



DOI 10.2478/sbe-2018-0040

SBE no. 13(3) 2018

INVESTIGATING THE FACTORS INFLUENCING STUDENTS' INTENTION TO ADOPT E-LEARNING IN A SMALL ISLAND DEVELOPING STATE (SIDS) ECONOMY: EVIDENCE FROM MAURITIUS

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Abstract:

This study is designed to investigate the factors influencing students' intention to adopt electronic learning (e-learning) in a Small Island Developing State (SIDS) economy. The overarching theory underpinning this study is the Technology Acceptance Model (TAM) which has been extended to include the learner's computer self-efficacy, the course flexibility and the instructor's attitude dimensions. Constructs from this extended TAM were used to design a questionnaire that was administered among 494 students using a survey method. Relevant hypothesis were formulated and tested using multiple regression analysis. The results indicate that gender, type of course, Internet experience, prior experience in e-learning/mixed mode courses and initial proficiency level in e-learning significantly impacted on student's intention to enroll for a fully online degree programme. Furthermore, computer self-efficacy, course flexibility and the instructor's attitude were found to be pertinent antecedent to the Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) while (PEOU) and (PU) were both found to be predictors of attitude towards e-learning. These results have managerial implications for higher education institutions which need to pay a close attention to the factors influencing students' attitude towards e-learning.

Key words: *e-learning, Technology Acceptance Model, SIDS, higher education*

1. Introduction

The rapid evolution of electronic learning (e-learning) system as a new paradigm in the field of higher education has triggered great interest on the study of e-

learning. According to Adewole-odeshi (2014) and Noesgaard *et al.* (2015), e-learning refers to the learning process that is facilitated by the use of Information and Communication Technology (ICT). To Desai *et al.* (2008) the difference between e-learning and the traditional class room learning can be analysed from two angles. Firstly, e-learning facilitates the simultaneous interaction between students and faculty at a specific time using the internet for direct communication. Secondly, students and faculty may interact at different times by placing messages or coursework in files that are accessed at different times. Over the years, e-learning has been implemented in many private and public institutions in both developed and developing countries (Qteishat, 2013). For example, 81% of the institutions in the United States offer at least one fully online course and 67% recognized online education as a critical long-term strategy (Cleveland-Innes & Garrison, 2010). On the other hand, higher education institutions in China provides online courses to a quarter million students (Pudaruth *et al.*, 2010). The benefits associated to use of a web-based learning environment can be analysed from the learner's and university's perspectives. Benefits of e-learning to the learner include convenience and flexibility (Northrup, 2002; Young & Norgard, 2006), independent learning (Bentley *et al.*, 2012) and saving in time (Swan & Springfield, 2010) and transportation costs (Bartley & Golek, 2004) amongst others. On the other hand, the benefits to the university are substantial in terms of overcoming the limitation of resources and space (Zaharias & Poylymenakou, 2009), receiving and providing instant feedback (Lee *et al.*, 2009), cost saving as well as improving the education standard (Ncube *et al.*, 2014).

Small Island Developing States (SIDS) were recognised as a distinct group of developing countries facing specific social, economic and environmental vulnerabilities at the Earth Summit held in Rio de Janeiro in 1992 (United Nations, 2008). Fifty two countries including Mauritius and territories (38 UN members and 14 non-UN members) are classified as SIDS by the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (OHRLLS), (UN-OHRLLS, 2011). The common challenges faced by SIDS include limited land area depriving them of the benefits of economies of scale, small domestic markets, heavy dependency on a few external and remote markets, high energy costs, transport problems, limited infrastructure, vulnerability to climate change, rising sea levels and growing population, remoteness and isolation, openness, poverty, limited capacity and limited access to external capital amongst others amongst others (UN-OHRLLS, 2011; World Bank, 2000).

Realising the load of opportunities that improvements in ICT present to the Mauritian tertiary education sector, private and public universities in Mauritius have recently started offering online courses. Nevertheless, a very low enrolment rate has been noted on these programmes, students preferring the traditional class room mode of delivery. Therefore, this pressing problem requires urgent research attention since the success of e-learning is highly dependent upon the students' intention to adopt this new IT based delivery mode. This highlights the importance of understanding the inherent factors that may influence the adoption of e-learning among students.

Literature search revealed that the adoption of e-learning is extensively researched in developed economies compared to developing countries; while in a SIDS context study on the adoption of e-learning is inexistent. This gap is significant given the social, economic, technological and environmental characteristics of SIDS economies (including Mauritius) which fundamentally differ from those of the developed nations. Therefore, due to these major differences, it would not be reasonable to assume that the factors affecting the adoption of e-learning in the developed economies would be similar to those of the SIDS economies. Against this backdrop, the present study aims at investigating the factors influencing students' intention to adopt e-learning in Mauritius. It will, thus, attempt to fill in the apparent research gap and to contribute to the extant literature on adoption of e-learning in higher education institutions. The findings of the study will help in improving the learners and academic relationships and in informing universities on the measures to reduce drop-out rate among learners which varies from 20% to 80 % in the field of e-learning (Maxwell, 2014). In this study, we aim at investigating students' intention to adopt and enrol on online courses by drawing and extending the extant Technology Acceptance Model (TAM).

The remainder of this paper is organised as follows. In the next section, relevant literature is reviewed to develop the integrative research model and hypotheses are formulated and discussed. In Section 3, the research methods employed in this study are described. Data analysis and results are presented in Section 4 and the findings are discussed in Section 5. The implications of this research for theory and practice are discussed in Section 6. Finally, Section 7 presents the conclusions of this research, the limitations and future research directions.

2. Literature review and research model

2.1 Education and e-learning in Mauritius

Mauritius is a small island developing state located in the South West part of the Indian Ocean. In 2015, size of the population of Mauritius was estimated at 1.3 million and the GNP the per capita reached 9468.94 USD (Statistics Mauritius, 2015). It has since independence in 1968, developed from a low-income, agriculturally based economy to a middle-income diversified economy with growing industrial, tourist and financial sectors. The education system in Mauritius is largely based on the British system and has remained one of the priorities of all governments. For several decades, learning at the primary, secondary and tertiary levels, has chiefly been based on the traditional face to face classroom approach. Recently, the government has embarked on a highly ambitious project of improving the teaching and learning process through the use and free distribution of tablets to secondary school students. At the tertiary level, learning on a mixed mode system is already an accepted practice since several years. However, the introduction of fully on-line degree programmes in universities is a new phenomenon which started in the year 2013. Nonetheless, the enrolment rate on these on-line programmes has been quite low as students still prefer to enrol on the traditional face to face courses.

Being a small island, Mauritius has been keeping pace with the technological progress over the years. For example, in 2015, the Internet World Stats predicted that the internet penetration ratio in Mauritius would turn around 43.3 % while the number of internet users was forecasted at 803,896 (representing 60 % of the population) while the Global Information Technology Report (2013) ranked the country at the 55th place in the network readiness index. Furthermore, realising the load of opportunities that improvements in ICT present to the Mauritian tertiary education sector, private and public universities in Mauritius have started implementing online courses. However, there are several barriers associated with the integration of information system into higher education, such as technology infrastructure, faculty effort, technology satisfaction, and graduates competency and readiness (Surry *et al.*, 2005). It is, therefore, imperative for universities to properly assess these influences in the learning context so as to make it a success. Considering these factors would ensure effective use of limited resources in the implementation of e-learning as an alternative and innovative learning strategy among universities of SIDS economies.

2.2 E-learning adoption

The efficiency of e-learning is significantly dependent on the extent of students' inclination to adopt and accept technology in the learning process (Kattoua, Al-Lozi & Alrowwad, 2016). Therefore, to increase users' acceptance of web-based learning systems, it is imperative that practitioners and policymakers understand the factors influencing students' decision to move from less efficient systems to systems that are relatively more advanced, beneficial and innovative (Tarhini, Hone & Liu, 2014). According to extant literature, adoption of e-learning amongst students is not solely dependent on the adoption of technology but also on a myriad of factors which play an important role in the way technology is implemented and used (Kim & Moore, 2005). These factors include the social factors (Schepers & Wetzels, 2007), the individual factors (Liaw & Huang, 2011), the organisational factors (Sun & Zhang, 2006) and the behavioural and cultural factors (Masoumi, 2010). However, while much of the research on the adoption and diffusion of e-learning has been carried in developed economies (Mulwa, 2017), little is known about the factors influencing adoption of e-learning in a SIDS context. Therefore, the focus of this study is students' adoption of e-learning in a SIDS economy. It is also the first study to examine the factors influencing Mauritian students' decision to adopt e-learning. We also believe that the current study is significant as an assessment of students' attitude and actual use of innovative technologies such as e-learning will provide more insights that will enlighten universities on the effective implementation of e-learning. Therefore, our study will have positive implications for the governments and universities in developing effective e-learning strategies.

2.3 Research Model

A number of theories has been used and applied in previous research to explain or predict users' adoption of technologies. These theories include the

Technology Acceptance Model (TAM) (Davis, 1989), Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1985) and Innovation Diffusion Theory (IDT) (Rogers, 1995) amongst others. These models have been used to assess acceptance behaviour of the integration of IT to business activities (e-commerce), the banking services (e-banking), the government services (e-government) and leaning (e-learning) amongst others. The model used for this study is the TAM which is considered as a universal model that has a strong theoretical base (Davis, 1989). Moreover, it has also received extensive empirical support through validations, applications and replications compared to other alternative models such as the TRA and TBP (Gefen & Straub, 2000; Dwivedi, Wade & Schneberger, 2012). Furthermore, King and He (2006) describe TAM as a powerful and robust model in predicting user's acceptance of ICT based systems. TAM has also been used in several studies (such as Shroff *et al.*, 2011; Al-Adwan *et al.*, 2013) to examine students' willingness to accept e-learning systems. Nevertheless Legris, Ingham and Colletette's (2002) argue that the application of the TAM should be context specific. We have, thus, revised and extended the core framework of the TAM (**Fig. 1**) to include three constructs (namely the learner's computer self-efficacy, the course flexibility and the instructor's attitude) in providing a better understanding to the exploration of e-learning technology acceptance amongst Mauritian students.

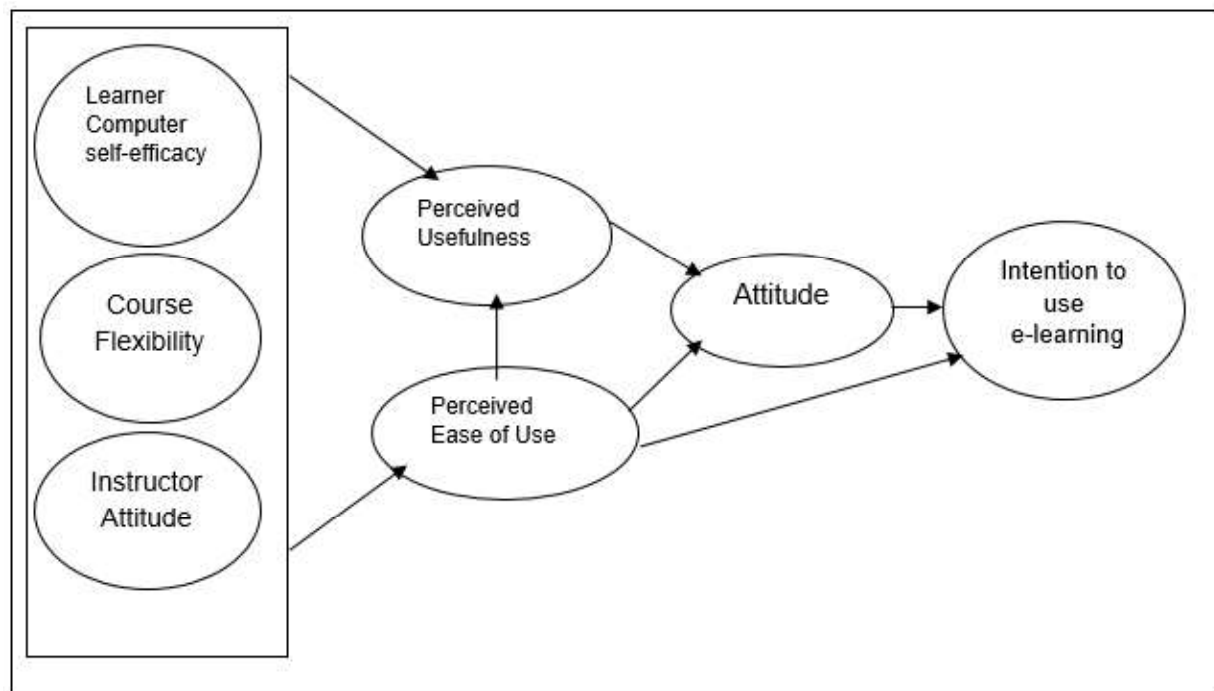


Figure 1. The study model

2.3.1. Technology Acceptance Model (TAM)

Developed by Davis (1989), the TAM (**Fig. 2**) is one of the most widely used models by IT/IS researchers to predict and explain the factors underpinning the acceptance and adoption of new technologies (Legris & Ingham, 2003; Al-Hujran, Al-Debei, Chatfield & Migdadi, 2015). It demonstrates how external variables influence

attitude and intention to accept and use Information Technology (IT). The adoption of technology has in fact gained importance through the application of the TAM in forecasting the extent of users' acceptance, its relationship to system usage and its associations with the system being used (Davis, Bagozzi & Warshaw, 1989). According to Davis (1989), one's behavioural intention to use and accept technology based systems is determined by two specific factors notably Perceived Ease of Use (PEOU) and Perceived Usefulness (PU).

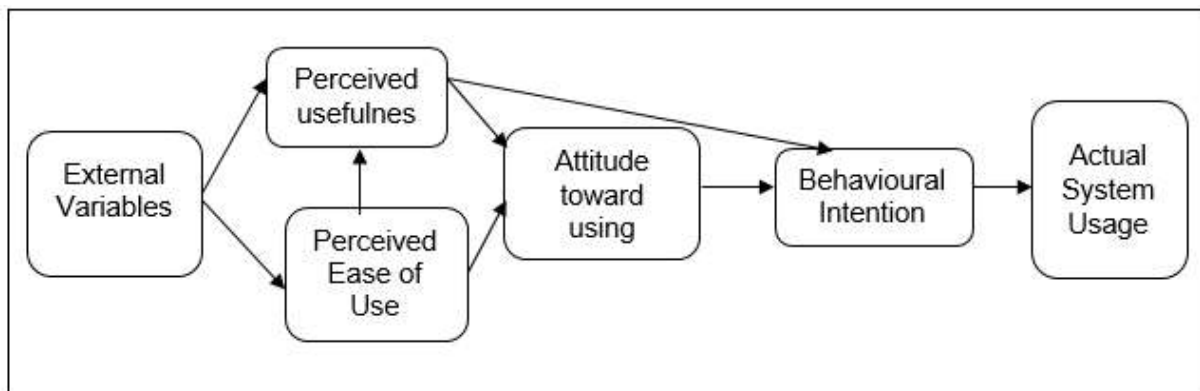


Figure 2. TAM Source (Davis, Bagozzi & Warshaw, 1989)

PEOU refers to the extent to which a person believes that using a particular system would be free from physical and mental efforts while PU is defined as the extent to which a user believes that using technology will improve his job performance (Davis, 1989). Moreover, TAM also theorises that the attitude construct has a central role in predicting the adoption of IT. Ajzen and Fishbein (1975) define attitude as an individual's positive or negative feeling associated with performing a specific behaviour. A positive attitude is developed towards a given behaviour if the person believes that the performance of that behaviour will lead to positive outcome and vice versa. Thus, a positive attitude towards the system influences the intention to the use system which, in turn, impacts positively on the actual use of the system. Furthermore, the TAM posits PEOU to have a direct impact on PU as it is thought that the user will enhance his performance if the system is easy to use (Davis *et al.*, 1989; Venkatesh & Davis, 2000). The causal linkages between PEOU and PU has been validated in several studies such as Venkatesh (1999); Park, Roman, Lee and Chung (2009) and Park (2010). However, although the TAM is still a demanding and the most tested model for explaining and making predictions about technology acceptance (Yousafzai, Foxall & Pallister, 2007), Moon and Kim (2001) argue that the TAM's fundamental constructs may fail in predicting technology adoption due to context specific factors.

2.4 Hypothesis Development

This study attempts to better understand the factors that influence the perceptions and attitudes in the adoption of e-learning among students. We have thus modified the TAM by introducing three external variables namely the learner's computer self-efficacy, the course flexibility and the instructor's attitude. We propose

that these three external variables have an effect on the relationship with respect to the paths from PEOU, PU, Attitude and Behavioural Intention.

2.4.1 Learner's Computer Self-Efficacy

In this study, we have considered the learner's computer self-efficacy as one of the antecedents influencing the paths from PEOU, PU, Attitude and Behavioural Intention is computer self-efficacy. This is so because the learner's attitude towards computers or IT is an important factor in e-learning satisfaction (Arbaugh, 2002). Efficacy is "the power to produce an effect" and self-efficacy is the belief in oneself to produce a desired effect. To Bandura (1995) self-efficacy is the belief in one's capabilities to organize and execute the courses of action required to manage prospective situations and to produce given attainments. Computer self-efficacy is defined as the judgment of one's capability to use computer technology (Yuen & Ma, 2008). In the context of e-learning, computer self-efficacy is related to the students' self-confidence in their abilities to search for information, communicate with others and their skills with the use of computers (Aguda-Peregrina, Hernandez-Garcia & Pascual-Miguel, 2014). Several studies have analysed the impact of self-efficacy on students' satisfaction to e-learning. For example, Wu, Tennyson and Hsia (2010) note that computer self-efficacy is one of the main determinants of students' satisfaction with blended e-learning system environments. Furthermore, Pellas (2014) found a positive relationship between computer self-efficacy and students' cognitive and emotional engagement factors. Moreover, Jong and Wang (2009) confirmed computer self-efficacy as an antecedent of perceived ease of use. On the other hand, computer self-efficacy was found to be a significant but less substantive influence on usage directly and indirectly through perceived usefulness (Lopez & Manson, 1997). Therefore, we argue that the more confidence an individual has regarding his ability to perform various tasks in the system, the more he will be tempted to use the system. We, thus, propose that:

H1 a: Computer self-efficacy positively predicts perceived ease of use of e-learning by students.

H1 b: Computer self-efficacy positively predicts perceived usefulness of e-learning by students.

2.4.2 Course Flexibility

According to Leidner and Jarvenpaa (1995), Berger (1999) and Arbaugh (2002), the flexibility in having access to e-learning materials positively affect the level of satisfaction and participation in e-learning courses. E-learning flexibility is defined as the perception that a learner has on the efficiency and effects of adopting e-learning in their working, learning and commuting hours (Tsai & Finger, 2008). This explains the reason for which learners on e-learning courses are people on the job (Sun, Tsai, Finger, Chen & Yeh, 2007). Moreover, through the elimination of physical barriers, e-learning paves the way to a more constructive and cooperative learning approach through the dynamic interactions among learners (Salmon, 2000). Similarly, instant,

anytime and anywhere communication reduces the problem of time and space associated with the traditional way of learning (Taylor, 1996). Furthermore, learners are freer to express themselves and ask questions through discussion groups (Finley, 1992). We, therefore, propose that:

H2 a: Course flexibility positively predicts perceived ease of use of e-learning by students.

H2 b: Course flexibility positively predicts perceived usefulness of e-learning by students.

2.4.3 Instructor's Attitude

In the context of e-learning the role of the instructor is changed from being the main source of students' learning in traditional learning styles to being the director of students' learning resources (Romiszowski, 2004). Therefore, this instructor's new role requires a new set of skills to facilitate the acceptance and adoption of e-learning amongst students. For example, it is important that the instructor has communication skills to promote collaboration and communication between himself and the learners as well as amongst the learners (Zainuddin & Kamaluddin, 2012). The instructor's attitude towards the integration of technology in the learning process is another factor impacting on the learning consequences and subsequently on the adoption of e-learning (Olson, 2005; Selim, 2007). According to Sun *et al.* (2008), a positive instructor's attitude towards the integration of technology in the learning process promotes acceptance of and adherence to e-learning. Moreover, previous research indicates that instructors' capability of handling e-learning activities and timely response to students' questions or requests significantly influences learners' satisfaction (Arbaugh, 2002). Furthermore, a statistically significant positive impact of the instructor's attitude was noted on the perceived ease of use (Alkandari, 2010) and on the perceived usefulness (Lee, Youn & Lee, 2009). Thus, we propose the following hypothesis:

H3 a: Instructor's attitude positively predicts perceived ease of use of e-learning by students.

H3 b: Instructor's attitude positively predicts perceived usefulness of e-learning by students.

2.4.4. Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Attitude & Intention

Adopted from the Theory of Reason Action (TRA) by Davis (1986), TAM is considered as a simple and effective way to evaluate technology acceptance (Aguda-Peregrina, *et al.* 2014). In this model, PEOU and PU are considered as significant predictors of attitude and intention to use a given technology. PEOU is defined as the degree to which a person believes that engaging in online transactions would be free of effort (Davis, 1986). In an e-learning system, PEOU is the learner's perception of the ease of adopting an e-learning system and it has been described as a fundamental determinant of the acceptance and use of IT in several studies such as (Jahangir &

Begum, 2008; Hsu, Wang & Chiu, 2009). Existing literature on e-learning such as Park (2009); Lee et al. (2005) and Selim (2003) posit PEOU as a significant construct to the adoption of IT based learning system.

On the other hand, PU is defined by Davis (1986) as the extent to which a person believes that using a particular system will enhance his or her job performance. According to Subramanian (1994); Taylor and Todd (1995) and Venkatesh and Davis (2000), PU has significant effect on usage intention. More specifically in the e-learning context, PU was found significant in affecting users' attitude towards e-learning in several studies such as Yuen (2002), Teo (2008) and Park (2009).

Furthermore, attitude has been defined by Karjaluoto *et al.* (2002) as someone's desirability to use a system. The TAM theorises attitude as the mediating affective response between usefulness and ease of use beliefs and intention to use a target system (Suki & Ramayah, 2010). To Davis (1989) and Lee et al. (2005), attitude is a significant predictor of behavioural intention. In the e-learning environment, Rabaa'i (2016) posits a student's feeling about the system as an antecedent to his/her behavioural intention to use the system. He further argues that students will possibly want to replace with a new one if they do not like the system or if they feel unpleasant when using it.

Therefore, applying TAM acceptance framework to the current study and based on previous studies such as Arbaugh and Duray (2002); Pituch and Lee (2006), the proposition is that the more the learners' perceive usefulness and perceive ease of use of e-learning, the more positive their attitudes are towards e-learning, consequently improving their learning experiences and satisfaction, and increasing their chances for using e-Learning in the future. We, thus, posit that:

H4: Learners' perceived ease of use positively predicts their attitude towards the use of e-learning.

H5: Learners' perceived usefulness of e-learning positively predicts their attitude towards the use of e-learning.

H6: Learners' attitude towards e-learning positively predicts their intention to use e-learning.

H7: Learners' perceived ease of use positively predicts their intention to use e-learning.

H8: Learners' perceived ease of use positively affects their perceived usefulness.

3. Research method

3.1 The subject and the procedure

This quantitative study utilized the survey questionnaire as the main instrument for data collection. Based on previous literature, we developed a self-completion and well-structured questionnaire which was pilot tested using 25 undergraduate students having prior experience with a mixed mode or blended learning system. Based on the results of the pilot test, some items were revised to improve face and content validity

as well reliability. The final version of the questionnaire was distributed to a total of 500 undergraduate students who have experience with a mixed mode or blended learning system. The students were selected randomly and their participation in the survey was completely voluntary. The completed questionnaires were then verified and checked to identify any blank or irrelevant answers. Out of the 500 questionnaire, 494 questionnaires (98.8%) were considered complete and appropriate for analysis (Table 1 summarises the demographic profile and descriptive statistics). Before proceeding with the data entry into the SPSS software for further processing and analysis, the answers were coded by assigning values to them.

3.2 Instrument development

To operationalise the study's constructs, we used items that have been validated in previous research to ensure content validity. Furthermore, content validity was also enhanced by the pilot test. A 5-point Likert scale ranging from 1 as strongly disagree to 5 as strongly agree has been used for the measurement.

Items to represent computer self-efficacy were adapted from Joo *et al.* (2000). The construct of course flexibility included items adapted from Arbaugh (2000) while the construct of instructor's attitude were taken from Thurmond *et al.* (2002). Items to measure Perceived Usefulness, Perceived Ease of Use and Attitude were taken from Davis (1989) and Arbaugh (2000). To measure participants' intention to adopt e-learning, we have used a 10 point Likert scale ranging from 1 as least likely to 10 as most likely. Table 2 shows the questionnaire items, their mean and standard deviation.

Table 1: Subject Demographics (n=494)

Measure	Category	Frequency	Percentage
Gender	Male	165	33.6
	Female	326	66.4
	Missing	3	0.6
Age	19-21 years	247	50.0
	22-24 years	134	27.1
	25 and more	110	22.3
	Missing	3	0.6
Type of course enrolled	Full-time	348	70.4
	Part-time	142	28.7
	Missing	4	0.9
Experience of mixed mode learning mode	1 year	271	54.9
	2 years	73	14.8
	3 years	58	11.7
	4+ years	36	7.3
	Missing	56	11.3
Level of IT skills	Novice	138	27.9
	Intermediate	266	53.8
	Expert	45	9.1
	Missing	45	9.1
Internet Experience	Very poor	7	1.4
	Average	55	11.1
	Good	325	65.8
	Excellent	94	19.0
	Missing	7	1.4

Table 2: Questionnaire Items and descriptive statistics

<i>Construct</i>	<i>Item No.</i>	<i>Item Description</i>	<i>Mean</i>	<i>Std. dev</i>
Computer self-efficacy	SE1	I am able to use the e-learning system well without any assistance.	3.21	1.09
	SE2	I feel confident when I use e-learning tools for learning.	3.34	0.87
	SE3	I am able to accomplish my tasks easily when I use e-learning tools.	3.47	0.90
	SE4	I am able to use communication tools in e-learning system (e.g. discussion forums, chat rooms).	3.49	0.94
	SE5	I am able to upload and download files to and from the e-learning system.	3.69	0.89
Course Flexibility	CF1	E-learning allows me to learn at my own pace and in my own time.	3.80	0.96
	CF2	E-learning allows me catch up with a class that I cannot attend.	3.89	0.92
	CF3	E-learning will save me a lot of time rather than attending a class.	3.59	1.12
	CF4	E-learning allows me to choose topics in order of my preference.	3.40	0.93
Instructor's Attitude	IC1	Instructors have experience in using modern ICT tools.	3.34	0.91
	IC2	Instructors are easily contacted via communication tools (e.g. email, Twitter, etc.).	3.64	1.00
	IC3	Instructors provide me with clear instructions on how to use the e-learning system.	3.23	0.94
	IC4	Instructors respond quickly to my queries.	3.26	0.96
	IC5	Instructors possess adequate technical skills to use an e-learning system in their teaching.	3.32	0.84
Attitude	A1	Adopting ICT and e-learning increases my level of satisfaction.	3.47	1.94
	A2	E-learning makes my learning more interesting.	3.44	0.94
	A3	E-learning supports my self-learning and independent study.	3.64	0.90
	A4	E-learning saves me time and effort when researching information.	3.66	0.94
Perceived Usefulness	PU1	Web-based learning will enhance my effectiveness in the program.	3.38	0.89
	PU2	E-learning improves my performance.	3.38	0.88
	PU3	E-learning is useful in my course.	3.51	0.93
	PU4	E-Learning enhances my productivity.	3.41	0.91
Perceived Ease of Use	PEOU1	Learning to operate the e-learning system will be easy for me.	3.29	0.91
	PEOU2	E-learning makes the learning process more effective for me.	3.56	0.90
	PEOU3	I find it easy to get the E-learning system to do what I want it to do.	3.34	0.92
	PEOU4	It is easy for me to become skilful at using the e-learning system.	3.39	1.02

4. Data Analysis

The SPSS software has been used to analyse data for this research. To prove the significance of the variables a step wise multiple regression analysis was used. We conducted a P-P plot for assessing the assumption of normality to adhere to the basic principle underlying the method of least squares. The plot showed that the quantile

pairs fell nearly on a straight line. It is, thus, reasonable to conclude that the data used for this study are approximately normal. Secondly, to assess the multicollinearity among independent variables in the model, we have used the Variance Inflation Factor (VIF). The VIF value of less than 3 among the independent variables indicated no severe multicollinearity problems among the regressors (Hair *et al.*, 1995). Finally, we have used the Durbin-Watson statistics to detect serial correlation. The value of 1.938 (less than 2) indicated that the residuals are uncorrelated and autocorrelation problem does not exist.

4.1 Reliability and validity analysis

Reliability was examined using the Cronbach's α values for each construct. As presented in Table 3, the constructs Instructors' Attitude and Perceived Usefulness have a Cronbach's α of above 0.72 which indicates a high level of reliability (Loewenthal, 2004) while the remaining constructs have a Cronbach's α of above 0.6 which is generally considered as an acceptable reliable scale (Hinton, Brownlow, McMurray, Cozens, 2004).

Table 3: Cronbach Alpha

Constructs	Cronbach Alpha	Items
Learner Self Efficacy (SE)	.658	5
Course Flexibility (CF)	.688	4
Instructor Attitude (IC)	.747	5
PEOU	.614	4
PU	.805	4
Attitude (A)	.605	4

4.2 Respondents' Profile

The descriptive statistics of the sample presented at Table 1 showed that 66.4% of the respondents were female and 33.6% were male. Respondents aged between 19 and 21 formed the largest group representing 50% of the sample and the most of the respondents (70.4%) were enrolled on a fully time course at the university. The majority of the respondents had 1 year of experience in mixed learning mode and represented 54.9% of the sample. Most of the respondents (65.8%) rated their internet experience as "good" while 266 of the respondents (53.8%) considered themselves to have an intermediate level of IT skills.

4.3 Testing the association between intention of enrolling for a fully online degree and demographic variables

We conducted these tests with an attempt to confirm if students' intention of enrolling for a fully online degree programme (henceforth known as Intention) and the demographic variables (gender, age, prior experience of mixed learning mode, level of IT skills and Internet experience) were statistically significant. Nevertheless, according to the survey responses, the mean score for the likelihood to enroll on fully-online

degree programmes was 5.47 which is slightly above the average. The Shapiro-Wilk test revealed that the composite score for the test variable (Intention) did not follow the normal distribution ($W(460) = .957, p < 0.01$), thus favouring non-parametric testing. Thus, the Mann-Whitney U and Kruskal-Wallis H tests were used to determine the significance of the association between Intention and demographic variables with two and more than two options respectively. The results are presented in Table 4

Table 4: Association between intention of enrolling for a fully online degree and demographic variables

Variable	Operational measures	Statistic	p-value
Gender	Nominal (male, female)	-3.793	.000**
Age group (years)	Nominal (19-21, 22-24, 25 or more)	4.869	.088
Type of course	Nominal (full-time, part-time)	2.761	.006**
Prior experience mixed mode courses (years)	Ordinal (1, 2, 3, 4+)	8.551	.036*
Level of IT skills	Ordinal (novice, intermediate, expert)	20.251	.000**
Internet experience	Ordinal ("Very poor" to "Excellent")	10.755	.029*

* $p < 0.05$ ** $p < 0.01$

Analysis showed that gender ($t = -3.793, p < 0.001$), type of course ($t = 2.761, p = 0.006$), prior experience in mixed mode courses ($\chi^2(3) = 8.551, p = .036$), level of IT skills ($\chi^2(2) = 20.251, p < 0.001$) and Internet experience ($\chi^2(4) = 10.755, p = .029$) significantly impacted on students' *Intention* of enrolling for fully online degrees.

Bearing in mind that higher means indicating greater intention, descriptive statistics (means and standard deviations) were used to explain the results for "gender" and "type of course" in the absence of non-parametric *post hoc* tests. It was found that males ($M = 5.94, SD = 2.088$) intended to enroll for fully online degrees more than their female counterparts ($M = 5.24, SD = 2.083$) did. For "type of course", there was a greater intent from part-time students ($M = 5.99, SD = 2.181$) to enroll for a fully online degree than from full-time students ($M = 5.28, SD = 2.058$).

With regards to "Internet experience", "prior experience in mixed mode courses" and "initial proficiency level in e-learning", non-parametric *post hoc* tests (via pairwise comparisons) were used, given that these four variables had more than two responses. Test results showed that there was a significant difference between the intentions of students with "good" and those with "excellent" Internet experience ($t(4) = -3.175, p = .015$), in that the latter had a greater intention of enrolling for a fully online degree (indicated by the negative *t*-value in the SPSS *post hoc* test table).

As far as "prior experience in mixed mode courses" is concerned, the only significant difference in intention was that between students with one year's experience and those with 4+ years of experience ($t(3) = -2.685, p = .044$), with obviously those with greater experience having a greater intention to enroll.

Lastly, *post hoc* tests also showed that there were significant differences in intentions among students belonging to all three categories (novice, intermediate and expert) of “initial proficiency level in e-learning”: novice and intermediate ($t(2) = -2.936$, $p = .010$), novice and expert ($t(2) = -4.301$, $p < .001$), and intermediate and expert ($t(2) = -2.674$, $p = .022$).

4.4 Correlation analysis

Table 5 presents the means, standard deviations and the correlations between variables.

Table 5: Descriptive Statistics and correlation among variables (n=494)

Variables		Mean	SD	(1)	(2)	(3)	(4)	(5)	(6)
(1)	Intention to use e-learning	5.47	2.11						
(2)	Learner Self Efficacy (SE)	16.96	3.26	.325*					
(3)	Course Flexibility (CF)	14.54	2.94	.311*	.637*				
(4)	Instructor Attitude (IC)	16.58	3.47	.146*	.558*	.448*			
(5)	Perceived Ease of Use (PEOU)	13.50	2.62	.374*	.649*	.588*	.470*		
(6)	Perceived Usefulness (PU)	13.53	2.98	.328*	.611*	.519*	.454*	.658*	
(7)	Attitude (A)	17.41	3.52	.270*	.536*	.494*	.363*	.464*	.533*

* $p < 0.01$

Perceived ease of use variable ($r=.374$, $p<0.01$) has the highest correlations to the dependent variable “Intention to use e-learning”. Other independent variables that significantly correlated with the dependent variable are the Perceived Usefulness ($r=.328$, $p<0.01$), learner self-efficacy ($r=.325$, $p<0.01$), course flexibility ($r=.311$, $p<0.01$), attitude ($r=.270$, $p<0.01$) and instructor attitude ($r=.146$, $p<0.01$). Therefore, all the variables demonstrated significant relationships with intention to use e-learning.

Results also showed that there were significant positive correlations between Attitude towards enrolling for a fully online degree and both Perceived Ease of Use ($r=.470$, $p < 0.01$) and Perceived Usefulness ($r=.533$, $p<0.01$). Perceived Ease of Use is also strongly and positively correlated to Perceived Usefulness ($r=.658$, $p < 0.01$). Thus, as would be expected, that part of TAM was validated, given the technological nature of online degree.

4.5 Hypothesis Testing

We conducted three stepwise multiple regression analysis to test the hypothesis. In the first regression analysis, the variables namely the learner self-efficacy, the course flexibility and instructor attitude were applied as independent

variables while Perceived Usefulness was used as dependent variables. Table 6-1 presents the results of the regression analysis. All the three variables are considered to have significant relationships with the Perceived Usefulness (p values of less than 0.05). Therefore, the test supports H_{1b}, H_{2b} and H_{3b}.

In the second multiple regression analysis, we tested the relationship between the independent variables (that is, learner self-efficacy, the course flexibility and instructor attitude) and dependent variable (Perceived ease of use). Table 6-2 presents the results of the regression analysis. All the three variables are considered to have significant relationships with the Perceived Usefulness (p values of less than 0.05). Therefore, the test supports H_{1a}, H_{2a} and H_{3a}.

In the third multiple regression analysis, the relationship between the independent variables (Perceived ease of use and Perceived usefulness) and dependent variable (Attitude) was tested. Table 6-3 presents the results of the regression analysis. The two variables are considered to have significant relationships with Attitude (p values of less than 0.05). Therefore, the test supports H₄ and H₅.

Table 6-1: Results of stepwise regression analysis (n = 494)

Independent Variables		Dependent Variable: Perceived Usefulness (PU)			
		β	t-value	Sig	VIF
Learner Self Efficacy		.391	8.08	.000	1.936
Course Flexibility		.209	4.65	.000	1.677
Instructor Attitude		.150	3.58	.000	1.449
R Square	.413				
Adjusted R Square	.410				
Durbin-Watson	1.806				

Table 6-2: Results of stepwise regression analysis (n = 494)

		Dependent Variable: Perceived Ease of Use (PEOU)			
		β	t-value	Sig	VIF
Learner Self Efficacy		.405	8.94	.000	1.936
Course Flexibility		.279	6.61	.000	1.677
Instructor Attitude		.129	3.29	.001	1.449
R Square	.487				
Adjusted R Square	.484				
Durbin-Watson	1.963				

Table 6-3: Results of stepwise regression analysis (n = 494)

		Dependent Variable: Attitude			
		β	t-value	Sig	VIF
Perceived Ease of Use		.210	4.17	.000	1.765
Perceived Usefulness		.385	7.64	.000	1.765

R Square	.300
Adjusted R Square	.297
Durbin-Watson	1.935

Hypotheses 6-8 are tested using the results of the correlation analysis presented at Table 5. Hypothesis 6 examined the effects of the learners' attitude on their intention to adopt e-learning. It has been found that the learners' attitude has a positive influence on learners' intention to adopt e-learning ($r=.270, p<0.01$).

Hypothesis 7 examined the relationship between the learners' perceived ease of use and their intention to use e-learning. It has been found that learners' perceived ease of use has a positive influence on their intention to adopt e-learning ($r=.374, p<0.01$).

Hypothesis 8 analysed impact of the learners' perceived ease of use on perceived usefulness. Results showed that learners' perceived ease of use had a positive significant influence on perceived usefulness ($r=.658, p<0.01$).

Therefore, the tests support H_6 to H_8 .

5. Discussion

Regardless of the various advantages of e-learning, the adoption of this innovative mode of learning among undergraduate students is still limited in a Small Island Developing State like Mauritius. The low enrolment rate on fully online degree programmes triggered the need to understand in more details the inherent factors that would help to increase students' intention to accept e-learning as an alternative mode of learning in universities. To explore this issue, the study has extended the TAM by integrating important and related external factors such as the learner self-efficacy, the course flexibility and the instructors' attitude. The study expands the existing body of knowledge on the adoption of technology among users as well as providing more insights on how to make e-learning in universities more effective.

As hypothesised, attitude was a predictor of the intention to enroll on online degree programmes ($r=.270, p<0.01$). This means that students' intention to enroll on these programmes is influenced by their attitudes towards the use of the system. This finding is consistent with Hartwick and Barki's (1994) and Hung's *et al.* (2013) predictions that users form their intention to use a system based on their attitude towards using the system. It can, therefore, be argued that the attitude construct is a central variable that is likely to influence intention to use e-learning. The study also hypothesised that there is positive relationship between learners' perceived ease of use and their intention to adopt e-learning. This hypothesis was empirically supported by the finding of the research. This finding is consistent to those of Jahangir & Begum (2008); Hsu, Wang and Chiu (2009) and Park (2009) which demonstrate that students are more likely to adopt e-learning if they believe that engaging in e-learning is free of effort. Thus, universities must design user friendly online platform so that learners find

e-learning easy to use and interact. Moreover, universities should inform and sensitise potential learners about the benefits of e-learning as well as the ease through which this innovative mode of learning can be used. This promotion can be achieved on open days at the university during which school leavers or any person having an interest on e-learning may be exposed to the way the system operates. The promotion campaign can also be carried out at the workplace to sensitize working people about this flexible mode of learning where they can balance their time among their studies, work as well as their family. This promotion campaign might prove to be effective given that findings of the study revealed that there was a greater intent from part-time students ($M = 5.99$, $SD = 2.181$) to enroll on a fully online degree programme than full-time students ($M = 5.28$, $SD = 2.058$)

Our findings also empirically confirmed that perceived ease of use and the perceived usefulness were significant predictors of attitude accounting for more than 29 % of the variance in the attitude towards e-learning ($R^2 = .30$, $R^2_{\text{Adjusted}} = .297$). This finding is consistent with the TAM (Davis, 1989) and other previous research such as Kwasi (2007) and Chang (2010) that tested and validated the perceived ease of use and the perceived usefulness constructs as antecedents of the attitude construct.

Furthermore, the positive correlation between attitude and perceived usefulness ($r = .533$, $p < 0.01$) denotes that students who believe that e-learning will improve their performance will be more likely to enroll on a fully online degree. This empirical evidence corresponds to the findings of Surendran (1989), Saeed (2008) and Su and Tsai (2013) which indicated that perceived usefulness has an influence on student's intention to use online learning systems. In addition, the positive correlation between attitude and perceived ease of use ($r = .658$, $p < 0.01$) demonstrates that students are more likely to adopt e-learning if they believe that engaging in e-learning if they are at ease with the system. Therefore, based on the previous discussions it can be deduced that our findings empirically confirmed perceived ease of use and the perceived usefulness have a significant relationship with attitude.

Results also indicated that the three independent variables learner's self-efficacy, course flexibility and tutor's attitude explained more than 48% of the shared variance with the dependent variable "perceived ease of use" ($R^2 = .487$, $R^2_{\text{Adjusted}} = .483$). The findings also showed that the three independent variables accounted for more than 41 % of the variance in the dependent variable "perceived usefulness" ($R^2 = .413$, $R^2_{\text{Adjusted}} = .410$). These findings, therefore, led us to conclude that the independent variables learner's self-efficacy, course flexibility and tutor's attitude have a significant impact on the perceived ease of use and perceived usefulness. These results correspond to some existing related research. For instance, findings of the research validating learner's computer self-efficacy as significant predictors of perceived ease of use and perceived usefulness, correspond to previous similar research including Womble (2007); Simmering *et al.* (2009); Tang and Wei (2013) and Pellas (2014). These studies found that computer self-efficacy has a positive relationship with

students' cognitive and emotional engagement factors. Furthermore, the findings demonstrating course flexibility as significant predictors of perceived ease of use and perceived usefulness corroborate with those of Leidner and Jarvenpaa (1995); Berger (1999) and Arbaugh (2002) who found that the flexibility of adopting e-learning at the working, learning and commuting hours positively influenced participation in e-learning. Similarly, Arbaugh and Duray (2002) found that course flexibility played an important role in e-learners' satisfaction as e-learning is not constrained by space, time and location. In addition, the findings of the research confirming instructor's attitude towards e-learning as antecedent of learners' perceived ease of use and usefulness of the system, participation and motivation in e-learning correspond to Romiszowski, (2004) and Olson (2005). To Sun *et al.* (2007), the instructor plays a key role in the student's learning process in both the traditional face-to-face teaching environments or in remote learning environments. For instance, a more enthusiastic instructor having a positive view of e-learning education will be more willing to engender useful perceptions for the acceptance and incorporation of technology into learning processes (Lee *et al.*, 2009; Alkandari, 2010; Lee & Hsiao, 2014).

6. Implications for theory and practice

This study makes significant theoretical contribution to the e-learning adoption research. Being the first in its kind, it provides unique insights on the external factors affecting adoption e-learning in a SIDS context. Based on our extensive search of the literature, our study appears to be the first to empirically explore the adoption of e-learning in a SIDS context while most of the studies investigate this phenomenon in developed and developing countries. Findings of the study correspond to previous related research and confirmed that the external factors learner's self-efficacy, course flexibility and tutor's attitude impact positively the perceived usefulness, perceived ease of use and attitude. Our study has further confirmed that the effectiveness of TAM in predicting users' intention to adopt IT based system. From a practical side, the study has identified key factors influencing the adoption of e-learning and as such the results have significant managerial implications for universities, policymakers and professionals working on the development of e-learning platforms. These factors can be considered as the cornerstone for any e-learning projects.

The survey indicated that learner's self-efficacy, course flexibility, tutor's attitude, perceived ease of use, perceived usefulness and attitude contributed significantly to the adoption of e-learning among undergraduates in Mauritius. Given that the implementation of e-learning in Mauritius has not been appealing to students, the outcomes of this research are believed to assist policy makers and Universities administrators from Mauritius and other SIDS countries which have similar characteristics to reposition their strategies so as to facilitate faster and more efficient adoption of e-learning. The outcomes of this research showed that tutors should have the necessary skills in delivering online courses and a positive attitude towards using and integrating technology in the learning process. Therefore, by appointing tutors

having prior experience in e-learning could lead to better acceptance of e-learning by students (Alkandari, 2010). More so, the necessary training on the use of e-learning platforms can be provided to tutors who do not have prior exposure to; but have a positive attitude towards e-learning. Moreover, universities should design e-learning platforms that are easy to use. For example, Costabile, De Marsilo, Lanzilotti, Plantamura and Roselli (2005) proposed that the design of the interface should provide good usability so that student's interactions with the software are as natural and intuitive as possible. This can be achieved by presenting clear and easy to use icons, buttons, graphical representations, pictures and text snippets (Snae & Brueckner, 2007). Universities should also endeavour to provide training on how to use online portals and other educational technologies to existing and prospective students. Through training and familiarity with the system, students can, thus evaluate the ease of use and benefits of e-learning which, in turn, can motivate them to enroll on online courses. In addition to the training, information on the benefits and flexibility of e-learning can be disseminated to prospective students during education fairs/events/open days organised by universities or other institutions. Similarly, universities should also develop and run modules (where appropriate) on a blended mode, facilitated by the use of ICT. This will allow students to acquire the required skills and knowhow that can motivate them to adopt e-learning in the future. Students can also share their experience of e-learning with other existing/prospective students through word of mouth communication. In addition, universities should increase the number of part time on line courses as findings showed that working people are more likely to enroll on online degree courses due to their family and social commitments (mean= 5.99) compared to full time students (mean=5.28). To encourage students to register on online degree programmes, universities can consider a reduction in the fees to pass on the cost savings associated to the normal delivery of lecture (that would have otherwise been encountered). Where the costs saved are substantial, the universities may also consider providing free of charge IT tools such laptops and tablets to facilitate the learning process. Furthermore, universities should invest more on the ICT facilities to promote e-learning on campus including the extension of the Wi Fi facilities to a wider geographical area as well as increasing broad band speed. A dedicated desk with the required facilities should also be set up to assist students facing technical problems with respect to the delivery of online programmes. This desk will also analyse and react promptly to students' feedback with a view to improve the service.

7. Limitations and future research

As with all studies, this study also has its own limitations which can narrow down scope of the conclusions. The first limitation is derived from the geographical location of the current research (i.e. Mauritius) and its application to other SIDS economies. It is believed that the findings may be applicable to other SIDS economies that share common demographic characteristics with Mauritius as well as

implementing e-learning at tertiary level. However, they may not be necessarily relevant to other SIDS economies that are not on the same level of e-learning implementation. Therefore, we should be cautious about making causal interpretations of these findings. Hence, further studies in different SIDS countries would most likely strengthen and validate the findings of this exploratory study. The next limitation is that being a cross-sectional study that represents a single point in time, it does not demonstrate how students' attitude and behaviour towards e-learning may change over time. Therefore, further studies can employ a longitudinal approach to ascertain any change in students' attitude and behaviour towards e-learning. Also, given the uniqueness of each country and its inherent educational system, future research can consider other possible factors including culture that could serve as potential antecedents to TAM. Future research efforts can also investigate students' experience of fully online courses with a view to improve existing e-learning systems.

8. Conclusion

To explore factors influencing university students' future intention to adopt e-learning in Mauritius, this study incorporates the learner's self-efficacy, course flexibility and tutor's attitude constructs to the key propositions of the TAM. The study contributes to extant research on the adoption of e-learning and it is believed that the research model developed for this study can serve as a basis for future research on the adoption of e-learning. The findings of the research revealed that the added constructs to the model have significant impacts on the TAM constructs. Moreover, the findings showed that university students' future intention to adopt e-learning is largely influenced by their attitudes towards e-learning. Based on the findings and discussion of the study, researchers and policymakers should consider these factors to increase the enrolment rate on online programmes and to strengthen e-learning implementation in SIDS economies such as Mauritius.

Acknowledgements

This study was supported and funded by the Mauritius Research Council (MRC).

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