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Development of a Conceptual Framework to Support ICT Adoption by Ghanaian Higher Education Students

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ABSTRACT

The purpose of this study is to develop a conceptual framework to examine Ghanaian higher education students' adoption of ICTs for learning. The study reviewed the theoretical and empirical literature on technology adoption, to develop a conceptual framework to investigate Ghanaian higher education students' adoption of ICT for learning.

The study identified 5 exogenous variables (performance expectancy, effort expectancy, social influence, facilitating conditions and ergonomic factors), 2 endogenous factors (behavioural intention and use behaviour), 2 mediating variables (health issues and satisfaction) and 5 moderating variables (age, gender, experience, voluntariness of use and educational level).

The study will be useful to administrators and policy makers in higher education to help with understanding and development of the best measures to arouse Ghanaian students' interest to adopt ICTs for learning and research. The conceptual framework extended the UTAUT, with health issues and satisfaction as variables mediating the relationship between ergonomic factors and students' behavioural intention to use ICT for learning and research.

Keywords: *effort expectancy; performance expectancy; social influence; ergonomic factors; health Issues; satisfaction*

INTRODUCTION

The proliferation of Information and Communication Technologies (ICT) has changed the face of how businesses are conducted. Most businesses have integrated ICT into their work with the view of achieving higher efficiency and improving upon productivity, which in turn leads to higher profitability. Nevertheless, significant investment in ICT does not guarantee higher returns, but the investment must be supported with the necessary complimentary assets such as appropriate and efficient business processes, team work and collaborative work environments (Laudon and Laudon, 2014). According to Noor et al. (2016) and Eastin (2010), ICT is any form of digital technology (such as, the Internet, personal computers, mobile devices and other wireless communications) that help transmit and receive information and aid communications. It is an undeniable fact that the use of computers and technologies add value to the process of teaching and learning. ICTs are used at different levels to improve access, efficiency and quality in the teaching and learning process.

The application of ICTs in higher education institutions allow for the creation of a more flexible model of learning and the development of an education based on learning where students acquire a more proactive role in the education process. Information and Communication Technology (ICT) in education creates new possibilities because of new technologies that can also create changes in attitudes and leadership (Dey, Hassanien, Bhatt, Ashour & Satapathy, 2017; Kavathatzopoulos, 2015). The integration of technology in learning and research helps students to discover different strategies of learning and helps them to be more creative and more engaged in the lessons leading to meaningful and lifelong learning (Karpudewan, Md Zain, Chandrasegaran, 2017; Ribeiro, Moreira, & Almeida, 2010). New and emerging technology creates exciting possibilities for student

learning. It provides for almost infinite and rapid access to information and also allows for students to be connected inside and outside of the classroom, to develop multimedia projects, and to learn experientially (Idri, 2013; Page & Page, 2010). Ideally, ICTs generate the interest and skill necessary for students to continue to search for new and exciting ways to integrate technology into their learning activities (Brooks, Borum & Rosenørn, 2014; Bastable, Gramet, Jacobs & Sopczyk, 2010).

In addition to the learning areas in which mobile technology is being integrated, mobile devices could have important influences on the pedagogical context as well (Lauricella, Blackwell & Wartella, 2017; Barr, & Linebarger, 2016). Teachers may choose to use tablets in addition to, or in place of more traditional activities because tablets are highly engaging for young children.

In Ghana, though successive governments have invested substantially in education, there is a growing hue and cry on the airwaves about falling educational standard at all levels. The president of the National Association of Graduate Teachers (NAGRAT) blamed the falling standard of education in the country on poor infrastructure and inadequate logistics (Aryeh, 2015). According to Jhurree (2005), it is important to painstakingly plan and involve management in technology integration in education settings. Failure to pay attention to these issues could either slow down a project or it can fail outright.

Though several technology acceptance models have been applied in the literature to understand students' adoption of ICTs for learning and research, the results from these studies varied even in situations where the same model has been employed. Thus, this study sought to develop a conceptual model that explains Ghanaian students' behavioural intention to use ICT and use behaviour in higher educational institutions by combining the UTAUT model (Venkatesh et al, 2003) with ergonomic factors, satisfaction and health issues.

LITERATURE REVIEW

The Unified Theory of Acceptance and use Model (UTAUT) formulated by Venkatesh et al. (2003) combined eight extant technology acceptance models. These models, include the Theory of Reasoned Action (TRA) (Fishbein & Azjen, 1975), Theory of Planned Behaviour (TPB) (Ajzen, 1991), Technology Acceptance Model (TAM) (Davies, 1989), Combined -TAM-TPB (C-TAM-TPB) (Taylor & Todd ,1995), Model of PC Utilization (Thompson et al. 1991), Motivational Model (Davis, Bagozzi, and Warshaw, 1992); Social Cognitive Theory (Bandura, 1986) and Innovation Diffusion Theory (Rogers, 2003). The model explained 70% of the variation in user's intention to accept technology. Table 1 below, presents the constructs and description used in the UTAUT model.

Table 1: *UTAUT Constructs and Description*

	Construct	**Description**
1	Performance Expectancy	The degree to which an individual believes that using the system will help him or her to attain gains in job performance
2	Effort Expectancy	The degree of ease associated with the use of the system
3	Social Influence	Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system.

4	Facilitating Conditions	The degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

Source: Venkatesh et al. 2003)

The literature reviewed indicates that since the inception of the UTAUT model by Venkatesh et al. (2003), researchers have employed it in different contexts across the globe with varying predictors of behavioural intention to use technology and use behaviour. Other researchers have extended the UTAUT model with different constructs, yet the results vary. Some of the results corroborate while others contradict the original postulation by Venkatesh et al (2003). Most of the prior work failed to address the moderating effect of age, gender, experience and voluntariness of use. According to Venkatesh et al., (2003), performance expectancy significantly relates intention to use technology. Prior work examining higher education students' adoption of ICT supports the assertion that performance expectancy relates students' behavioural intention to use ICT (Yakubu & Dasuki, 2018; Lwoga & Komba, 2015; Awwad & Al-Majali, 2015). However, many other studies provided evidence to show that the performance expectancy has no relationship with students' behavioural intention to use technology (Amin, Rahman, Khan & Karim, 2018; Abdullateef & Allumi, 2014).

Also, the UTAUT model posits that effort expectancy has a significant effect on behavioural intention (Venkatesh et al., 2003). Empirical studies on higher education students' adoption of technology, which supported the assertion that effort expectancy significantly influences students' behavioural intentions to use technology include the following: (Yakubu & Dasuki, 2018; Lwoga & Komba, 2015; Awwad & Al-Majali, 2015). Nevertheless, other studies showed no evidence to support the relationship between effort expectancy and behavioural intention to use technology (Jong & Wang, 2009; Šumak, et al., 2010; Decman, 2015). Furthermore, the UTAUT model postulates, that social influence has a direct effect on Behavioural Intention to use technology. Many prior studies support this assertion (Lwoga & Komba, 2015; Awwad & Al-Majali, 2015; Decman, 2015). Conversely, other studies did not support the assertion that Social Influence relates to intention to use technology (Yakubu & Dasuki, 2018; Dulle and Minishi-Majanja, 2011; Deng, Liu and Qi, 2011).

Though the UTAUT model restricted the predictors of behavioural intention to use technology to effort expectancy, performance expectancy and social influence, other studies have extended the model with different constructs, such as, attitude (Akbar, 2013; Jong and Wang, 2009;), awareness (Dulle and Minishi-Majanja,2011), anxiety (Liebenberg, Benade, Ellis, 2018; El-Gayar, Moran & Hawke ,2010), e-learning motivation (Maldonado et al., 2011), habit (Masa'deh, Tarhini, Mohammed & Maqableh, 2016), information quality (IQ) , service quality (Chang, Lou, Cheng, Lin, 2015), satisfaction (Bouznif ,2018), self-efficacy (Lwoga & Komba, 2015), and all have shown a significant relationship with behavioural intention to use technology.

Critically assessing the reviewed literature, it is apparent that the postulations in the UTAUT model differ from one group of students to another. Apart from the inconsistencies, other studies have extended the model with different variables and their effect on students' behavioural intention to use technology is significant. It is therefore important for researchers to develop a model that comprehensively help understand a group of students' behaviour toward the use of technology for learning and research. In this regard, this study seeks to develop a conceptual framework to analyse Ghanaian higher education students' intention to use ICT and usage behaviour since there is paucity of literature in this area of study.

CONCEPTUAL FRAMEWORK

The proposed conceptual framework is comprised of four important types of variables:

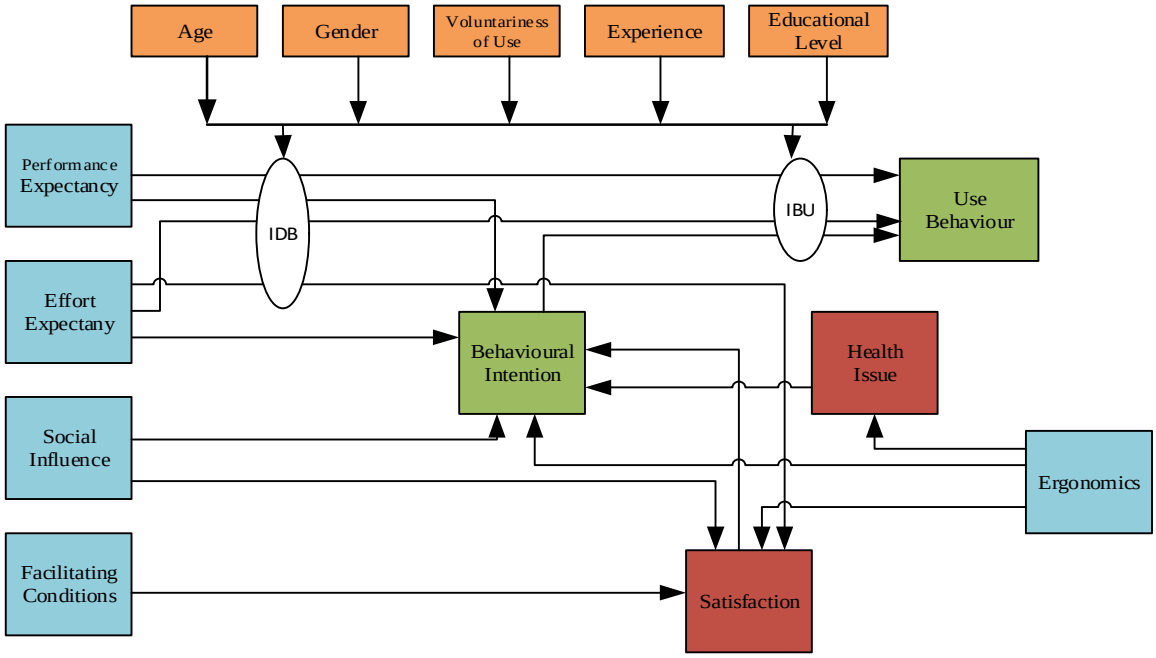
1) Five independent variables: effort expectancy, performance expectancy, social influence, facilitating conditions and ergonomics factors. These independent variables are expected to influence students' Behavioural Intention to use ICT.

2) Two dependent variables: behavioural intention to use ICT in higher education and actual use behaviour. Behavioural intention is expected to influence actual use behaviour.

3) Five moderating variables consisting of: age, gender, voluntariness of use, experience and, educational level. These moderators are expected to impact on the influence of performance expectancy, effort expectancy and social influence toward behavioural intention to use ICT and the impact on the influence of behavioural intention, performance expectancy and effort expectancy toward usage behaviour.

4) Two mediating variables: satisfaction and health issues. Satisfaction and health issues are expected to mediate the relationship between ergonomic factors and students' Behavioural Intention to use ICT.

The variables are shown in Figure 1 below.



IDB: The impact of moderators on the direct paths between determinants and behavioral intention
IBU: The impact of moderators on the paths between behavioural intention, effort expectancy performance expectancy and use behaviour

Figure 1: Conceptual Framework

Performance Expectancy

Performance expectancy (PE) used in UTAUT (Venkatesh at al., 2003), TAM (Davis 1989), TAM2 and Combined TAM and TPB (C-TAM-TPB) (Taylor & Todd, 1995), was postulated as a strong direct determinant of behavioural intention. Recent studies have provided strong evidence to support this assertion (Yakubu & Dasuki, 2018; Decman, 2015; Lwoga & Komba, 2015; Awwad & Al-Majali, 2015). Similarly, performance expectancy which is also perceived usefulness (Davis, 1989) has also been shown to have a positive relationship with Actual Usage (Moya, Nakalema & Nasamba 2017; Arif & Kanwa 2016; Almasri, Alshalabi & Bader, 2016). Performance expectancy is defined and used in this study as: The degree to which an individual or group of people expect to be proficient in their work or education when they are using technology (Usoro, Echeng & Majewski, 2014). It is expected that performance expectancy will significantly determine students' intention to use ICT and actual usage behaviour for learning and research. From this evidence, it is a good foundation to use performance expectancy as the direct determinant of student's behavioural intention to use ICT and actual usage in this study.

Effort Expectancy

Effort expectancy was hypothesized as a direct determinant of behaviour intention (Venkatesh et al., 2003). There is strong evidence from recent studies in the literature that support the assertion that effort expectancy is a direct determinant of behavioural intention to use ICT (Yakubu & Dasuki 2018; Lwoga & Komba 2015; Jawad & Hassan 2015). Other theories and models including TAM, TAM2, and C-TAM-TPB regard effort expectancy as perceive ease of use (PEOU) and theorized that PEOU or effort expectancy indirectly determines Actual Usage (Al-Azawei, Parslow, & Lundqvist , 2017; Lo, Ramayah & Mohamad, 2015). Also, other studies provided strong support for a direct relationship between effort expectancy and actual usage behaviour (Moya, Nakalema & Nasamba, 2017; Jabeen, Khan & Ahmad, 2015). Furthermore, other prior studies have also indicated that effort expectancy exert significant effect on students' satisfaction (Chen & Yao. 2016; Sharma, Chandel & Govindaluri, 2014; Joo, Lim & Kim, 2011).

Effort expectancy is defined and used here as: the extent to which a person or organization believes that using technology will be free from effort (Zuiderwijk, Janssen & Dwivedi, 2015). Based on the discussed theories/models and previous research, effort expectancy is justified as an important determinant of behavioural intention to use ICT, actual usage behaviour and satisfaction in the conceptual model.

Social Influence

Social Influence is represented as a subjective norm in many theories (Venkatesh et al., 2003) including the TRA, TPB, DTPB, and C-TAM-TPB. None of the social influence constructs in the aforementioned models was significant in a voluntary context. However, they were significant in a mandatory context. Though these prior works affirmed that social influence predicts behavioural intention, they were not solely from mandatory context as suggested by the models and theories (Decman 2015; Lwoga and Komba 2015; Awwad and Al-Majali, 2015; Jawad & Hassan 2015). Other articles in the literature also contradicted the claim that social influence predicts behavioural intention (Bouznif, 2018; Yakubu and Dasuki 2018; Masa'deh et al., 2016).

The Attention Relevance Confidence Satisfaction (ARCS) model is an important model in education. Many prior studies have lent support to the postulation that social influence has a significant effect on students' satisfaction (Liao & Hsieh 2011; Yau, Cheng & Ho 2015). With this supported rationale, social influence is used as a direct determinant of students' behavioural intention to use ICT and satisfaction in this study. Social Influence is defined in this study as: the extent to which individuals' perceptions that the people who are close to them or those who hold

important positions in their life believe that they should try using the new system. (Magsamen-Conrad, Upadhyaya, Joa & Dowd, 2015). With this supported rationale, social influence is used as a direct determinant of students' behavioural intention to use ICT and Satisfaction in this study.

Facilitating Conditions

Venkatesh et al., (2003) theorised that facilitating conditions is a direct determinant of actual use behaviour. However, other extant technology acceptance models such as DTPB posit facilitating conditions as a direct antecedent of both behavioural intention and actual use behaviour. Many empirical studies in the literature affirmed the assertion that facilitation conditions impact on students' behavioural intention to use technology for learning and research (Jawad & Hassan 2015; Mtebe & Raisamo 2014). Also, other articles in the literature showed support for facilitating conditions exerting significant influence on students' actual usage of ICT for learning and research (Yakubu & Dasuki 2018; Awwad & Al-Majali 2015). Furthermore, Raman et al., (2014) showed that facilitating conditions influence both behavioural intentions and actual usage of ICT.

The updated Delong and McLean information systems success model posits that service quality, has direct influence on users' satisfaction which in turn influences intention to use. According to Sami & Päivi (2015), students are satisfied when provided with a comfortable learning environment. Lee (2010) reported that when students felt supported to use websites to check their own online learning progress, they displayed a positive level of satisfaction. Thus, this study theorised that Facilitating Conditions is a direct determinant of students' satisfaction. In this study, facilitating condition is defined and used as the perceived availability of organizational and technological infrastructure that supports the use of systems (Moon & Hwang, 2018).

Ergonomics

Ergonomics is as an applied science concerned with designing and arranging things people use so that the people and things interact most efficiently, safely and optimize both health (reduce stress conditions that will be encountered) and productivity (Majid, Prayogi, Surantono & Hendarsih 2018; Gupta, Bhat, Mohammed, Bansal & Gupta 2014). Bowman et al. (2014), defines ergonomics as the correct individual positioning and adaptation of equipment when using a laptop computer (such as a foot rest, adjustable chair, laptop stands, and a separate keyboard) that can help achieve the ideal position, frequency of eye breaks, some eye exercises and frequency of rest breaks.

According to Smith (2012), when persons are well adapted to an environment, they are considered to have achieved a state of balance between the demand of the external environment and individual competency. The work of Kim & de Dear (2013) found that noise disturbance affected satisfaction with the environment and health, however, the relationship between noise disturbance and self-rated job satisfaction was not significant. Vimalanathan & Babu (2017) asserted that the physical ergonomic factors such as physical workload, workplace design, sitting posture affects performance and human health. The work of Ikonne (2014), revealed that suitable workstation and equipment designs as well as a condition of work posture are aspects of ergonomic factors that contributed significantly in attaining a higher level of job satisfaction for librarians.

Environmental factors, such as, lighting, (Wilson & Cotgrave, 2016), temperature (Wilson & Cotgrave 2016; Yang, Becerik-Gerber, Mino, 2013), and flexibility of space have been noted to influence student's satisfaction (Thomas, 2010; Holm, 2011). An article by Hill and Epps (2010) suggested that attributes with satisfactory conditions, such as lighting, temperature, and space management, increased student satisfaction with learning environments. In this study, the ergonomic factor is defined as the comfort of the working environment (Ersoy, 2015). The study expects ergonomics factors to influence students' health issues and satisfaction, which in turn influence behavioural intention to use ICT.

Behavioural Intention

The UTAUT model emphasizes that behavioural intention is an appropriate proxy to examine and predict a user's behaviour toward a particular technology or system. Other extant technology acceptance models such as TAM, TPB and DTPB supported the assertion that, the path from behavioural intention to actual use behaviour is significant. User behaviour is largely influenced by the Behavioural Intention (BI), so BI plays an important role in predicting Use Behaviour. However, it is imperative to note that BI is more predictive of Use Behaviour when individuals have had past experience with the technology (Taylor & Todd 1995) Recent researches have confirmed the claim that Behavioural Intention significantly influence usage behaviour (Yakubu & Dasuki 2018; Awwad & Al-Majali, 2015).

The objective of this study is to consider behavioural intention as well as usage behaviour because the investigation of behaviour intention may help in predicting future usage. Therefore, it is expected that behavioural intention will exert significant influence on students' ICT use behaviour. This study referred to behavioural intention as the inclination to take action in the future based on personal subjective judgments, which can be used to predict the behaviours of an individual (Hu, 2014).

Usage Behaviour

The application of ICT by students in higher education is subject to the demands of the institution. Whereas it is voluntary for students to use ICTs for learning and research in some institutions, it is mandatory in other institutions. With regard to this, it can be said that this conceptual framework is developed on both mandatory and voluntary use of ICT for learning and research. With these mixed contexts, it is not obvious that students' behavioural intention will impact significantly on actual use behaviour. In the mandatory context, one can assume that students' behavioural intention will influence use behaviour. However, for students in institutions where ICT usage is voluntary, the effect of behavioural intention may be significant or insignificant on students' use behaviour. Therefore, it is reasonable to claim that students' behavioural intention to use ICT will be closely related to their use behavior, if the use of the technology depends on their own free will. Several current studies lend support to the claim that behavioural intention and use behaviour have a significant relationship (Yakubu & Dasuki 2018; Awwad and Al-Majali, 2015; Jawad & Hassan, 2015; Raman et al., 2014). Therefore, it is expected that behavioural intention will have a significant influence on students' ICT use behaviour. In this study, use behaviour refers to the degree to which users use ICT for learning and research (Harsono and Suryana, 2014).

Satisfaction

Satisfaction is a state felt by a person who has experienced performance or an outcome that fulfilled his or her expectations (Lyas, & Arif, 2013). When a person perceives that the service encountered is good, he or she is satisfied, otherwise he or she is dissatisfied when his or her perception falls short of the service expectation. Thus, students' satisfaction can be defined as a function of the relative level of experiences and perceived performance about educational service (Mukhtar, Anwar, Ahmed, & Baloch, 2015).

When students are considered as customers of an organization, then it is very important for educational institutions to provide special attention to meeting students' satisfaction by providing their learning needs. Students cannot learn properly if they feel that there are environmental and or personal barriers that hinder attainment of objectives (Al-Azawei & Lundquist, 2015). According to Liaw and Huang (2013), enhancement of environmental satisfaction improves learners' positive learning attitudes of behavioural intentions toward e-learning. Likewise, a study by Pereira, Ramos, de Andrade & de Oliveira (2015), strongly asserted that satisfaction is decisive for continuance

intention in the e-learning context. Lastly, the work of Findik-Coşkunçay, Alkiş & Özkan-Yildirim (2018) also affirmed the claim that satisfaction influences behavioural intention. Therefore, this research expects satisfaction to influence students' behavioural intention to use ICT. In this study satisfaction is defined as the feeling of happiness with the environmental factors, obtained when a student fulfils his or her needs and desires through the use of ICT (Saif, 2014).

Health Issues

Many of the studies reviewed have identified health issues in diverse forms. A recent study by Kamimura et al., (2018), referred to Health Issues as negative emotions (such as, mad, sad, worried), being overwhelmed with responsibilities, family, lack of sleep, feeling rushed, anxiety, school, mental health (such as, thoughts/attitudes), and physical or emotional stressors. Workers are also affected physically, emotionally, and mentally with related health issues such as severe musculoskeletal discomfort, headaches, depression, and loss of appetite (Maakip, Keegel & Oakman 2017; Khan & Khan, 2012). In an educational context, chronic stress, anxiety, depression and low self-esteem, have resulted in poor academic performance, school failure, and disruptive behaviour at school. Celik (2015) suggested that technology anxiety has a direct negative effect on intention to use technology. Furthermore, other prior studies demonstrated that stress affects users' intention to discontinue use of technology (Bhattacherjee & Lin, 2014; Sun, 2013). In all these discussions of health issues among the different authors, there is one important theme, that is, a discomfort experience by the unit of study. Therefore, this study expects health issues to have a significant influence on behavioural intention to use ICT. Thus the definition of health issues is the general condition of a person's body caused by illness, injury, pain, or discomfort in using ICT for learning and research (Fan, Lederman, Smith & Chang, 2014).

Moderators

The UTAUT model posits that age and gender moderates the relationship between performance expectancy and social influence on behavioural intention. The model also suggested that age, gender and experience moderate the relationship between effort expectancy and behavioural intention. Furthermore, the UTAUT model postulated that age, gender, experience and voluntariness of use moderates the relationship between social influence and behavioural intention. Finally, the model suggested that age and experience moderate the relationship between facilitating conditions and use behaviour.

Age

Suksa-ngiam & Chaiyasoonthorn (2015) investigated why Thai students use social media and the differences between demographic groups. The findings of the study statistically confirms that age moderates the path between subjective norm (social influence) and behavioural intention. The effect is stronger for older students than for younger people. Wang, Wu & Wang (2009), provided evidence to support the declaration that age moderates the relationship between social influence and behavioural intention. Other studies have also confirmed the assertion that age moderates the relationship between effort expectancy and behavioural intention (Tarhini et al., 2014; Awwad and Al-Majali, 2015).

Gender

Recent studies in the area of technology adoption in higher education have mixed results with regard to the five moderating variables in the relationships between independent and dependent variables. Tarhini et al., (2014) and Raman et al., (2014) found that gender moderates the relationship between effort expectancy and behavioural intention. The findings of these studies also affirm the claim that gender moderates the relationship between social influence and behavioural intention. However, other studies did not support the moderating effect of gender on the relationship between the key determinants of intention (effort expectancy, performance expectancy, social

influence and facilitating condition) and behavioural intention (Arif, Ameen & Rafiq 2018; Jambulingam, 2013).

Voluntariness of Use

Ramayah (2010), suggested that voluntariness of use moderates the relationship between effort expectancy and performance expectancy on use behaviour. This study expects voluntariness of use to moderate the relationships in the model.

Experience

Maduku (2015) and Abu-Al-Aish & Love (2013) found that experience moderates the relationship between effort expectancy and behavioural intention. However, Arif, Ameen & Rafiq (2018) noted that experience has no effect on the relationship between effort expectancy and social influence on behavioural intention, as well as, facilitating conditions and use behaviours.

Educational Level

Although the original UTAUT model did not address the moderating effects of educational level on the key relationships, there were empirical studies which investigated the moderating effect of education level. Recent studies (McKeown & Anderson, 2015; Haghshenas, Chatroudi, & Njeje. 2012) showed that student cohort moderated the key relationships in the UTAUT model. Furthermore, Awaad & Al-Majali (2015) showed that educational level moderated the relationship between effort expectancy and behavioural intention. Moreover, educational level had a significant effect on the relationship between performance expectancy and behavioural intention and the relationship was significant for undergraduate students, but irrelevant to postgraduate students (Awaad & Al-Majali, 2015). The current study expects the educational level to moderate the key relationship in the conceptual model. Educational level in this study is a cohort of students made up of undergraduate and postgraduate.

CONCLUSION

The study provides a blueprint in the form of a conceptual framework for the adoption of ICTs for students in Ghanaian higher education for learning and research. The study has attempted to extend the UTAUT model by including factors such as ergonomics as a distal variable, health issues and satisfaction as mediating variables influencing students' behavioural intentions to use ICT for learning and research. It is expected that this conceptual framework will serve as a blueprint for administrators of higher education institutions in Ghana and developing countries at large. When the model is validated, other researchers can employ it or its extension to investigate the adoption of technology from a different context. Finally, it can enable policy makers to develop policies that would arouse students' interest to adopt ICTs for learning and research.

REFERENCES

Abdullateef, A. O. & Allumi, N. A (2014). Determinants of Moodle 1.9 Online Learning-Zone Services Adoption Journal of Management Information System and E-commerce, vol. 1, no. 1.

Abu-Al-Aish, A. & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. *The International Review of Research in Open and Distributed Learning*, vol. 14, no. 5, pp. 82-107.

Ajzen, I. (1991). The Theory of Planned Behaviour. Organizational Behaviour and Human Decision Processes, vol. 50, no. 2, pp. 179–211.

Akbar, F. (2013). What Affects Students' Acceptance and Use of Technology? Dietrich College Honours Theses.

Almasri, A. K, Alshalabi, F. S. & Bader D. M.(2016) , New Mobile Learning Process Model for Higher Education Students in Jordanian Universities, *Asian Journal of Information Technology* vol. 15, no. 12, pp. 2016-2022

Al-Azawei, A. & Lundqvist, K. (2015). Learner differences in perceived satisfaction of an online learning: an extension of the technology acceptance model in an Arabic sample, *The electronic journal of e-learning*, vol. 13, no. 5, pp .408- 426.

Al-Azawei, A., Parslow, P., & Lundqvist, K. (2017). Investigating the effect of learning styles in a blended e-learning system: An extension of the technology acceptance model (TAM), *Australasian Journal of Educational Technology*, 2017, vol. 33, no. 2.

Amin, M. K., Rahman, M.A, Khan, T. & Karim M. T (2018) Investigating Students' Adoption and Usage Behaviour of Educational Technology(EduTech) at Tertiary Level (PLS-SEM Approach) , *AIUB Journal of Science And Engineering,* vol. 17, no. 1, pp. 2520 – 4890

Arif, M., Ameen, K.& Rafiq, M. (2018) Factors Affecting Students use of Web-Based Services: Application of UTAUT in the Pakistani context, The Electronic Library, https://doi.org/10.1108/EL/-06-2016-0129

Arif, M. & Kanwa, S. (2016) Adoption of Social Media Technologies and their Impact on Students' Academic Performance: The only Way for Future Survival of Distance Education Students in Pakistan

Aryeh, O. A.(2015, September 5). NAGRAT Bemoans Falling Standards of Education. Retrieved from https://www.a1radioonline.com/4964/nagrat-bemoans-falling-standards-of-education/index.html

Awwad, M. S & A-Majali, S. M. (2015) "Electronic library services acceptance and use: An empirical validation of unified theory of acceptance and use of technology", The Electronic Library, vol 33 issue:6 pp. 1100-1120

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice Hall series in social learning theory (Vol. 1).

Barr, R. & Linebarger, D. N. (2016) Media Exposure During Infancy and Early Childhood: The Effects of Content and Context on Learning and Development,Springer International Publishing,

Bastable,S. B, Gramet, P., Jacobs, K. & Sopczyk, D. I (2010)Health Professional as Educator: Principles of Teaching and Learning, Jones & Bartlett Learning

Brooks, E. P., Borum, N & Rosenørn, T (2014)Designing Creative Pedagogies Through the Use of ICT in Secondary Education, International Conference on Education & Educational Psychology 2013 (ICEEPSY 2013, Procedia - Social and Behavioural Sciences 112 (2014) pp. 35 – 46

Bhattacherjee, A. & Lin, C.-P. (2014) A unified model of IT continuance: three complementary perspectives and crossover effects. European Journal of Information Systems. doi: 10.1057/ejis.2013.36.

Bouznif, M.(2018). Business Students' Continuance Intention Toward Blackboard Usage: An Empirical Investigation of UTAUT Model, *International Journal of Business and Management*, vol. 13, no. 1.

Bowman, P. J., Braswell, K. D. R., Cohen, J. R., Funke, J. L., Landon, H. L., Martinez, P. I., & Mossbarger J. N.(2014), Benefits of laptop computer ergonomics education to graduate students, Open *Journal of Therapy and Rehabilitation*, vol.2, no.1, pp. 25-32

Celik, H. (2015) "Customer Online Shopping Anxiety within the Unified Theory of Acceptance and Use Technology (UTAUT) framework", *Asia Pacific Journal of Marketing and Logistics*, vol. 28, no. 2, pp.278-307, https://doi.org/10.1108/APJML-05-2015-0077

Chang, S, Lou, S., Cheng, S & Lin, C. (2015),"Exploration of usage behavioural model construction for university library electronic resources", *The Electronic Library*, vol. 33, no. 2 pp. 292 - 307

Chen, W. S & Yao, Y.T. (2016). An Empirical Evaluation of Critical Factors Influencing Learner Satisfaction in Blended Learning: A Pilot Study, *Universal Journal of Educational Research* vol. 4, no. 7, pp.1667-1671

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, vol. 13, no. 3, pp. 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology*, vol. 22, no. 14, pp.1111–1132.

Decman, M (2015), modelling the acceptance of e-learning in mandatory environment of higher education: The influence of previous education and gender, *Computers in human behaviour*, vol. 49. pp. 272-281

Deng, S. Liu Y & Qi, Y.2011. An empirical study on determinants of web based questions-answer services adoption. *Online Information Review*, vol. 3, no. 5, pp.789-798

Dey, N., Hassanien, A.B., Bhatt, C., Ashour, A.S. & Satapathy, S. C. *(*2017) Internet of Things and Big Data Analytics Toward Next-Generation Intelligence Springer International Publishing

Dulle F. W. and Minishi –Manjanja M. K. (2011).The suitability of the Unified Theory of Acceptance and Use of Technology (UTAUT) model in open access adoption studies. *Information Development*, vol. 27, no. 1, pp. 32–45

Eastin, M. S.(2010). Handbook of Research on Digital Media and Advertising: User Generated Content and Consumption, Information Science Reference

El-Gayar, O., Moran, M., & Hawkes, M. (2010). Tablet Personal Computer Integration in Higher Education: Applying the Unified Theory of Acceptance and Use Technology Model to Understand Supporting Factors, *Journal of Educational Computing Research*, vol. 42, no. 1, pp. 79-101

Ersoy, M. (2015). A Proposal on Occupational Accident Risk Analysis: A Case Study of a Marble Factory. Human and Ecological Risk Assessment: *An International Journal*, vol. 21, no. 8, pp. 2099-2125. doi:10.1080/10807039.2015.1017878

Fan, H., Lederman, R., Smith, S. P.; and Chang, S. (2014) "How Trust Is Formed in Online Health Communities: A Process Perspective,"Communications of the Association for Information Systems: vol. 34, Article 28. Available at: http://aisel.aisnet.org/cais/vol34/iss1/28

Fishbein M, Ajzen A. (1975) Beliefs, attitudes, intentions, and behaviour: An introduction to theory and research. Reading, MA: Addison-Wesley

Findik-Coşkunçay, D., Alkiş, N. & Özkan-Yildirim S.(2018) A Structural Model for Students' Adoption of Learning Management Systems An Empirical Investigation in the Higher Education Context, *Journal of Educational Technology & Society*, vol. 21, no. 2, pp. 13-27

Gupta, A., Bhat, M., Mohammed, T., Bansal, N and Gupta, G (2014) Ergonomics in dentistry. Int J Clin Pedir Dent 2014; vol.7, no.1, pp.30-34

Haghshenas, H., Chatroudi, E. A., & Njeje, F. A. (2012). Does Educational Level Matter in Adopting Online Education? A Malaysian perspective. *Journal of Marketing for Higher Education*, vol. 22, no. 1, pp.117–151. doi:10.1080/08841241.2012.705798

Harsono, L. D., & Suryana, L. A. (2014). Factor affecting the user behaviour of social media using UTAUT2 Model. In Proceedings of the First Asia-Pacific Conference on Global Business, Economics, Finance and Social Sciences. Singapore

Hill, M. C., & Epps K. K (2010). "The Impact of Physical Classroom Environment on Student Satisfaction and Student Evaluation of Teaching in the University Environment." *Academy of Educational Leadership Journal*, vol. 14, no. 4 (2010), pp. 65-79.

Holm, J. (2011), "Management: pros and cons of open plan and office-based workplaces", Keeping Good Companies, vol. 63, no. 3, pp. 178-181.

Hu, J.L. (2014) Factors of the Employment Behavioural Intention of Leisure and Hospitality Management College Students in Taiwan. J Hotel Bus Manage 3:110. doi: 10.4172/2169-0286.1000110

Idri, N. (2013) Using multimedia labs in enhancing EFL Students' research methods, *Multilinguales* URL: http:// journals.openedition.org/multilinguales/3108 ; DOI : 10.4000/multilinguales.3108

Ikonne, C. N. (2014), Influence of Workstation and Work Posture Ergonomics on Job Satisfaction of Librarians in the Federal and State University Libraries in Southern Nigeria, *IOSR Journal Of Humanities And Social Science* (IOSR-JHSS, vol. 19,no. 9, pp. 78-84

Jambulingam, M. (2013). Behavioural Intention to Adopt Mobile Technology among Tertiary Students. *World Applied Sciences Journal*, vol. 22, no. 9, pp. 1262–1271.

Jabeen, F., Khan, M., & Ahmad, S. Z. (2015) Understanding the technology receptivity in higher education students in the UAE context, 25 August 2015, 18th International Academic conference, London

Jawad, H., & Hassan, Z. (2015). Applying UTAUT to Evaluate the Acceptance of Mobile Learning in Higher Education in Iraq. *International Journal of Science and Research (IJSR),* vol. 4, no. 5, pp. 952-954.

Jhurree, V. (2005). Technology integration in education in developing countries: Guidelines to policy makers. *International Education Journal*, vol. 6, no. 4, pp. 467–483.

Jong, D & Wang, T (2009) Student Acceptance of Web-based Learning System, Proceedings of the 2009 International Symposium on Web Information Systems and Applications (WISA'09) Nanchang, P. R. China,, pp. 533-536

Joo, Y. J., Lim, K, Y & Kim E. K (2011). Online university students' satisfaction and persistence: Examining perceived level of presence, usefulness and ease of use as predictors in a structural model, *Computers & Education,* vol. 57 (2011), pp.1654–1664

Kamimura, A., Trinh, H. A., Johansen, M., Hurley, J., Pye, M., Sin, K. & Nguyen, H. (2018).Perceptions of mental health and mental health services among college students in Vietnam and the United States, *Asian Journal of Psychiatry*, vol. 37, pp. 15-19

Karpudewan, M., Md Zain, A. N. &. Chandrasegaran, A.L. (2017).Overcoming Students' Misconceptions in Science: Strategies and Perspectives from *Malaysia*, Springer Singapore

Kavathatzopoulos, I. (2015) "ICT and sustainability: skills and methods for dialogue and policy making", *Journal of Information, Communication and Ethics in Society*, vol. 13, no. 1, pp.13-18

Khan, A. & Khan, R. (2012). Understanding and managing workplace bullying. Ind Commerce Train 44:85e9.

Kim, J., & de Dear. R. (2013). "Workspace Satisfaction: The Privacy-communication Trade-off in Open-Plan Offices." *Journal of Environmental Psychology,* vol. 36, pp. 18–26. doi:10.1016/j.jenvp.2013.06.007.

Laudon, K. C., & Laudon, J. P. (2014). Management Information Systems: Managing the Digital Firm (13th Editi). Edinburgh: Pearson Education Limited.

Lauricella, A. R., Blackwell, C.K. & Wartella, E (2017). The "New" Technology Environment: The Role of Content and Context on Learning and Development from Mobile Media, Springer International Publishing Switzerland

Lee, J.-W. (2010). Online support service quality, online learning acceptance, and student satisfaction. *The Internet and Higher Education*, vol. 13, no. 4, pp. 277–283. doi:10.1016/j.iheduc.2010.08.002

Liaw, S.-S., & Huang, H.-M. (2013). Perceived Satisfaction, Perceived Usefulness and Interactive Learning Environments as Predictors to Self-Regulation In E-Learning Environments. *Computers & Education*, vol. 60, no. 1

Liao, P.-W., & Hsieh, J. Y. (2011). What Influences Internet-Based Learning? *Social Behaviour and Personality: An International Journal*, vol. 39, no. 7, pp. 887–896. doi:10.2224/sbp.2011.39.7.887

Liebenberg J., Benadé, T., & Ellis, S. (2018) Acceptance of ICT: Applicability of The Unified Theory of Acceptance and Use of Technology (UTAUT) Model South African Students, *The African Journal of Information Systems*, vol. 10, no. 3

Lo, M.C., Ramayah, T., & Mohamad, A. A. (2015) Does Intention Really Lead to Actual Use of Technology? A Study of an E-learning System among University Students in Malaysia, *Croatian Journal of Education*, vol.17; no.3

Lwoga, E.T. & Komba, M. M (2015). Antecedents of Continued Usage Intentions of Web-Based Learning Management System in Tanzania, Education and Training. DOI: 10.1108/ET-02-2014-0014

Lyas, M. & Arif, S., (2013). Quality of Work-Life Model for Teachers of Private Universities in. *Quality Assurance in Education*, pp. 282-298.

Maakip, I., Keegel, T., & Oakman, J. (2017). Predictors of musculoskeletal discomfort: A cross-cultural comparison between Malaysian and Australian office workers. Applied Ergonomics, 60, 52–57. doi:10.1016/j.apergo.2016.11.004

Maduku, D. K. (2015).Factors of E-book Use Intentions: Perspective of Students in a Developing Country, Perspectives on Global Development and Technology, vol. 14 (2015), pp. 597-618

Magsamen-Conrad, K., Upadhyaya, S., Joa, C. Y., & Dowd, J. (2015). Bridging the divide: Using UTAUT to predict multigenerational tablet adoption practices. *Computers in Human Behaviour*, vol. 50, pp. 186–196. doi:10.1016/j.chb.2015.03.032

Majid, A, Prayogi, A. S., Surantono, & Hendarsih, S (2018), Simple Foot Elevator for Diabetic Ulcer Treatment (SIFOEDT), Health Notions, vol. 2, no. 1

Maldonado, U. P. T., Khan, G. F., Moon, J., & Rho, J. J. (2011). E-learning motivation and educational portal acceptance in developing countries. *Online Information Review*, vol. 35, no.1, pp. 66–85.

Masa'deh, R., Tarhini, A., Mohammed, A. B. & Maqableh, M. (2016). Modeling Factors Affecting Student's Usage Behaviour of E-Learning Systems in Lebanon, *International Journal of Business and Management*; vol. 11, no. 2;

McKeown, T & Anderson, M., (2015),"UTAUT: capturing differences in undergraduate versus postgraduate learning?" *Education + Training*, vol. 58, no. 9, pp. 945 – 965

Moon, Y & Hwang, J. (2018). Crowdfunding as an Alternative Means for Funding Sustainable Appropriate Technology: Acceptance Determinants of Backers, MDPI

Moya, M. B., Nakalema, S. E. & Nasamba, C. (2017) Behavioural Intention: Mediator of Effort Expectancy and Actual Usage, ORSEA Journal Vol 7(1)

Mtebe, J. S., & Raisamo, R. (2014). Investigating Students' Behavioural Intention to Adopt and Use Mobile Learning in Higher EEducation in East Africa. *International Journal of Education and Development Using Information and Communication Technology*, vol. 10, no.3, pp. 4–20.

Mukhtar, U., Anwar, S., Ahmed, U. & Baloch, M. A., (2015). Factors Affecting the Service Quality of Public and Private Sector Universities Comparatively: An Empirical Investigation. Arts, Science & Commerce, pp. 132-142.

Noor, M.Y.M., Ahmad, B.E., Ismail, M. R., Hashim, H., Baharum, M. A. A (2016) Proceedings of the Regional Conference on Science, Technology and Social Sciences (RCSTSS 2016), Springer Singapore

Page, R. M. & Page, T. S. (2010). Promoting Health and Emotional Well-Being in Your Classroom, Medicine and Health

Pereira, F. A., de M., Ramos, A. S. M., Gouvêa, M. A., & da Costa, M. F. (2015). Satisfaction and Continuous Use Intention of E-learning Service in Brazilian Public organizations. *Computers in Human Behaviour*, vol. 46, pp. 139–148.

Raman, A., Don, Y., Khalid, R., & Rizuan, M. (2014). Usage of Learning Management System (Moodle) among Postgraduate Students: UTAUT Model, *Asian Social Science*, vol. 10, no. 14;

Ramayah T. (2010), The Role of Voluntariness in Distance Education Students' Usage of A Course Website, TOJET: *The Turkish Online Journal of Educational Technology,* vol. 9, no.3

Ribeiro, J, Moreira, A. & Almeida, A. M. (2010). ICT in the Education of Students with SEN: Perceptions of Stakeholders Verlag Berlin Heidelberg TECH-EDUCATION , CCIS 73, pp. 331–337

Rogers, E. M. (2003). *Diffusion of Innovations*. *Addictive Behaviours* (Vol. 27).

Saif, N. I., (2014). The Effect of Service Quality on Student Satisfaction: A Field Study for Health Services Administration Students. *International Journal of Humanities and Social Science,* pp. 172-181.

Sami, K, & Päivi, J. (2015) "A framework for measuring student and staff satisfaction with university campus facilities", *Quality Assurance in Education*, vol. 23, no.1, pp.47-66, https://doi.org/10.1108/QAE-10-2013-0041

Sharma, S.K., Chandel, J. K., & Govindaluri, S. M, (2014),"Students 'Acceptance and Satisfaction of Learning Through Course Websites*", Education, Business and Society: Contemporary Middle Eastern Issues*, vol. 7, no. 2/3, pp. 152 – 166

Smith, S. J (2012), International Encyclopedia of Housing and Home, *Elsevier Science*

Suksa-ngiam, W., & Chaiyasoonthorn, W. (2015). "The adoption of social media by Thai university students: Multiple group moderating effects"*. Information Development*, vol. 31, no.1, pp. 69–82. doi:10.1177/0266666913502800

Sumak, B., Hericko, M., Polancic, G., & Pusnik, M. (2010). Investigation of E-Learning System Acceptance using UTAUT. *International Journal of Engineering Education*, vol. 26, no. 6, pp. 1327–1342.

Sun, H. (2013) A longitudinal study of herd behaviour in the adoption and continued use of technology. *MIS Quarterly*, vol. 4, no. 37, pp. 1013–1041.

Tarhini, A., Hone, K., & Liu, X. (2014). The Effects of Individual Differences on E-Learning Users' Behaviour in Developing Countries: A Structural Equation Model. *Computers in Human Behaviour*, vol. 41, pp. 153-163. http://dx.doi.org/10.1016/j.chb.2014.09.020

Taylor, S., & Todd, P. (1995). Decomposition and crossover effects in the theory of planned behaviour: A study of consumer adoption intentions. *International Journal of Research in Marketing*, vol. 12, no. 2, pp.137–155.

Thomas, H. (2010), "Learning spaces, learning environments and the displacement of learning", *British Journal of Educational Technology*, vol. 41, no. 3, pp. 502-511.

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly*, vol. 15, no. 1, pp.124–143.

Usoro, A, Echeng, R,.& Majewski, G. (2014). A Model of Acceptance of Web 2.0 in Learning in Higher Education: a case study of two cultures, *E–Learning and Digital Media*, vol. 11, no. 6

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User A Cceptance of Information Technology : Toward a Unified View. *MIS Quarterly*, vol. 27, no.3, pp. 425–478.

Vimalanathan. K and Babu, RT. (2017). A Study on the Effect of Ergonomics on Computer Operating Office Workers in India, *Journal of Ergonomics*, 7211

Wang, Y., Wu, M. & Wang, H. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning, *British Journal of Educational Technology*, vol. 40, no. 1, pp. 92–118

Wilson, H. K & Cotgrave, A., (2016),"Factors that influence students' satisfaction with their physical learning environments", *Structural Survey*, vol. 34, no. 3, pp. 256-275

Yau, H. K., Cheng, A. L. F. Ho, W.M. (2015) Identify the Motivational Factors to Affect the Higher Education Students to Learn Using Technology, *TOJET: The Turkish Online Journal of Educational Technology*, vol. 14, no. 2

Yakubu, M. N. & Dasuki, S (2018). Factors Affecting the Adoption of E-Learning Technologies Among Higher Education Students in Nigeria: A structural Equation Modelling Approach. Information Development

Yang, Z. Becerik-Gerber, B. & Mino, L. (2013). A study on student perceptions of higher education classrooms: Impact of classroom attributes on student satisfaction and performance, Building and Environment 70 (2013) pp.171-188

Zuiderwijk, A., Janssen, M, & Dwivedi, Y. K. (2015), Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology, Government Information Quarterly, http://dx.doi.org/10.1016/j.giq.2015.09.005