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AN ANALYSIS OF THE 21ST-CENTURY DIGITAL LITERACY SKILLS AMONG MALAYSIAN POSTGRADUATES

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Abstract

With the advent of technology, the internet is the main source of millions of answers. By clicking one button, it answers many questions one might have. The more information there is, the more users have to know how to navigate through ambiguity and triangulate and validate viewpoints. As such, learning in a digital world has become more challenging today as students need to apply what they know in solving problems that come with navigating the internet. With mass media content, information on the internet contributes more often than not to misinformation, fake news, information bias, or even post-truth. Especially for those pursuing postgraduate studies, knowing the content is insufficient. In addition, students need to use the appropriate digital tools to get the information they need. Therefore, this research proposes the need for determinant skills in the 21st Century digitally for postgraduate students in Malaysia. 21st Century Skills Scale was used to gather data from 97 Universiti Teknologi MARA (UiTM) postgraduate students. The determinants are creativity and innovation, critical thinking, communication, and collaboration. The study revealed that Creativity and Innovation skills have the lowest mean among all the other determinants among postgraduates which results in implications for the postgraduate programs.

Keywords: Determinants, digital literacy skills, Malaysian, postgraduates

1. Introduction

Digital literacy is being incorporated as one of the skills needed in 21st-century learning. As learners, and educators thus society becomes dependent on the internet, and the landscape of the education system has changed. Learning is not just confined to classrooms but also on the world wide web In Higher Education Institutions (HEi), digital literacy is seen as vital as the need to complete assignments or tasks would require the use of digital gadgets. As such, having digital skills represents an essential asset as it makes it possible to access digital services and carry out numerous activities and assignments for students in the HEi.

2. Problem Statement

Postgraduates need to graduate on time or GOT to ensure the sustainability of higher institutions, especially postgraduate programs. In addition, GOT ensures confidence and accountability towards the stakeholders of the universities. According to Higher Education Statistics (Kemasukan pelajar Sarjana, PhD meningkat pada 2021 - KPT, 2022) by the Ministry of Higher Education Malaysia, in May 2021, 7,831 students enrolled in Ph.D. programs and 18,612 in Master programs. However, 3,407 (43.55%) students managed to graduate on time, and 13,360 (71.95%) from the overall enrolment. Graduate on time or GOT means the postgraduate candidate can complete his or her studies on time. A Master's degree is usually 2 years and a Ph.D. is 4 years. These statistics have serious implications for the local higher learning institution when the number of students who GOT is not the same as the number of enrollments (Komitmen dua hala tingkatkan kesejahteraan pelajar pascasiswazah untuk GOT, 2022). The postgraduate programs may not be competitive as potential candidates may believe that graduation or completion may not be on time, especially those receiving scholarships. Usually, scholarship recipients have a time stipulation as to when they are supposed to graduate. In the case of the Academy of Language Studies, the University of Technology MARA, Shah Alam, Malaysia started its very own postgraduate studies in 2008. It started with 6 students and now has grown steadily to 278 students from Malaysia, China, Pakistan, Nigeria, and Iraq. The number of enrolments is encouraging, however, up till 2022 not many have graduated on time. 36 have completed their postgraduate studies but not GOT.

A recent study on postgraduates from 3 universities in Malaysia revealed that research skills, institutional support, and self-management skills significantly influenced the postgraduate students' motivation to GOT (Priyadarshini et al., 2022). Findings suggest that strategic behavior centers around the development of four core skills: engaging in self-directed thinking; fostering effective communication; fostering leadership and shared responsibility; and using technology to reinforce, extend, and deepen learning as mentioned in Curry and Moore (2003). Therefore, postgraduates are expected to be aware of their skills and apply them appropriately. Applying skills like critical thinking in searching for information digitally is vital. The digital skills employed whilst browsing for relevant information and searching for legitimate sources are invaluable to possess as postgraduates. Shariman et al. (2014) expressed the ongoing and growing concern among educators about the ability of Malaysian university students to critically use digital content to meet their information needs. According to Krishnamurthy and Shettappanavar (2019) in their study, it was found that postgraduates who lacked efficient search and

retrieval of information strategies on the Internet proved to be struggling in their postgraduate studies. Another study that involved 59 postgraduate students and four lecturers revealed that postgraduates articulated success in using ICT skills, collaborating, and lifelong learning in being leaders but lacked critical and creative thinking and communication skills (Sidhu et al., 2015). Postgraduate students need to be just equipped with digital skills but with the necessary skills to apply them to ensure timely completion of the postgraduate programs.

Digital literacy skills proved to be invaluable to postgraduate students. Competencies such as these are essential to the 21st-century workforce, where being able to critically evaluate and convey knowledge, as well as work well with a team, has become the norm. Therefore, this research proposes the need for determinant skills in the 21st Century digitally for online postgraduate students in Malaysia.

2.1. Related studies in digital literacy skills

There have been many debates on the definition and interpretation of digital literacy. Berry (2010) defined 21st-century learning as learning that enables students to master content while producing, synthesizing, and evaluating information from a wide variety of subjects and sources with an understanding of and respect for diverse cultures. The term 21st-century skills are generally used to refer to certain core competencies such as collaboration, digital literacy, critical thinking, and problem-solving that schools need to teach to help students thrive in today's world. For this purpose, Trilling and Fadel (2009) define 21st-century skills as the new set of skills required to succeed in learning, working, and living. Fullan (2013) proposed digital literacy in the 21st century is described as the ability to design and manage projects, solve problems, and make effective decisions using a variety of tools and resources. Belshaw (2011) emphasizes that digital literacies are plural, transient, and context-dependent. Digital literacy was first coined by Gilster (1997) in his book and was further explained by Bawden (2001) and further elaborated by other researchers. Table 1 below is a summary of the definition and interpretation of digital literacy that is being used for this research.

Table 1. Adapted from from Belshaw (2011)

Researchers	Definition of Digital Literacy
Bawden (2001)	as part of knowledge assembly," building a reliable information hoard" from diverse sources, retrieval skills, plus critical thinking for making informed judge-ments about retrieved information, with wariness about the validity and completeness of internet sources, reading and understanding non-sequential and dynamic material, awareness of the value of traditional tools in conjunction with net-worked media, awareness of people network as sources of advice and help, using filters and agents to manage incoming information and being comfortable with publishing and communicating information, as well as accessing it.
Gilster (1997)	the ability to understand and use information in multiple formats from a wide variety of sources when it is presented via computers' and literacy in the Digital Age – as being a current instantiation of the 'traditional' concept of literacy itself, which has always been seen as involving, at its simplest, both reading and writing.
Belshaw (2011)	places this literacy, along with traditional literacy, computer literacy, and media literacy as four interrelated sets of competencies, within a broader set of information problem-solving skills, with information literacy as the intersection of the four

Lankshear and Knobel (2008) as cited in Belshaw (2011)	literacies as new types of knowledge associated with "digitally saturated social practices" For example, word processing has become a standard for writing (instead of pen and paper), emails and the short messaging system has dominated modes of communication, and sites like Facebook, Twitter, and Youtube have enabled users to share ideas.
Warlick (2005) cited in Van Laar et al. (2020)	Digital literacy refers to the ability to locate, organize, understand, evaluate, and create information using digital technologies.
Hague and Payton (2010) cited in Van Laar et al. (2020)	Digital literacy with eight components They proposed that embedding digital literacy across the curriculum is one method for executing the curriculum in a multifaceted and dynamic manner. The eight core skills are functional, creativity, critical thinking and evaluation, cultural and social understanding, Collaboration, the ability to find and select information, effective communication, and E-safety.
Despo and Nikleia (2011), as cited in Van Laar et al. (2020)	defines digital literacy as "the ability to understand information and more importantly to evaluate and integrate information in multiple formats that computers can deliver".

Hague and Payton (2010) further defined digital literacy with eight components as shown in Figure 1. They proposed that embedding digital literacy across the curriculum is one method for executing the curriculum in a multifaceted and dynamic manner. The eight core skills are functional, creativity, critical thinking and evaluation, cultural and social understanding, Collaboration, the ability to find and select information, effective communication, and E-safety.
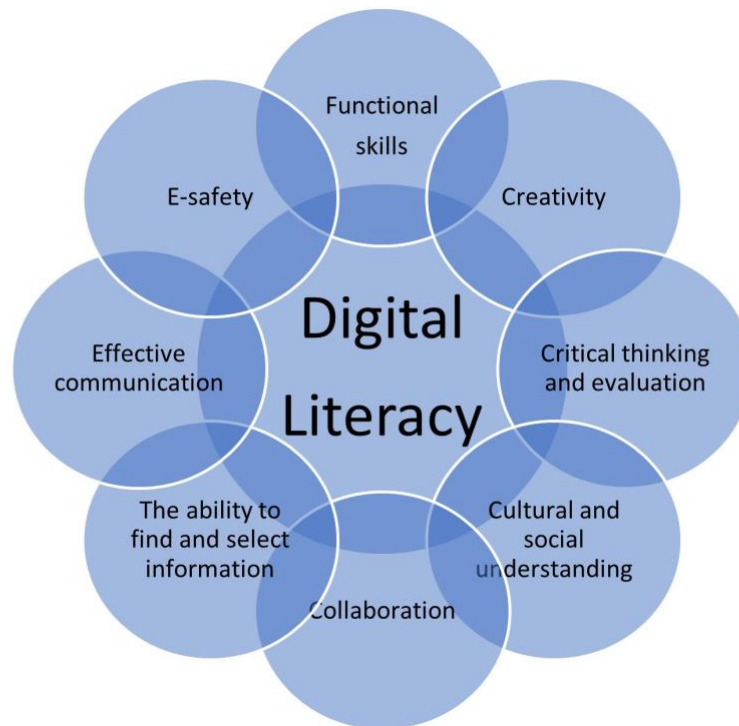

Figure 1. From Components of Digital Literacy (Hague & Payton, 2010)

3.   Research Questions

The research questions are as follows:

i.   What are the significant determinants of 21st-century (digital) skills among postgraduates from Malaysia?

ii.   What are the non -significant determinants of 21st-century (digital) skills postgraduates from Malaysia?

3.1.   The Survey for 21st century skills

The 21st Century Skills survey developed by Kelley et al. (2019) focuses on the learning and innovation skill category that encompasses creativity, critical thinking, communication, and collaboration. They believe in emphasizing students' ability to think critically, examine problems, gather information, and make informed, reasoned decisions while using technology. In Malaysia, the Ministry of Higher Education (MOHE) has listed critical thinking skills as one of the seven skills that students need to develop during their tertiary education. As postgraduate students, having gone through undergraduate studies hence they are expected to possess higher-order thinking skills. Among the crucial cognitive skills is critical thinking. Critical thinking refers to a form of mental discipline in which a person can conceptualize, analyze and reflect upon various inputs and other information and then apply it constructively. Arguably, Critical Thinking is now more important than ever. It gives young people the ability to distinguish reliable information from 'fake news' – an essential skill in our increasingly digitalized world. According to Rashid (2021) in his article *Updating the Ph.D.: Making the Case for Interdisciplinarity in 21st-century doctoral education,* postgraduate students are required to be independent and critically effective to complete their studies.

Another crucial skill that students need to develop is the ability to collaborate with others. According to Tazijan et al. (2022) during the unprecedented time of the Covid-19 pandemic, students used collaboration softwares such as Zoom, WhatsApp, Skype and others to communicate with their friends and lecturers during this emergence time. Thus, this helps them to practice collaboration and teamwork. By doing this, students understand how to address a problem, pitch solutions, and decide the best course of action. It is also helpful for them to learn that other people do not share the same ideas that they do involve working in coordination with others to convey information or tackle problems. Volkova et al. (2022) highlighted the importance of soft skills that include the ability to communicate, lead, cooperate, establish relationships, present ideas, and solve open-ended tasks creatively. These skills are equally important as professional competencies. Closely related to collaborative skills are communication skills. Four skills are included in Communication skills which are interpersonal, intrapersonal communication skills, and non-verbal communication skills. According to Mustafa@Busu et al. (2022), there is a need to consider effective communication skills where seriousness, experience, and interest in the profession or field students are involved later. This will allow positive values and students' social and emotional skills.

Another determinant of 21st Century Skills by Kelley et al. (2019) is focusing on creativity and innovative skills. These two skills are interpreted as the early phase of a problem-solving process, while

innovation is the implementation of the idea and its acceptance. In this 21st century, innovation skill is essential for an individual. With this in view, the concept of multidisciplinary interest, and research on this situation has been developed in several areas of knowledge including administration, education, economics, psychology, and sociology (Nakano & Wechsler, 2018). Adaptation to new situations is important when creativity is involved. As creativity is the practice of thinking outside the box, it will lead to innovation that can empower students to see concepts from a different angle. The ability to think creatively is often seen as producing new, diverse, and unique ideas free from the restrictions of rules, customs, or norms.

Hence, to be successful in the 21st century the mentioned skills are considered paramount. The students should not only learn how to apply content knowledge but also engage in critical thinking, problem-solving, and analysis (Kelley et al., 2019). Thus, this survey instrument does not include all the 21st-century skills. There are additional 21st-century skills including life and career skills, media and information, and technological literacy skills, which are not measured by the instrument. They developed the 21st Century Scale instrument for high school students in Problem-Based Learning tasks. The survey was tested on 276 students. The researchers claim that there is a void of 21st-century skills instruments that can measure achievement and hope that this instrument can help other researchers to gauge their students' 21st Century Skills (Kelley et al., 2019).

An issue that prevails is the most accurate method in measuring or interpreting the scores of the 21st Century Skills instrument. According to Kyllonen (2012, May), the assessment methods suggested include rating scales (self, teacher, and parent) are widely used in the assessment of 21st-century skills. Situational judgement tests were also used to measure what prove to be hard-to-measure skills such as teamwork, and communication skills. There are performance measures for some of the 21st-century skills, such as collaborative problem-solving, and creativity and developments in these areas are likely to prove increasingly important in the short and medium term, as users demand more objective measures of these very important skills. However, these skills are difficult to measure or gauge descriptively or narratively Quieng et al. (2015) used a self-assessment questionnaire to measure non-cognitive skills of soft skills in the 21t Century Skills categories. They interpreted data as a 4-point Likert scale ranging from 1 (very little extent) to 4 (great extent), and participants reported a self-assessment of their perceived 21st-century-based soft skills. Another research by Shariman et al. (2014), a digital literacy questionnaire on 420 final-year university students. To interpret the level of the digital literacy score, they labelled it as basic (18-30), moderate (31-44), high (45-58), and expert competency (59-72). Khuzzan and Mahdzir (2020) highlighted that the various types of assessment used in HEIs (Higher Education Institutions) contain some challenges in the process of implementing learners, thus failing to fully measure the learners' competency in soft skills. It is suggested that a more holistic approach to assessment should be implemented to fully understand the range of soft skills as described in the 21st Century skills framework.

4. Research Methods

The main aim of the study was to investigate postgraduate Malaysia UiTM 21st-century skills. This study employed a quantitative approach that utilized a questionnaire to collect data. In the Academy of Language Studies, University of Technology MARA, Shah Alam the total of postgraduate students is

278. Out of 278 postgraduates, 192 are Malaysian students. A total of 97 or 50.5% of UiTM Malaysian postgraduate students volunteered to participate in the study. The Survey Monkey platform was used to disseminate the questionnaire to the respondents.

Data were collected using a questionnaire. The questionnaire referred to as the 21st Century Skills Scale Survey comprised two main sections and a total of 56 items. The first section has 50 items of 21st Century Skills statements measured by the Likert scale, ranging from *Strongly Disagree* to *Strongly Agree*. The second section contains 6 items on the demographic data of the respondents. The survey was adapted from 21st Century Skills Scale by Kelley et al. (2019). They developed a 21st Century Scale instrument for high school students which is based on collaboration, critical thinking, creativity, and communication skills in Problem-Based Learning tasks. This resulted in an improved 21st Century Scale survey that can be used as an achievement measure in 21st Century Skills. This instrument was developed by these researchers as there is a void of 21st-century skills instruments that can measure achievement and hoped that this instrument can help other researchers to gauge their students' 21st Century Skills.

For this study, Kelley et al. (2019) 21st Century Skills Scale is used because it aligns with the MOHE curriculum development framework (2014), and the skills which are learning and innovation skills (collaboration, critical thinking, creativity, and communication skills). The researchers acknowledge that there are other skills, but these skills proved to be more significant.

5. Findings

5.1. Background information

The 97 respondents were from Malaysia. 27.8% of the respondents are from the 18 to 24 years age group, followed by 36% from the 25 to 34 age group, 29.9% from the 35 to 44 group, 5.2% from 45 to 54 group, and 1 respondent from the age group of 55 to 64. 36% of the respondents have limited access to the Internet while 63.9% do not have access problems. They used several types of devices to access the Internet such as a laptop (54.6%), smartphone (26.8%), tablet (10.3%), and desktop (8.2%). They mostly access the Internet from home (84.5%), from work (13.4%), and 1% each from the library as well as from outside.

The respondents mostly used the Internet for academic research (21.6%) followed by social networking (20.6%). They also used the Internet to send and receive messages (9.3%) to keep in touch with friends (7.2%) and keep up with current events (5.2%). Some respondents use the Internet for educational purposes such as taking online classes (5.2%), online professional training courses (3.1%), and practicing new languages (3.1%). They also used it to purchase products or services (4.1%) and pay bills (2.1%) besides for entertainment such as playing games (4.1%), videos (2.1%), music (2.1%), reading comments (2.1%), make calls (1%), find recipes (1%) survey (1%) and find jobs (1%) among others (4.1%).

The following section entails the four determinants of digital literacy skills of Malaysian postgraduates:

5.2. Critical thinking skills

All the survey items have the highest percentage in the (4) Agree category followed by the (5) Strongly Agree category as indicated in Table 2. Item no 5, "Evaluate reasoning and evidence that support an argument", has the highest number of Agree responses (81.4% with Mean 4.06, SD .517), and item 8, "Gather relevant and sufficient information from different sources" has the highest response in Strongly Agree category (24.7%) followed closely by item no 1 (23.7%).

These findings contradict a study done on postgraduates by Sidhu et al. (2015). They found the 59 postgraduates in their study lacked critical thinking skills which affected the length of their study. As Rashid (2021) stated that critical thinking is vital for postgraduates especially in the age of the Internet due to the infiltration of new information. It can be assumed that the postgraduates in this particular study had to apply their higher-level cognitive skills due to the challenges of the pandemic. They had to sieve and filter the information from the Internet as it was the main source of information. This is proven by item 8, "Gather relevant and sufficient information from different sources".

Table 2. Findings from the critical thinking skills determinant

Critical Thinking	SCALE					Mean	SD
Survey Item	1 (n, %)	2 (n, %)	3 (n, %)	4 (n, %)	5 (n, %)		
1. Revise drafts and justify revisions with evidence.	1 (1%)		7 (7.2%)	66(68%)	23 (23.7%)	4.13	.623
2. Develop follow-up questions that focus on or broaden the inquiry	1 (1%)	1 (1%)	11 (11.3%)	70 (72.2%)	14 (14.4%)	3.98	.629
3. Understand how knowledge or insights might transfer to other situations or contexts	2 (2.1%)	-	5(5.2%)	70 (72.2%)	20 (20.6%)	4.09	.663
4. Identify in detail what needs to be known to answer a science inquiry question.	1 (1%)	2 (2.1%)	19 (19.6)	64 (66%)	11 (11.3%)	3.85	.682
5. Evaluate reasoning and evidence that support an argument.	1 (1%)	-	4 (4.1%)	79(81.4%)	13 (13.4%)	4.06	.517
6. Develop follow-up questions to gain an understanding of the wants and needs	1 (1%)	-	11 (11.3%)	66 (68%)	19 (19.6%)	4.05	.635
7. Understand questions that lead to critical thinking	-	3 (3.1%)	19 (19.6%)	58 (59.8%)	16 (16.5%)	3.91	.697
8. Gather relevant and sufficient information from different sources	1 (1%)	-	5 (5.2%)	66(68%)	24 (24.7%)	4.17	.610
9. Justify choices of evaluation criteria	1 (1%)	-	9 (9.3%)	72 (74.2%)	14 (14.4%)	4.02	.580
10. Thoroughly assess the quality of information.	1 (1%)	-	6 (6.2%)	72 (74.2%)	17 (17.5%)	4.08	.574
11. Recognize the limitations of our design and know when to consider alternatives	1 (1%)	1 (1%)	8 (8.2%)	72 (74.2%)	15 (15.5%)	4.02	.612
TOTAL						4.03	.620

5.3. Collaboration skills

The collaboration determinant in Table 3 shows the highest percentage of respondents' input is in the Agree (4) category for all items except for item 1 followed by the Strongly Agree (5) category. Item 1 "Be polite and kind to course-mates" scored the highest mean, 4.67 (SD .494). However, item no 18 "Help resolve issues without asking the lecturers for help", shows the percentage in the Uncertain (3) category is higher than in the Strongly Agree category.

Interestingly for item 22, "Track my progress toward goals and deadlines", the Agree (4) category shows the majority percentage at 97.9% where 1% each in the Undecided category (3) and Strongly Agree (1) category. This finding suggests that the majority of postgraduates were made aware of their progress most probably by the effort of the faculty that they report their progress every semester. This is to ensure that they realize that they are measured by their supervisors in terms of their performance. Nonetheless, whether this would translate to GOT may require further investigation. Support from the institution, especially the collaboration with supervisors, definitely plays a role in GOT (Priyadarshini et al., 2022).

Table 3. Findings from the collaboration skills determinant

Collaboration			Scale				
Survey Item	1 (n,%)	2 (n, %)	3 (n, %)	4 (n, %)	5 (n, %)	Mean	SD
1. Be polite and kind to course-mates	-	-	1 (1%)	30 (30.9%)	66 (68%)	4.67	.494
2. Acknowledge and respect other perspectives.	1 (1%)	1 (1%)	42 (43.3%)	53 (54.6%)	76 (36.5%)	4.49	.663
3. Follow the rules for team meetings.	1 (1%)	-	4 (4.1%)	63 (64.9%)	27 (27.8%)	4.21	.617
4. Make sure all coursemates' ideas are equally valued.	-	1 (1%)	1 (1%)	61 (6.29%)	34 (35.1%)	4.32	.550
5. Offer assistance to others in their work when needed.	1 (1%)	-	7 (7.2%)	59 (60.8%)	27 (27.8%)	4.18	.655
6. Improve my work when given feedback.	1 (1%)	-	4 (4.1%)	51 (52.6%)	40 (41.2%)	4.34	.662
7. Use appropriate body language when presenting.	1 (1%)	-	8 (8.2%)	55 (56.7%)	33 (34%)	4.23	.685
8. Come physically and mentally prepared each day.	1 (1%)	3 (3.1%)	16 (16.5%)	59 (60.8%)	17 (17.5%)	3.92	.749
9. Follow rules for course mates making.	1 (1%)	1 (1%)	7 (7.2%)	61 (62.9%)	27 (27.8%)	4.15	.682
10. Make detailed plans about the use of technology.	1 (1%)	6 (6.2%)	11 (11.3%)	54 (55.7%)	24 (24.7%)	3.98	.846
11. Make detailed plans about how to work together.	1 (1%)	2 (2.1%)	12 (12.4%)	55 (56.7%)	26 (26.8%)	4.07	.757
12. Use the time, and run meetings, efficiently.	1 (1%)	1 (1%)	15 (15.5%)	55 (56.7%)	24 (24.7%)	4.04	.739
13. Consistently use technology as agreed upon by the coursemates to manage project tasks.	1 (1%)	-	2 (2.1%)	60 (61.9%)	32 (33%)	4.28	.613

							Mean	SD
14.	Complete research to contribute to the coursemates.	1 (1%)	-	2 (2.1%)	63 (64.9%)	28 (28.9%)	4.21	.628
15.	Involve all coursemates in tasks.	1 (1%)	-	2 (2.1%)	54 (55.7%)	40 (41.2%)	4.36	.632
16.	Interact with coursemates effectively.	1 (1%)	-	5 (5.2%)	63 (64.9%)	28 (28.9%)	4.21	.628
17.	Assign roles as needed, based on course mates strengths.	-	2 (2.1%)	15(15.5%)	57 (58.8%)	23 (23.7%)	4.04	.691
18.	Help resolve issues without asking the lecturers for help.	3 (3.1)	18 (18.6%)	29 (29.9%)	39 (40.2%)	8(8.2%)	3.32	.974
19.	Provide feedback useful to coursemates and lecturers	2 (2.1)	-	12 (12.4%)	59 (60.8%)	24 (24.7%)	4.06	.747
20.	Create a task list that divides group work reasonably among coursemates	-	2 (2.1)	12 (12.4%)	56 (57.7%)	27 (27.8%)	4.11	.690
21.	Help the course-mates solve problems and manage conflicts.	1 (1%)	1 (1%)	13 (13.4%)	58 (59.8%)	24 (24.7%)	4.06	.719
22.	Track my progress toward goals and deadlines.	-	-	1 (1%)	158 (97.9%)	1 (1%)	4.00	.144
	TOTAL						4.15	.66

5.4. Communication skills

The Agree (4) category in the Communication determinant table 4, has the highest percentage of all survey items. Item no 3 "Complete tasks without having to be reminded", 6 "Clearly communicate alternatives or opposing perspectives" and 8 "Create a clear and interesting introduction and conclusion" has a higher percentage in the category Uncertain (3) compared to the other items.

Though communication skills show a consistently high percentage in the Agree (4) category, collaborative skill still has the highest percentage in the Agree (4) category.

Table 4. Findings from the communication skills determinant

Communication			Scale				Mean	SD
Survey Item		1 (n,%)	2 (n, %)	3 (n, %)	4 (n, %)	5 (n, %)		
1.	Organize information well.	1 (1%)	1 (1%)	11 (11.3%)	60 (61.9%)	23 (23.7%)	4.07	.700
2.	Adopt a communication style appropriate for the purpose, task, or audience.	1 (1%)	-	4 (4.1%)	65 (67%)	27 (27.8%)	4.21	.611
3.	Complete tasks without having to be reminded.	2 (2.1%)	8 (8.2%)	15 (15.5%)	51 (52.6%)	20 (20.6%)	3.82	.929
4.	Present all information, concisely, and logically.	1 (1%)	1 (1%)	14 (14.4%)	63 (64.9%)	18 (18.6%)	3.99	.685
5.	Answer questions clearly and concisely.	1 (1%)	-	17 (17.5%)	57 (58.8%)	22 (22.7%)	4.02	.707
6.	Communicate alternatives or opposing perspectives.	2 (2.1%)	-	18 (18.6%)	61 (62.9%)	16 (16.5%)	3.92	.731
7.	Speak clearly and professionally.	1 (1%)	2 (2.1%)	12 (12.4%)	57 (58.8%)	25 (25.8%)	4.06	.747
8.	Create a clear and interesting introduction	1	-	19	57	20	3.98	.707

	and conclusion	(1%)		(19.6%)	(58.8%)	(20.6%)		
9.	Use appropriate media to enhance understanding.	1 (1%)	-	6 (6.2%)	61 (62.9%)	29 (29.9%)	4.21	.644
	TOTAL						4.03	.718

5.5. Creativity & innovation skills

The creativity and Innovation determinant in Table 5 also has the highest percentage in the Agree (4) category compared to the other categories. Meanwhile, the second highest category is the Undecided (3) category followed by the Strongly Agree (5) category except for item 1 "Find sources of information and inspiration when others do not", 4 "Elaborate and improve on ideas", 5 "Use brainstorming to generate original ideas" and 6 "Use creativity and imagination". Creativity & Innovation also has the lowest mean among all the other determinants. This finding shows that these postgraduates may be too focused in their field of study, thus, restricting their ability to venture into the multidisciplinary study. Nakano and Wechsler (2018) emphasize that innovation and creativity stem from the combination of fields of knowledge and interests.

Table 5. Findings from the creativity & innovation skills determinants

Creativity & Innovation Skill	Scale						
Survey Item	1 (n,%)	2 (n, %)	3 (n, %)	4 (n, %)	5 (n, %)	Mean	SD
1. Find sources of information and inspiration when others do not.	1 (1%)	2 (2.1%)	16 (16.5%)	52 (53.6%)	26 (26.8%)	4.03	.783
2. Create ideas geared to the research/projects.	1 (1%)	2 (2.1%)	19 (19.6%)	61 (62.9%)	14 (14.4%)	3.88	.711
3. Create new, unique, surprising research/projects.	1 (1%)	5 (5.2%)	30 (30.9%)	46 (47.4%)	15 (15.5%)	3.71	.829
4. Elaborate and improve on ideas.	1 (1%)	-	12 (12.4%)	65 (67%)	19 (19.6%)	4.04	.644
5. Use brainstorming to generate original ideas.	1 (1%)	-	11 (11.3%)	60 (61.9%)	25 (25.8%)	4.11	.675
6. Use creativity and imagination.	1 (1%)	2 (2.1%)	15 (15.5%)	52 (53.6%)	27 (27.8%)	4.05	.782
7. Promote a variety of creative perspectives.	1 (1%)	-	25 (25.8%)	53 (54.6%)	17 (17.5%)	3.89	.724
8. Combine different elements into complete research/projects.	1 (1%)	1 (1%)	20 (20.6%)	55 (56.7%)	20 (20.6%)	3.95	.741
TOTAL						3.96	.736

5.6. Overall skills

The postgraduates from Malaysia have the highest mean in Collaboration skills and the lowest mean is in Creativity & Innovation skills. It is highlighted that in item 22, "Track my progress toward goals and deadlines", the Agree (4) category shows the majority percentage at 97.9% with Mean=4.00, SD=.144. These indicate that the postgraduates are concerned and aware of their progress in their studies. Meanwhile under shows a higher percentage of uncertainty for all items. In addition, the item "Create

new, unique, surprising research/projects" has the lowest Mean=3.71, SD=.829. Thus, these postgraduates may be concerned about their progress but at the same lack the creativity to make full use of the available resources digitally. These findings are consistent with a study done on 56 postgraduates in Malaysia Sidhu et al. (2015). It was found that the postgraduates felt they were successful in working collaboratively, however, they were not too confident concerning the acquisition of critical and creative thinking skills. The study also added perspectives from the lecturers. It was revealed that the student's ideas were mostly irrelevant and this often led to the lecturer contributing most of the ideas. Dependency on lecturers restricts not just creativity but also the exploration of new ideas. In this study, under Collaborative skill, item no 18 "Help resolve issues without asking the lecturers for help", shows a high percentage in the Uncertain (3) category which indicates this dependency on lecturers.

From this research, the postgraduates monitor their progress to ensure that they GOT. This means they are aware of the requirements to graduate. However, the execution of strategies and adapting to the learning environment, particularly applying digital skills, to ensure GOT may be lacking. As Priyadarshini et al. (2022) highlighted that research skills were identified as the strongest predictor of the motivation to GOT. This means the postgraduates need to be able to apply creatively what they learn as a researcher to achieve their objectives.

In table 6, the Digital literacy Skills are emphasized according to the mean of all four determinants given in percentage (Mean 0.81, SD 0.092).

Table 6. Findings from the digital literacy skills determinants

Skills	Mean, Std Dev
Critical Thinking	.80, .099
Collaboration	.82, .090
Communication	.80, .109
Creativity & Innovation	.79, .116
Digital literacy	.81, .092

6. Conclusion

As the higher education setting in Malaysia moves toward the National Blueprint, the number of postgraduate students increase, which makes for the realization of the policy. Therefore, a need to look into reviewing skills is important to meet this need. Although the importance of these skills to fulfil the demands of workers in the 21st century has been well established, research has identified that comprehensive knowledge about skill assessment is lacking (Voogt & Roblin, 2012). Various components of digital skills have been described in theory (e.g., Claro et al., 2012; Jara et al., 2015; Siddiq et al., 2017; Van Laar et al., 2020), however, which variables preceded other variables are yet to be studied. Moreover, most articles on 21st-century and digital skills describe the skills on a conceptual level with little evidence of corresponding data.

The research focused on 4 specific variables or determinants which are critical thinking, collaboration, communication, creativity, and innovation skills. Although there are other variables, these variables that were developed by Kelley et al. (2019) are the closest to being aligned with the MOHE policy. The results of this study revealed that Creativity and Innovation skills have the lowest mean

among all the other determinants among postgraduates. As has been defined earlier, creativity allows one to apply new knowledge that leads to innovations. As postgraduates in this digital era, being analytical and critical of existing knowledge is truly crucial. The journey of a postgraduate is likened to problem-solving. One has to reveal and unravel 'hidden' information. However, what one does with the discovered knowledge to create new knowledge is even more profound. With the infiltration of an abundance of information from the Internet, postgraduates cannot afford to just absorb ideas and accept them at the surface level. They need to apply the knowledge gained to build new concepts and to sustain the adaptability of new information.

The number of students in Universiti Teknologi MARA is increasing, especially postgraduate students. It is necessary for investigating the 21st Digital Century Skills of these postgraduates to gauge and build an effective program that caters to these students. As such, it is useful to synthesize existing knowledge concerning the factors that cause differences in the level of 21st-century digital skills among postgraduates. The survey used in this study would be able to describe and indicate the specific determinants that reflect the experiences and skills of the postgraduates. It depends on the stakeholders of the institution to reciprocate with the faculties to develop a more competitive program that ensures GOT.

Acknowledgments

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