

The Impact of COVID-19 on Digital Competence

A Case Study of Preservice Teacher Education Students in the Sultanate of Oman

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Abstract— The study looked into how COVID-19 affected the digital competence of a group of preservice teacher education students at a higher education institution in the Sultanate of Oman. The paper examined students' digital profile in five areas namely information and data literacy, communication and collaboration, digital content creation, safety and problem solving. Data from 32 undergraduate students was collected by utilizing DigComp, a European Commission digital skills self-assessment tool and findings from a survey. The digital competence framework measures the set of skills, knowledge and attitudes that describes what it means to be digitally competent. These skills are important for students to be effective global citizens in the 21st century. The results of the study revealed that the majority of the students scored Level 3 (Intermediate) in their self-assessment competency test score. The majority of the students perceived that their digital competence improved significantly as the result of online learning which was accelerated by the COVID-19 pandemic. The rationale of this investigation is that it helps educators understand the students' level of digital competence and the students' perspectives on ICT skills. In turn, it informs us the ways to monitor the students' digital progress and the next steps in developing their digital competency.

Keywords—Digital competence; digital skills; digital profile; ICT skills; preservice teacher education

I. INTRODUCTION

Oman's National Education Strategy 2040 aims to align the country's education system with the changing needs of the economy and society, with a focus on developing the skills and knowledge that student need to be successful in a rapidly changing world. This includes a focus on critical thinking, digital literacy, as well as the promotion of values such as creativity, innovation, and entrepreneurship [58]. The Education Council explained that twenty-first century skills are the "global currency" (p.17) for local and international workplaces [52]. Developing digital competencies can help students in Oman to develop skills and competencies that are in line with the needs of international labor markets. Digital competencies such as proficiency in technology, digital literacy, and digital communication are becoming increasingly important in today's global economy. By developing these skills, students in Oman can better prepare themselves for jobs in various fields, including technology, business, and communication. Additionally, digital competencies can also help students to become more adaptable and resilient in an ever-changing job market [2]. Many jobs today need digital skills [28]. To that end, the Education Council [52] described:

Oman's movement towards a knowledge-based economy requires reform of the current education system. [It] should consider improving the information technology infrastructure in educational institutions [and] supporting the use of cutting-edge technology, e-learning, capacity building and infrastructure improvement in schools and higher education (p.33).

The COVID-19 pandemic led to a rapid shift towards digital learning as universities were forced to close and shift to remote learning. This included the use of online learning platforms, video conferencing tools, and virtual classrooms. In a recent report, the Ministry of Transport, Communications, and Information Technology has set-up plans and strategies to equip 10,000 young Omanis with digital skills by 2025 [4]. The task of learning new digital skills is not new in Oman. Prior to the pandemic, students in the higher education institutions in Oman has somewhat experienced using electronic databases and e-learning platforms, as well as engaging with their peers in formal learning context online [38]. However, students often cited internet speed and internet coverage as factors that limit their online experience [50]. However, the internet speed, bandwidth and coverage in the Sultanate of Oman dramatically increased after the pandemic [41]. As a result, universities, such in the case of this study, Dhofar University, were able to adapt to the challenges posed by the pandemic and continue providing education to students through online learning [49]. As the result of that, the instructors at the university were able to utilize synchronous and asynchronous classroom instructions during online learning. Dhofar University is a private higher education institution located in the southern region of Oman. The Methodology section of a study provides a detailed explanation of the research design and methods used to conduct the study.

The COVID-19 crisis has led to the discovery of new and creative ways to utilize technology for teaching, learning, and analysis. The research aims to investigate the effect of post-pandemic online learning on the digital competence of a group of students in preservice teacher education. The study is framed by the following research questions:

1) How do the preservice teacher students evaluate their digital competencies?

2) How do the preservice teacher students perceive their competencies in Information and Communications Technology (ICT) post-pandemic?

3) What is the relationship between the number of years the preservice teacher students report to actively use ICT in their everyday lives to their digital assessment score?

The present study is significant as it documents the preservice teacher students' digital profile and sought the students' perspectives on their ICT skills. The individuals examined in the study were students preparing to become teachers. Currently, there is a lack of knowledge about the digital abilities of these student teachers within the context of Oman. The World Bank reported two important findings that set the backdrop of this study. First, the majority of Omani teachers have less than a decade of teaching experience. Second, the majority of the teachers do not know how to incorporate technology in the classroom. The lack of digital competence among the new teachers is a cause for concern. As Oman shifts its focus to hiring local talent through its Omanization policy, it is crucial to ensure that preservice teachers, like the participants in this study, are proficient in digital skills. Omanization is the national initiative to increase the employment of local citizens in the workforce [2]. Oman Vision 2040 has placed the education sector at the center of the country's development. In order to ensure that the country produces highly competent teachers, it is evident that teacher education programs need to be scrutinized.

The study aimed to gather information on the students' digital profiles and their views on their ICT skills before and after the online learning during the COVID-19 pandemic, using a survey method. The main idea behind the research was that online learning would result in an improvement in self-perceived digital proficiency.

II. BACKGROUND OF STUDY

A. Digital Competence in Higher Education

The widespread use of information and communication technology (ICT) has made digital competence a commonly discussed topic in academic literature and policy documents [60] [7]. The rise of digitalization has also led to new expectations in higher education [60]. The heavy influence of digitalization can be seen in the way it has impacted the knowledge development process and the performance of both teachers and students.

Digital competence is a clear priority in European policies [47], hence the common references to European Union policy documents when defining the concept in academic publications [60]. In the context of higher education, digital competence is poorly defined, and most scholars use definitions from policy papers [60]. A viable explanation is the future-oriented nature of digital competence, as it focuses on the skills required to become a professional and citizen [47]. Higher educational institutions are responsible for the development of these skills among students [47]. This view is echoed in the United Nation's 2030 Agenda for Sustainable Development [57], which endorsed that ICT skills and competencies must be harnessed by young people, and that digital technologies enable rethinking teaching and learning processes. There is a growing place for ICT and digital competence in and out of the HE classroom to support teaching and learning [44].

B. Teachers' Digital Competencies in Higher Education

Digital competence is among the key challenges that teachers in higher education face [8]. However, there is no established definition for professional digital competence, nor is it an established practice [9]. Although digital competence is becoming essential for citizens in general, teachers in higher education specifically hold a responsibility to master it. Digital transformation and improvement of education very much depend on teachers' actions [8]. Professional digital competence in education settings is highly contextual, as teachers need to manage complexity and master decision-making for the optimal use of ICT to meet learning outcomes [9] [53]. Moreover, studies recognize that teachers are role models for students, who need to be digitally confident to inspire the class to make the best use of ICT [5] [26].

A popular conceptualization of teachers' digital competence is the layered approach levels [26]. The macro level is concerned with generic skills. At the meso level is didactic digital competence and how classrooms are affected and afforded by ICT. The micro level is connected to teachers' enactment of digital competence to design courses, communicate with audiences and stakeholders manage digitally-rich classrooms [22]. A fourth dimension, suggesting that educators should possess transformative agency [9]. The term captures the notion that teachers are not passive recipients of frameworks and tools. Instead, they take the initiative to transform practices and engage in problem-solving by implementing ICT, depending on the classroom situations they face [9] [1].

C. Impact of the COVID-19 Pandemic on Preservice Teachers' Digital Competence

It was against this backdrop when the COVID-19 pandemic abruptly replaced most face-to-face teacher education courses with online lectures [42] [45]. The pandemic pushed the importance of digital competence in higher education to a new height [60]. Pre-service teachers had to go through their training online [25]. It is not that they were not familiar with technology like Google Classroom, Zoom or WhatsApp. However, some of them were not ready for extensively using it [6]. Moreover, student teachers also had to deliver online lectures as a part of their practicum [6] [10].

On the one hand, the coronavirus outbreak encouraged teachers in higher education to quickly change their practices to allow for learning continuity from distance [8]. On the other hand, teachers' urgent response to the crisis involved little time for preparation [25] [35]. A few studies posed the question of whether the digital competence of pre-service teachers increased during the pandemic or not [24] [29]. A study found that during the first year of the pandemic prospective teachers at a German university made enormous changes towards digital technology adoption [24]. Despite this, the researchers did not report a significant impact on their digital competencies, probably because they were seeing the pandemic as a temporary event and were planning to go back to their pre-pandemic behaviour. Another study surveyed 147 pre-service teachers to reveal their self-reported digital literacy pre-university, or before the pandemic, and during

distance education after the COVID-19 outbreak [43]. Findings show that pre-university evaluations were more positive, while the emergency highlighted some weaknesses that resulted in lowered evaluations of digital literacy. Much of the issue stems from widespread the use of smartphones to attend online classes, which causes distractions. Nevertheless, 27% of participants reported improvement in digital communication skills [43]. Another report looked at the written reflections of 51 student teachers in Norway [25]. Their findings demonstrate an overall reluctance to integrate digital technology during teaching practicum due to some difficulties related to digital competence. The scholars highlight the need for continuous development of ICT skills, as the pandemic has demonstrated their critical significance for teachers' education.

The Background section addresses issues that support the need for a research design that allows preservice teacher education students to evaluate their digital competence and ICT skills before and after the pandemic.

III. METHODOLOGY

A. Context of the Study

The Sultanate of Oman is situated in the southeast portion of the Arabian Peninsula and shares borders with Saudi Arabia, the United Arab Emirates, and the Republic of Yemen. The latest census shows that the population of Oman is slightly above 4.5 million, with Omani citizens making up 62% of the population and expatriates comprising 38% [37]. The majority of the study participants come from the Dhofar region, which is located in the southern part of the country and borders the Republic of Yemen.

The Sultanate of Oman generates most of its revenue from oil resources and it has been the source of the country's development [46]. After oil, the fisheries account for the majority of the country's trade export. The government identified other sectors as means to diversify the country's economy. The sectors are tourism, fisheries, mining, logistics and manufacturing. The Sultanate also aimed to make the ports in the country into regional maritime hubs [46]. The traditional economic activities in Oman, in particular the Dhofar region, are production of honey, frankincense, fisheries, and agriculture which includes raising animal livestock such as camels and cows [37]. While a proportion of the population still maintain the traditional economic activities, some moved and worked in the cities to take up jobs in various government and private sectors [37]. The government is also pushing the agenda for the growth of entrepreneurship and Small-Medium Enterprises (SME) for wider socio-economic goals, as part of the country's Vision 2040 [27]. The national policy also outlined digitization and technological innovation in transforming the country's economy [37].

In the education sector, the ministry is rolling-up the plans for digital transformation. This included training teachers with skills and technology [38], developing IT infrastructure [40], and equipping students with digital skills for their future careers [4]. Being digitally competent in all areas of work, in

particular, the education sector is crucial in the development of the Sultanate of Oman.

B. Participants of the Study

The study recruited 32 undergraduate students (28 female, 4 male) from Dhofar University in Oman, using a systematic sampling method. These participants were all enrolled in a preservice teacher course and had prior experience with online learning due to the pandemic. The participants were at the second, third, or fourth year level of their undergraduate studies and had the intention to become teachers after graduation.

C. Data Collection

The participants of the study are 32 undergraduate preservice teacher education students at Dhofar University. Dhofar University students who participated in the research experienced remote learning during the restricted movement as part of the country's initiatives to minimize the spread of COVID-19 pandemic from March 2020 to July 2021. Although some of the students had experienced some aspects of technology in the classroom prior to the pandemic, the abrupt move towards online learning forced the students to acquire new skills without sufficient training and in a ramp-up time [59].

Dhofar University's learning management system is Moodle. Through Moodle, the students received synchronous and asynchronous instructions. The instructors at Dhofar University, at least some of them, used video conferencing tools to deliver their classes virtually. There were also several instructors who used game-based learning tools. The students who participated in the research returned to campus for face-to-face learning beginning September 2021. Although the majority of the courses are delivered face-to-face, some instructors continued to incorporate some aspects of technology in their classroom teaching and learning.

The data was gathered and analyzed using the following steps. First, the students were invited to evaluate their digital competence in the form of an online test. The testing tool that was used, as further explained in the Research Instruments section, is DigComp. The data gathered from the test were recorded as their digital profiles in five areas namely, information and data literacy, communication and collaboration, digital content creation, safety and problem solving. All items were averaged respectively. The data was then interpreted using Dimension 3 Proficiency Level from the European Digital Competence Framework for Citizens. Second, the students were invited to self-assess their ICT competencies pre- and post- pandemic through an online survey. The survey items were adapted from the DiCTE project [15]. The hypothesis being tested was that participating in online learning during the pandemic would result in a rise in self-reported digital proficiency. The statistical analysis was carried out using SPSS (Version 27). To evaluate the hypothesis, a Paired-Samples test was applied to the mean of responses to all items ($p < .05$ significance level). Additionally, the open-ended responses were analyzed, coded and grouped according to themes.

D. Research Instruments

The investigation utilizes two research instruments. The first is the testing instrument called the DigCom. The instrument is developed from the European Digital Competence Framework for Citizens DigComp 2.1. [19]. The digital competence framework measures the set of skills, knowledge and attitudes that describes what it means to be digitally competent. These skills are important for students to be effective global citizens in the 21st century. The test covers five competence areas namely information and data literacy, communication and collaboration, digital content creation, safety and problem solving [20]. When completing the test, the participants will receive overall results per competence area and an average level for all competences (Foundation, Intermediate or Advanced). The test allows participants to evaluate their own digital competence level, from 1 to 6. Levels 7 and 8 of DigComp 2.1 are not taken into consideration as they are reserved for highly specialized careers [20]. DigCom has been used and tested in many countries in Europe as part of their Digital Education Plan, as well as countries outside of Europe and this can be traced in the report by the Council of European Professional Informatics Societies (CEPIS) [11] [51]. In this study, the DigComp test results are used as a reference to define and assess digital profiles for the preservice teacher education students.

The online survey serves as the second research tool. It enables students to assess their proficiency in ICT, from “not at all” to “very high degree”, both pre- and post-pandemic. The survey was adapted from the DiCTE project, which stands for Developing ICT in Teacher Education and is funded by the European Commission. The survey created by the DiCTE project aims to determine the digital competence of student teachers at the start of their education [15] [31].

IV. RESULTS

DigCom test covers five competence areas namely information and data literacy, communication and collaboration, digital content creation, safety and problem solving, as indicated in Table I below. The data are then interpreted using Dimension 3 of the European Digital Competence Framework.

TABLE I. DIGCOM MEAN SCORE

Competencies	Mean score
Information and data literacy	2.451612903
Communication and collaboration	2.709677419
Digital content creation	3.387096774
Safety	2.290323
Problem-solving	2.193548387
Overall	2.606452

The results from Table I revealed the mean score of the participants’ digital profile is as follows:

- 1) Information and data literacy at the mean score of 2.45

- 2) Communication and collaboration at the mean score of 2.7
- 3) Digital content creation at the mean score of 3.38
- 4) Safety at the mean score of 2.29
- 5) Problem-solving at the mean score of 2.19

The overall mean score of the students’ digital competence in all five areas is at 2.6. Each of the mean score is interpreted using Dimension 3 of the European Digital Competence Framework. Each of the competency is explained in turns.

A. Information and Data Literacy

The students’ competency in Information and Data Literacy is based on their ability in the following categories:

- 1) Browsing, searching, and filtering data
- 2) Evaluating data
- 3) Managing data, information, and digital content

The preservice teacher education students who participated in this study scored an average of 2.45 for Information and Data Literacy. According to the Dimension 3 of the European Digital Competence Framework, the students’ competence in Information and Data Literacy is in the Foundation 2 category. This means, the students are able to do a simple search on their own or with guidance. They can identify their information needs, detect the credibility and reliability of data sources, and organize information in structured environments.

B. Communication and Collaboration

The participants’ competence in Communication and Collaboration is at the mean score of 2.7. The students’ competency in Communication and Collaboration is based on their ability in the following categories:

- 1) Interacting through digital technologies
- 2) Sharing through digital technologies
- 3) Engaging citizenship
- 4) Collaborating through digital technologies
- 5) Netiquette
- 6) Managing digital identity

The students’ proficiency in Communication and Collaboration is categorized at the level of Intermediate 3. Dimension 3 of the DigComp 2.1 framework described the students’ competence at Intermediate 3 Communication and Collaboration as the ability to perform interactions with digital technologies, select appropriate digital communication to participate in society, to empower oneself and to collaborate with others. At this level too, students are able to explain know-how while using technologies, express communication strategies adapted to an audience, and ways to protect one’s reputation online.

C. Digital Content Creation

The participants’ digital competence in Digital Content Creation is at the mean score of 3.38. Out of the five digital competence areas, this area is the highest mean score. When interpreted against Dimension 3 of the European Digital Competence Framework, the score can be categorized as Intermediate 3 level.

The participants' digital competence in Digital Content Creation Literacy is based on their ability in the following categories:

- 1) Developing digital content
- 2) Integrating and re-elaborating digital content
- 3) Copyright and licenses
- 4) Programming

According to Dimension 3 of the DigComp 2.1 framework, at Intermediate 3 Digital Content Creation, the students are able to create and edit routine content, express oneself through the digital content creation, indicate rules of copyright and licenses, as well as to list instructions for a computing system to solve routine problems.

D. Safety

The participants' digital competence in Safety is at the mean score of 2.29. When interpreted against Dimension 3 of the European Digital Competence Framework, the score can be categorized at the Foundation 2 level. The students' digital competency in Safety is based on their ability in the following categories:

- 1) Protecting devices
- 2) Protecting personal data and privacy
- 3) Protecting health and well-being
- 4) Protecting the environment

At the Foundation 2 level, students are able to identify simple ways to protect their devices and digital content, differentiate simple risks and threats, follow simple safety and security measures, and have due regard to reliability and privacy. They can also select simple ways to protect their personal data and privacy in digital environments, use and share personally identifiable information while protecting themselves and others from damages, differentiate simple ways to avoid health risks and threats to physical and psychological well-being while using digital technologies, and select simple ways to protect themselves from possible dangers in digital environments [20].

E. Problem-Solving

Lastly, the participants' digital competence in Problem-Solving is at the mean score of 2.19. Out of the five digital competence areas, this is the lowest mean score. When interpreted against Dimension 3 of the European Digital Competence Framework, the score can be categorized at the Foundation 2 level. The students' digital competency in Problem-Solving is based on their ability in the following categories:

- 1) Solving technical problems
- 2) Identifying needs and technological responses
- 3) Creatively using digital technology
- 4) Identifying digital competence gaps

At the Foundation 2 level, students can recognize basic technical issues while using devices, propose basic solutions, identify needs, and understand basic digital tools and how they can be used to address those needs. They can also identify digital tools and technologies that can be used to generate new knowledge and improve processes and products. Additionally, they are able to address basic problems in digital

environments, recognize areas where their own digital skills need improvement or updating, and identify opportunities for self-development and staying current with digital advancements [20].

F. Overall Digital Competence Score

The overall mean score of the participants' digital competence is at 2.6. When interpreted against the Dimension 3 of the European Digital Competence Framework, we can round-up the mean score and conclude that the students' digital competence can be categorized as Intermediate 3 level.

G. ICT Competencies Pre- and Post- Online Learning COVID-19 Pandemic

The results for the next section are presented based on the statistical tests outlined in the Data Collection section. Significance levels are indicated by * for $p < .05$, ** for $p < .01$, and *** for $p < .001$.

The students self-assessed their ICT competencies pre- and post- pandemic in regard to the following areas:

- 1) Competence in using word processor
- 2) Competence in using spreadsheet
- 3) Competence in using Presentation tools
- 4) Competence in using photo and video editing applications and tools
- 5) Competence in using Learning Management System
- 6) Competence in using educational games

The research utilized paired samples test to measure the differences in the way the students perceived the impact of online learning on their digital competencies, pre- and post-pandemic. The following hypotheses guided the statistical analysis of the study:

The null hypothesis (H_0): $\mu =$ there is no association of the students' participation in online learning to an increase in self-assessed digital competence

The alternative hypothesis: (H_a): $\mu =$ there is an association of the students' participation in online learning to an increase in self-assessed digital competence

The data suggests that the students perceived an increase in ICT competence post- pandemic, as they participated in online learning. Utilizing a 0.05 level of significance, the p-values are of 0.001, 0.000 and 0.002 are less than the significance level of 0.05. Thus, it rejects the null hypothesis.

The common themes emerged from the open-ended responses to, "as a preservice teacher education student, I should be digitally competent because ..." are coded and categorized as follows:

- 1) Learning approach for present and future times
- 2) Prepare students with skills for the workplace
- 3) Prepare students for the global society

Finally, the findings measured the correlation between the participants' digital competency overall score (DigCom) to the number of years they reported to actively use ICT in their everyday lives. The Pearson correlation coefficient for the number of years and score is .893, which is significant ($p < .01$ for a two-tailed test). There is a significant relationship

between years of experience and competency score. It demonstrates that the student's experience in utilizing technology in their everyday lives has a significant impact on their competency score, as illustrated in Table II below.

TABLE II. CORRELATION BETWEEN NUMBER OF YEARS ACTIVELY USE ICT AND DIGITAL COMPETENCY SCORE

		Score	Number of years
Score	Pearson Correlation	1	.893**
	Sig. (2-tailed)		.000
	N	32	32
Number of years	Pearson Correlation	.893**	1
	Sig. (2-tailed)	.000	
	N	32	32

** . Correlation is significant at the 0.01 level (2-tailed).

V. DISCUSSION

The paper investigated the perspectives of a group of preservice teacher education students on their digital competence by assessing their digital competence before and after the online learning resulted from the pandemic. In regards to the first research question, the findings show the students' overall proficiency in digital skills is at Intermediate 3. This finding is similar with the result with undergraduate Chilean students, with a sample size of 817 participants [48]. Although the overall score is similar, the Chilean report differs when it comes to the five digital areas. The Chilean students scored highest for Safety/Network Security and lowest for Digital Content Creation. The students participated in this research on the other hand, scored highest for Digital Content Creation. In both countries, Chile and the Sultanate of Oman, the low mean score for Problem-Solving is a cause for concern. In current scholarship, particularly in the context of the Sultanate of Oman, the inability of graduates in solving problems is viewed as one of the major educational challenges [36]. The educational policy makers and curriculum developers in the country were tasked to ensure that soft skills, such as problem-solving are integrated in the curriculum. Previous investigations addressed different ways problem-solving skills may be incorporated in the classroom teaching and learning [55] [3].

An area that needs to be addressed is the participants' increased competency in Digital Content Creation, particularly when it comes to developing and integrating digital content. One possible explanation is that the participants are active and frequent users of Web 2.0. Web 2.0 refers to the current state of the internet technology that allows users to generate content for other end users [13]. The earlier version of the internet, Web 1.0 had fewer content creators and the majority of the internet users were only consumers [13]. Web 2.0 gave rise to various social media platforms. The skills associated with the active and frequent use of social media may contribute to the reported level of skills in creating digital contents. With the population of slightly above 4.5 million [39], social media applications in the country are Facebook and Instagram. Facebook has 1.6 million users while Instagram has 1.2 million users [39]. The popularity of the social media

applications depends on the active participation of the users in producing, sharing, and interacting about digital contents.

In regards to the second line of inquiry, the research measured the differences in the perceived ICT competence pre- and post- pandemic. The finding rejected the null hypothesis and unveiled that there was an association of the students' participation in online learning to an increase in self-assessed digital competence. In their self-assessment, the participants reported to have increased ICT competence in using word processor, spreadsheet, presentation tools, photo and video editing tools, Learning Management System and educational games post- pandemic, resulted from online learning. Similar finding was traced in previous studies [16] [18]. The study found that the preservice teachers' competence and online teaching readiness was enhanced post-pandemic. Although the findings favored online learning as it has positively impacted the students' ICT skills, we cannot assume that the students are prepared with pedagogical practices to teach online. In a study in the US, the authors found that even though most teachers perceived readiness, they did not use the appropriate digital tools when teaching in the classroom [16].

Another consideration is regarding the survey instrument. The survey' results represent the students' belief about their ICT competence rather than their actual level of competence. This latter should be measured by performance tasks [21]. Previous research explained that one of the weaknesses of survey instruments is the respondents themselves [30]. The participants may respond to the survey items with social-desirability bias such as the desire to please the instructor or bias in self-perception. The previous study addressed the need for the validation of the survey instruments, particularly when it is used as the yardstick in measuring one's competence [54].

The open-ended item in the survey sought the participants' perspectives on the importance of equipping oneself with digital skills. The common themes that emerged from the responses can be summarized and categorized as follows:

- The participants linked equipping oneself with digital skills to the ability to approach classroom teaching and learning that is relevant for present day and for the future
- The participants linked the importance of equipping oneself with digital skills to prepare students for the workplace and global society.

An excerpt from one of the responses states,

"It's important for me to be digitally competent so that I can impart my knowledge to my students in a new way. We are no longer living in a traditional way- to learn from books. Students today learn from YouTube and Google". (S11)

The excerpt above is one of the examples the participants gave in which the student linked the importance of preservice teacher education students equipping themselves with ICT skills to the ability to approach the classroom that fit current and future times. In other words, digitally competent teachers are able to make classroom teaching and learning relevant.

Other excerpts state,

“I don’t see how we can teach without having some ideas about technology. Maybe we are not IT experts, but we should have some ideas. In future, our students need IT skills for their work too. It starts with us”. (S8)

“Oman is no longer a traditional society. We interact with people from different countries through studies, work, government and so on. Being good with technology is important for us as future teachers so that we can show the younger Omani children how to use technology to connect with people from other countries”. (S3)

The excerpts above are examples the participants gave in which the students linked the importance of preservice teacher education students equipping themselves with ICT skills to preparing students for the workplace and the global society. Being competent in ICT is an unarguably an essential part of teacher education [23]. In a study with preservice teacher education in Ireland, Norway and Spain, the authors found that despite the different ways the education policies developed, the participants had a similar and shared view of the importance of digital skills [32]. Another study found that preservice teacher education students in an Irish University had a favorable positive attitude toward using technology in the classroom [33]. Both of the studies utilized the DiCTE project survey as their instrument of study.

Finally, this paper investigated the relationship between the participants’ digital competency score, which was derived from DigComp digital profile to the participants’ reported active use of ICT in their daily lives. The active use of ICT is narrowed into the following: the use of word processor, spreadsheet, presentation tools, photo and video editing tools, Learning Management System and educational games. The results found there is a strong correlation between the number of years the participants reported to actively use ICT in their lives to their digital competence score. In other words, the duration of exposure and active use of ICT has a significant impact on their digital competencies. This discovery aligns with previous research that found teachers who feel confident in their ability to use educational technology and see it as beneficial for teaching and learning are more likely to incorporate digital tools in their teaching. Similarly, providing preservice student teachers with more opportunities to work with digital tools has been found to improve their ability to use technology in their classrooms in the future [12] [14].

VI. CONCLUSION

The study examined the effects of COVID-19 on the digital skills of preservice teacher education students at Dhofar University in Oman, focusing on the students’ level of digital competence, their views on their ICT abilities post-pandemic, and the correlation between their reported years of active ICT use and their digital competency scores.

The study utilized two instruments that were DigCom, a digital skills self-assessment tool which was produced by the European Commission and a survey which was adapted from the DiCTE project. Both of the research instruments have been validated by studies around the world, as explained in the Discussion section.

In summary, the findings first revealed that the majority of the students scored Level 3 (Intermediate) in their self-assessment competency test score. The results of the study also showed that among the five areas tested, namely information and data literacy, communication and collaboration, digital content creation, safety and problem solving, the students scored the highest for digital content creation and the lowest for problem-solving. Second, the findings showed that the majority of the students perceived that their digital competence improved significantly as the result of online learning which was accelerated by the COVID-19 pandemic. Finally, the study demonstrated that the duration of active use of ICT has a significant impact on the students’ digital competency score.

The rationale of this investigation is that it helps educators understand the preservice teacher students’ level of digital competence. It also gave us an insight on the ways the students perceived their ICT skills before and after the pandemic. In turn, the data informs us the ways we could identify their strengths and weaknesses, monitor their progress and identify ways in supporting and developing their digital skills.

An avenue for future research, is to consider measuring the students’ digital competency based on performance tasks. The present study is based on the students’ self-assessment, which reflect their belief about their digital competence. Another consideration to make is to have digital assessment that is more relevant to the Arab region. The expression of survey result may differ, as the participants respond to statements that are more contextually relevant to them.

The implication that can be drawn from the findings of the study is that, if the students were given more time and opportunities to engage with various forms of ICT, the more they would perceive themselves to be digitally competent. This belief would then influence the way they conduct their classes. The more positive the belief is, the more effectively they would incorporate aspects of technology in their classroom. As future teachers, the students have a greater responsibility to empower their students with important skills for work and participation in the society through the use of technology. As the DiCTE project [15] explains,

“Formal education has an important role to play in this regard and none more so than in teacher education. From a perspective of equity, it is crucial for teacher education to equip future teachers with the required professional digital competence so that they can prepare children to grow up in a digital society” (para.2).

The growing importance of technology in education is without a doubt, transforming the ways learning takes place. In the Sultanate of Oman, there have been suggestions for hybrid education in which combine the aspects of face-to-face and online learning in classroom teaching and learning [34]. Reimagine Education, an initiative pioneered by the UNICEF explained that technology could bring about change in delivering learning opportunities to children and young people “anywhere, at any time” [56]. The growth of technology requires innovative pedagogies, which could only take place if the future teachers are digitally competent. As these students

would be future teachers, they would be given a greater responsibility in designing instructional strategies that align with the country's Vision 2040, the implications of this study are immediate to them.

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