



# Electronic library resource use by postgraduate students at a university of technology in South Africa



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**Background:** A university of technology in South Africa provides different kinds of e-library resources to its users. Not much is known about the use of these e-library resources by postgraduate students. The existing literature focuses mostly on using e-library resources by all university students and do not specifically emphasise postgraduate students. Therefore, there is a need for a study to investigate the use of e-library resources by postgraduate students.

**Objective:** The study aimed to investigate the use patterns and the factors influencing the use of e-library resources by postgraduate students of a university of technology in South Africa.

**Method:** The unified theory of acceptance and use of technology (UTAUT) model was used to conceptualise the study. A quantitative approach was used with a descriptive survey research method. Questionnaires were designed and distributed through email using survey monkey.

**Results:** Facilitating conditions (FCs) directly influence postgraduate students' intention to use e-library resources and age moderates the influence of facilitating conditions on e-library resource use. Mediated by behavioural intention (BI), e-library resource use is influenced by performance expectancy (PE), by effort expectancy (EE) and by social influence (SI).

**Conclusion:** The UTAUT model was used to determine the use patterns and the factors influencing the use of e-library resources by postgraduate students of a university of technology in South Africa.

**Contribution:** The literature has underemphasised the need to investigate the influence of postgraduate students in South African universities using e-library resources. Therefore, the study results are expected to fill that gap.

**Keywords:** e-library resources; university libraries; e-resource usage; UTAUT; postgraduate students; information literacy.

## Introduction

The vital function that libraries play in finding, keeping, retrieving and transmitting current and pertinent information makes them relevant in every human culture. Prior to the development of information and communication technology (ICT), libraries solely kept and preserved physical collections, as there was no other way to obtain information (Norch & Adzakpa 2022). Previous studies by Hsu et al. (2017) reveal that e-library resources altered how people use and retrieve information. Access to information now easily takes place in many forms via Internet-connected devices. This access enables users to access information in any database at any time using their devices. Hasty improvements through information technology have adapted libraries from physical and paper formats to digital and virtual bibliographic databases. University libraries took advantage of the advancements in information digitisation and communication technologies (Kalema & Mogase 2017). Technology in the contemporary information environment is an essential driver of the quality and efficiency of a library (Izuagbe et al. 2019). According to Anyim (2018), e-library resources are resources available in an electronic format over the Internet so that users can access the library remotely. E-library resources are updated regularly to keep the information appropriate to use. Therefore, users can access information from the library, Internet cafés, homes, residences, workplaces and so forth at all times of the day. There are many types of e-library resources to which universities subscribe, such as e-journals, e-data archives, e-manuscripts, e-maps, e-books, e-magazines, e-theses and dissertations, e-newspapers, e-research reports and e-bibliographic content (Moyo 2017).

E-library resources are systems in the libraries that are designed to fulfil the information needs of library users. Therefore, the university must determine whether students are familiar with

e-library resources and make effective use of these resources (Omotaya & Haliru 2020). Improving access to e-library resources seems to be important and therefore the lack of access has become a significant concern mostly among student users. Hence, university libraries must be significantly transformed to deliver this technology efficiently to students and staff (Al-Khateeb 2021; Mawere & Sai 2018). This study is motivated by a desire to improve e-library resource accessibility in remote areas. Previous initiatives have provided the essential networked infrastructure that allows universities worldwide to access databases for free or at discounted rates and access e-journals through programmes such as EBSCOhost (Patel & Darbar 2017).

The unified theory of acceptance and use of technology (UTAUT) model is adopted in this study to determine the degree to which e-library resources are used and accepted by postgraduate students at a university of technology in South Africa. The UTAUT model consists of four constructs, which are performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating condition (FC) (Venkatesh et al. 2003). These four factors of the UTAUT model are aspects that determine the behavioural intentions (BIs) and use of e-library resources. The UTAUT model also has four moderators, namely age, gender, experience and voluntariness of use. Of the four moderators, this study adopted age and gender and added faculty and level of study. The UTAUT model was found to be dependable because it is able to interpret a high proportion of the inconsistency in use intention (Abdullah 2022).

## Goal and objectives of the study

This study aimed to investigate the use of e-library resources by postgraduate students in the context of a South African university. The objectives of the study are:

- To determine the use patterns of e-library resources by postgraduate students of a university of technology in South Africa.
- To ascertain the factors influencing the use of e-library resources by postgraduate students of a university of technology in South Africa.

## Problem statement

As mentioned in the introduction of this study, it was observed that there is a high need for e-library resource use, particularly by postgraduate students. Students are reluctant to use the resources. Therefore, this article includes the resource-use determinants in a research problem for this study and seeks to find out:

- What aspects determine the use of e-library resources by postgraduate students?

The use of e-library resources must be revisited to examine the factors that hinder use (Tella et al. 2018). Therefore, it is imperative to mention that the use of e-library resources

depends on students' acceptance and adoption of technology.

The existing literature focuses mostly on using e-library resources by all university students. The studies do not specifically emphasise postgraduate students. Therefore, there is a gap to investigate the use of e-library resources and to determine the factors influencing the use of e-library resources by postgraduate students. University libraries invest in purchasing and subscribing to e-library resources that will cater for the information needs of students. However, the libraries have been concerned that many of these e-library resources were underutilised. Dolo-Ndlwana (2013) states that a large sum of money is spent purchasing e-library resources. Therefore, it is significant to determine about their use. It is crucial to determine and understand the extent of use of the available databases, as the cost of e-library resources should be justified by this use. (Gumede, 2021) mentioned that:

[A]s Durban University of Technology (DUT) librarians, we are of the opinion that expensive resources invested in by DUT are underutilised. For instance, the study of Gumede concluded that students still like using generic search engines like Google and YouTube over paid electronic databases. (p. 6)

## Literature review

### E-library resources

Osinulu (2020) defines e-library resources as an electronic version of print formats, which forms a key part of the library collection in the digital era. These e-library resources require computer interface access, such as a desktop, laptop, iPad or smartphone, for learning, studying and researching. E-library resources are databases with online resources such as e-journals, e-books, e-newspapers, e-magazines, e-research reports, e-theses, e-dissertations, and e-lecture notes, among others (Odili et al. 2020). Current awareness services and online public access catalogues (OPACs) are provided by university libraries to their user communities using the Internet through various hardware configurations (Onoh, Ihekwoaba & Ali 2022). According to Abdullah (2022), e-library resources are online library services that libraries provide through the use of the Internet.

Ankrah and Atuase (2018) are of the view that e-library resources offer academic researcher with electronic access to scholarly information sources. Therefore, university e-library resources play a vital role in supporting research in universities by providing a wide array of information resources, which are researchable, accessible and retrievable. E-library resources enable users to refer to any electronic published articles or books from their dwelling, workplace or institution through the Internet. Abdullah (2022), for example, uses the term 'e-library resources' in his study as 'e-library services' to emphasise user access to electronic resources via the Internet. The use of e-library resources enables users to access information globally with less restriction, which was difficult in the past (Omeluzor et al.

2022). E-library resources permit university libraries to go beyond physical presence to allow access to information in remote servers (Samrgandi 2020). It has been stated by Anyim (2018) that in a university, postgraduate students are typically involved in research activities; therefore, the provision of e-library resources becomes vital considering the fact that the resources contain updated information. Omotayo and Haliru (2020) comment that e-library resources have a positive effect as information is made available, accessible and usable. This important fact enables the library staff to provide better service to their users. For instance, users can search information in any location, with no limit on library hours and they can download, print and e-mail articles to themselves. Information is available 24 h a day, therefore users are able to work independently according to their time setting and wherever they feel comfortable (Tripathi, Sonkar & Rajbanshi 2020). Omeluzor et al. (2022) state that e-library resources are currently becoming more significant, accurate and accessible anywhere, crossing all geographical boundaries. Anyim (2018), similarly, finds that the swift publication, availability and accessibility of information on the desktop are crucial benefits attracting researchers. Gumede (2021) mentions that the advantages brought by e-library resources have imposed that most university libraries should move to provide access to electronic resources for learning and research purposes. The next section discusses about the advantages of e-library resources.

### Advantages of e-library resources

- **Easy-to-use:** Readable, affordable and accessible and searchable. The benefits of e-library resources as compared with print media.
- **Multi-access:** Offers 24/7 multi-access at concurrent points in time to multiple users with no geographical boundaries.
- **Quickness:** E-library resources are much quicker to browse and search information, assimilate the browsed information into other sources and reference dissimilar publications.
- **Functionality:** E-library resource allows the users to approach the publications to analyse screen content in new ways with the click of a mouse. The functionality also gives a hint that will allow the user to pick some relevant information for the search.
- **Content:** The e-library resources mostly contain a large amount of information (Abubakar & Adetmirin 2016; Jayakanathan & Jeyaraj 2019; Lata 2015; Tripathi et al. 2020).

### Theoretical framework

The UTAUT model was formulated by Venkatesh et al. (2003) when exploring user acceptance of information technology. After observing the insufficiency of individual theories in the research study of information technology acceptance, some eight models were combined, forming the new, unified model. This UTAUT model was then formulated to unify more than a few competing models, such as the technology

acceptance model (TAM) (Davis 1989), theory of reasoned action (TRA) (Fishbein & Ajzen 1974), and theory of planned behaviour (TPB) (Ajzen 1991) to explain the acceptance of technology within organisations. Dillon and Morris (1996) define user acceptance of information technology as 'the willingness of an individual or group of people within an institution to use information technology for the duty intended to support the organisation'. The UTAUT enlightens researchers on user BI to use information systems and successive use behaviours (Venkatesh et al. 2003).

The UTAUT model was developed to explain an individual's acceptance and use behaviour for new technology in an organisational context. This model was 70% accurate when predicting BI to use a system. The UTAUT model consists of four main factors, which are PE, EE, SI and FCs. The UTAUT model also consists of four moderating factors: age, gender, experience and voluntariness (Venkatesh et al. 2003).

This study adopted the UTAUT model because it is believed to be more vigorous than other TAMs in assessing and predicting technology acceptance (Venkatesh & Zhang 2010). Various empirical studies have been conducted using UTAUT since its inception. This study explores an integrated model that will provide online service quality aimed at university library e-resources, confirming the influence and predictive fitness.

Recently, the UTAUT model was required to be broader. The model is no longer limited to the discussion of the use of information systems, such as Internet banking adoption (Rahi et al. 2021) and technology adoption (Dwivedi et al. 2019). It is for this reason that this study adopted the UTAUT model as the underpinning conceptual framework.

Unified theory of acceptance and use of technology has been successfully used in many studies, which investigated the adoption and use of ICTs, particularly e-library resources. The UTAUT was employed by studies and approaches of both quantitative and qualitative methods (Bwalya & Ssebale 2017; Jayakanathan & Jeyaraj 2019; Sejane 2017). Figure 1 illustrates the hypothesis that was investigated in the study.

The research model in Figure 1 identified the following external factors adapted from the UTAUT model: PE, EE, SIs and FCs, all of which were anticipated to have a significantly positive relationship with BI to use e-library resources. The study employed this UTAUT external factors to determine the use patterns and the factors influencing the use of e-library resources by postgraduate students of a university of technology in South Africa:

- **Performance expectancy** is when a person believes that using the system (e-library resources) can help increase performance, and the person's intention to accept it increases. Therefore, this study predicts that PE, when mediated by behaviour intention, influences e-library resource use.

- **Effort expectancy** is described as the degree of ease with the use of the information system. Effort expectancy is significant in students' BI to use electronic information resources at the library.
- **Social influence** is the degree to which someone believes that significant others maintain that he or she ought to use the new system. Social influence, in this study, is the extent to which an individual perceives that significant others consider that he or she must use the e-library resources.
- **Facilitating condition** is the construct that represents the degree to which a person believes that an organisation has technical infrastructure to support and maintain the use of an information system. In this study, FCs are explained as the degree to which postgraduate students have confidence that a technical infrastructure is available to improve the use of e-library resources.
- **Behavioural intention** to use, as a kind of strength that measures the intention to perform a specified behaviour. Therefore, BI, in this study, reveals that postgraduate students' intention to use e-library resources depends on their perception of such use.

Following from the research model, as shown in Figure 1, this study sets out several research hypotheses, as introduced in Table 1.

Moderating variables proposed, include gender, age, level of study and faculty.

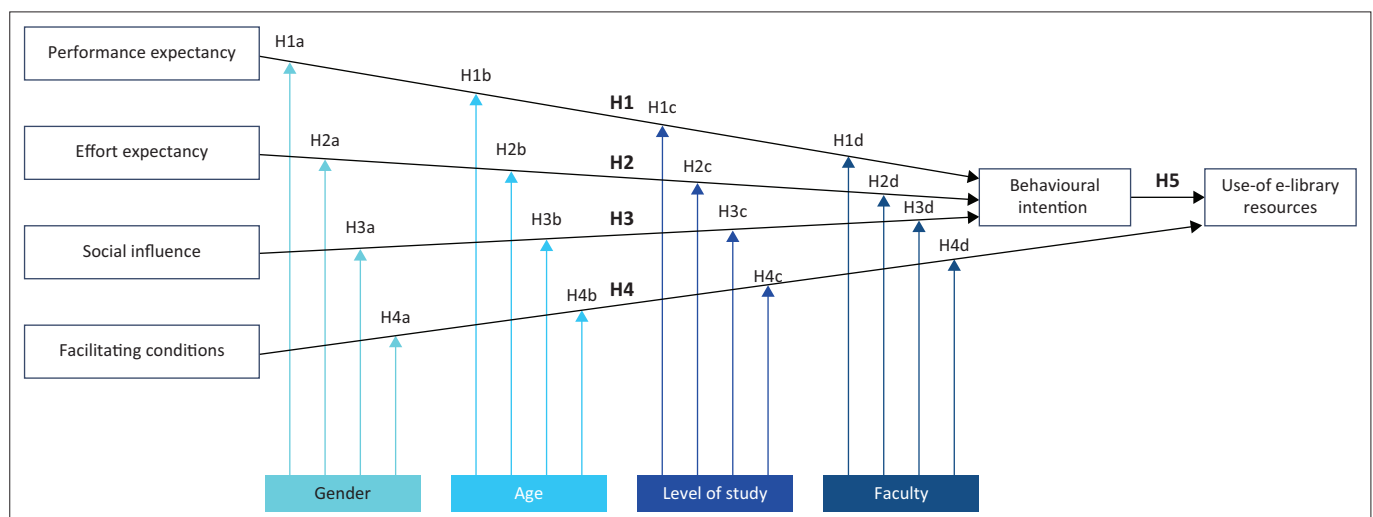
## Methodology

This study adopted the quantitative research method because it was considered suitable for this study because of its reliability and its ability to generalise to a large population (Fowler & Floyd 2013). An advantage of quantitative methods is that the results could be valid and dependable when generalised to a larger population to accommodate all postgraduate students at the University of Technology campuses. The total population was 2040 registered postgraduate students at the university of

technology. A sample size of 679 from the seven faculties within the university of technology responded by completing the online questionnaire. There were eight non-responders, bringing the total to 671. Of the sample, 18 respondents were from the Faculty of Arts and Design, 36 from the Faculty of Economics and Finance, 88 from the Faculty of Engineering and the Built Environment, 209 from the Faculty of Humanities, 128 from the Faculty of Information and Communication Technology, 101 from the Faculty of Management Sciences,

**TABLE 1:** Research hypotheses.

Hypotheses	Hypothesis relationship
H1.	When mediated by behavioural intention, performance expectancy influences e-library resource use.
H1a.	Gender moderates the influence of performance expectancy on e-library resource use.
H1b.	Age moderates the influence of performance expectancy on e-library resource use.
H1c.	Level of study moderates the influence of performance expectancy on e-library resource use.
H1d.	Faculty moderates the influence of performance expectancy on e-library resource use.
H2.	When mediated by behavioural intention, effort expectancy influences e-library resource use.
H2a.	Gender moderates the influence of effort expectancy on e-library resource use.
H2b.	Age moderates the influence of effort expectancy on e-library resource use.
H2c.	Level of study moderates the influence of effort expectancy on e-library resource use.
H2d.	Faculty moderates the influence of effort expectancy on e-library resource use.
H3.	When mediated by behavioural intention, social influence influences e-library resource use.
H3a.	Gender moderates the influence of social influence on e-library resource use.
H3b.	Age moderates the influence of social influence on e-library resource use.
H3c.	Level of study moderates the influence of social influence on e-library resource use.
H3d.	Faculty moderates the influence of social influence on e-library resource use.
H4.	Facilitating conditions directly influence e-library resource use.
H4a.	Gender moderates the influence of facilitating conditions on e-library resource use.
H4b.	Age moderates the influence of facilitating conditions on e-library resource use.
H4c.	Level of study moderates the influence of facilitating conditions to e-library resource use.
H4d.	Faculty moderates the influence facilitating conditions to e-library resource use.
H5.	Behavioural intention directly influences e-library resource use.



**FIGURE 1:** Research model derived from the unified theory of acceptance and use of technology model.



and 91 from the Faculty of Sciences. Responses to online surveys were transmitted through SurveyMonkey instantly through email. The resulting sample was a census of participant postgraduate (BTech, honours, master's and doctoral) students from all the university of technology's campuses and faculties in South Africa.

For this study, the data collection instrument was a questionnaire using closed-format questions and a few open-ended questions. Closed-format questions are mostly suitable in a quantitative approach as it seeks to obtain responses from many participants (Creswell & Creswell 2017). On the types of closed-ended questions, this study adopted Likert-type scales. Closed-ended questionnaires in this study were developed based on the UTAUT model (2003). The UTAUT model constructs are PE, EE, SI and FCs. This study adopted a census method because of the accuracy, as each unit or component of the population was studied before drawing any conclusions from the research. A census is a reading of every unit or all people in a population. It is a complete count and enumeration of everyone within the selected space for the data collection. The space might constitute a specific place where a group of people is found, or any area with the specific needs of a population (Creswell & Creswell 2017). Participants were grouped according to their current level of study. Staff and undergraduate students were not included as participants in this study. Data were extracted after closing the survey, and all responses were transferred from MonkeySurvey to Microsoft Excel for data visualisation and analysis. Data were cleaned before data were analysed to eradicate inadequate and irrelevant items. Microsoft Excel-generated graphs and quantitative data were coded numerically with the Microsoft Excel package and exported into Stata SE 14.0 software to analyse the data.

Table 2 shows the construct reliability statistics measured by Cronbach's alpha. In this study, validity and reliability were measured for each construct. Table 2 indicates that 28 items were measured to test the reliability of the results. The reliability of the construct was tested using Cronbach's alpha also known as alpha Cronbach's alpha tests, to see whether multiple-question in Likert scale surveys are reliable. The Cronbach's alpha, with a 0.7 cut-off point, was used to test for internal consistency. Thus, the observed Cronbach's alpha of less than 0.7 indicates that a set of variables are not reliably testing the latent construct. This study has five constructs as per the research model. The reliability of the four constructs was above the required minimum coefficient value of 0.7. One of the constructs is the FC, which had a lower value of 0.5 cut-off point, which did not meet the requirement (Alzahrani 2019). Table 2 illustrates the construct reliability statistics.

## Data analysis and results

The research methodology section indicated that the questionnaire was sent to all 2040 registered postgraduate students at the university of technology. Of the 679

questionnaires administered, 671 surveys were completed, representing a completion rate of 99% and a response rate of 33%. Non-responders numbered 8; therefore, having a total of 671 indicated that the current level of study could be analysed ( $N = 671$ ). Preferably, or ideally, a larger sample size is favoured for a quantitative study (Sadiku, Issa & Mohammed 2019). The institution under study has a large population. Thus, 671 responses are sufficient for the purpose and scope of this study. Figure 2 indicates the overall questionnaire completion rate.

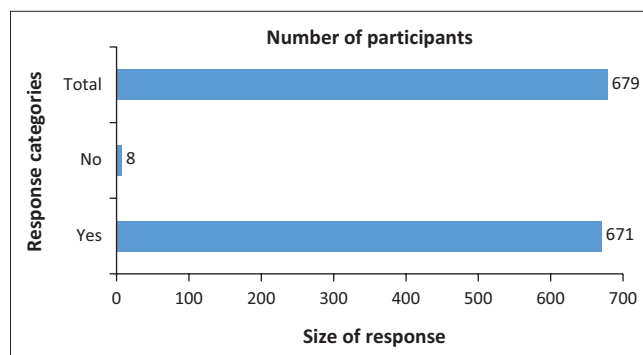
## Use patterns of e-library resources by postgraduate students

Figure 3, Figure 4 and Figure 5 show the use patterns of e-library resources by postgraduate students. Participants were requested to show whether they use e-library resources or not. They were asked this question because the use of e-library resources is the keyword of this study. The research focus was to determine if the participants use e-library resources. Figure 3 illustrates the e-library resource use.

Figure 3 indicates that students who are aware of e-library resources have a higher percentage (49%) than those who do not know how to use e-library resources (21%). The results show that (30%) of participants did not respond to the question. This might be because they are unsure if they can use the e-library resources. If the 30% of undecided participants are added to the 21% of participants who do not use e-library services, this indicates that 51% of participants do not use e-library resources. Participants who responded that they do not use e-library resources were asked to give reasons for not using e-library resources and select all the reasons that apply. Figure 4 shows the participants' responses regarding the reasons for not using e-library resources.

**TABLE 2:** Construct reliability statistics.

Construct	Cronbach's alpha	Cronbach's alpha based on standardised items	Number of items
Performance expectancy	0.8989	0.8987	4
Effort expectancy	0.8915	0.8911	4
Social influence	0.8261	0.8273	5
Facilitating condition	0.5557	0.5566	6
Behavioural intentions	0.9476	0.9479	3
User behaviour (UB)	0.6824	0.6893	6



**FIGURE 2:** Participants' completion rate.

Figure 4 indicates that participants are not using e-resources because of different reasons. The higher percentage 13 (40%) indicates that they have their own reasons for not using e-resources. They were provided open-ended questions to specify their reasons. As their reasons were so many, the reasons were not analysed. The researcher will use the reasons to recommend what could be done in the future to make participants use the e-library resources. Some 79 (23%) participants showed that they were not aware of e-library resources, 76 (22%) were those who do not know how to use e-library resources, 32 (9%) participants indicated that e-library

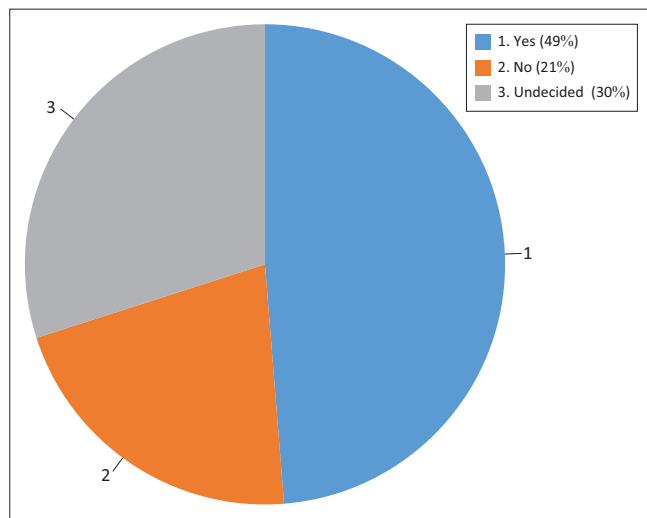


FIGURE 3: E-library resource use.

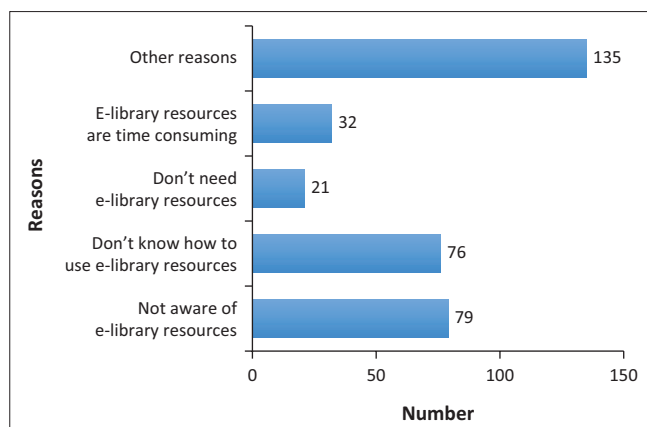


FIGURE 4: Reasons for not using e-library resources.

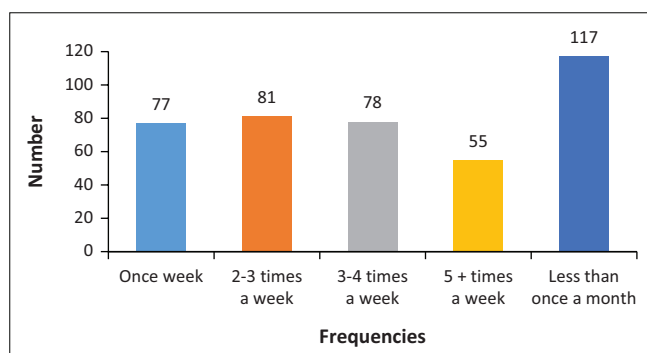


FIGURE 5: Frequencies of using e-library resources.

resources are time-consuming, and lastly, 21 (6%) are those who indicated that they do not need e-library resources.

Participants who responded that they use e-library resources were requested to specify how frequently they use e-library resources. Figure 5 illustrates the frequencies of the use of e-library resources response rate.

Figure 5 indicates that the lowest percentage of 55 (13%) of participants access the e-library five times a week. An equal number of 77 (19%) participants access at least once a week and 78 (19%) access three to four times a week. Some participants specified that they access e-library resources two to three times a week (Figure 5). The majority of 117 (29%) of participants access less than once a month, thus indicating the ineffective use of e-library resources.

In this study, a linear regression model was conducted to test whether the independent variables (PE, EE and SI) will positively predict the BI to use e-library resources. This study also tested if the independent variable (FC) will directly influence the use of e-library resources. Regression model results showed that the variables are a statistically significant predictor of the BI to use e-library resources, all with the  $p < 0.000$ . These results were compared with a study by Alshahrani and Walker (2017) that adopted M-learning in higher education institutions. The regression model results were tested to be significant of the BI to use M-learning,  $F = 338.83$  (3,844),  $p < 0.001$ .

## Factors influencing the use of e-library resources by postgraduate

Table 3 provides a summary of the findings from the hypothesis testing. The summary outlines the results pertaining to the factors influencing the use of e-library resources by postgraduate students of this study. Hypotheses for which the regression model results were found to be significant are indicated by grey shading.

## Discussion

This study was conducted to examine the role of the UTAUT constructs in explaining the postgraduate student's intention to use e-library resources. The patterns and factors influencing the use of e-library resources by postgraduate students will be discussed according to the results.

## The use patterns of e-library resources by postgraduate students

The review of literature indicates that numerous methodologies have been used to evaluate the use of e-library resources. It has been observed, therefore, that there are virtually enough e-library resources to support all of the disciplines that are now in use, but the infrastructure needed to access those resources is inadequate and may make it difficult to meet user needs. Sadiku et al. (2019) insist that

**TABLE 3:** Hypothesis summary.

Hypothesis	Hypotheses relationship	Significance value (P)	Action (Result)
H1	When mediated by behavioural intention, performance expectancy influences e-library resource use	0.000	Significant
H1a	Gender moderates the influence of performance expectancy on e-library resource use	0.075	Not significant
H1b	Age moderates the influence of performance expectancy on e-library resource use	0.475	Not significant
H1c	Level of study moderates the influence of performance expectancy on e-library resource use	0.864	Not significant
H1d	Faculty moderates the influence of performance expectancy on e-library resource use	0.297	Not significant
H2	When mediated by behavioural intention, effort expectancy influences e-library resource use	0.000	Significant
H2a	Gender moderates the influence of effort expectancy on e-library resource use	0.570	Not significant
H2b	Age moderates the influence of effort expectancy on e-library resource use	0.025	Significant
H2c	Level of study moderates the influence of effort expectancy on e-library resource use	0.930	Not significant
H2d	Faculty moderates the influence of effort expectancy on e-library resource use	0.422	Not significant
H3	When mediated by behavioural intention, social influence influences e-library resource use	0.000	Significant
H3a	Gender moderates the influence of social influence on e-library resource use	0.696	Not significant
H3b	Age moderates the influence of social influence on e-library resource use	0.195	Not significant
H3c	Level of study moderates the influence of social influence on e-library resource use	0.371	Not significant
H3d	Faculty moderates the influence of social influence on e-library resource use	0.066	Not significant
H4	Facilitating conditions directly influence e-library resource use	0.000	Significant
H4a	Gender moderates the influence of facilitating conditions on e-library resource use	0.397	Not significant
H4b	Age moderates the influence of facilitating conditions on e-library resource use	0.154	Not significant
H4c	Level of study moderates the influence of facilitating conditions on e-library resource use	0.340	Not significant
H4d	Faculty moderates the influence of facilitating conditions on e-library resource use	0.315	Not significant
H5	Behavioural intention directly influences e-library resource use	0.076	Not significant

technological innovation has to enhance the satisfactory use of e-library resources. There are limited studies that pay attention to the satisfactory use of e-library resources in universities. The key objective of the university library is to support the teaching, learning, and research capacity of its users. Consequently, it is necessary to find the frequency of library use. Figure 5 shows the frequency of using e-library resources. The majority of the respondents showed that they access e-library resources less than once a month. This indicates the ineffective use of e-library resources. Naidu and Kishore (2019) presented similar data in their studies on participants' frequency of accessing the university library: the majority accessed e-library resources, while the minority accessed them only occasionally.

## Factors influencing the use of e-library resources by postgraduate students

Postgraduate students' purpose in using e-library resources is affected by the belief that the e-library resources are accessible, useful and helpful. In the study of UTAUT, this is known as PE. The greater the belief (by postgraduate students), the greater their intention to use e-library resources. Ease of access to the e-library resources is the subsequent factor. Postgraduate students will not use the e-library resources if the required article is not effortlessly accessible and downloadable (EE). Furthermore, the social factors and the prevalence of facilities to enhance the use of e-library resources are also influential factors (SI and FCs). There are supplementary factors, such as age and gender, that are strengthening or weakening factors. The findings in this study indicate that male students are likely to have better technological ability. Similarly, younger students are likely to be more willing to use the information technology (BI).

### Performance expectancy

The statistical results of the study demonstrated that the PE was significant among the postgraduate students. The postgraduate students believe that by using e-library resources, they will be able to complete a number of tasks with the use of e-library resources. A study conducted by Mabitsela (2016) found a similar result as Venkatesh et al. (2003). Previous researchers revealed that, in the perception of age, older end-users tend to find new information technology such as e-library resources challenging to use; they do not find such technology particularly useful when performing their jobs (Anyim 2018). The correlation between demographical variables and PE scale resulted in  $p \leq 0.05$ ,  $p \leq 0.01$  and  $p < 0.001$ , respectively. Therefore, a significant relationship in PE concept established great positive ratings as per the Likert scale used. The results indicate that, generally, the users find the e-library resources useful in that it increases their academic performance and productivity on the subject.

### Effort expectancy

Effort expectancy was found to be a significant construct. Previous studies on the use of e-library resources reported a positive relationship between EE and BI (Jayakanathan & Jeyaraj 2019; Moyo 2017; Sejane 2017). The statistical analysis indicates that the path coefficient in the structural model results of the hypothesis testing between EE and BI indicates the strongest relationship that displays the relationship between demographical variables and EE scale resulted in  $p \leq 0.05$ ,  $p \leq 0.01$  and  $p < 0.001$ , respectively. Effort expectancy is significant in postgraduate students' BI to use electronic resources at the library. The results show that, generally, the users of the e-library resources find that gaining information through e-library resources is clear and effortless.

### Social influence

Social influence, in this study, is the extent to which an individual perceives that significant others consider that he

or she must use the e-library resources (Bwalya & Ssebale 2017; Sejane 2017). The SIs resulted in a moderately positive relationship in attitude of users towards the use of e-library resources in the university libraries, as suggested by Venkatesh et al. (2003). A study by Sejane (2017) shows that awareness of the availability of e-library resources in university libraries was influenced by colleagues and peer users. The correlation between demographical variables and SI scale resulted in  $p \leq 0.05$ ,  $p \leq 0.01$  and  $p < 0.001$ , respectively. Therefore, a significant relationship of an SI construct received positive ratings as per the Likert scale used. The results show that, generally, the users of the e-library resources find that people who influence, for example, schoolmates and lecturers believe that they should use the e-library resources.

### Facilitating condition

The construct of FC was also found to be significant in this study. The result of the original UTAUT shows a significant relationship between FC and BI, and it was confirmed by previous studies. Facilitating conditions, for the purpose of this study, are expected to radically improve e-library resources development ideas. This can be achieved by introducing a new standard, which has a lasting effect on the use of the system (Chohan, Bhatti & Naeem 2017). Hamzat and Mabawonku (2018), from the reviewed literature, commented that the standard that allows FCs is the infrastructure serving as a technological solution, positioned and maintained by organisations. The maintenance of the technical infrastructure ought to guarantee the accessibility and quality of the services offered to the library users. The correlation between demographical variables and a FC scale resulted in  $p \leq 0.05$ ,  $p \leq 0.01$  and  $p < 0.001$ , respectively. Therefore, a significant relationship of FC constructs received positive ratings as per the Likert scale used. The results show that, generally, the users of the e-library resources find that they need necessary resources to use the e-library resources, for example, off-campus access to e-library resources.

### Behavioural intention

Behavioural intention directly influences e-library resource use. The findings revealed that PE, EE and SI proved a positive and significant influence on BI. Results are consistent with those of Mabitsela (2016), Sejane (2017) and Patel and Darbar (2017), who supported these three UTAUT constructs to be positively and significantly related to the intention to use e-library resources. The outcome implied that postgraduate students who accepted the benefits of e-library resources would have more intention to use e-library resources. The correlation between demographical variables and BI scale resulted in  $p \leq 0.05$ ,  $p \leq 0.01$  and  $p < 0.001$ , respectively. Therefore, a significant relationship of BI constructs received positive ratings. The results show that, generally, the users of the e-library resources find that they intend to use the e-library resources.

The UTAUT model proposes that BI affects actual use. These results suggest the significant role of FC and BI, which means that actual positive use of e-library resources relies on the

provision of the university community, possibilities for easy learning and research and compatibility with prevailing technologies.

## Conclusion

The UTAUT model was used to determine the use patterns and the factors influencing the use of e-library resources by postgraduate students of a university of technology in South Africa. The findings show that the UTAUT constructs have a positive influence on the intention to use e-library resources. Positive actual use of e-library resources relies on the provision of the technical infrastructure by the university management. This study furthermore pinpointed that some postgraduate students are not using e-library resources because of not being aware, not knowing how to use them or not needing e-library resources. The findings of this study indicate that despite frantic efforts by the university to avail e-library resources, there is ineffective use. Participants did not respond to some of the questions. This might be because they are unsure if they are capable of using the e-library resources. Younger male users are labelled as 'tech savvy' and have a higher percentage of using e-library sources. Therefore, higher education institutions and universities need to pay more attention to females and elderly users with limited information technology and Internet experience. This study shows that using e-library resources is common among the university and that some postgraduate students need these resources to access information relevant to their needs. This study revealed that users had positive perceptions, believing that the e-library resources were useful to their tasks and that this could assist them in being more effective in their studies.

Information literacy gives more information about e-library resources and motivates undecided students to overcome their anxiety and to be more comfortable using e-library resources.

## Recommendations

The findings of this study specify that regardless of efforts by the university to avail e-library resources, there is poor use. According to data analysis, the significant attribute is the lack of awareness and training among postgraduate students. Based on the results of the present study, the researcher desires to make the following recommendations towards the effective use of e-library resources in university libraries:

- **Usage patterns:** Evaluating use patterns offers valuable insights for evolving use cases such as the use of technological devices. The use of e-library resources in South African universities must be consistently examined to determine the level of use. This will enable the library management to observe users' attitudes while using e-library resources. Universities must take the initiative to design the subject evaluation components so that postgraduate students are encouraged to use subscribed e-library resources more often. The faculty members should encourage students to increase their use of e-library resources by assigning research-focused projects.



Furthermore, information librarians should work on improving the repository of e-library resources according to the faculties' recommendation and students' requirements. The results of this study show that participants have not received satisfactory or proper training in the use of e-library resources. User training is crucial to enhance the use of e-library resources because the postgraduates of all faculties still have to be assisted and guided in the effective use of e-library resources. Librarians should organise training sessions for students to provide hands-on training on the use of e-library resources:

- **Performance expectancy:** Performance expectancy was a critical factor in the use of e-library resources by postgraduate students. It serves to say that a user will only use a system because of the belief that the system will perform as expected by providing answers to their assignment. If more postgraduate students perceive that e-library resources will be useful in providing current and timely information to enhance their learning and research, their belief will influence their use of the system. However, if postgraduate students perceive that e-library resources may not enhance their job performance, they might not use the system. Therefore, there is a need for improvement in FCs such as the provision of uninterrupted power supply and Internet connectivity. As indicated by participants, the expense of data to connect students to the Internet and slow bandwidth is also considered a hindrance to the use of e-library resources. Universities should ensure that they have supporting structures such as Internet access appropriate to the number of postgraduate students enrolled.
- **Effort expectancy:** The university should consider creating a virtual private network (VPN) link that will allow students to access the e-library resources from outside (off-campus) of the university network. This study's findings project that the perceived benefits acquired or gained from use and effortlessness seeking of scholarly information sources influences the postgraduate students' intention to use the e-library resources. Therefore, the university management should ensure that gaining information through e-library resources is simple and effortless, making use of e-library resources more convenient. There is a need for improved access to e-library resources for postgraduate students to improve effortlessness. Most e-library resources the institutions offer are only available within the university network infrastructure. Students not on campus cannot access these resources, making a VPN for off-campus use desirable.
- **Social influence:** In this study, SI refers to the level of influence regarding the use of e-library resources that postgraduate students receive from schoolmates, lecturers, peers, information librarians and others. Social influence was statistically significant in determining the BI to use e-library resources. The participants specified the impact of SI from lecturers and peers on their acceptance of e-library resources. Therefore, the study recommends that the staff at the university should

influence postgraduate students to continue using e-library resources for their academic work.

- **Facilitating conditions:** Participants in this study indicated that they do not have enough resources like computers and the Internet. Therefore, the lack of computers and Internet access may limit the students from using e-library resources. Given this insufficiency, the university management should increase computer laboratories with Internet access to enhance the use of e-library resources. Some participants also indicated that they do not know how to use computers. University management must help students to be computer literate, which will encourage them to be self-sufficient and use e-library resources. This is assumed that computer training will assist the students in developing Internet-browsing skills. Universities should also conduct marketing and awareness campaigns on the availability of their e-library resources and the benefits that students might derive from their use. This study recommends that the university should always provide assets and technical infrastructure to support learning, teaching and research for postgraduate students.
- **Behavioural intention:** This study recommends that postgraduate students intend, predict and plan to use e-library resources in the future. Students should see an advantage in using e-library resources for their studies. The use of e-library resources in South African universities should be consistently examined to monitor the level of use. Monitoring will enable the library management to observe the users' attitudes towards using e-library resources. The configuration of the e-library services should be studied to meet the information needs and expectations of the users. Therefore, more studies should be conducted in the same field, particularly on the infrastructure insufficiency, which is a challenge in meeting the information needs of users. Researchers interested in studying the use of e-library resources in South Africa could conduct related or similar research, including research at other South African universities and at universities worldwide.

## Areas for further studies

The use of e-library resources in South African universities must be consistently examined to determine their level. This will enable the library management to observe the users' attitude towards using e-library resources. The configuration of the e-library services must be studied with the intention of meeting the information needs and expectations of the users. Therefore, more studies should be conducted in the same field, particularly on infrastructure insufficiency, which is a challenge in meeting the information needs of users. Researchers interested in studying the use of e-library resources in South Africa could conduct related or similar research, with more focus on all South African universities. There have been several studies conducted focused on the use of e-library resources, especially in specific universities, which is an appropriate topic for the Fourth Industrial Revolution

(4IR). Changes in the 4IR era to libraries arise from many factors. A common aspect is the management of technology innovation. Many universities, if not all, use online library resources. Library information resources must be better understood to be effectively used in an appropriate and satisfactory manner by the anticipated users. Further studies are required, which could contribute to a general viewpoint of the use of e-library resources. Studies could reveal additional objectives using the information systems model and related contexts for the use and acceptance of information technology. Consequently, more studies are required on effective training, particularly on information search skills for users.

This study backed the prevailing literature that revealed how the UTAUT model was used in evaluating students' use of e-library resources. Other universities can adopt the model used in this study to analyse postgraduate students' BI to use e-library resources. Hence, the study proposes that the students' PE in the use of e-library resources might be influenced by the effectiveness of the system. The focus must be on FCs; students expect the university to make resources available through technical infrastructure.

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### Authors' contributions

M.C.M. contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

A.B.P. contributed to the conceptualisation, methodology, original draft, data analysis and review and editing of the manuscript.

### Ethical considerations

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### Data availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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