



The age factor in the use of peer-reviewed electronic journals by Zimbabwean academics



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Background: The emergence of peer-reviewed electronic journals on the academic scene at the turn of the century was well received by university libraries in Zimbabwe. They established a consortium to facilitate conveyance of the resources to their patrons. Use of electronic journals by academics, however, has remained minimal almost two decades after their introduction. Efforts by librarians to address this challenge are hampered by lack of context-specific information on how age, among other demographic factors, affects adoption and use of electronic journals by academics. Such information is critical in promoting its use.

Objectives: This study examined age differences in the awareness of peer-reviewed electronic journals by academics in Zimbabwean universities, use of electronic journals and possession of technological skills needed to negotiate the electronic journals environment.

Method: This study employed a quantitative approach using a survey research design. Data were collected through structured questionnaires administered to a sample of 363 academics from three universities in Zimbabwe. Data were analysed through the Statistical Package for Social Sciences to produce tables.

Results: Younger academics were more aware of electronic journals, however, the older academics accessed more articles. Younger academics possessed higher technological skills than older academics.

Conclusion: There are age differences among academics with respect to awareness, use and possession of technological skills that librarians must take into account as they promote adoption and use of electronic journals.

Keywords: academics; peer-reviewed electronic journals; age; awareness; adoption and use; technological skills; Zimbabwean universities.

Introduction

Peer-reviewed electronic journals are vital and indispensable instruments of scholarly information for teaching, learning and research in the contemporary, globalised academic world. The resources have been adopted by university libraries and libraries of other higher and tertiary institutions across the world to support the activities of academics and students (Abinew & Vuda 2013; Machimbidza & Mutula 2017, 2019). The resources are renowned for their depth; timeliness; currency; speed and ease with which they can be accessed; powerful searching capabilities; round-the-clock remote accessibility; facilities for downloading, printing and copying information; a wide range of abstracts and full-text documents from globally renowned academic databases; ability to share downloads with members of research groups; ability to provide multiple access to many researchers at the same time; possibility of inclusion of audio and video content; ability to be adapted to technologies for the visually impaired; advanced functional capabilities such as hyperlinks to other relevant articles; and manipulability like the ability to link, annotate, visualise and integrate tables (Bar-Ilan, Peritz & Wolman 2003; Dilek-Kayaoglu 2008; Min & Yang 2010; Monopoli et al. 2002; Voorbij & Ongering 2006; Zainab, Huzaimah & Ang 2006). Electronic journals have matured to be considered prerequisites for an efficient and productive academic system (Ani 2013).

Peer-reviewed electronic journals were introduced in Zimbabwean universities in 2003, courtesy of partnerships developed between the Zimbabwe University Libraries Consortium (ZULC) and providers such as the International Network for the Availability of Scientific Publications (INASP), World Health Organization (WHO), Food and Agricultural Organization (FAO), United Nations Environment Programme (UNEP) and Electronic Information for Libraries (EIFL) (Machimbidza & Mutula 2017). Zimbabwe University Libraries Consortium is an association of university libraries in Zimbabwe, which acts as a conduit for the collective subscription of electronic journals and

provides a platform for resource sharing for member institutions (Machimbidza & Mutula 2019; ZULC 2018). University librarians in Zimbabwe expected electronic journals to easily gain traction with the academic community owing to their well-established benefits. This expectation has been dampened by the prolonged underutilisation reported in studies by Tsvere, Nyaruwata and Swamy (2013), Madondo, Sithole and Chisita (2017) and Machimbidza and Mutula (2017). Academics in Zimbabwe have been singled out for their failure to provide leadership in the use of electronic journals (Machimbidza & Mutula 2017). In this study, the term 'academics' refers to teaching and research staff in universities who have at least a master's degree.

The consequences of non-use or low usage of electronic journals by academics in Zimbabwe are many. Academics who do not use electronic journals are unlikely to encourage their students to use them. Course outlines and reference materials prepared by such academics would not include electronic journals, thereby perpetuating a culture of indifference towards the electronic resources by the academic community (Tenopir 2003). Academics who do not make much use of electronic journals do not give their students tasks that require them to use these resources. This results in a culture of shallow learning in universities (Khan & Ahmad 2009). Underutilisation of electronic journals by academics could imply that they are teaching with outdated material. The material provided by electronic journals is current and up-to-date (Thanuskodi 2011). Low use of electronic journals by academics negatively affects their own research activities. This ultimately affects the ranking and integrity of universities (Harle 2010). The correlation between academics' productivity and the use of electronic journals is well-founded in literature through studies conducted in multiple geographical contexts globally (Akpojotor 2016; Ellis & Oldman 2005; Jankowska 2004; Kirlidog & Bayir 2007; Nwezeh 2010; Sivathaasan & Velnampy 2013; Tenopir et al. 2008).

Studies that have attempted to understand the problem of underutilisation of peer-reviewed electronic journals by academics in Zimbabwean universities have paid little attention to demographic factors that need to be appreciated to properly promote these resources. Studies have focussed on Internet usage patterns (Tsvere et al. 2013), adoption and use (Madondo et al. 2017), and the conditions that facilitate adoption and use (Machimbidza & Mutula 2017). None of the studies have sought an in-depth understanding of the role of age as a key demographic factor in the adoption and use of peer-reviewed electronic journals by academics in Zimbabwe. This gap in literature starves university libraries in Zimbabwe of the information they need to practice target promotion of electronic journals. It also undermines efforts to craft policies aimed at improving the use of the resources in the country. This situation is undesirable, especially because it comes against the backdrop of increasing subscription costs (Harle 2010; Machimbidza & Mutula 2019; Shahmohammadi 2012). Justifying costs to university administrators is a difficult task in the face of minimal usage.

The libraries run the risk of having their electronic journals subscription budgets cut. Understanding all the angles of this problem, including age dynamics, is crucial in improving usage and averting impending budget cuts that will undermine the availability and accessibility of information in Zimbabwean universities.

The need to study demographic factors in general and age in particular as a measure to understand the adoption and use of electronic journals in universities is well established in literature. Zhang, Ye and Liu (2011) argued that research on electronic journals and their use by different demographic groups in academic institutions 'establishes an important foundation for selecting and providing effective library holdings and services'. Such a foundation allows for the understanding of the 'variety of users' demands in order to improve the efficiency and value of the utilisation of electronic journals (Zhang et al. 2011). The operating environment of electronic journals must be tailored according to users' demographics (Voorbij & Ongering 2006). This enables libraries to enhance service quality and customer satisfaction. Research on electronic journals, especially understanding the extent of awareness by age, extent of use by age as reflected in the level of adoption of the resources and the number of articles consulted per week, and skills of different age groups to utilise the resources, is of significant theoretical and practical value (Okiki & Asiru 2011; Tyagi 2011; Waldman 2003). Such a study is made all the more necessary by the contrasting narratives emerging from literature on the effect of age on the adoption and use of peer-reviewed electronic journals (Ani 2013; Tenopir et al. 2008).

Purpose of this study

This study investigated the effect of age in the adoption and use of peer-reviewed electronic journals by academics in selected Zimbabwean universities.

Research questions

The research questions (RQ) of this study were as follows:

- **RQ1:** What age differences exist in the awareness of peer-reviewed electronic journals by academics in Zimbabwean universities?
- **RQ2:** To what extent is the use of peer-reviewed electronic journals by academics in Zimbabwean universities affected by age?
- **RQ3:** Are there any age differences in the possession of technological skills needed to negotiate the electronic journals environment?

Literature review

Several researchers have located the debate about age differences in the adoption and use of peer-reviewed electronic journals within the broader context of age differences in the use of Information Communication Technologies (ICTs), in general, and computers, in particular. Early in the life of electronic journals, Rolinson, Meadows

and Smith (1995:135) pointed out that 'it has been part of computer mythology that younger people are happier using computers than older people'. Younger people were more likely to use electronic journals, as the resources are accessed through computers and, more recently, smartphones and tablets. Waldman (2003) studied freshmen students at Baruch College, City University of New York, and found that age was a variable that correlates with comfort with computers and the use of electronic resources. Younger generations have been brought up with computers, whereas older generations may not have had as much exposure, resulting in increased computer anxiety. Tenopir (2003) found in a study at the University of Tennessee, Knoxville, the United States, that younger users were more enthusiastic adopters of digital resources than the older users. Kinengyere (2007) conducted a study in academic and research institutions in Uganda and concluded that the older generation of researchers uses ICTs and e-resources less because most of them have a low level of information technology (IT) literacy. Gamage and Halpin (2007) surveyed the use of ICTs in Sri Lanka and found that most of the users were youths and adults younger than 35 years. Park (2010) opined that younger people learn about technology more easily than older ones. Tyagi (2011) found in a study in India that the ability to use e-resources efficiently depends on basic computer skills, knowledge of what is available and how to use it, and the ability to define a research problem. However, they found that age has an influence on these issues, with younger users displaying more competencies.

Turning specifically to the use of electronic journals, the trend mostly follows that of the use of ICTs and computers. Barllan and Fink (2005) concluded after extensive research in Israel that 'increased age is inversely related to the use of electronic journals'. Tenopir (2003) after an analysis of several user studies noted that younger users use electronic journals more frequently than the older users. Older scholars believed that electronic journals decreased the quality and rigour of research. They also tended to complain more of unfriendly interfaces than the younger users. In a study that spanned institutions in east and southern Africa, Harle (2010) postulated that age does affect the adoption and use of electronic journals. The younger academics showed more enthusiasm when using the resources. Older academics felt more comfortable with print. Gargiulo et al. (2003) surveyed academics in 25 Italian institutions and discovered that a large percentage of the users of electronic journals fell in the 31–40 age range with 30.5% of usage. Around 26.1% of academics younger than 30 years and 25.4% of those in the 41–50 age group used electronic journals. Those aged over 50 years were the lowest at 18.1%. Bar-llan et al. (2003) conducted studies at several Israeli universities and found that academics in their 30s and 40s used electronic journals more frequently than those older than 50 years. For example, 75.4% of academics in their 30s used electronic journals, as did 68% of those in their 40s, while only 4.8% of those older than 50 years used these resources.

The survey by Sivathaasan, Achchuthan and Kajanathan (2013) on demographic variables and the usage of electronic journals among academics in Sri Lanka revealed that there were significant mean differences among age groups. University lecturers younger than 35 years had the highest mean usage, followed by those between 35 and 45 years, while lecturers between the age of 45 and 55 years accounted for the lowest usage. Findings from the one-way ANOVA (*t* test) revealed that usage differed significantly by age group. This finding agrees with that of Monopoli et al. (2002) who found in an online survey of e-journal usage by academics of University of Patras, Greece, that the resources were more frequently used by end-users who were 35 years and younger. Borrego et al. (2007) conducted a study at the universities belonging to the consortium of Catalonian university libraries in Spain and confirmed that age is an explanatory factor in the use of electronic journals. Use was more pronounced in the younger ages. In their study of the use of electronic journals in three countries, Finland, Australia and the United States, Tenopir et al. (2008) found that there was more use of electronic resources by the younger academics than the older ones in the overall results in Australia and the United States. King et al. (2009) studied information-seeking behaviour in US universities and reported that older academic staff were more likely to access and use print than electronic resources in their research; electronic journals were less used among the older academic staff in the universities. Deng (2010) investigated the extent of use of electronic resources in an Australian university among academic staff and students. Results showed that respondents younger than 29 years were the major users of electronic resources (52.4%), followed by those within the range of 30–39 years (21.8%), 40–49 years (12.8%), 50–59 years (11.1%) and those older than 60 years (2%).

Nigeria has more than a fair share of studies addressing the effect of age on the use of electronic journals. Amkpa (2007) conducted a study at the University of Maiduguri and found a significant age difference in the use of computer and electronic journals among undergraduate students. Younger students were more comfortable with technology. Alao and Folorunsho (2008) conducted a study on the use of Internet cybercafé and associated resources in Ilorin and found that the major users were people aged 21–30 years. Okiki and Asiru (2011) conducted a study to determine the factors influencing the use of electronic information sources by postgraduate students in Nigeria. They found significant age differences in the computer task, as measured by older adults, making few correct decisions and taking longer time to make their decisions than younger adults. Quadri (2013) studied the influence of demographic factors on the use of online library resources by undergraduate students in two private universities in Ogun State, Nigeria: Babcock University and Redeemer's University. Results showed that younger users relied on electronic resources more heavily and rated themselves more adept at using them than the older ones. There was a significant relationship between age and the use of electronic resources. Ani (2013) studied two Nigerian universities, University of Ibadan and University of Calabar,

and found no significant influence of age on accessibility and utilisation of electronic resources at the University of Ibadan although descriptive statistics still showed that younger respondents used electronic journals more than the older ones. This study found a significant difference by age at the University of Calabar. Further analysis revealed that respondents younger than 40 years significantly accessed and used e-resources more than those aged 60 years and above. Similar results were obtained between respondents aged 40–59 years and those aged 60 years and above.

While majority studies show age differences in the use of peer-reviewed electronic journals, there are few studies that are of the contrary view. Rogers (2001) conducted a study at the Ohio State University and revealed that there was little or no correlation between age and frequency of use. Bar-Ilan and Fink (2005) studied users at Hebrew University in Jerusalem, Israel, and concluded that more than 80% of the respondents frequently used and preferred an electronic format, irrespective of age. Kurata et al. (2009) conducted a study among Japanese medical researchers and found no significant differences relating to article usage patterns by age groups. Nikkar and Mooghali (2010) conducted a study at Payam-e-Noor University, Iran, and concluded that aged faculty, with more experience, had a higher tendency of electronic journal usage. Zhang et al. (2011) argued that while many studies have shown an inverse relationship between e-journal usage and age, all ages have switched to the use of electronic journals such that impact of age as a usage determinant has dwindled.

Theoretical framework

The impact of age on the adoption and use of peer-reviewed electronic journals evidenced in most of the literature reviewed above is not without theoretical backing. One of the greatest theories to ever emerge on the prediction of user behaviour in the sphere of adoption and use of technology is the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al. 2003). The potency of the theory is recognised internationally not least because it is an amalgamation and synthesis of eight established technology adoption models: Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Diffusion of Innovation (DOI), Social Cognitive Theory (SCT), Motivational Model (MM), Model of Personal Computer Utilisation (MPCU) and Combined Theory of Planned Behaviour/Technology Acceptance Model (TPB/TAM).

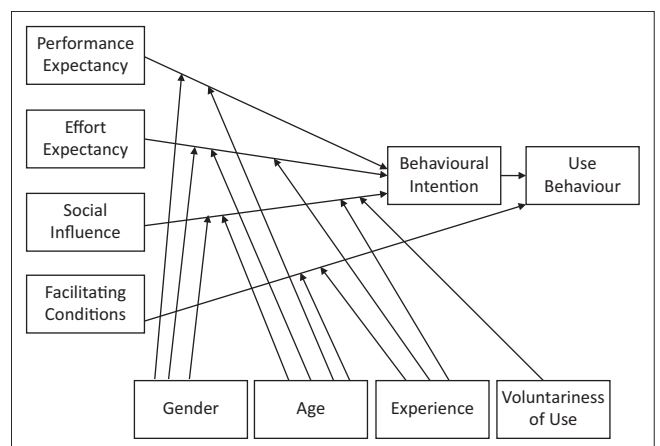
The theory hypothesises that age is one of the moderators that have an effect on the four constructs of the theory: performance expectancy, effort expectancy, social influence and facilitating conditions. Age affects how an individual believes that using the system will enhance job performance (performance expectancy). Age has an effect on the degree of ease associated with the use of the system (effort expectancy). The theory further holds that age affects the degree to which

an individual perceives that important others believe he or she should use the new system (social influence). The theory also holds that age affects the degree to which an individual believes that organisational and technical structure exists to support his or her use of the system (facilitating conditions). A summation of these four effects determines how people of different ages adopt and use a given technology, in this case peer-reviewed electronic journals. The UTAUT is diagrammatically represented in Figure 1.

Research methods and design

This study employed a quantitative approach using a survey research design. Data were collected through structured questionnaires administered to a sample of 363 academics from three universities in Zimbabwe: Bindura University of Science Education (BUSE), National University of Science and Technology (NUST) and Midlands State University (MSU). Apart from the University of Zimbabwe (UZ), which declined to participate in this study, the three are the biggest in terms of the number of academics and students. They are all state universities. This is an important quality in this study, given that state universities are the founding members of ZULC. They have been offering peer-reviewed electronic journals for some time. The three universities were also suitable because they offer a variety of disciplines, a feature which was critical in preventing discipline bias in the results of this study.

The sample size for academics was determined through a sampling framework developed by Bartlett, Kotlik and Higgins (2001). This framework, which assumes a margin of error of 0.05 or 5%, dictates that for a population of 800, the sample size should be 363. The total population of academics in the three universities is 794. This figure was rounded up to 800 so that it fits within the sampling framework. As the respondents came from different universities, the number targeted at each university was decided upon on a proportional basis as follows: the number of academics at each university divided by the



Source: Venkatesh, V., Morris, M.G., Davis, G.B. & Davis, F.D., 2003, 'User acceptance of information technology: Toward a unified view', *MIS Quarterly* 27(3), 425–478, viewed 17 June 2019, from <http://www.jstor.org/stable/30036540>.

FIGURE 1: Unified theory of acceptance and use of technology.

total number of academics in the three universities multiplied by the sample size. This produced sample sizes for the three universities as shown in Table 1.

To ensure reliability and validity of the instrument used to collect data in this study, the researchers adapted questionnaires that were successfully used to investigate the adoption and use of electronic resources in several universities in Africa. The first set of questionnaires was developed by Megersa and Mammo (2008) and used to evaluate the use of electronic journals in nine institutions of higher learning in Ethiopia. The second set was developed by Manda (2008) and used to evaluate the use of electronic journals in 23 research and academic institutions in Tanzania. These questionnaires were consistent and valid. Data were analysed through the Statistical Package for Social Sciences (SPSS) to produce tables. Statistical Package for Social Sciences is recognised as a suitable package for statistical representation of information (Franklin 2013).

Ethical consideration

Ethical clearance was sought from the University of KwaZulu-Natal's Humanities and Social Sciences Research Ethics Committee. Full approval was granted (protocol reference number HSS/0201/012D). Clearance to conduct studies in the participating universities was sought from their registrars, and permission was granted. Study participants were shown the permission letters, including a letter explaining the purpose of this study. They also signed the informed consent form before participation.

Results and discussion

Response rate

A total of 212 questionnaires were completed and returned from the 363 that were distributed. This gives a response rate of 58.4%, which was considered adequate for the purposes of this study. The age distribution of the respondents is shown in Table 2.

Academics in the 31–40 years age range made up the largest number of respondents at 44.3%, whereas those of 61 years and above constituted the least at 1%.

TABLE 1: Sample sizes for the three universities.

Variable	BUSE	NUST	MSU	Total
Population	180	302	312	794
Sample size	82	138	143	363

BUSE, Bindura University of Science Education; NUST, National University of Science and Technology; MSU, Midlands State University.

TABLE 2: Age distribution of respondents.

Age range	Frequency	%
30 years and below	27	12.7
31–40 years	94	44.3
41–50 years	64	30.2
51–60 years	25	11.8
61 years and above	2	1.0
Total	212	100

Age differences in the awareness of peer-reviewed electronic journals

Results reveal that the majority of academics were aware of the existence of peer-reviewed electronic journals in their institutions. Of the 212 academics who participated in this study, 204 (96.2%) indicated that they were aware of the existence of electronic journals, whereas 8 (3.8%) indicated that they were not aware. Although descriptive statistics show slight variations in awareness by age as shown in Table 3, all ages generally have a high awareness of peer-reviewed electronic journals.

In all the age ranges, except the 61 years and above age group, more than 90% of their academics were aware of the existence of electronic journals. The percentage awareness of the 61 years and above group could have been negatively affected by the fact that only two of them responded to this study.

The high levels of awareness of peer-reviewed electronic journals across all ages established by this study are contrary to the findings of Tenopir (2003), Nwagwu, Adekannibi and Bello (2009) and Harle (2010), who found poor awareness in the institutions they studied. The results are, however, consistent with the views of Tenopir (2003), who asserted that awareness grows with time such that its effect on use decreases the longer the resources are offered. This is confirmed by studies by Tyagi (2011) and Ani (2013), who found high levels of awareness in the institutions they studied.

This study also went further to determine the depth or extent of awareness. This question only applied to the 204 academics who had indicated awareness of electronic journals. The measures of depth or extent of awareness were determined by the number of electronic databases (electronic databases house electronic journals) and the number of electronic journals academics were aware of.

Only 84 (41.2%) knew between five and 10 databases. The rest (120 or 58.8%) knew between one and four. None indicated knowing more than 10 databases. This is against the backdrop of more than 200 databases that Zimbabwean universities have access to. Of the 84 who knew between five and 10 databases, the 30 years and below age group had the highest ratio (18 of 26 or 69.2%), followed by the 31–40 years group with 41 of 91 (45.1%), followed by the 41–50 age group with 22 of 63 (34.9%), followed by the 51–60 age group with three of 23 (13%). The one academic in the 61 and above age group knew less than five databases.

TABLE 3: General awareness by age range.

Age range	Number of respondents in category	Number of academics aware	General awareness (%)
30 years and below	27	26	96.3
31–40 years	94	91	96.8
41–50 years	64	63	98.4
51–60 years	25	23	92.0
61 years and above	2	1	50.0
Total	212	204	-

Only 45 of the 204 (22.1%) academics knew between five and 10 specific electronic journals. The rest (159 or 77.9%) knew between one and four. None indicated knowing more than 10 specific electronic journals. There are thousands of electronic journals housed in the more than 200 databases that Zimbabwean universities have access to. This shows that virtually all age groups had poor knowledge of specific journals. However, age trends generally followed that of databases cited above, where awareness decreased as age increased. Studies by Amkpa (2007), King et al. (2009) and Deng (2010) confirmed that academics have unsatisfactory in-depth knowledge of electronic journals at their disposal. The same studies also found that younger users displayed more in-depth knowledge than the older academics.

Extent to which the use of peer-reviewed electronic journals by academics is affected by age

Of the 212 academics who responded to this study, 193 (91%) indicated that they had adopted the use of electronic journals. Nineteen academics (9%) did not use electronic journals at all. The figure of non-users includes the eight (3.8%) who reported not being aware of the resources. Twenty-six of 27 respondents (96.3%) in the 30 years and below age category used the resources, as did 88 of 94 respondents (93.6%) in the 31–40 years age group, 58 of 64 respondents (90.6%) in the 41–50 age group, 20 of 25 respondents (80%) in the 51–60 years age group and one of two (50%) in the 61 years and above age category. The pattern that emerges from these statistics is that the percentage number of users per category decreases as the age ranges increase.

The results on adoption of electronic journals are in tandem with the expectations of the UTAUT theory that underpins this study. The theory hypothesises that age is a factor in the adoption and use of technology (Venkatesh et al. 2003). While this study did not go as far as measuring statistical significance, the descriptive results show a pattern where the level of adoption decreases with an increase in age. These results were also confirmed by researchers such as Waldman (2003), Tenopir (2003), Kinengyere (2007), Gamage and Halpin (2007) and Park (2010).

This study also considered the number of articles consulted per week by each of the age categories from the 193 academics who reported using electronic journals. Use was classified into three categories: low (one to 10 articles per week), average (11–20 articles per week) and high (21 articles and above per week). Table 4 shows the age differences in usage of electronic journals by academics.

While results cited earlier on the number of academics who have adopted the use of electronic journals revealed a pattern where the number of users decreased as the ages increased, Table 4 suggests that younger academics were actually low users of the resources. The statistics suggest that a number of young academics use electronic journals; however, they use them sparingly. Fewer academics in the

TABLE 4: Level of use of electronic journals by academics' age based on the number of articles consulted per week.

Age range	Low		Average		High		Total	
	n	%	n	%	n	%	n	%
30 years and below	14	53.8	8	30.8	4	15.4	26	100
31–40 years	26	29.6	42	47.7	20	22.7	88	100
41–50 years	14	24.2	22	37.9	22	37.9	58	100
51–60 years	5	25.0	13	65.0	2	10.0	20	100
61 years and above	0	0	1	100	0	0	1	100
Total	59	-	86	-	48	-	193	-

older ages use electronic journals, but those who use do so in a significant way. An analysis of Table 4 reveals that 53.8% of academics in the 30 years and below age category are low users, as are 29.6% of those aged 31–40 years, 24.2% of academics in the 41–50 years age category and 25% of those aged 51–60 years, respectively. The age group with the highest number of high users is the 41–50 years category at 37.9%, followed by 31–40 age group (22.7%), 30 years and below age group (15.4%) and 51–60 years age group (10%). The lone user in the 60 years and above category is an average user. Most academics in the 31–40 and 51–60 age groups fall in the average users' category.

Contrary to the findings of this study, past research has found that younger academics use electronic journals more heavily, accessing more articles than older academics (Borrego et al. 2007; King et al. 2009; Quadri 2013; Tenopir et al. 2008). Another school of thought points to neutrality in usage by age. Kurata et al. (2009) and Zhang et al. (2011) argued that given the time that has passed since the introduction of electronic journals, the impact of age as a usage determinant has dwindled. The findings of this study are in line with a third view that holds that the older academics use electronic journals more heavily, accessing more articles than the younger academics. Nikkar and Mooghali (2010) conducted a study in Iran and found that the more experienced and publishing-oriented older academics were heavier users of electronic journals.

Age differences in the possession of technological skills needed to negotiate the electronic journals environment

The third RQ sought to establish if there were age differences among academics in Zimbabwean universities in the possession of technological skills needed to negotiate the electronic journals environment. Academics' responses are shown in Table 5.

The results provided in Table 5 show that most academics perceived that they had low to average skills. Of the 193 users, 31 indicated low skills and 86 indicated average skills. This means that 60.6% of academics possess low to average skills, with only 39.4% (76) reporting high skills. Results also show that the younger the age the higher the skills. About 65.4% of academics in the 30 years and below category reported high skills, as did 43.2% of academics in the 31–40 years age group, 32.8% of academics in the 41–50

TABLE 5: Level of skills of academics in the use of electronic journals.

Age range	Low		Average		High		Total	
	n	%	n	%	n	%	n	%
30 years and below	3	11.5	6	23.1	17	65.4	26	100
31–40 years	15	17.0	35	39.8	38	43.2	88	100
41–50 years	7	12.0	32	55.2	19	32.8	58	100
51–60 years	5	25.0	13	65.0	2	10.0	20	100
61 years and above	1	100	0	0	0	0	1	100
Total	31	-	86	-	76	-	193	-

years age group and 10% of those in the 51–60 years age group, respectively. Many of the academics older than 30 years reported average skills. There are also a sizeable number of academics aged over 30 years who demonstrated low skills. Results of this study are consistent with the running theme in literature that younger users possess higher skills in technology use than the older academics. The UTAUT theory asserts that age influences the 'effort expectancy' of the user (Venkatesh et al. 2003). Researchers such as Waldman (2003), Tenopir (2003), Kinengyere (2007), Park (2010), Harle (2010) and Tyagi (2011) have all pointed to younger users having more technological skills than the older users.

Conclusion

The majority of academics across all age groups were aware of the existence of peer-reviewed electronic journals in their institutions. The academics, however, knew very few databases and specific electronic journals. Academics aged 30 years and below knew more databases and journals than their older counterparts. This suggests that while university libraries in Zimbabwe still need to inculcate in-depth awareness of the resources to increase usage, they have to be sensitive to age differences in their efforts. Many of the academics in Zimbabwe have adopted the use of electronic journals; however, there remain differences in the adoption rate by age. The rate of adoption decreases as age increases. This gives a signal to librarians to work more to assist the older academics in their quest to improve usage. This study also reveals that having a higher adoption rate does not necessarily mean more active usage of the resources. The older generation accessed more articles per week than the younger generation of academics in spite the latter having higher adoption rates. Librarians have to work hard to get the younger academics to use the resources to their full potential. This study shows that the majority of academics have low to average technological skills. However, the younger generation of academics possesses higher skills than the older academics. This information is useful for librarians, as they organise training and retraining sessions for academics to increase their confidence in negotiating the electronic journals environment. Overall, this study concludes that there are specific age-related differences in terms on in-depth awareness of electronic journals, usage and possession of technological skills that librarians have to take into account in their provision of these resources.

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Competing interests

The authors have declared that no competing interest exists.

Authors' contributions

T.M. carried out the research as part of a broader PhD study. S.M. supervised the research.

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Data availability statement

Statistical Package for Social Sciences data are available on request.

Disclaimer

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References

- Abinew, A.A. & Vuda, S., 2013, 'A case study of acceptance and use of electronic library services in universities based on SO-UTAUT model', *International Journal of Innovative Research in Computer and Communication Engineering* 1(4), 903–910, viewed 25 May 2019, from http://ijirce.com/upload/2013/june/17_A%20Case%20Study.pdf.
- Akpojotor, L.O., 2016, 'Awareness and usage of electronic information resources among postgraduate students of Library and Information Science in southern Nigeria', *Library Philosophy and Practice* 1–23, viewed 21 May 2019, from <https://digitalcommons.unl.edu/libphilprac/1408/>.
- Alao, I.A. & Folorunsho, A.L., 2008, 'The use of cybercafes in Ilorin, Nigeria', *The Electronic Library* 26(2), 238–248, viewed 11 May 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/02640470810864127>.
- Amkpa, S.A., 2007, 'Gender and age differences in computer use and attitudes among students of University of Maiduguri, Nigeria', *The Information Technologist* 4(1), 60–67, viewed 11 May 2019, from <https://www.ajol.info/index.php/ict/article/view/31975>.
- Ani, O.E., 2013, 'Accessibility and utilisation of electronic information resources for research and its effect on productivity of academic staff in selected Nigerian universities between 2005 and 2012', PhD thesis, Department of Information Science, University of South Africa, Pretoria.
- Bar-Ilan, J. & Fink, N., 2005, 'Preference for electronic format of scientific journals: A case study of the science library users at the Hebrew University', *Library & Information Science Research* 27, 363–376, viewed 14 April 2019, from <https://reader.elsevier.com/reader/sd/pii/S0740818805000368?token=424B35D5F9C9628116571126FBE76DB6579B11CE6AF5A048522229FACD13D3F013D89255EE3D3F6E52B5C2C4BF302F64>.
- Bar-Ilan, J., Peritz, B.C. & Wolman, Y., 2003, 'A survey on the use of electronic databases and electronic journals accessed through the web by the academic staff of Israeli Universities', *Journal of Academic Librarianship* 29(6), 346–361, viewed 10 April 2019, from <https://www.sciencedirect.com/science/article/pii/S0099133303000909>.
- Bartlett, J.E., Kotrik, J.W. & Higgins, C.C., 2001, 'Organisational research: Determining appropriate sample size in survey research', *Information Technology, Learning, and Performance Journal* 19(1), 43–50, viewed 14 May 2019, from <https://www.opalco.com/wp-content/uploads/2014/10/Reading-Sample-Size1.pdf>.
- Borrego, A., Anglada, L., Barrios, M. & Comellas, N., 2007, 'Use and users of electronic journals at Catalan universities: The results of a survey', *The Journal of Academic Librarianship* 33(1), 67–75, viewed 09 April 2019, from <https://reader.elsevier.com/reader/sd/pii/S0099133306001613?token=E7B415B48E5F3ECA9B62DCTAD6B3172E764089179C13F45CBA60618060E2B07E775802A4724B2568AF6D406F211830>.

- Deng, H., 2010, 'Emerging patterns and trends in utilising electronic resources in a higher education environment: An empirical analysis', *New Library World* 11(3/4), 87–103, viewed 15 May 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/03074801011027600>.
- Dilek-Kayaoglu, H., 2008, 'Use of electronic journals by faculty at Istanbul University, Turkey: The results of a survey', *Journal of Academic Librarianship* 34(3), 239–247, viewed 19 May 2019, from <https://www.sciencedirect.com/science/article/pii/S0099133308000396>.
- Ellis, D. & Oldman, H., 2005, 'The English Literature researcher in the age of the Internet', *Journal of Information Science* 31(1), 29–36, viewed 14 May 2019, from <https://journals.sagepub.com/doi/pdf/10.1177/0165551505049256>.
- Franklin, M.I., 2013, *Understanding research: Coping with quantitative-qualitative divide*, Routledge Publishers, London.
- Gamage, P. & Halpin, E.F., 2007, 'E-Sri Lanka: Bridging the digital divide', *The Electronic Library* 25(6), 693–710, viewed 17 May 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/02640470710837128>.
- Gargiulo, P., Conti, C., Contino, U., Farinelli, P. & Marquardt, L., 2003, 'Digital libraries and users: An Italian experience. Changes in academic users' attitudes, perceptions and usage of study and research tools in a hybrid context', viewed 07 April 2019, from https://www.academia.edu/721630/Digital_libraries_and_users_an_Italian_experience._Changes_in_academic_users_attitudes_perceptions_and_usage_of_study_and_research_tools_in_a_hybrid_context.
- Harle, J., 2010, *Growing knowledge: Access to research in east and southern African universities*, The Association of Commonwealth Universities, viewed 17 March 2019, from <https://www.acu.ac.uk/focus-areas/arcadia-growing-knowledge>.
- Jankowska, M.A., 2004, 'Identifying university professors' information needs in the challenging environment of information and communication technologies', *The Journal of Academic Librarianship* 30(1), 51–66, viewed 12 April 2019, from <https://www.sciencedirect.com/science/article/pii/S009913330300140X>.
- Khan, A.M. & Ahmad, N., 2009, 'Use of e-journals by research scholars at Aligarh Muslim University and Banaras Hindu University', *The Electronic Library* 27(4), 708–717, viewed 14 April 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/02640470910979642>.
- Kinengyere, A.A., 2007, 'The effect of information literacy on the utilisation of electronic information resources in selected academic and research institutions in Uganda', *The Electronic Library* 25(3), 328–341, viewed 25 May 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/02640470710754832>.
- King, D.W., Tenopir, C., Choemprayong, S. & Wu, L., 2009, 'Scholarly journal information-seeking and reading patterns of faculty at five US universities', *Learned Publishing* 22(2), 126–144, viewed 06 March 2019, from <https://onlinelibrary.wiley.com/doi/epdf/10.1087/2009208>.
- Kirlidog, M. & Bayir, D., 2007, 'The effects of electronic access to scientific literature in the Consortium of Turkish University Libraries', *The Electronic Library* 25(1), 102–113, viewed 05 May 2019, from <https://www.emerald.com/insight/content/doi/10.1108/02640470710729155/full/html?fullSc=1&mbSc=1>.
- Kurata, K., Mine, S., Morioka, T., Sakai, Y., Kato, S. & Ueda, S., 2009, 'Reading and information seeking behavior of Japanese medical researchers in the era of the electronic journal and open access', *Library and Information Science* 61, 59–90, viewed 17 May 2019, from <https://keio.pure.elsevier.com/ja/publications/reading-and-information-seeking-behavior-of-japanese-medical-rese>.
- Machimbidza, T. & Mutula, S., 2017, 'Factors influencing the behaviour of academics towards peer-reviewed electronic journals in Zimbabwean state universities', *South African Journal of Libraries and Information Science* 83(2), 42–51, viewed 27 May 2019, from <http://sajlis.journals.ac.za/pub/article/view/1688/1481>.
- Machimbidza, T. & Mutula, S., 2019, 'Exploring experiences of librarians in Zimbabwean state universities with the consortium model of subscribing to electronic journals', *Information Development* 1–15, viewed 29 May 2019, from <https://journals.sagepub.com/doi/abs/10.1177/0266666919834055>.
- Madondo, T., Sithole, N. & Chisita, C.T., 2017, 'Use of electronic information resources by undergraduate students in the Faculty of Management and Administration at Africa University, Mutare, Zimbabwe', *Asian Research Journal of Arts and Social Sciences* 2(2), 1–12, viewed 23 March 2019, from http://www.journalrepository.org/media/journals/ARJASS_45/2017/Feb/Sithole222016ARJASS29633.pdf.
- Manda, P.A., 2008, 'Access to electronic library resources and services in academic and research institutions in Tanzania', in D. Rosenberg (ed.), *Evaluating electronic resource programmes and provision: INASP research and education case studies no. 3*, pp. 33–51, INASP, Oxford.
- Megersa, A. & Mammo, W., 2008, 'Evaluation of the use of PERI resources in academic institutions in Ethiopia', in D. Rosenberg (ed.), *Evaluating electronic resource programmes and provision: INASP research and education case studies no. 3*, pp. 63–78, International Network for the Availability of Scientific Publications (INASP), Oxford.
- Min, S. & Yang, Y., 2010, 'E-resources services and user surveys in Tsinghua University Library', *Program: Electronic Library and Information Systems* 44(4), 314–327, viewed 26 May 2019, from <https://www.emerald.com/insight/content/doi/10.1108/00330331011083211/full/html>.
- Monopoli, M., Nicholas, D., Georgiou, P. & Korfitai, M., 2002, 'A user-oriented evaluation of digital libraries: Case study of electronic journals service of the library and information service of the University of Patras, Greece', *ASLIB Proceedings* 54(2), 103–117, viewed 09 April 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/00012530210435239>.
- Nikkar, M. & Mooghali, A.R., 2010, 'Investigating the electronic journals' status in comparison with printed journals among the faculty members of Payam-e-Noor University: A study', *International Journal of Information Science and Management* 8(1), 83–105, viewed 15 June 2019, from <http://ijism.ricest.ac.ir/index.php/ijism/article/viewFile/33/41>.
- Nwagwu, E.W., Adekannbi, J. & Bello, O., 2009, 'Factors influencing use of the Internet: A questionnaire survey of the students of University of Ibadan, Nigeria', *The Electronic Library* 27(4), 718–734, viewed 13 May 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/02640470910979651>.
- Nwezeh, C.M., 2010, 'The impact of Internet use on teaching, learning and research activities in Nigerian universities: A case study of Obafemi Awolowo University', *The Electronic Library* 28(5), 688–701, viewed 11 May 2019, from <https://www.emerald.com/insight/content/doi/10.1108/02640471011081960/full/pdf?title=the-impact-of-internet-use-on-teaching-learning-and-research-activities-in-nigerian-universities-a-case-study-of-obafemi-awolowo-university>.
- Okiki, O.C. & Asiru, S.M., 2011, 'Use of electronic information sources by postgraduate students in Nigeria: Influencing factors', *Library Philosophy and Practice* 4–6, viewed 20 February 2019, from <https://digitalcommons.unl.edu/libphilprac/500/>.
- Park, J., 2010, 'Differences among university students and faculties in social networking site perception and use: Implications for academic library services', *The Electronic Library* 28(3), 417–431, viewed 12 June 2019, from <https://www.emeraldinsight.com/doi/pdfplus/10.1108/02640471011051990>.
- Quadri, G.O., 2013, 'Influence of demographic factors on use of online library resources by undergraduate students in two private Nigerian university libraries', *Library Philosophy and Practice* 1–14, viewed 28 May 2019, from <https://digitalcommons.unl.edu/libphilprac/976/>.
- Rogers, S.A., 2001, 'Electronic journal usage at Ohio State University', *College and Research Libraries* 62(1), 25–34, viewed 18 May 2019, from <https://crli.acl.org/index.php/crl/article/view/15418/16864>.
- Rolinson, T., Meadows, A.J. & Smith, H., 1995, 'Use of information technology by biological researchers', *Journal of Information Science* 21(2), 133–139. <https://doi.org/10.1177/016555159502100207>
- Shahmohammadi, N., 2012, 'Online electronic journals use among university academic faculty members of Islamic Azad University, Karaj Branch', *Asian Journal of Natural and Applied Sciences* 1(1), 26–32, viewed 28 March 2019, from [http://www.ajsc.leena-luna.co.jp/AJSCPDFS/Vol.1\(1\)/AJSC2012\(1.1-03\).pdf](http://www.ajsc.leena-luna.co.jp/AJSCPDFS/Vol.1(1)/AJSC2012(1.1-03).pdf).
- Sivathaasan, N., Achchuthan, S. & Kajanathan, R., 2013, 'Demographic variables of university teachers and usage of electronic information resources: A case in Sri Lanka', *International Journal of Business and Management* 8(19), 90–98, viewed 10 May 2019, from <http://www.ccsenet.org/journal/index.php/ijbm/article/view/28807/18021>.
- Sivathaasan, N. & Velnamby, T., 2013, 'Use of electronic information resources and academic performance of university teachers: A case study', *European Journal of Business and Management* 5(14), 46–52, viewed 10 May 2019, from https://www.researchgate.net/profile/Thirunavukkarasu_Velnamby/publication/253233550_Use_of_Electronic_Information_Resources_and_Academic_Performance_of_University_Teachers_A_case_study_links/0deec51f6355cbf55b000000/Use-of-Electronic-Information-Resources-and-Academic-Performance-of-University-Teachers-A-case-study.pdf.
- Tenopir, C., 2003, 'Use and users of electronic library resources: An overview and analysis of recent research studies', *Council on Library and Information Resources*, viewed 10 February 2019, from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.120.3442&rep=rep1&type=pdf>.
- Tenopir, C., Wilson, C.S., Vekkari, P., Talja, S. & King, D.W., 2008, 'Scholarly e-reading patterns in Australia, Finland, and the United States: A cross country comparison', in *World Library and Information Congress: 74th IFLA General Conference and Council*, Quebec, Canada, August 10–14, pp. 1–16, viewed 13 April 2019, from http://origin-archiv.ifa.org/IV/ifla74/papers/160-Tenopir_Wilson_Vakkari_Talja_King-en.pdf.
- Thanuskodi, S., 2011, 'User awareness and use of e-journals among education faculty members in Chennai: A survey', *International Research: Journal of Library and Information Science* 1(1), 1–13, viewed 18 March 2019, from <http://irjlis.com/wp-content/uploads/2011/11/IR006.pdf>.
- Tsvere, M., Nyaruwata, T.L. & Swamy, M., 2013, 'Internet usage by university academics: Implications for the 21st century teaching and learning', *International Journal of Science and Research* 2(9), 19–25, viewed 22 March 2019, from <https://www.ijsr.net/archive/v2i9/MjgwODEZMDE=.pdf>.
- Tyagi, S., 2011, 'Use and awareness of electronic information sources at IIT Roorkee, India: A case study', *Italian Journal of Library, Archives and Information Science* 2(1), 1–22, viewed 11 April 2019, from <https://www.ijlis.it/article/view/4586/4482>.
- Venkatesh, V., Morris, M.G., Davis, G.B. & Davis, F.D., 2003, 'User acceptance of information technology: Toward a unified view', *MIS Quarterly* 27(3), 425–478, viewed 17 June 2019, from <http://www.jstor.org/stable/30036540>.
- Voorbij, H. & Ongering, H., 2006, 'The use of electronic journals by Dutch researchers: A descriptive and exploratory study', *Journal of Academic Librarianship* 32(3), 223–237, viewed 21 February 2019, from <https://www.sciencedirect.com/science/article/pii/S0099133306000358>.
- Waldman, M., 2003, 'Freshmen's use of library electronic resources and self-efficacy', *Information Research* 8(2), 1–26, viewed 24 May 2019, from https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1051&context=bb_pubs.
- Zainab, A.N., Huzaimah, A.R. & Ang, T.F., 2006, 'Using journal use study feedback to improve accessibility', *The Electronic Library* 25(5), 558–574, viewed 16 April 2019, from <https://www.emerald.com/insight/content/doi/10.1108/02640470710829541/full/pdf?title=using-journal-use-study-feedback-to-improve-accessibility>.
- Zhang, L., Ye, P. & Liu, Q., 2011, 'A survey of the use of electronic resources at seven universities in Wuhan, China', *Program* 45(1), 67–77, viewed 16 June 2019, from <https://www.emeraldinsight.com/doi/full/10.1108/00330331111107402>.
- Zimbabwe University Libraries Consortium (ZULC), 2018, 'Zimbabwe University Libraries Consortium: Brief history and current status', viewed 27 March 2019, from http://zulc.ac.zw/?page_id=12.