Teaching and learning using 21st century educational technology in accounting education: Evidence and conceptualisation of usage behaviour

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Technologies are ubiquitous in the 21st century, and educators need to integrate relevant technologies into their teaching practices to meet stakeholders' expectations and keep abreast with the accounting profession's advancement. A mixed-method approach of quantitative and qualitative techniques was used in this study, with the latest version of the SPSS software (version 26) and NVivo software to analyse the data. The results depict the accounting educators' usage efforts of 21st century educational technology tools and platforms; it is neither highly prevalent nor optimised. Future researchers could expand the investigation of 21st century educational technology by utilising the proposed constructs, model and hypotheses from this study's qualitative findings. The study revives the stagnant educational technology literature in accounting education and explicates technology usage issues in accounting education, specifically in developing countries and the Asian region.

Implications for practice or policy:

- Education ministries, higher education institutions, faculties, policymakers and academics should encourage educators to adopt and integrate 21st century educational technology into their practices.
- The integration of 21st century educational technology in teaching and learning practice should align with individual attributes, technology characteristics and organisational factors.
- Accounting educators must acquire technological competence through appropriate professional development and training programmes.

Keywords: accounting education, educational technology, Fourth Industrial Revolution, technology usage, teaching, learning

Introduction

Nowadays, technology plays an immense role in humans' lives, revolutionising many fundamental activities and penetrating most areas, including education (Raja & Nagasubramani, 2018), transforming research activities, scholarship and services to society in the academic field and enhancing teaching and learning (Rana, 2017). Educational technology refers to technology integration into the curriculum, altering the educational process (Cloete, 2017). Students develop new skills and enhance their learning experience through various technology platforms (Lawrence & Tar, 2018). Technology supplements teaching materials, offering students a new customisable learning experience with a self-paced, problem-based, interactive learning environment, improving their knowledge and understanding (Moro et al., 2021). Past research (Akçayır & Akçayır, 2016; Moro et al., 2021; Saltan & Arslan, 2016) shows educational technology improves students' motivation, satisfaction, attitudes, interaction, engagement and academic performance.

The massive changes brought by technological advancement in the accounting field necessitate accounting educators to embrace technology for effective communication, better teaching aids and to assist students' self-expression (Mohd Yusof & Tahir, 2017). Educational and professional courses acknowledge technology's importance in contemporary teaching (Watty et al., 2016), while raising research and expectations from accounting organisations, and the business environment emphasises technology use in the accounting curriculum (Lee et al., 2018).

Thus, accounting education needs to progress, develop, adopt and advocate for good governance in technology application to accommodate the new trend in the human capital market (Malaysian Institute of Accountants, 2018; Yap et al., 2014). Accordingly, the accounting education syllabus needs rejuvenation for the 21st century demand and industrial needs. The importance of technology is also recognised by the Pathway Commission in 2012, established by the American Accounting Association and the American Institute of Certified Public Accountants, which are responsible for the future structure of accounting higher education (Association of Chartered Certified Accountants, 2021; Soroosh & Krahel, 2018). They highlighted specific technologies, such as data visualisation, integrated audit modules and cloud infrastructure, which transform and reshape the accounting profession's policies and processes.

The World Economic Forum (2018) reported several declining occupations such as accounting, bookkeeping, accountants and auditors due to technology's advancement; the accounting curriculum neglecting technology aggravates the situation (Burritt & Christ, 2016; Morris et al., 2015). Nevertheless, accounting practitioners welcome the technology (Ilias et al., 2020). Taib et al. (2022) noted the high correlation between digitalisation with accountants' technology readiness, yet technological knowledge and usage do not depict the current industrial needs. The Fourth Industrial Revolution (IR4.0) augmented the impact and challenges of the future accounting profession with three major changes: (a) smart and digital technology evolvement; (b) the globalisation of reporting and disclosure standards; (c) new regulations (Malaysian Institute of Accountants, 2018). The shifts in the role of accountants from merely recording transactions to analysing and interpreting data require skills and information technology knowledge. These skills lead to better decision-making (Wahyuni, 2018).

Technology integration into accounting education is vital because rapid technological growth affects the global economy and changes accountants' roles (Morris et al., 2015; Ogundana et al., 2015). Accordingly, the educational setting must efficiently and effectively provide content adapting to these changes (Birt et al., 2018). Moreover, future graduates are entering a technology-rich workplace requiring sufficient digital technology literacy skills to operate efficiently (Ahmad & Mohd Rhouse, 2016; Watty et al., 2016). Accounting educators are responsible for shaping future accounting professionals to bridge the gap between the current issues, the accounting curriculum and accounting practice (Asonitou, 2020). Al-Htaybat et al. (2018) asserted that technology integration into accounting education allows graduates to gain relevant knowledge, skills and abilities. They also highlighted that the current global accreditation standards and accounting professional qualifications require accounting graduates to be empowered with high-end technology and automation competencies for the future advisory role for IR4.0.

Educators' responsibilities include transferring knowledge and providing guidance and training to students. They are key stakeholders in integrating technology into the education system (Birt et al., 2018; Qasim & Kharbat, 2020; Tondeur et al., 2019). The role is poorly executed, causing a disparity between industry demands and graduates' quality. Higher education institutions lag in adopting innovative pedagogy and overlook complex skills fostered by technology (Birt et al., 2018; Moro et al., 2021). One key reason is educators' reluctance to embrace the information age. Studies reveal the unoptimised and minimal integration of educators' technology usage (Lawrence & Tar, 2018; Taib et al., 2022; Watty et al., 2016) because educators opined the challenges – time constraints, accessibility, and network connection, lack of training and competency, and little technical support – outweigh the benefits (Awang et al., 2018; Ghavifekr, Abd Razak et al., 2014; Milutinovic, 2022). Educators are also concerned about losing control over how their students manage tasks with technology integration (Dunleavy et al., 2008; Gurjar & Sivo, 2022; Moro et al., 2017). Hence, debate between educational institutions and industry players over educational technology adoption is ongoing due to the gap between employers' expectations and

requirements relating to technology competency and the actual skills and abilities of accounting graduates.

This study describes the 21st century educational technology usage among accounting educators in their practices through an overview of educational technology usage frequency, tools and platforms used. Accounting educators' insights were explored to clarify the descriptive results, identify constructs and build a conceptual model. This study aims to raise awareness and understanding among educational institutions, accounting bodies and other stakeholders of the prospect of improved integration of technology and digital resources through supportive action, policies and regulations. Understanding accounting educators' technology usage will assist in designing comprehensive intervention strategies.

Literature review

Technology and accounting education

Integrating e-learning and other educational technologies affected accounting education (Al-Htaybat et al., 2018; Breedt, 2015; Chrismastuti & Purnamasari, 2015). Technology application in accounting education enables interactive, constructive and independent learning (Delgado et al., 2015), improving classroom activities' effectiveness and student engagement (Dua et al., 2016; Mirzajani et al., 2016). Technologies applicable in accounting education are web applications and relevant technology devices used to prepare teaching materials, tests and tutorials and engage with students (Kearney et al., 2017; Khatib, 2016). New experiential learning allows students to better understand, decode and learn the material (Moro et al., 2017). Incorporating technologies into accounting education encourage progress and good governance in technology usage and adoption (Asonitou, 2020) for the 21st century educational setting.

Technology integration in education considers the intersection of content, pedagogical and technological knowledge for effective instruction to achieve learning goals (Nelson et al., 2019). Wolugbom et al. (2020) described technology integration as introducing modern facilities and various technologies into accounting courses. Technology integration eases knowledge transference and encourages creativity, collaborative problem-solving and independent learning. Scholars believe educational technology improves students' performance, stimulates creativity and innovative thinking, and promotes student engagement (Cheah, 2016; Mohd Yusof & Tahir, 2017; Qasim & Kharbat, 2020). Technology also nurtures students' cognitive processes (Moro et al., 2017).

Prevalent education technology in accounting education

Educational technology studies in accounting have identified various instructional technologies (hardware or software) for accounting educators' usage (Abu Karsh, 2018). Ahadiat (2008) identified the most and least popular instructional technologies used by accounting educators in the United States of America (see Tables 1 and 2). Thus, it is timely to investigate technology advancement to determine its current landscape. Lee et al. (2018) noted that Excel was the most frequently used data analysis software in the accounting field. Similarly, Blankley et al. (2018) concluded that spreadsheet and word-processing software were mostly used in accounting education. There are concerns about accounting education's current technology usage following the dramatic changes in the contemporary business environment.

Table 1
Most popular technologies in accounting education

Rank	Technology
1	Email communications with colleagues
2	Information retrieval via the Internet
3	Computer word-processing assigned to students
4	Computer spreadsheets to keep grades, records, etc.
5	Computer spreadsheet assigned to students
6	Individual contact with students via email
7	Presentation software (e.g., PowerPoint) to prepare handouts, transparencies or presentations)
8	Video used in class or assigned to students
9	Computer lab for class meeting
10	Data analysis software such as Statistix, SPSS, LINPRO, SAS or Excel

Source: Adapted from Ahadiat (2008, p. 126)

Table 2
Least popular technologies in accounting education

Rank	Technology
1	Audio in class or assigned to a student
2	Distance education
3	Data analysis software assigned to students, such as Statistix, SPSS, LINPRO, SAS
4	Course-specific computer teleconferences or bulletin
5	Film used in class or assigned to students
6	Multimedia for students' individualised learning
7	Electronic lists for discussions with colleagues
8	Multimedia for in-class presentations

Source: Adapted from Ahadiat (2008, p. 127)

21st century educational technology in accounting education

Technology is evolving; nevertheless, current technology is viable for creating a technology-enhanced learning environment (Moro et al., 2021). Educators must holistically prepare students and produce work-ready graduates for job market demands (Darling-Aduana & Heinrich, 2018; Foulger et al., 2016; Wu et al., 2019). Accounting education researchers have emphasised technological tools and applications provide opportunities and improve education quality and student engagement (Al-Htaybat et al., 2018; Gurjar & Sivo, 2022; Ilias et al., 2020; Mavroudi & Tsagari, 2018; Qasim & Kharbat, 2020; Taib et al., 2022; Wu et al., 2019). Technology does not replace pedagogy but rather enhances teaching and learning (Al-Emran & Shaalan, 2015).

Watty et al. (2016) suggested using Web 2.0, Web 3.0, cloud computing, tablets and smartphones, games and gamification, learning management systems and massive open online courses (MOOCs). Augmented reality (AR), virtual reality, 3D printing and mobile devices could be key educational technology for learning engagement (Birt et al., 2018; Johnson et al., 2016), facilitating information delivery, collaboration, connection and communication between students, peers and lecturers. Pan and Seow (2016) proposed training accounting graduates with technology applications, such as eXtensible Business Reporting Language software and forensic tools. Meanwhile, modern businesses have eliminated some manual procedures for financial information reporting (Pincus et al., 2017).

The above discussion suggests a symbiotic relationship between 21st century technology and accounting education. Technology adoption and integration are inevitably essential, and the role of educators is crucial. Hence, the following five research questions drove this study:

(1) How frequently do accounting educators use any of the 21st century educational technologies listed in Table 3 in their teaching practice?
(2) What technology tools are mostly used by accounting educators in their teaching?
(3) What technology platforms are mostly used by accounting educators in their teaching?
(4) What are the perceptions of accounting educators about the descriptive results and findings?
(5) What are the dimensions, constructs and conceptual model depicting the usage behaviour of 21st century educational technology by accounting educators?

Methods

A mixed-method approach of quantitative and qualitative analyses was applied, using samples of accounting educators from 12 public universities in Peninsular Malaysia offering bachelor's degree programmes in accounting. The selected accounting educators possessed the highest accounting qualification and experience in teaching and learning accounting subjects regardless of position grade, terms of appointment, specific university establishment and location; educators teaching non-accounting subjects were excluded to avoid deviation from the accounting educators' perceptions and definitions.

Data were collected from April 2020 to August 2020 during the COVID-19 outbreak, and participants were identified through their respective university websites. An Excel database containing the accounting educators' information facilitated the online questionnaire distribution via the SurveyMonkey platform. In adhering to ethical considerations, the participants were informed about the purpose of the study and how the data would be used as stated on the cover page of questionnaires. Anonymity and confidentiality were strictly observed according to the university ethics and governance policy, and the results of data collection were be intended solely for academic purposes. Of the total number of 508, we selected 275. Respondents with experience using any of the 21st century educational technologies listed in Table 3 were eligible to participate; those without the relevant experience (68) were excluded, leaving 207. Only 195 out of 207 who returned questionnaires proceeded to the analysis stage.

Table 3
Example of educational technologies for the 21st century classroom

No.	Categories of educational technologies	Example
1.	Learning management systems (LMSs)	Moodle; Blackboard; Desire2Learn; iLearn System; MOOCs; i-Folio; Claroline; MyGuru2; Learning Care; Learning Cube; Blackboard; MyLMS
2.	Social media or collaborative technologies	Blogs; Wikis; Twitter; Facebook; Instagram; YouTube; Google Drive; Dropbox; Vimeo; Metacafe
3.	Communication	*Asynchronous* (e.g., online discussion board; email; WhatsApp; WeChat; Telegram) *Synchronous* (e.g., Skype; Google Chat; Adobe Connect; Bloomz; Remind; Sli.do)
4.	Simulated learning systems	The Normalised Game; Legends of Learning; Classcraft; SiLAS Solutions; CodaQuest; Animoto, Legends of Learning
5.	Learning styles or approach concept	Flipped Classroom; Gamification; Padlet; Nearpod; Kahoot! Socrative; blended learning; mobile learning; distance or online learning, Peardeck
6.	Mobile technology	Tablet computer; smartphones; mobile apps (e.g., iOS, Android)
7.	Technology assessment or evaluation	Quizlet; Quizlet live; Google Classroom; Quizizz; Formative; MOOCs; ZipGrade; Flipgrid; Scan Attendance Manager; Plickers; Kahoot!; Write to Pdf; Google Spreadsheet; Google Form; ClassDojo
8.	Presentation and learning resource creation tools	*Software* (e.g., Adobe Presenter; voice recognition software; Microsoft PowerPoint; Google Slide; Book creator; Adobe Captivate; screen capture, i.e., Jing, Camtasia; Prezi; Powtoon; Padlet; Nearpod; Google Slides; Canva; PiktoChart; Adobe Acrobat Reader; Showbie; Plotagon Education) *Hardware* (e.g., drawing tablet, i.e., Wacom; microphones; In-class Document Reader; smartphones
9.	Learning objects or resources	eBooks; lecture notes or slides; narrated PowerPoint slides; podcast, i.e., audio & video; video lectures; instructional videos; automated video drawings; Flickr; Google Photos; Photobucket; Google Drives; QR code scanner
10.	Common accounting tools	ATO eTax software; Microsoft ACCESS; Microsoft Excel; QuickBooks; SAS Enterprise Guide; Internet Evidence Finder Forensics; accounting software (e.g., UBS Accounting Software; SQL Accounting Software; ABSS Accounting; Mr. Accounting)

Note. Participants were asked to denote as "others" educational technologies used other than those on the provided list.

The questionnaire consisted of two sections. Section A recorded demographic information, and Section B identified the educators' experience and usage frequency, tool and platforms used in their practice. A segment for technology categories and examples of accounting educators' usage was provided (refer to Table 3). The list is a combination of the educational technologies proposed by Watty et al. (2016) and Rachael (2018) and was deemed useful 21st century technology applicable for accounting education. Respondents had to indicate whether they use any of the listed technology in their teaching practices and other unlisted educational technologies used. SPSS version 26 analysed the data for descriptive results.
The qualitative method employed in-depth interviews with six accounting educators with various academic positions through a convenience purposive sampling method. Their perspectives on technology application and the technology tools and platforms used were explored. The descriptive results summary was shared with the interviewees to gauge their thoughts, experience, current usage and influencing

factors for using 21st century educational technology. The recorded interviews were transcribed using the NVivo software to capture and thematise the findings and written format to support the quantitative results. The final themes, relevant dimensions and sample narratives were developed to propose a model and hypotheses from the applicable constructs.

Research findings

Table 4 presents the results of the demographic analysis. The majority were female, with 146 respondents (74.9%) and 49 male respondents (25.1%). Most respondents were between 40 and 49 years old (53.3%), followed by 30 and 39 years old (30.2%) and 16.4% aged 50 years and above. About 66.2% of the respondents have a doctorate, 32.8% have a master's degree, and 1% have a professional qualification. More than half (59.5%) were senior lecturers, followed by 22.6% associate professors and 13.8% lecturers. Professor and assistant professors have a similar percentage (2.1%). Approximately 43.6% of respondents have served for less than 20 years, 27% for less than 10 years, and 26.1% for 21 to 30 years; 2.6% of respondents have more than 30 years of working experience. The majority (45.6%) of the respondents spent about 10 to 15 hours a week on teaching activities, and 42.9% spent around 4 to 9 hours.

Table 4
Demographic profile of the respondents (N = 195)

Demographic profile		Frequency	Valid percentage (%)
Gender	Male	49	25.1
	Female	146	74.9
Age	30–34 years old	18	9.2
	35–39 years old	41	21.0
	40–44 years old	48	24.6
	45–49 years old	56	28.7
	50 years old and above	32	16.4
Highest education level	Doctorate (PhD or DBA)	129	66.2
	Master's degree	64	32.8
	Professional qualification (e.g., ACCA, CIMA)	2	1
Current academic appointment	Professor	4	2.1
	Associate professor	44	22.6
	Assistant professor	4	2.1
	Senior lecturer	116	59.5
	Lecturer	27	13.8
Working experience as an educator (years)	5 years and below	12	6.2
	6–10 years	42	21.5
	11–15 years	26	13.3
	16–20 years	59	30.3
	21–25 years	33	16.9
	26–30 years	18	9.2
	Above 30 years	5	2.6
Teaching hours spent per week	3 hours and below	9	4.6
	4–9 hours	83	42.6
	10–15 hours	89	45.6
	16–20 hours	12	6.2
	Above 20 hours	2	1

Table 5 summarises the respondents' educational technology usage of the 21st century technologies listed in Table 3. About 34.9% of respondents admitted using educational technology in their teaching activities all the time; 3.1% rarely use it. Laptops, desktop computers and LCD projectors were the most used technological devices. Tablets, camera video devices, sound devices, software and applications were

seldom used. Smart televisions and interactive whiteboards were least used. As for the technological platforms, most respondents (70.3%) used LMSs, followed by communication platforms (68.2%) and mobile technologies (50.8%). Only 7.7% of respondents simulated the learning system for their classroom strategies. Other technology platforms (learning styles or approach concepts; mobile technologies; assessment or evaluation technologies; presentation and learning resource creation tools; learning objects or resources; common accounting tools) show less and average usage.

Table 5
Respondents' educational technology usage profiles (N = 195)

Educational technology profile		**Frequency**	**Valid percentage (%)**
Usage frequency in teaching and learning	Rarely used	6	3.1
	Occasionally used	20	10.3
	Frequently used	51	26.2
	Use almost always	50	25.6
	Use all the time	68	34.9
Educational technology tools	Smartphone	128	65.6
	Tablet	24	12.3
	Laptop	155	79.5
	Desktop computer	151	77.4
	LCD projector	153	78.5
	Interactive whiteboard	5	2.6
	Smart television	2	1.0
	Camera video device	64	32.8
	Sound device	20	10.3
	Software and applications	99	50.8
	Others	7	3.6
Educational technology platforms	Learning management system (LMS)	137	70.3
	Social media or collaborative technologies	102	52.3
	Communication	133	68.2
	Simulated learning systems	15	7.7
	Learning styles or approach concepts	55	28.2
	Mobile technologies	99	50.8
	Assessment or evaluation technologies	64	32.8
	Presentation and learning resource creation tools	99	50.8
	Learning objects or resources	88	45.1
	Common accounting tools	50	25.6

Note. Participants were allowed to tick more than one educational technology tool and platform they use in teaching and learning.

Discussion

This study investigated 21st century technology usage in accounting educators' practices. The findings describe their pattern of educational technology usage frequency, tools and platforms used. The following subsections describe this pattern's theme and elaborate on the quantitative analysis result supported by the qualitative findings.

Usage frequency of 21st century educational technology

Table 5 describes accounting educators' usage frequency of 21st century educational technologies in Table 3 (either rarely, occasionally, frequently, almost always, all the time) in the classroom. About 34.9% of respondents fully integrated technologies into their practices; 26.2% used them frequently. Meanwhile, 25.6% used them almost always, 10.3% occasionally and 3.1% rarely.

Educators must embrace educational technology because technology significantly impacts people's lives and activities (Abu Karsh, 2018; Ahmad & Mohd Rhouse, 2016). With more comprehensive technological advancements available, the usage frequency should be higher (Allison, 2022). Efforts were noted but they were insufficient for instilling the maximum learning experience for students' skills development. Nevertheless, the qualitative findings on their perspective of 21st century educational technology application suggest that most respondents agreed on its positive implications with optimised usage and integration into the curriculum:

> The use of educational technology is good as it would reduce paper usage … accommodate the younger generation's needs who were born with technologies … improve the knowledge and prepare the students for Industry Revolution 4.0 (IR 4.0) if it becomes the common practice in the classroom. (Respondent A)
>
> Integrating technology optimally … assist accounting educators in upgrading their technical skills and technology skills, and might attract students in the learning process and encourage them to focus. (Respondent B)
>
> Educational technology is emerging … I saw more technology used by our young colleagues and junior staff; perhaps they have greater enthusiasm for it compared to the senior educator. (Respondent C)
>
> Good for the education system and a bit overwhelming experience for accounting lecturers to teach using educational technology more often as they need to develop techniques differently from usual. I can say that young lecturers used educational technologies more, compared to the senior one … they have the spirit to try something new. (Respondent E)
>
> It is great for the education system and new experience for me to teach with educational technology … and I need to acquire more skills. From what I saw, technology usage among young lecturers and junior staffs in teaching process are quiet promising. (Respondent F)

However, some respondents speculated about the reluctance of senior educators to optimally use such technologies. A possible explanation could be the age factor since the educators' age might reflect the number of educators integrating technology into their practices. The notion is reasonable since past studies reported that higher age is correlated with higher technology anxiety.

Notably, this study's respondents were mostly 40 years and above, and the usage pattern in Table 5 shows several less explored technologies. Accordingly, Cherry (2014) revealed that educators aged 40 years and older were less likely to integrate educational technology into their practices than younger educators. Moreover, past studies often found older people have less technology experience and are less open to technology integration, leading to anxiety and unfavourable attitudes (Abbasi et al., 2015). Unfamiliar technologies were deemed complex, ignored and rarely optimised.

Educational technology tools used

The quantitative findings suggest that accounting educators mostly use desktop computers (77.4%), LCD projectors (78.5%) and laptops (79.5%), similar to the findings of Ahadiat (2008) and Goksun et al. (2018). The findings of our study conducted in 2020 projected a similar pattern to previous studies. The technology tools' high usage could be due to familiarity, as some have been used since the 1990s and are

still applicable in the current education landscape (Ghavifekr, Abd Razak et al., 2014; Ghavifekr, Kunjappan et al., 2016).

However, our findings reveal widespread usage of smartphones in teaching and learning (65.6%). Several scholars (Lawrence & Tar, 2018; Taib et al., 2022) mentioned that while many educators embraced technology in their practice, they disregarded other 21st century educational technologies; for instance, interactive whiteboards and smart televisions might be mostly unavailable in education institutions due to their high cost and training requirement.

The unavailability of facilities and infrastructure was potentially the main challenge and barrier to teaching using technology (Abdullah et al., 2016; Ghavifekr, Abd Razak et al., 2014). This is corroborated by the qualitative analysis's findings. Some respondents disclosed feeling incapable and requiring specific training to implement different educational technology in the classroom:

> I am willing to use technology, but poor facilities were the main problem; not all classes have computers and projectors, sometimes systems are outdated … no appropriate support from the university or faculty, training, and encouragement or appreciation. (Respondent A)

> I'm comfortable teaching my students without using other complex technologies because I'm used to it. (Respondent B)

> I have tablet and smartphones … for my personal use and not so much to use it for my teaching practice as I feel less confident using the devices in front of students. (Respondent C)

> I normally use technology and devices already available in the classroom, such as computers and projectors … Spending another cost to acquire the new tools is not my plan now. (Respondent D)

> I prefer to use technology in the classroom and do not prefer to buy new devices or subscribe to new technology services and platforms. (Respondent E)

> My university should provide me with the technology facilities … I don't want to spend my cash to acquire advanced educational technology tools. However, it has becomes a challenge to me when the classroom is only equipped with basic technology tools such as a personal computer. On top of this … there is lack in terms of constant support and adequate training. (Respondent F)

In the burgeoning era of data analytics, data visualisation, and artificial intelligence accounting educators are expected to explore and optimise the usage of 21st century educational technology tools (Lee et al., 2018; Ramaila & Molwele, 2022). Hindering factors such as the lack of classroom facilities, cost, technological competency and unfamiliarity with current technology deter educators from changing and disrupt the integration that could enhance educators' effectiveness and interactive pedagogy (Alshmrany & Wilkinson, 2017; Dua et al., 2016).

Educational technology platforms used

The findings show that the most used platforms by accounting educators were LMSs (70.3%), communication (68.2%) and social media or collaborative technologies (52.3%). Blankley et al. (2018) corroborated that accounting educators naturally use LMSs. The faculty or institution usually provided the platform, hence, the familiarity or obligation to use it.

Although LMSs support the teaching process, their functions are limited to paperless work (Blankley et al., 2018), which is insufficient for instilling technological skills among students as demanded by IR4.0.

Likewise, the findings indicate educators' minimal usage of the flipped classroom learning approach, gamification (e.g., Padlet, Kahoot, Socrative, Nearpod) and blended learning; they create game-based activities and animations to help students learn (Watty et al., 2016).

The qualitative result indicates that characteristics and behaviour are the major predictors of educators' tendency to use various 21st century educational technology platforms for classroom activities. Other concerns are insufficient facilities and infrastructure, university support, government support, financial ability, competencies and educators' capabilities. The following responses illustrate the educators' opinions:

> Currently, I only use the LMS to share documents. Other types of technology? I don't think I'm capable of exploring them myself … it is difficult for me to use new technologies as I need to allocate my time to learning them … I think my colleagues also have the same views. (Respondent A)

> Capabilities and attitudes are the reasons for educators' decision ... If their attitude is inclined to resist technology, no matter how good the technology or the infrastructure is, it will remain unrealisable. (Respondent B)

> I only know the LMS … we must log in using the website only. If you ask me to use other apps from the smartphone, sorry, I am not capable of using it, but if somebody wants to teach me, I will consider using it. (Respondent B)

> The usage behaviour of the educator is the prime factor … educators sometimes feel uncomfortable and forced to implement such technology. (Respondent C)

> Lack of full support from the university and the administration … educators must invest their own money to use various educational technology platforms in teaching and learning … I think this situation will obstruct the effort for technology integration and make them refuse to adopt. (Respondent D)

> Facilities and infrastructure could be improved; the main concern is the attitude of educators … can't accept new things or use other educational technology resources they regarded as burdensome. (Respondent E)

> Any effort to embrace the various educational technology in teaching and learning will be meaningless if the educators resist changes… I mean, there should be a sufficient effort from the learning institution in providing extensive technology medium. (Respondent F)

Respondents B and C emphasised educators' active role in using various educational technology platforms to improve technology-integrated teaching activities. Educators ignoring changes tend to choose teacher-centred or traditional teaching practices (Hartman et al., 2019). Several researchers highlighted critical infrastructure, facilities and support for educators to embrace educational technology (Abu Karsh, 2018; Alshmrany & Wilkinson, 2017; Gordon et al., 2018). Other factors were educators' attitudes, knowledge, skills and technology capabilities (Scherer et al., 2019; Weng et al., 2018). Educational institutions and the government's strategic approach, training and support could result in the integration of 21st century educational technology platforms into education.

Conceptualisation of usage behaviour: proposed themes, dimensions and model

This study thematised the interviewees' informative points (shown in Table 6), to propose a model with relevant constructs.

Table 6
Themes and dimensions from qualitative findings

Theme	Sample narrative	Dimension
Cost	Spending another cost to acquire the new tools is not my plan now. Educators must invest their own money.	Technology
Complexity	I'm comfortable teaching my students without the use of other complex technologies.	Technology
Infrastructure	I am willing to use technology, but poor facilities were always the main problem. Sometimes even the systems are outdated.	Organisational
Age	More technology used frequently by our young colleagues and junior staff	Predictor
Self-enthusiasm	Perhaps they have a greater enthusiasm for it compared to the senior educator.	Individual
Institutional support	Lack of full support from the university and the administration	Organisational
Training	No appropriate training and encouragement or appreciation	Organisational
Technological competency	Other types of technology? I don't think I'm capable of exploring them myself. If you ask me to use other apps from the smartphone, sorry, I am not capable of using it.	Individual
Attitude	The main concern is the attitude of educators who can't accept new things. Capabilities and attitudes are the reasons for educators' decision to use or not to use the education technology. Will be meaningless if the educators resist changes If their attitude … resist technology, no matter how good the technology or the infrastructure is, it will remain unrealisable.	Individual
Usage behaviour	The reasons for educators' decision to use or not to use the education technology The usage behaviour of the educator is the prime factor. I have tablets and smartphones … for my personal use and not … for my teaching practice as I feel less confident to apply those devices in front of students. I am willing to use technology, but poor facilities were always the main problem. Educators who can't accept new things or use other educational technology resources.	Consequence

Based on Table 6, this study proposes a model reflecting the accounting educators' use of 21st century educational technology; their usage is the outcome variable. There are three main proposed categories (technology characteristics, organisational factor, individual factor) with eight constructs (cost of technology, complexity, infrastructure, institutional support, training, self-enthusiasm, technological competency, attitude) as independent variables. Age of educator appears as a moderator variable. Figure 1 illustrates the proposed conceptual model.

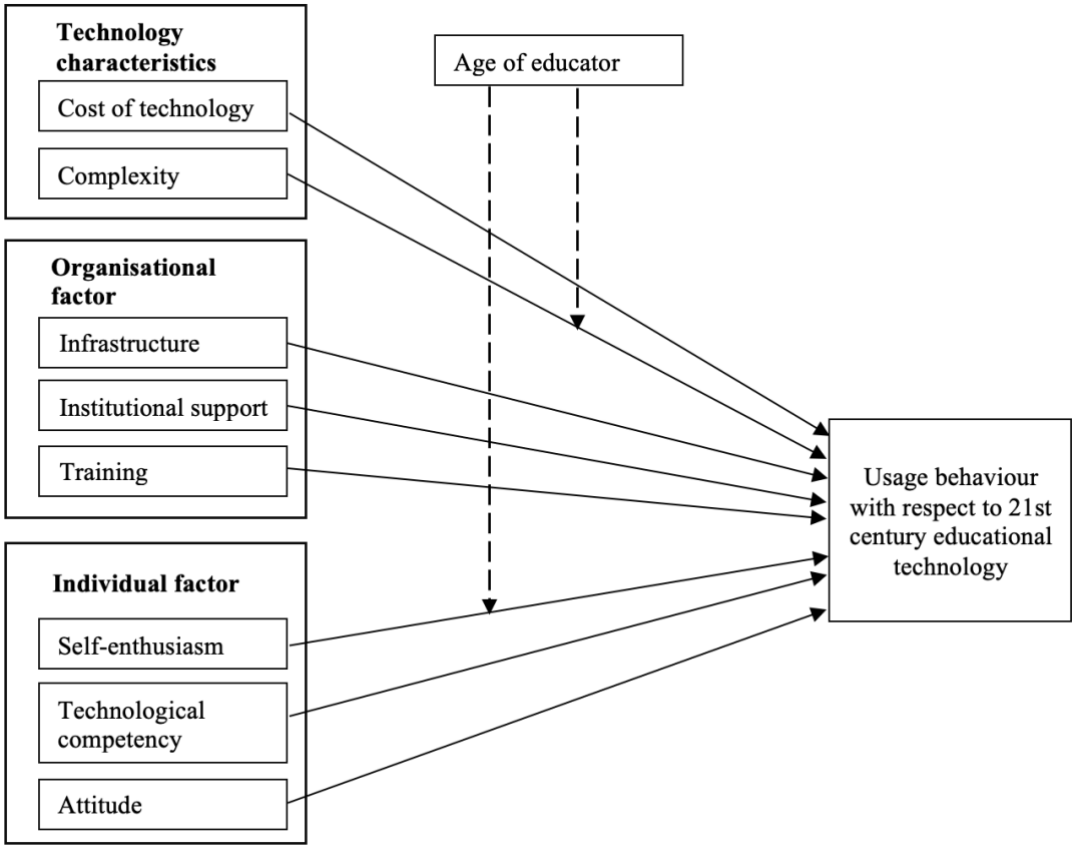

Figure 1. Proposed conceptual model of the usage behaviour of accounting educators with respect to 21st century educational technology

Based on the proposed conceptual model, we propose these hypotheses (Table 7):

Table 7
Proposed hypotheses

	Direct relationship
H1	Cost of technology is positively related to usage behaviour with respect to 21st century educational technology.
H2	Complexity of technology is positively related to usage behaviour with respect to 21st century educational technology.
H3	Infrastructure is positively related to usage behaviour with respect to 21st century educational technology.
H4	Institutional support is positively related to usage behaviour with respect to 21st century educational technology.
H5	Training is positively related to usage behaviour with respect to 21st century educational technology.
H6	Self-enthusiasm is positively related to usage behaviour with respect to 21st century educational technology.
H7	Technological competency is positively related to usage behaviour with respect to 21st century educational technology.
H8	Attitude is positively related to usage behaviour with respect to 21st century educational technology.
	Indirect relationship (interaction)
H9	Age of educator moderates the relationship between technology complexity and usage behaviour with respect to 21st century educational technology.
H10	Age of educator moderates the relationship between self-enthusiasm and usage behaviour with respect to 21st century educational technology.

Study implications

A comprehensive solution for accounting educators to optimise 21st century educational technology tools and platforms and integrate them into the accounting curriculum is required, raising awareness among educators and relevant stakeholders of the importance of 21st century educational technology. A conducive environment cultivating educators' positive attitudes towards technology integration into teaching and learning is imperative to prepare students for future industrial demands. Educational institutions must proactively minimise negative attitudes towards educational technology through training and sufficient facilities, emphasising its importance to current education practices and its critical impact on the accounting profession. Notably, accounting educators' efforts in using educational technology still require much work.

This study's findings are relevant to higher educational institutions in developing countries requiring educational technologies and advanced Internet facilities. Evidently, most accounting educators adopt widely available and familiar technologies. They must explore other educational technologies and improve their technology skills according to changes in the accounting profession as future professional accountants need to engage with technology-related advocacy, expanding their capabilities with digital resources and technology advancement (Association of Chartered Certified Accountants, 2021). Accounting educators are not merely transmitting knowledge but students' human, social and decisional capital sources as well (Martin et al., 2015). The intention to use and accept new teaching policies is half the battle; the individual factors and perceptions are equally crucial. The findings emphasise professional learning, technological competency development and opportunities as decisive factors. Educators need continuing training, staff action learning groups and other professional development approaches to optimise educational technology usage (Kearney et al., 2017).

Conclusion

Technology nowadays is inevitable. Its application is ubiquitous across sectors, including education, and continuously evolving; thus, accounting educators must proactively embrace 21st century technology in their practices. The numerous tools and technology platforms and industry demands necessitate educators to embrace technologies to equip graduates with technological skills and knowledge. Consequently, educational institutions must create a technology-integrated environment that motivates educators to use interactive 21st century educational technology in their classrooms.

The study's quantitative findings, supported by the qualitative analysis, indicate the accounting educators' technology tools and platforms' usage trend. They have used some technologies but ignored others. They must adopt various contemporary educational technologies to facilitate interactive teaching pedagogy and enhance students' learning experiences. Furthermore, the findings reveal technology characteristics, organisational factors and individual factors significantly influence accounting educators' usage behaviour towards 21st century educational technology.

The findings provide invaluable insight into accounting educators' uses of technology in their practices. Evidently, despite their numerous viewpoints on 21st century educational technology, the individual factor is the most critical in instigating technology usage. Educators are crucial in demonstrating the effectiveness of technology integration in preparing future graduates that embrace the profession's volatility, uncertainty, complexity, and ambiguity. Therefore, academics and university management responsible for the accounting curriculum should consider initiatives to exploit and maximise 21st century educational technology use in instructional design.

Limitations and future studies

Despite the study's significant findings, limitations are inevitable. First, it involves only accounting educators in public universities. Future studies should include educators from private universities or colleges; they generally have better facilities and tend to use a performance-oriented approach. Besides, future studies may emphasise younger samples or compare educational technology usage between younger and older accounting educators; examining the age factor's influence would be interesting.

Using other developing countries as samples would provide a broader comparison. Furthermore, the sample population of other academic and social sciences disciplines would offer more diverse insights on technology usage in the social sciences field. Another possibility is adding other variables or individual factors for alternative perspectives on educators' reluctance to adopt educational technology fully, through regression, correlation or path analysis to enrich the findings.

Future research may also explore the impact of COVID-19, at least after 3 years, to examine the probable changes in technology adoption. Further, researchers could also increase the sample size for both quantitative and qualitative measures to draw solid and rigorous conclusions.

Finally, the study's findings reflect 21st century educational technology usage; therefore, another possibility is for future research to explore the influence of individual factors on this phenomenon. Future studies could utilise the proposed model for empirical testing to validate the model and discover more concrete findings. Furthermore, studies could consider the findings highlighted in the qualitative results in analysing other study contexts.

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