Assessing First Semester Diploma Students' Digital Capabilities, Self-Regulation and Perceptions on Computing-based Course: A Post-Covid Study

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Abstract. This study investigated the computing usage, capabilities, and self-regulation of first-semester diploma students who have taken online classes since the COVID-19 outbreak in 2020. The research employed a purposive sampling method, meaning the sample was selected based on predefined criteria. The data collection tool was a survey form composed of closed-ended questions, with responses measured using a five-point Likert scale. The collected data were then descriptively analyzed using the IBM Statistical Package for the Social Sciences (SPSS) version 27. This analysis involved calculating percentages, mean scores, and standard deviations (SD). The study aimed to identify areas where students may require support and instruction to develop the digital skills necessary for success in today's society. The findings also provided insights into the effectiveness of computing-based courses and suggested ways in which they can be modified to better meet the needs of students. By addressing these research aims, this study contributes to our understanding of the role of technology in education. It provides a foundation for future research in this area.
Keywords: ICT, education, COVID-19, self-regulation, digital skills, information management.

1 Introduction

When the World Health Organization announced the COVID-19 outbreak in early 2020, it caused extraordinary closures and disruptions in various industries, including education. The pandemic has compelled educational institutions worldwide to shift to online learning. In Malaysia, the pandemic has substantially impacted the education industry, with around 2.6 million pupils affected by the closure of educational institutions in 2020 (Malaysia, 2021). The transition to online learning has presented

students with a number of obstacles, including issues with digital capabilities and self-regulation. Some of these children found it difficult to learn independently and self-regulate their learning (Yasin, 2021). Furthermore, due to financial constraints, many students have failed to equip themselves with the requisite digital capabilities, limiting their capacity to engage effectively in online classes. According to Malaysian Communications and Multimedia Commission research, around 21% of Malaysian families have no personal computer access. In comparison, 32.7% do not have access to a laptop or desktop computer (Commission, 2020). Some students have struggled to keep up with their studies because of the teacher's physical absence and the lack of peer assistance. According to the Malaysian Ministry of Higher Education, 73% of students experienced difficulty managing their schoolwork during the COVID-19 pandemic (Malaysia, 2020).

This study examines the computing usages, capabilities, self-regulation and perceptions of first-semester diploma students who have taken online classes since the COVID-19 outbreak in 2020. Because of the pandemic, these pupils were in Form 3 or 4 three years ago and have had to adapt to online instruction. During the lockdown, they even had to answer SPM (Sijil Pendidikan Malaysia), Malaysia's equivalent to the General Certificate of Secondary Education (GCSE) in the United Kingdom.

This study focuses on three key areas: digital device usage, digital competencies, self-regulation, and perceptions of computing-based courses. This study is essential for discovering areas where students require support and instruction to build the digital skills needed for success in today's society, especially after the pandemic. It aids in understanding how students manage the demands of computing-based learning and identifying areas where they may want more support to effectively regulate their learning. Furthermore, the study sheds light on the success of computing-based courses and how to modify them to better fulfil the needs of students. The study is directed by the following research aims to attain this goal:

To investigate student’s device usage in learning.

i. To assess the digital capabilities of first-semester diploma students who took online classes after the COVID-19 outbreak in 2020.
ii. To investigate first-semester diploma students' self-regulation practises in computing-based courses.
iii. To investigate first-semester diploma students' perceptions towards computing-based courses.

The following research questions will lead this study to attain the aforementioned research objectives:

i. How did the students employ digital devices in supporting their learning activities?
ii. What are the digital abilities of first-semester diploma students enrolled in computing-related courses?
iii. What self-regulation strategies are practised by first-semester diploma students in computing-based courses?
iv. What are first-semester diploma students' perceptions towards computing-based courses?

2 Literature Review

This section discusses the aspects of digital capabilities, self-regulation and the significance of students' perception towards a computing-based course.

2.1 Digital Capabilities

The knowledge, skills, and attitudes required to effectively use digital technology for learning, communication, and participation in a digital society are called digital capabilities. This encompasses skills like digital literacy, citizenship, creativity, and problem-solving. There has been a rising acknowledgement of the value of digital skills in education in recent years. The growing usage of digital technologies has changed how we study and work. Digital capabilities are vital in education to enable learners to fully participate in the digital age and become digitally literate.

Digital capacities are becoming increasingly vital for effective learning in the post-COVID era. As educational institutions shift to online and hybrid learning methods, students must be digitally capable of interacting with various digital tools and platforms (Crawford & Cifuentes-Faura, 2022). Furthermore, the epidemic has forced kids to learn independently, which requires self-regulated learning and the capacity to set objectives, monitor progress, and alter learning tactics (Calamlam et al., 2022; Edisherashvili et al., 2022). As a result, digital competencies are critical for promoting online learning and ensuring students can navigate digital settings confidently and comfortably.

Limniou (2020) designed digital capabilities and self-efficacy questionnaire (DCSE) based on the Technology Acceptance Model (TAM), a widely used model for predicting technology uptake and use. According to the TAM, consumers' opinions about a technology's value and simplicity impact their desire to acquire and employ it (Davis, 1989). The DCSE questionnaire, which comprises four distinct dimensions: attitudinal, technical, cognitive, and social-emotional, examines learners' attitudes about their abilities to utilize digital technologies effectively. It is based on the TAM's idea of self-efficacy. The questionnaire benefits researchers who want to know what factors influence learners' adoption and use of digital technology.

In addition to these studies, several projects have been launched to develop and measure learners' digital capabilities, such as the Digital Capability Framework produced by Jics United Kingdom (Tham et al., 2021). Similarly, Jisc employed the DCSE questionnaire to examine various digital capabilities essential for effective learning and functioning in a digital society. The study reported significant findings that offer educators direction on building and measuring these capabilities in their students.

Recent research has focused on using information about learners' digital capabilities to construct learning content, particularly non-face-to-face modes. For example, Limniou et al. (2021) investigated the relationship between learners' digital capabilities and their perceived efficacy of online learning. The study discovered that learners' digital competencies, such as their ability to use technology and handle information online, were positively associated with their perceived online learning effectiveness.

Kwiatkowska and Wiśniewska-Nogaj (2022) conducted another study examining the association between learners' digital capabilities and their participation in online learning activities. The study discovered that learners' digital capabilities, including digital literacy and the ability to interact and communicate using digital platforms, were positively connected with their participation in online learning activities. The study also emphasised the need to design online learning activities that correspond with their digital capabilities to promote learners' engagement and learning outcomes.

2.2 Self-regulation

The ability to manage and control one's thoughts, emotions, and behaviours in pursuit of a purpose or objective is referred to as self-regulation (Zimmerman, 1990). Self-regulation in educational environments entails using metacognitive, motivational, and behavioural techniques to govern one's learning process (Zimmerman & Schunk, 2011). Students with good self-regulation skills can create goals, monitor their progress, and change their learning tactics to attain academic achievement.

Due to the COVID-19 pandemic, many students have been forced to adapt to remote and hybrid learning environments, significantly impacting their self-regulation abilities. Students have faced various obstacles due to the abrupt move to online learning, including self-regulating their learning without face-to-face supervision and support from teachers and classmates (Boström & Rising, 2023; O'Connor et al., 2020), 2020). The epidemic has also worsened existing inequities in self-regulation abilities, as students from low-income families may lack the resources and assistance needed to acquire and maintain strong self-regulation skills (Schuurman et al., 2023).

Hence, there are tremendous investigations carried out by educational institutions, policymakers and scientists investigated and attempted to incorporate better self-regulation measures into their online and hybrid learning programmes in response to the pandemic's issues. These studies continue to look for new ways to teach self-regulation and provide students with the resources and support they need to succeed (Chang et al., 2022; Scoular, 2021; Vishwakarma & Tyagi, 2022; Zhu & Bonk, 2022). The researchers have emphasised the significance of self-regulation abilities in online and hybrid learning environments. For example, Scoular (2021) discovered that students' self-regulation skills were favourably connected with their academic progress in online courses.

2.3 Students' perceptions towards computing-based courses

Numerous studies investigate students' perceptions regarding the courses/subjects they are learning. Understanding students' views about these courses is critical to building successful and engaging learning experiences (Bowden et al., 2021). Analysing recent journal papers entails the factors influencing students' attitudes, the impact of perspectives on learning outcomes, and ways to change students' perceptions of computing-based courses.

The COVID-19 pandemic, with its shift to self-learning practices and increased reliance on digital capabilities, has transformed students' prior computing knowledge (Al-Ansi et al., 2021; Eri et al., 2021). This transformation can subsequently influence their perception of the computing-based courses offered by their learning institutions (Xie et al., 2020). Students' attitudes towards these courses might have a positive or even a negative substantial impact on their learning experience and academic success (Abuhassna et al., 2022). Many recent studies have examined university students' views towards digital educational technology (Almaiah et al., 2022; Bartolic et al., 2022). As global education transitions to the post-pandemic era, it is critical to reflect on the lessons learnt during the distance learning period and assess their implications for existing computing-based courses (Schleicher, 2020).

3 Methodology

Ethics approval was obtained from UiTM Research Ethics Committee before administering the research instruments. The survey questions utilized in this study were adapted from a previous study on digital literacy in higher education conducted by Limniou (2020). These questions were modified specifically for this research and focused primarily on first-semester diploma students at the Universiti Teknologi MARA Sabah branch.

The research employed purposive sampling, which means the sample was selected based on predefined criteria, such as enrollment as first-semester students, followed by simple random sampling. The survey was conducted online and remained available for 14 days. The adapted questionnaire consisted of five main sections. Section A gathered information regarding the participants' demographics. Section B assessed their digital capabilities. Section C explored the connection between student attitudes and dimensions of digital capabilities. Section D investigated self-directed learning, while Section E examined participants' attitudes towards the computing course in the current semester. The survey form consisted of closed-ended questions utilizing a five-point Likert scale. The data collected were analyzed descriptively using IBM Statistical Package for the Social Sciences (SPSS) version 27 to calculate percentages, mean scores, and standard deviations (SD).

4 Findings

The study presents the results of a group of 105 semester-one diploma students of Universiti Teknologi MARA Sabah Branch. The group participants consist of two subgroups as follows: 54 students from the Faculty of Political Sciences and Administrations and 51 students from the Faculty of Computer and Mathematical Sciences. The primary sociodemographic data collected are summarised in Table 1. The analysed group consists mainly of female participants. High percentages (66.4%) of the respondents originated from urban areas.

Table 1. Demographic data

		Frequency	Percentage (%)
Gender	Female	68	64.8
	Male	37	35.2
Area of study	Political Sciences and Administrations (AM)	54	51.2
	Computer and Mathematical Sciences (CS)	51	48.6
Area of origin	Urban	70	66.7
	Rural	35	33.3

Responding to RQ1: How did the students employ digital devices in supporting their learning activities?

Table 2. Students' digital device usage in supporting their learning activities

		CS students	AM students
Devices used for studying purposes (during online learning)	Single device: laptop/Desktop	13	7
	Single device: smartphone	7	7
	More than 1 device	31	38
	Combination usage of digital devices & books	0	2
Software/applications used for studying purposes	Social platform	40	45
	Web conferencing apps	29	41
	Virtual learning platforms	51	52
	Word processing	40	45
	Spreadsheet	8	17
	E-mail	11	14
	Presentation software (PPT)	29	37

I used the digital device to:		Strongly agree	Agree	Averagely	Disagree	Strongly disagree	Mean	SD
Access Learning resources (e.g., PowerPoint slides, pdfs, videos provided by my teachers).	CS	43.1	56.9	0	0	0	4.4	0.50
	AM	44.4	55.6	0	0	0	4.4	0.50
Supplement lecture notes (e.g., type notes on my device, take photos from lecturers' presentations).	CS	2.0	31.4	54.9	3.9	7.8	3.2	0.86
	AM	7.4	11.1	50.0	24.1	7.4	2.9	0.97
Access course/module information (e.g., announcements, reading list, room information, assessment criteria)	CS	51.0	49.0	0	0	0	4.5	0.5
	AM	59.3	40.7	0	0	0	4.6	0.50
Read journal article(s) and other relevant learning material provided by my lecturer	CS	13.7	54.9	27.5	2.0	2.0	3.8	0.79
	AM	16.7	27.8	50.0	1.9	3.7	3.5	0.93
Browse web pages related to the lecture topic.	CS	11.8	49.0	33.3	3.9	2.0	3.6	0.82
	AM	14.8	33.3	25.9	22.2	3.7	3.3	1.10
Use searching database tools (e.g., scientific journal databases, university libraries, professional engines) to find material relevant to my learning.	CS	7.8	52.9	31.4	3.9	3.9	3.6	0.85
	AM	3.7	9.3	57.4	13.0	16.7	2.7	0.98
Browse and watch videos related to the lecture topic(s)	CS	13.7	47.1	76.5	5.9	3.9	3.6	0.64
	AM	3.7	9.3	81.5	3.7	1.9	3.1	0.59
Complete assignment(s) and/or complete online tests/ tasks (e.g., multiple-choice tests).	CS	47.1	52.9	0.0	0.0	0.0	4.5	0.50
	AM	64.8	29.6	5.6	0.0	0.0	4.6	0.60
Participate in online learning activities (e.g., Poll Everywhere, Kahoot, discussion boards).	CS	3.9	29.4	51.0	9.8	5.9	3.2	0.88
	AM	3.7	18.5	53.7	24.1	0	3.0	0.76
Create my own digital material related to the module topic (e.g., photos, videos, blog)	CS	2.0	19.6	39.2	29.4	9.8	2.7	0.96
	AM	11.1	20.4	37.0	22.2	9.3	3.0	1.12
Have contact with my lecturers (e.g., email, discussion board).	CS	47.1	43.1	9.8	0	0	4.4	0.66
	AM	44.4	55.6	0	0	0	4.4	0.50
Communicate with my peers on study/learning-related matters.	CS	47.1	47.1	5.9	0	0	4.4	0.61
	AM	29.6	70.4	0	0	0	4.3	0.46
Share learning resources with my peers and/or my teacher.	CS	33.3	60.8	5.9	0	0	4.3	0.57
	AM	25.9	72.2	1.9	0	0	4.2	0.47
Use social media networks (e.g., Facebook, Twitter, and WhatsApp) for learning purposes.	CS	25.5	64.7	9.8	0	0	4.2	0.58
	AM	24.1	66.7	9.3	0	0	4.1	0.56
Post comments on other people's work.	CS	11.8	33.3	23.5	21.6	9.8	3.2	1.19
	AM	7.4	42.6	27.8	22.2	0	3.4	0.91

Collaborate online with fellow students for learning purposes.	CS	39.2	58.8	2.0	0	0	4.4	0.53
	AM	46.3	53.7	0	0	0	4.5	0.50

Based on Table 2, the findings revealed how students employed digital devices for learning during online classes. Notable results include that most students (69%) used more than one device for studying purposes, with CS students slightly more likely to do so. Virtual learning platforms and social platforms were commonly used for studying, with higher usage reported by AM students.

It is presented in the finding that most students strongly agreed or agreed that they used digital devices to access learning resources like PowerPoint slides, PDFs, and movies that their teachers gave them (43.1% CS, 44.4% AM). This shows that a lot of the students use digital devices to get to their training materials. Meanwhile, only 2.0% of CS students and 7.4% of AM students highly agreed or agreed that they used digital devices to supplement their lecture notes by typing notes or taking photos of presentations. Many students (51.0% CS, 59.3% AM) said they used digital devices to access course/module information, such as announcements, reading lists, room information, and evaluation criteria. Both CS and AM students said they used digital devices to read journal articles and other learning materials given to them by their lecturers/educators. Even though the levels of agreement were not all the same, this shows that digital devices are used for academic study. More CS students (29.4%) than AM students (18.5%) took part in online learning activities, such as using Poll Everywhere and Kahoot, to learn than the other way around. However, 53.7% of AM students agreed that they took part in online learning tasks, which shows they were interested in interactive learning. Both CS and AM students said they use digital gadgets to work together and talk to each other and their teachers. Students in CS said they participated moderately, while a high number of AM students (70.4% agreed) said they talked with their peers.

Responding to RQ2: What are the digital abilities of first-semester diploma students enrolled in computing-related courses?

Table 3. Respondents' digital abilities in computing-related courses

Connection of student attitudes and digital capabilities dimensions: digital capabilities-attitudes statements								
		Strongly agree	Agree	Averagely	Disagree	Strongly disagree	Mean	SD
I like using digital device(s) for my learning.	CS	39.2	54.9	2.0	2.0	2.0	4.3	0.78
	AM	38.9	40.7	16.7	3.7	0.0	4.1	0.83

I learn better when I use a digital device(s).	CS	7.8	47.1	23.5	15.7	5.9	3.4	1.04
	AM	20.4	53.7	9.3	11.1	5.6	3.7	1.09
By using digital device(s) learning is more interesting to me.	CS	15.7	41.2	21.6	11.8	9.8	3.5	1.18
	AM	18.5	50.0	14.8	14.8	1.9	3.7	1.01
I am motivated to learn using a digital device(s).	CS	13.7	41.2	17.6	13.7	13.7	3.3	1.27
	AM	9.3	51.9	16.7	16.7	5.6	3.4	1.06
Using digital device(s) for learning allows me to be a self-directed and/or independent learner.	CS	15.7	64.7	19.6	0	0	4.0	0.60
	AM	14.8	61.1	16.7	5.6	1.9	3.8	0.83
Connection of student attitudes and digital capabilities dimensions: digital capabilities-technical dimension								
I know how to solve my own technical problems.	CS	13.7	49.0	33.3	3.9	0.0	3.7	0.75
	AM	3.7	48.1	22.2	22.2	3.7	3.3	0.97
I can learn new technologies easily.	CS	11.8	64.7	23.5	0.0	0.0	3.9	0.59
	AM	7.4	55.6	20.4	14.8	1.9	3.5	0.91
I keep up with the latest digital technology developments.	CS	11.8	60.8	27.5	0.0	0.0	3.8	0.61
	AM	13.0	40.7	24.1	22.2	0.0	3.4	0.98
I have the technical skills to use a digital device(s) for learning.	CS	13.7	66.7	13.7	3.9	2.0	3.9	0.78
	AM	11.1	38.9	33.3	16.7	0.00	3.4	0.90
I believe that I have good ICT skills.	CS	9.8	47.1	39.2	3.9	0.0	3.6	0.72
	AM	13.0	38.9	35.2	13.0	0.0	3.5	0.88
Connection of student attitudes and digital capabilities dimensions: digital capabilities-cognitive dimension								
I am confident with my search and evaluation skills concerning obtaining learning-related information from the Web.	CS	13.7	58.8	27.5	0.0	0.0	3.9	0.63
	AM	11.1	50.0	24.1	14.8	0.0	3.6	0.88
I am familiar with issues related to web-based activities, e.g., cyber-safety, search issues and plagiarism.	CS	13.7	58.8	17.6	9.8	0.0	3.8	0.81
	AM	5.6	37.0	40.7	13.0	3.7	3.3	0.90

Connection of student attitudes and digital capabilities dimensions: digital capabilities-social emotional dimension								
By using digital device(s) I am able to collaborate better with my peers on project work and other learning activities.	CS	19.6	64.7	15.7	0.0	0.0	4.0	0.60
	AM	24.1	51.9	5.6	18.5	0.0	3.8	1.01
I obtain help with university work from my online friends (e.g., through Skype, Facebook, Blogs).	CS	13.7	68.6	17.6	0.0	0.0	4.0	0.56
	AM	13.0	59.3	20.4	7.4	0.0	3.8	11.1
There is a lot of potential in the use of digital device(s) for my learning	CS	23.9	52.9	17.9	5.9	0.0	3.9	0.81
	AM	42.6	48.1	9.3	0.00	0.00	4.3	0.64
My teachers encourage me to use digital device(s) for learning.	CS	47.1	49.0	3.9	0.0	0.0	4.4	0.57
	AM	18.5	55.6	25.9	0.0	0.0	3.9	0.67
My teachers use digital applications in their teaching.	CS	47.1	52.9	0.0	0.0	0.0	4.5	0.54
	AM	37.0	59.3	3.7	0.0	0.0	4.3	0.55
My institute encourages me to use digital device(s) during my studies	CS	31.4	62.7	5.9	0.0	0.0	4.3	0.56
	AM	20.4	66.7	11.1	0.0	1.9	4.0	0.70

Table 3 presents how students feel about and use digital devices to learn. Majority of the students showed a positive approach toward using digital devices. 39.2% of the students in the CS group and 38.9% of the students in the AM group said they like to use digital devices to learn. A large number of students also said that digital gadgets helped them learn. In particular, 47.1% of CS students and 53.7% of AM students agreed that using digital devices to learn helps them understand better.

Many were confident in their ability to solve technical problems when it came to technical competence and skill learning. In the CS group, 49.0% of students said they could solve technical problems, while 48.1% of students in the AM group said the same thing, which is still a large number. Based on these numbers, it seems that students in both groups have a certain amount of confidence in their technical skills.

The data gives us more information about how students see their digital knowledge and learning skills. Notably, 66.7% of CS students said they were confident they had the right technical skills to use digital gadgets for learning. On the other hand, 38.9% of AM students thought the same thing about their ability to use digital learning tools

technically. Also, the results show that a lot of students in both the CS group (47.1%) and the AM group (38.9%) said they were good at using ICT.

Responding to RQ3: What self-regulation strategies are practised by first-semester diploma students in computing-based courses?

Table 4. Respondents' self-regulation in computing-based courses

Self-regulation								
		Strongly agree	Agree	Averagely	Disagree	Strongly disagree	Mean	SD
I sometimes procrastinate to the extent that it negatively impacts my work.	CS	21.6	39.2	21.6	11.8	5.9	3.6	1.13
	AM	13.0	48.1	37.0	1.9	0.0	3.7	0.71
Other things in my life tend to take priority over this course.	CS	9.8	31.4	23.5	27.5	7.8	3.1	1.15
	AM	0.0	64.8	35.2	0.0	0.0	3.6	0.48
I rarely find time to review my notes or readings.	CS	0.0	7.8	37.3	37.3	17.6	2.4	0.87
	AM	5.6	77.8	16.7	0.0	0.0	3.9	0.46
Sometimes, I cannot motivate myself to study, even if I know I should.	CS	11.8	49.0	13.7	25.5	0.0	3.5	1.00
	AM	27.8	57.4	14.8	0.0	0.0	4.1	0.65
I find it hard to stick to a study schedule.	CS	9.8	23.5	25.5	37.3	3.9	3.0	1.09
	AM	20.4	66.7	13.0	0.0	0.0	4.1	0.58
During class time, I often miss important points	CS	2.0	21.6	21.6	49.0	5.9	2.6	1.00
	AM	9.3	72.2	18.5	0.0	0.0	3.9	0.52

because I'm thinking of other things								
I should begin my coursework earlier than I do.	CS	41.2	54.9	3.9	0.0	0.0	4.4	0.56
	AM	35.2	61.1	3.7	0.0	0.0	4.3	0.54

Table 4 shows the study's results, reflecting how first-semester diploma students in computing-based classes self-regulate. The data shows that majority of the students in both groups agree that procrastination sometimes hurts the quality of their work. In particular, many CS students (39.2%) and AM students (48.1%) agree that this is a problem. Also, about 21.6% of CS and 13.0% of AM students know how putting things off affects their learning process. The survey shows that students have different priorities when it comes to putting schoolwork ahead of other obligations. 9.8% of CS students strongly agree that schoolwork comes first, and 31.4% agree. On the other hand, AM students show a clear trend, with no students highly agreeing and 64.8% agreeing that other things in life often come before schoolwork.

Most CS students (37.3%) and most AM students (77.8%) say they put in average work to review their notes or readings. On the other hand, many CS students (37.3%) say they rarely have time for this practice. The responses to the question on self-motivation for studying are varied. Among CS students, 49.0% agree that they sometimes lack the motivation to study even when they understand its importance. This sentiment is echoed by 57.4% of AM students. In contrast, 25.5% of CS students and 27.8% of AM students express disagreement with this statement. In responding to challenges with study schedules, both groups say it is hard to stick to a set study routine. Notably, 37.3% of CS students and 20.4% of AM students do not agree that keeping a study plan is a good idea. On the other hand, this is how 25.5% of CS students and 66.7% of AM students describe their efforts. Many students in both groups say that they often could not pay attention in class and miss out on important information because of this. This is a problem for 49.0% of CS students and 72.2% of AM students.

Responding to RQ4: What are first-semester diploma students' perceptions towards computing-based courses?

Table 5. Respondents' perceptions towards the computing-based course

Students' perception towards the computing courses								
		Strongly agree	Agree	Averagely	Disagree	Strongly disagree	Mean	SD
I am satisfied with the course	CS	64.8	29.6	5.6	0.0	0.0	4.6	0.60
	AM	20.4	51.9	14.8	13.0	0.0	3.8	0.92
The course is relevant to the university program I am doing.	CS	59.5	40.5	0	0	0	4.6	0.50
	AM	37.0	59.3	3.7	0.0	0.0	4.3	0.55
The course will benefit me when I join the industry.	CS	59.2	40.8	0	0	0	4.6	0.50
	AM	30.5	56.0	13.5	0.0	0.0	4.3	0.55
The course has enhanced my ICT understanding	CS	52.9	47.1	0.00	0.0	0.0	4.5	0.50
	AM	20.4	55.6	16.7	7.4	0.0	3.9	0.82
Employability awareness								
I can apply my digital skills in my professional career.	CS	31.4	62.7	5.9	0.0	0.0	4.3	0.56
	AM	29.6	42.6	25.9	1.9	0.0	4.0	0.80
I can apply my digital skills in social/private life.	CS	47.1	51.0	2.0	0.0	0.0	4.5	0.54
	AM	20.4	51.9	14.8	13.0	0.0	3.8	0.92
I can apply my digital skills in my university life.	CS	31.4	66.7	2.0	0.0	0.0	4.3	0.50
	AM	22.2	53.7	20.4	3.7	0.0	3.9	0.76

Table 5 presents data addressing RQ4, of the CS students, 64.8% strongly agree and 29.6% agree that they are satisfied with the course. In the AM group, 51.9% agree, but 13.0% disagree that they are satisfied with the course. In assessing the relevance of computing-based courses to their respective programs, students' responses shed light

on their perceptions: 59.5% of CS students strongly agree that the course aligns closely with their program, indicating a strong sense of relevance. Among AM students, the data reveals a contrasting picture. While a significant portion (37.0%) strongly agrees that the courses are relevant to their program, a notable 13.0% disagree. However, 59.3% of AM students still agree that the courses are relevant to their program, albeit without the same level of strong agreement seen in the CS group. Both groups express over 30% strong agreement that the course will benefit them in the industry. In CS, 52.9% strongly agree that the course enhanced their ICT understanding; in AM, 20.4% strongly agree, but 7.4% disagree. Both groups express strong confidence in applying digital skills in their professional careers.

5 Discussion

The findings of this study give essential information about how first-semester diploma students use digital gadgets to help with their learning. In the next section, we will discuss what these results mean and how they relate to online learning, digital skills, self-control, and how students feel about computer-based classes.

Addressing RQ1, the results show that students increasingly use digital devices in their learning routines. Most students who took part said they used digital devices to access learning materials like slides, PDFs, and online learning material that their lecturers/educators provided them. This trend shows how crucial digital devices are for getting educational material to students in an online setting (Li, 2020). The COVID-19 pandemic has sped up the use of technology in learning, which aligns with the results. The study also showed that students' digital capabilities in employing different learning activities besides just reading their course materials. Digital devices are helpful for a wide range of activities and interactions, such as participating in online learning activities, working with peers, and talking to teachers. These results show how important it is for technology to create chances for active learning, make real-time communication possible, and help students work together, supporting many other investigations (Al-Ansi et al., 2021; Schleicher, 2020).

In response to RQ2, the study found that many first-term diploma students like the idea of using digital devices for educational purposes. The results showed that most CS and AM students preferred to use digital tools, consistent with research indicating that students are becoming more interested in and comfortable with using technology for educational purposes (Elnagar et al., 2021). Additionally, a large number of students agreed that using digital devices helps them learn, with most CS students agreeing that using digital gadgets in their classes helps them learn more effectively. This aligns with research showing that digital tools can enhance academic performance and engagement (Eri et al., 2021).

The study also examined students' technical capabilities and how they learned new skills. The results showed that most students in both groups believed they were capable of resolving technical issues with digital tools. This is consistent with previous research linking students' confidence in their technical skills to their use of digital tools (Keržič,

2021; Lone, 2021). Students are becoming more adept at handling technical problems due to increased exposure to technology and a growing tech-savviness among young people.

When comparing the current study to others, it was possible to gain valuable insights into how students perceive their digital literacy, capabilities and learning skills. Most CS students believed they had the technical skills necessary to effectively use digital gadgets for learning. In contrast, a slightly smaller group of AM students shared this view. This confidence in using digital resources for educational purposes is supported by previous research, highlighting the importance of digital literacy as a core component of modern education (Hebebci & Ertuğrul, 2022; Tytler, 2020). Additionally, the data indicates that many students in both groups reported proficiency in ICT skills. This result aligns with other studies emphasizing the importance of ICT proficiency for effective learning in digital environments (Bejaković & Mrnjavac, 2020; Schmid & Petko, 2019).

When comparing the results of this study to those of other studies, it becomes clear that first-term computing-related students increasingly view digital gadgets as valuable learning tools. Their positive attitudes and confidence in their technological and digital literacy skills demonstrate that technology is integral to their learning journey. These findings have important implications for schools and teachers, underscoring the importance of incorporating digital tools into teaching to enhance student engagement and learning outcomes.

RQ3 offers insights into the challenges these students face in managing their academic responsibilities and sheds light on the ongoing pandemic's potential impact on their self-regulation strategies. The COVID-19 pandemic has had a significant effect on education right now. This has shifted from standard in-person learning to remote and hybrid learning. Because of this change, students have had to change how they manage themselves to fit the new learning setting (Schleicher, 2020). The study's results suggest that the popularity of online learning platforms and asynchronous coursework may have made it harder to avoid putting things off and stick to study plans. Due to online learning, the lines between school and life may be less clear, which could be why some students put other things ahead of their schoolwork.

Self-regulation strategies are essential for students to do well in school but can also be challenging. The results show that students who can control their tendencies to put things off do a better job keeping up high-quality work. Even though they are less common, those who put schoolwork ahead of other obligations have a better academic focus. On the other hand, sticking to study plans and staying motivated is hard, which shows that self-control could be better in some ways. This finding supports the claims made by (Biwer et al., 2021; Iilonga et al., 2020)

The results of this study can be used by teachers and organizations. Recognizing that students have different ways of controlling themselves can help guide the development of focused interventions. Teachers can use strategies that help students organize their time, get motivated, and stay interested, whether they are learning in person or online. Also, institutions can give students the tools and support systems they need to deal with problems linked to self-regulation.

RQ4 provides insight into the perceptions of first-semester diploma students towards computing-based courses, highlighting differences between the CS and AM groups in various aspects of their experiences and expectations. The findings indicate that students in both programs have varying perceptions of the relevance of computing-based courses to their respective academic programs. A large number of students in the CS program strongly agree that these courses are relevant to their academic goals, demonstrating the importance of perceived relevance. This alignment likely facilitates learning for CS students and maintains their motivation (Bowden et al., 2021).

In contrast, a large percentage of students in the AM program strongly agree that these courses are essential. Still, a number disagree, suggesting a broader range of opinions. These results indicate an opportunity for lecturers to clarify to enhance the delivery and also how computing-based courses fit into the AM program and address the diverse expectations of students. The relevance of a course greatly impacts students' overall learning experience and academic performance. Bowden et al. (2021) suggest that students are more engaged and motivated when they perceive a strong alignment between course content and their academic program. However, if students do not see this connection or have differing opinions, it can decrease interest and motivation (Abuhassna et al., 2022). Therefore, educators must ensure that course material is relevant and to clearly communicate this to students to create an optimal learning environment.

6 Conclusion

In conclusion, this study investigated digital device usage, digital competencies, self-regulation, and perceptions of computing-based courses among first-semester diploma students. The results provide valuable insights into areas where students may require support and instruction to develop the digital skills necessary for success in today's society, particularly in the aftermath of the COVID-19 pandemic. The study also sheds light on how students manage the demands of computing-based learning and identifies areas where they may desire additional support to effectively regulate their learning. Furthermore, the findings offer insights into the effectiveness of computing-based courses and suggest ways in which they can be modified to better meet the needs of students. By addressing these research aims, this study contributes to our understanding of the role of technology in education. It provides a foundation for future research in this area.

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