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Digital Competencies of Saudi University Graduates Towards Digital Society: The Case of The University of Tabuk

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ABSTRACT

This paper presents findings and proposes recommendations from an evaluation of the level of digital competencies among Saudi university graduates to ascertain their readiness for becoming digital citizens, with high confidence in using digital technologies to successfully engage in digital transformation efforts to achieve Saudi Vision 2030. The sample comprised 352 University of Tabuk students from ten different colleges (faculties) who answered an online five-point Likert-type structured questionnaire pertaining to their awareness and readiness concerning aspects of digital competence, based on previous research. The questionnaire dimensions comprised information and data literacy, digital content creation, communication and collaboration, safety, and problem-solving. The data was analyzed using SPSS statistical software package to perform, reliability test, descriptive statistics, and comparative tests. The study revealed a fair degree of digital competencies in general, with notable differences between graduates from different colleges, when comparing the five levels dimensions of digital competencies.

1. Introduction

1.1. Digital Citizens and Digital Society

The hallmark of the modern world and globalized socio-economic development is significant technological development and scientific progress, producing incredible changes in industrial practices and the everyday lives of people. Every day and ubiquitous technological tools nowadays would have been considered science fiction in the recent past, such as Smartphone technologies, virtual reality, sharing information through email to different parts of the world, etc. Technological advancement pushes society forward and makes various stakeholders increasingly dependent on digital infrastructures and technologies. Over the years, different industries have started to rely on various digital solutions and online and automated processes [1].

Governments, institutions, and business leaders all understand the importance and benefits of adopting digital changes in their respective environments to remain ahead of the competition, to ensure access to the best technology, and to make their performance more effective [2]. However, the execution of attempts to adopt and use technologies in practice often lead to failure, representing a theory-practice gap that often frustrates the aspirations of technological investments. Consequently, researchers have explored digital transformation initiatives among both public and private sector stakeholders, to explore success and failure factors, and identify ways in which digital transformations can make workflow easier, faster, and more efficient by optimizing various processes [3].

The concept of 'digital society' is used to conceptualize and explore the interconnection between individual and community users and digital technologies deployed in various tasks [4]. Digital society refers to a society that has started to become paperless and digital, in which electronic technologies are normal and no longer seen as controversial [5]. A shift from the previous digital era has occurred as society has moved to a computational information one; indeed, society is now moving toward a new 'post-digital' world, where digital elements have been seamlessly integrated into the global economy and everyday lives [4].

Public policy responses to the Covid-19 pandemic, including social distancing and lockdown measures, galvanized latent trends in technology adoption, including the wholesale transfer of work tasks and service delivery to online platforms for certain periods (due to the lockdown of physical facilities), including offices and educational institutions. In this milieu, the concept of the 'digital citizen' has become increasingly popular to describe

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the advancements of technology being integrated into business, work, and education, etc. [6].

In an educational context, digital citizens are normal individuals (e.g., parents and educators) who can teach in a safe online place with no ethical issues, interconnected with other teachers or students. Digital citizenship protects users, making them as safe as possible in the online world, as well as preparing students to adapt, survive, and grow in a society that relies on technology and an environment that is embedded with communications, information, and networks [6]. While Saudi Arabia is massively investing into digital transformation access in all sectors, there is a need to evaluate the level of universities' graduates to make sure they can easily integrate into the digital revelation. This paper looks at how digital transformation has occurred in Saudi Arabia and how it has affected higher education, especially among graduates at the completion of their academic programs, by testing the study Hypothesis: College of study does not significantly affect degree of digital competence.

1.2. Digital Competencies

Five digital competencies have been identified in previous literature, as explored below: information and data literacy (IDL), communication and collaboration (C&C), digital content creation (DCC), safety (SAF), and problem solving (PS) [7]

1.2.1 Information and data literacy (IDL)

IDL is the articulation of required information as well as retrieving digital data and locating information or content required for specific tasks, or whatever the user needs [8]. For example, researching immigration in China requires locating various types of official and unofficial data on immigration rates in the country, and evaluating their relative import. This type of literacy also refers to how a user judges that the data is factual and relevant to their needs [9]. Furthermore, it relates to the management, organization, and storage of data in hardware, cloud, and even paper formats, as well as how information *per se* is managed.

1.2.2 Communication and collaboration (C&C)

C&C concerns the transfer of information and interactions between people through digital technologies (e.g., using phones or on computers via Skype etc.). People communicating with one another must understand ethical, cultural, and diversity issues, and respect one another and engage in a safe manner. It allows for societies all over the world to participate in communication through private or public digital services, and can help manage their digital reputation, presence, and identity [8]. It is often used to put people out there and have their identity known. In the education sector, students close to graduation will often use digital apps such as LinkedIn to advertise their skills to companies and potential employers [9].

1.2.3 Digital Content Creation (DCC)

DCC and the editing processes are fundamental to articulating voices, such as posting stories on a short story blog or using apps such as TikTok to create whatever content a user wants to make. It relates to users understanding copyright and licensing laws, and how they are applied to any content they create, as well as understating how the content will be used, shared, or seen, and any digital algorithms used [7].

1.2.4 Safety (SAF)

SAF This aspect pertains to protecting users and devices from harm. It protects any content users make and share with the world, and their personal data in the digital environment. It ensures that their privacy is not an issue when a user goes online [7]. It also refers to the protection and safeguarding of psychological and physical health, which is increasingly important due to cyber bullying. This also encompasses understanding that digital technologies can impact on a person's social inclusion and their social well-being. Moreover, being aware of the environmental impact that these technologies can have and how they are used also relates to SAF in the broader sense [8].

1.2.5 Problem solving (PS)

PS is for understanding any issues that could arise from a user's content or activity online [8]. It identifies how to resolve any issues in digital environments and to use digital tools to develop solutions to the problems or needs of users, such as ad blocks being created to block any ads that appear in the digital environment. It also keeps the user up to date with digital evolutions, such as updates to apps like ad blockers or new security measures, and apps that can help solve specific issues [9].

1.2.6 Digital Skills for Future Success

In [10], the author aimed to research how artificial intelligence and digital society can be used in higher education, and concluded that these digital developments were important, but that the efforts to integrate them in education are insufficient. It was noted that it is important to aid students in getting past challenges in the labor market or any workforce, as digital skills are becoming more essential for hiring agencies and employees. However, pedagogical studies have noted that teachers in educational institutions tend to resist technological integration in education, as they feel it undermines pedagogical value and human relations and feelings, making it hard to empathize with students and develop them emotionally for future preparedness and success [11]. Nevertheless, it is increasingly essential for students to have technology mixed in with their education to prepare them with prerequisite skills for a digital economy, as most careers will inevitably have various degrees of interaction with different dimensions of the digital world, thus digital skills are necessary.

Communication and information technology have been fundamentally important in career dynamics for many years, with both negative and positive influences on the work environment [12]. For example, increased internet access within a research assistant job has made it easier for people to find other papers relating to their task or find people to communicate with. This leads to employees doing their jobs accurately, using all available resources [13]. A positive pattern between earnings growth and the use of the web is apparent, indicating that behaviors and digital skills to find professionally relevant resources are rewarded by the labor market [14]. Efficiently using the internet, ensuring that any information they find is fact-checked and not false, is an important digital skill that employers look for, as false information can cause

issues within the work organization, and which can damage their reputation [13].

Trust issues in digital skills are essential for individual employees as well as organizations. Some analysts have conceptualized the division of 'digital immigrants' and 'digital natives' to refer to people who reached adulthood and began their professional lives before the popularization of mass computer and internet usage (from the 1990s onwards in developed countries). In many developing countries, this divide remains a pertinent feature of the human resource landscape. Digital immigrants spend effort and time acquiring digital skills to be able to stay at their jobs or find new jobs, as employers are looking for workers who can use technology or digital platforms accurately and efficiently. 'Digital natives' tend to have such skills intrinsically, although they may lack critical depth in their choices and behaviors in their general technology adoption and use. In general, however, digital skills are essential for employers when recruiting and hiring people [13].

Another skill required for future success is data intuition skills, which relate to understanding any data provided and how to apply it to solve issues within organizations, as well as the ability to develop critical thinking skills. Data visualization and communication is critical to learn, as it helps with making and supporting data-based decisions [15]. For example, the financial industry requires these skills to be able to describe why their solution works against any problems they encounter. It further develops critical thinking, which is a transferable skill for any role. Being proficient at using programming language and tools allows one to access, present or retrieve data in a neat way. Presenting data in a clear and readable format is something employees look for as it shows one can easily explain their data and present it in a way everyone can understand [15].

1.3 Digital Transformation and Saudi Vision 2030

Digital advances are intrinsically beneficial, but their application and use can pose disadvantages and disruptions. Thus governments, researchers, and industries are trying to figure out how the world will transform and change to be able to find opportunities and tackle emergent challenges. This phenomenon is known as digital transformation, which can be defined as digital usages developed to encourage creativity, innovation, and results, in significant alteration to the information or professional domains [16]. The importance of digital transformation (which is part of the Vision 2030) is being increasingly recognized. Saudi Arabia is one of the biggest technology and information markets in the Middle East and North Africa region, with public spending of USD 45 billion at the end of 2019, mainly in the education sector. During 2014–2020 the government spent around SAR 200 billion per year on X [17], with a conscious goal to promote digital technology use as per Vision 2030 [18]. The Saudi Ministry of Education implemented a digital technology system in 2020 to minimize the effect of Covid-19 on student education.

Economic diversification and private sector growth are an essential objective of Vision 2030 and the sustainable development of Saudi Arabia. The Vision seeks to drive a digital transformation and society to produce a knowledge economy, with guidelines and safety for technology users, veering information use, processes, and policies [19]. In 2020, Saudi Arabia launched the National Transformation Program to build an institutional network with the capabilities needed to achieve the 2030 goals. This Program will help to build and develop the digital infrastructure, which is a goal for the Vision 2030. It seeks to provide a secure and powerful online platform that can be used by many people simultaneously, without the fear of the entire network failing.

Vision 2030 aims for Saudi Arabia to become a global investment powerhouse, hence it focuses on empowering graduates with digital skills that can be used in any sector or industry, to increase employability and national human resources, which can attract global investment. The goal is to also transform the public investment fund into the largest sovereign wealth fund in the world. This was spearheaded by the floating of Saudi Aramco, and is now diffused into local production, economic expansion, workforce expansion, and sending students to study abroad, etc. [20]. By 2030, Saudi Arabia wants to increase the involvement and achievements of its young workforce, particularly graduates and students. It has invested massively in domestic education and scholarships for advanced studies by young Saudi students [17]. These invitations will contribute to the country's economy and increase the skills of the local workforce [20].

1.4 Efforts and Importance of Empowering Saudi University Graduates with Digital Skills

Studies understand that their future success entails training in digital skills, and Saudi national educational policy and Vision 2030 recognizes the impact of technology on learning and e-learning potential [21]. E-services have an increasing presence on Saudi campuses and within lessons, and it is essential to ensure that students know how to use them, and what they can be used for within work environments. 70.3% of staff members are also aware of the advantages of their students having digital skills and the importance of practicing them in the field (e.g., a work environment) [22].

While Vision 2030 has galvanized technology adoption in Saudi education, this is merely the latest stage of a long-term overhaul of the national educational paradigm, which began in 2005 when King Abdullah agreed with President G. W. Bush to increase the number of male and female Saudi students studying in the US, thereby inaugurating the King Abdullah Scholarship Program (KASP), targeted to facilitate the development of Saudi human resources [23]. This also helped alleviate the pressure of unemployment due to limited opportunities for work in the private sector at the time, thus sending students to study abroad to learn and acquire skills was doubly effective, in training the future workforce and alleviating contingent pressures [24]. This was the largest scholarship program in Saudi history, seeking to prepare future generations for future careers and a knowledge-based society [23].

The National Transformation Program continues these goals, sending students to the best universities to learn from the best educators, setting high professional and academic standards, and exchanging digital, educational, cultural, and scientific experience with different countries [25]. This helps develop the

workforce level of professionalism and skills for employability and flexibility [22]. It also seeks to reduce the gender gap within the workforce and education, particularly by empowering women with education, learning skills to be able to work in whatever field they want. 82% of students and graduates on the Program believed that studying abroad and getting foreign qualifications would result in higher paid jobs for them when they returned to Saudi Arabia [25].

Similarly, the Cooperative Training Strategy combines programs among employment agencies and universities to give students a way to put their skills in use and learn new transferable skills. It builds technical, social, and moral qualities that can be used in future jobs. The objective of the program is to explore a variety of different jobs while studying, to understand which sector suits them or interests them. It emphasizes cooperative knowledge of the working environment and experiential learning while developing skills [22].

2. Methodology

This study uses a quantitative research method with a cross-sectional survey, to obtain university graduates' opinions on the subject being tested at the stage of their graduation, the given time for the study [26]. Electronic survey was the most suitable method, as it enables quick data collection, reachability, low cost, and direct digitization of data to be transferred to data analysis software. This was also expedient and safe due to on-going Covid-19 restrictions at the time of data collection.

2.1 Participants

The survey targeted 6,000 graduates according to the university's expected number of graduates for the last three years. Graduates from ten different collages were invited to take part; the highest response came from the College of Education and Arts (17.3%), while the lowest response was from the College of Pharmacy (4.3%). The distribution of responses by college of study is shown in Table 1. The total number of respondents was 352, which is considered a representative sample for this study.

Table 1: Participant colleges of study

College of Study	N	%
College of Education and Arts (CoEA)	61	17.3
College of Sharia and Regulations (CoSR)	44	12.5
College of Computer and Information Technology (CoCIT)	41	11.6
College of Business Administration (CoBA)	39	11.1
College of Science (CoSc)	39	11.1
College of Medicine (CoMed)	33	9.4
College of Art and Design (CoAD)	29	8.2
College of Engineering (CoEng)	29	8.2
College of Applied Medical Sciences (CoApMed)	22	6.3
College of Pharmacy (CoPharm)	15	4.3
Total	352	100

2.2 Data Collection Tool

The Digital Competence Questionnaire was adopted from tools used in previous literature [27] [28], which in turn were based on the DigComp framework [29]. It was digitized on Google Forms and was used as a data collection tool. The questionnaire included two main sections: the general information section, including college selection, and the section covering the five analyzed dimension of digital competence (IDL, C&C, DCC, SAF, and PS).

The questionnaire comprised paragraph items answerable with a five-point Likert-type scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The instrument was validated by two members of staff from the CoCIT to make sure it works properly; it was found to be clear and understandable for a wide range of participants from different colleges.

2.3 Data Analysis

SPSS software package was used to perform the analysis. Three types of analysis methods were used in this study: reliability test, aiming to make sure the responses are valid before meaningful analysis; descriptive statistics, to provide general overview of on the level five aspects of digital competence by presenting the mean for each item in questionnaire; and comparative analysis, to examine differences between the ten groups' data. The assumptions reading the analysis were established before the analysis started. The means, standard deviation (SD), frequency, percentages, and degrees were calculated based on the following:

Length of period	=	Upper bound - lower bound	=	5-1	1.33
		Number of levels		3	

The number of period levels was thus as follows: low (1-2.33), medium (2.34-3.67), and high (3.68-5). These values were in the ranges stated by [30] and can be considered as normal distribution. Similarly, the normality of distribution for each sub-group was examined. Cronbach's alpha coefficient was used to test the stability of the study instrument, requiring a score of at least (0.6) to indicate that items measured the variables they were intended to, and that the instrument was consistent and dependable. The Cronbach's alpha coefficient (0.83) indicates the stability of the study tool [31]. One-way analysis of variance (ANOVA) was used to test the difference between the levels of digital competence between different groups (i.e., different colleges).

3. Results and Discussion

3.1 Descriptive Analysis

The scores shown in Table 2 fundamentally answer the question of the degree of digital competence among participants. It shows the mean scores of all items representing digital competence; all items were measured using a five-point Likert scale. Three is a good general indication that participants had a high level of competence for nearly two-thirds of items, but all of them were marginal at the lower high. While the other third of the items scored medium.

Table 2: Digital Competence Score

Digital Competence	Mean	SD	%	Degree
When sharing my personal information online, I take precautions to protect the personal data of others (not to tag them in a photo without permission, etc.)	3.86	1.163	77.2	High
I am aware of the risks and threats in online environments	3.84	1.239	76.8	High

Digital Competence	Mean	SD	%	Degree
I take precautions about safety and privacy in online environments	3.82	1.211	76.4	High
I comply with behavioral norms (ethical rules) when interacting in online environments	3.81	1.18	76.2	High
I am aware of the effects of digital technology use on health (physical, psychological)	3.8	1.174	76	High
I protect personal data and privacy in online environments	3.79	1.162	75.8	High
I investigate from different sources whether the data, information or digital content I access is reliable	3.78	1.227	75.6	High
I identify my needs when searching for data, information, or digital content in online environments	3.77	1.206	75.4	High
I am familiar with data policies (how to use personal data) of the digital services that I am a user of (social networking, etc.)	3.76	1.186	75.2	High
I take different measures to protect my digital device and content	3.76	1.191	75.2	High
I am aware of the environmental impact of using digital technologies	3.74	1.178	74.8	High
I use digital technologies to communicate in online environments	3.72	1.113	74.4	High
I can develop content in different formats (video, visual, animation, etc.) using digital technologies	3.72	1.212	74.4	High
I develop my digital competence by following new developments	3.71	1.156	74.2	High
I share data, information or digital content using different digital technologies	3.7	1.108	74	High
I easily organize and store data, information and content in online environments	3.7	1.146	74	High
I pay attention to source and citation representations when sharing data, information or digital content	3.69	1.138	73.8	High
I access the data, information and digital content I need in online environments	3.68	1.078	73.6	High
I know what to look out for when creating a digital identity (profile) in online environments	3.68	1.204	73.6	High
I know how to deal with online threats	3.66	1.176	73.2	medium
I pay attention to copyrights and licensing when developing digital content	3.65	1.169	73	medium
I identify the causes of technical problems I encounter when using digital media and devices	3.65	1.167	73	medium
I use digital technologies to collaborate in online environments	3.65	1.147	73	medium
I am aware that I leave a digital footprint when I navigate online environments	3.62	1.118	72.4	medium
I use information search strategies to access data, information, and digital content in online environments	3.61	1.129	72.2	medium
I develop content in simple forms using digital technologies	3.61	1.12	72.2	medium
I produce digital content by making changes to ready-made content	3.6	1.143	72	medium
I solve the technical problems I encounter when using digital media and devices	3.59	1.072	71.8	medium
I identify opportunities for the development of my digital competences	3.58	1.101	71.6	medium
I use different digital technologies to create innovative solutions	3.57	1.155	71.4	medium
I critically evaluate the accuracy of the data, information or digital content I access	3.54	1.149	70.8	medium
Average	**3.70**	**1.159**	**74.0**	**High**

Table 3 shows that participants had higher digital competence scores for the SAF dimension (3.76), followed by DCC (3.72), and IDL (3.68); and they had medium scores for C&C (3.64) and PS (3.62).

Table 3: Scores for Digital Competence Items

Digital Competence	Mean	SD	%	Degree	Ranking
IDL	3.68	0.968	73.6	Medium	3
DCC	3.72	0.986	74.4	High	2
C&C	3.64	1.016	72.9	Medium	4
SAF	3.76	1.023	75.1	High	1
PS	3.62	0.998	72.4	Medium	5
Average	3.7	1.159	74	High	

The following analysis discusses each dimension separately.

Table 4 shows that participants had high scores for all but two items representing IDL (3.68-3.78), and the paragraph "I investigate from different sources whether the data, information or digital content I access is reliable" had the highest degree. The paragraphs "I use information search strategies to access data, information, and digital content in online environments" and "I critically evaluate the accuracy of the data, information or digital content I access" had medium scores (3.61, 3.54, respectively).

Table 4: Scores for IDL Items

Paragraph	Mean	SD	%	Degree
I investigate from different sources whether the data, information or digital content I access is reliable	3.78	1.227	75.6	High
I identify my needs when searching for data, information or digital content in online environments	3.77	1.206	75.3	High
I pay attention to source and citation representations when sharing data, information or digital content	3.69	1.138	73.9	High
I access the data, information and digital content I need in online environments	3.68	1.078	73.7	High
I use information search strategies to access data, information, and digital content in online environments	3.61	1.129	72.3	Medium
I critically evaluate the accuracy of the data, information or digital content I access	3.54	1.149	70.9	Medium
Average	3.68	.968	73.6	Medium

Table 5 shows that all items representing C&C got high scores (3.70-3.81), except for the medium score for "I use digital technologies to collaborate in online environments" (3.65). The paragraph "I comply with behavioral norms (ethical rules) when interacting in online environments" had the highest score.

Table 5: Scores for C&C Items

Paragraph	Mean	SD	%	Degree
I comply with behavioral norms (ethical rules) when interacting in online environments	3.81	1.180	76.1	High
I use digital technologies to communicate in online environments	3.72	1.113	74.4	High
I share data, information or digital content using different digital technologies	3.70	1.108	74.1	High
I easily organize and store data, information and content in online environments	3.70	1.146	74.1	High
I use digital technologies to collaborate in online environments	3.65	1.147	73.0	Medium
Average	3.72	.986	74.4	High

Table 6 shows that for all items representing DCC participants had medium scores (3.60-3.65), except the paragraph "I can develop content in different formats (video, visual, animation, etc.) using digital technologies," which had a high score (3.72).

Table 6: Scores for DCC Items

Paragraph	Mean	SD	%	Degree
I can develop content in different formats (video, visual, animation, etc.) using digital technologies	3.72	1.212	74.3	High
I pay attention to copyrights and licensing when developing digital content	3.65	1.169	73.0	Medium
I develop content in simple forms using digital technologies	3.61	1.120	72.1	Medium
I produce digital content by making changes to ready-made content	3.60	1.143	72.0	Medium
Average	3.64	1.016	72.9	Medium

Table 7 shows that participants had high scores for most items representing SAF (3.68-3.86), with the highest score for the paragraph "When sharing my personal information online, I take precautions to protect the personal data of others (not to tag them in a photo without permission, etc.)." Medium scores were reported for the items "I know how to deal with online threats" (3.66), and "I am aware that I leave a digital footprint when I navigate online environments" (3.62).

Table 7: Scores for SAF Items

Paragraph	Mean	SD	%	Degree
When sharing my personal information online, I take precautions to protect the personal data of others (not to tag them in a photo without permission, etc.)	3.86	1.163	77.2	High
I am aware of the risks and threats in online environments	3.84	1.239	76.9	High
I take precautions about SAF and privacy in online environments	3.82	1.211	76.3	High
I am aware of the effects of digital technology use on health (physical, psychological)	3.80	1.174	76.0	High
I protect personal data and privacy in online environments	3.79	1.162	75.9	High
I am familiar with data policies (how to use personal data) of the digital services that I am a user of (social networking, etc.)	3.76	1.186	75.3	High
I take different measures to protect my digital device and content	3.76	1.191	75.2	High
I am aware of the environmental impact of using digital technologies	3.74	1.178	74.9	High
I know what to look out for when creating a digital identity (profile) in online environments	3.68	1.204	73.5	High
I know how to deal with online threats	3.66	1.176	73.1	Medium
I am aware that I leave a digital footprint when I navigate online environments	3.62	1.118	72.4	Medium
Average	3.76	1.023	75.1	High

Table 8 shows that participants had medium scores for all items representing PS (3.57-3.65), except the paragraph "I develop my digital competence by following new developments," which had a higher score (3.71).

Table 8: Scores for PS Items

Paragraph	Mean	SD	%	Degree
I develop my digital competence by following new developments	3.71	1.156	74.1	High
I identify the causes of technical problems I encounter when using digital media and devices	3.65	1.167	73.0	Medium
I solve the technical problems I encounter when using digital media and devices	3.59	1.072	71.8	Medium
I identify opportunities for the development of my digital competences	3.58	1.101	71.6	Medium
I use different digital technologies to create innovative solutions	3.57	1.155	71.4	Medium
Average	3.62	.998	72.4	Medium

3.2 Comparative Analysis: Hypothesis Testing

Hypothesis: College of study does not significantly affect degree of digital competence ($\alpha \leq 0.05$).

To test the above hypothesis, we used one-way ANOVA. Table 9 shows that all (F) values were statistically significant at ($\alpha \leq 0.05$) except for C&C, thus we conclude that there is a statistically significant difference in degree of digital competence by college of study at ($\alpha \leq 0.05$) for IDL, DCC, SAF, and PS, with superior competence among respondents from CoCIT, and the worst among CoAD, as shown in Figure 1.

Table 9: One-way ANOVA

Study College	N	Mean	SD	df	F	Sig.
Information and data literacy (IDL)						
CoApMed	22	3.80	.854	9	2.375	.013*
CoAD*	29	3.29	.931			
CoBA	39	3.56	1.020			
CoCIT*	41	4.00	.911			
CoEA	61	3.42	1.089			
CoEng	29	3.82	.920			
CoMed	33	3.58	.978			
CoPharm	15	3.48	.919			
CoSc	39	3.90	.947			
CoSR	44	3.90	.771			
Total	352	3.68	.968			
Communication and collaboration						
CoApMed	22	3.57	.957	9	1.123	.345
CoAD	29	3.46	.909			
CoBA	39	3.58	1.000			

Study College	N	Mean	SD	df	F	Sig.
CoCIT	41	3.94	1.021			
CoEA	61	3.58	1.097			
CoEng	29	3.79	.871			
CoMed	33	3.67	1.016			
CoPharm	15	3.64	.914			
CoSc	39	3.90	1.064			
CoSR	44	3.93	.814			
Total	352	3.72	.986			
Digital content creation						
CoApMed	22	3.41	1.010			
CoAD*	29	3.28	.963			
CoBA	39	3.48	.984			
CoCIT*	41	4.05	.978			
CoEA	61	3.44	1.088			
CoEng	29	3.86	.898	9	2.473	.010*
CoMed	33	3.48	1.066			
CoPharm	15	3.52	.837			
CoSc	39	3.94	1.065			
CoSR	44	3.80	.903			
Total	352	3.64	1.016			
Safety						
CoApMed	22	3.66	1.004			
CoAD	29	3.51	1.047			
CoBA	39	3.66	1.038			
CoCIT	41	4.14	.943			
CoEA	61	3.46	1.195			
CoEng	29	3.90	.963	9	2.499	.009*
CoMed	33	3.56	1.080			
CoPharm	15	3.50	.891			
CoSc	39	3.99	.915			
CoSR	44	4.05	.752			
Total	352	3.76	1.023			
Problem solving						
CoApMed	22	3.47	1.066			
CoAD	29	3.27	1.165			
CoBA	39	3.38	1.020			
CoCIT	41	4.07	.942			
CoEA	61	3.39	.987			
CoEng	29	3.81	.982	9	3.092	.001*
CoMed	33	3.47	.996			
CoPharm	15	3.36	.836			
CoSc	39	3.86	.927			
CoSR	44	3.90	.790			
Total	352	3.62	.998			
At						
CoApMed	22	3.61	.908			
CoAD*	29	3.39	.946			
CoBA	39	3.56	.974			
CoCIT*	41	4.06	.895			
CoEA	61	3.46	1.046			
CoEng	29	3.85	.872	9	2.511	.009*
CoMed	33	3.56	.980			
CoPharm	15	3.50	.847			
CoSc	39	3.93	.909			
CoSR	44	3.94	.711			
Total	352	3.70	.940			

[a.] * statistically significant at ($\alpha \leq 0.05$)

4. Conclusion and Recommendations

The outcomes from this study provide some indications of the level of digital competencies among Saudi graduates as future digital citizens joining the local and global digital transformation. The findings showed some good general indications when looking at all items of all five indicators used to access participant levels of digital competencies. However, when comparing findings for each indicator, moderate competence levels are evident for three out of five studied dimensions: IDL, C&C, and PS. Differences between graduates from different colleges are evident when comparing levels of digital competencies. Hence, it could be recommended to conduct more studies with different universities to obtain comparative findings to confirm these academic specialty-related differences in other institutions to address this study limitations. Moreover, efforts must be made to sustain and promote good areas of digital competencies, with targeted strategies and support for learners with specific needs to increase their competence in certain areas. A national level of digital competencies assessment framework could be linked with other efforts of Saudi digital transformation mission to help continuous evaluation of graduate levels and provide suggestions to accommodate enhancement to enable abilities for the use of future technologies. This would help integrate pedagogical efforts toward achievement of Saudi Vision 2030 and improve the employability of Saudi graduates.

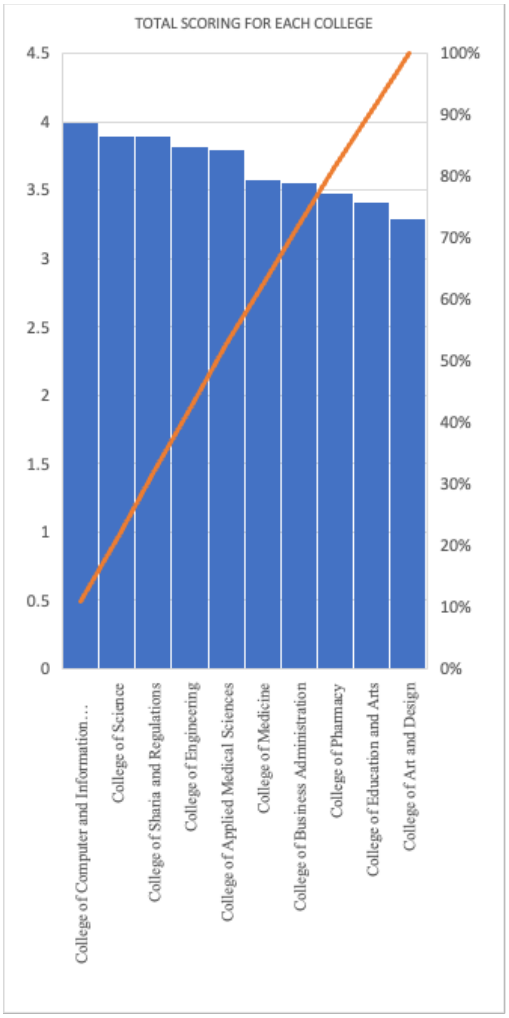

Figure 1: Total scoring for each college.

Conflict of Interest

The author declares no conflict of interest.

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