiteracy (CA=0.656; CR=0.814; AVE=0.594)	
CT	Critical thinking	0.739
CO	Communication	0.740
PA	Processing and analyzing information	0.829

Note: CA= Cronbach's α coefficient; CR=the Composite Reliability; AVE=Average Variance Extracted.