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UTAUT: Integrating Achievement Goals and Learning Styles for Undergraduates' Behavioural Intention to Use Technology

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Abstract

In Malaysia, technology use is much emphasised as the Ministry of Education foresees great potential of technology use in amplifying students' learning. However, the great potential of technology use has not been fully realised. Therefore, the purpose of this study was to explore the influence of the existing antecedents in the Unified Theory of Acceptance and Use of Technology (UTAUT) model with two additional variables (achievement goal and learning styles) on undergraduates' behavioural intention to use technology. This study also aimed to determine the best predictor of undergraduates' intention to use technology. Hence, a quantitative survey method involving 699 undergraduates was employed in this study. The findings indicated that the undergraduates' effort expectancy, performance expectancy, social influence and achievement goals had significant influence on their behavioural intention to use technology. This study provides insights to the education stakeholders on the necessity to enhance pedagogical technology innovations in the higher education system.

Keywords: UTAUT, Technology Use, Achievement Goals, Learning Styles

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1. Introduction

Technology has become an integral part of all levels of the modern education and students' learning approach, from pre-school to university (Liebenberg, Benade, & Ellis, 2018; Šumak & Šorgo, 2016). In particular, students at the tertiary level are encouraged to use technology for better learning outcomes and academic achievements. However, technology use for these purposes of have not been fully realised (Ministry of Education, 2015).

Hence, educational technology challenges, initiatives and transformations are repeatedly emphasised in the Malaysia Education Blueprint 2013-2025 and Education Blueprint for Higher Education 2015-2025 in concurrence with vast development of technology. In an effort to practise education transformation, it was reported that approximately RM6 billion has been invested to meet the educational objectives in line with the educational initiatives and transformations (Ministry of Education, 2013). The Malaysian Ministry of Education had started strengthening its education system through providing necessary facilities and infrastructure in schools, as well as offering relevant trainings for teachers (Ministry of Education, 2013; Raman et al., 2014). The government's support for educational technology is also reflected in the Malaysia Education Blueprint for Higher Education 2015-2025, with great emphasis on online learning for tertiary education (Balakrishnan & Gan, 2016).

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According to the blueprint, all higher learning institutions in Malaysia are set to implement a combination of online and conventional pedagogy approach for teaching and learning. Students, in particular, undergraduates, are encouraged to optimise their intention to use technology for self-directed learning as technology allows richer information access and generates personalised learning content despite distance and learning pace (Ministry of Education, 2013, 2015; Raman et al., 2014).

Malaysia has manifested evident effort in becoming a technology-driven country with the aim to consolidate its education system. This is in view of the potential of technology as a powerful tool to improving students' learning experience, developing better learning contents, enriching teacher-student interaction, and overcoming mismatch in pedagogy and students' needs (Fook, Sidhu, Kamar, & Aziz, 2011; Seyal & Rahman, 2015).

However, the aspirations of leveraging technology use for optimal educational outcomes have not yet been achieved, though the prospective of technology in the Malaysian education system is highly anticipated. In 2012, UNESCO also reported that technology use in education has not progressed beyond word-processing applications (Ministry of Education, 2013).

"Higher learning institutions need to use research-validated, learner-centred, instructional approaches that utilises Information Communication Technology as learning enablers" (Ministry of Education, 2015, p. 78). This further affirms the urgent need to research on the antecedents that influence undergraduates' intention to use technology in Malaysia.

1.1. Antecedents of behavioural intention to use technology

There are a multitude of theoretical models which have been established to explain the acceptance and use of technology. The Unified Theory of Acceptance and Use of Technology (UTAUT) model is one of the most outstanding models in explaining technology acceptance and use thus far (Decman, 2015; Liebenberg et al., 2018; Marchewka, Liu, & Kostiwa, 2007). Venkatesh, Morris, Davis, and Davis (2003) formulated the UTAUT model based upon eight extant theoretical models.

According to Dwivedi, Rana, Jeyaraj, Clement, and Williams (2017), the UTAUT model is lack of individual constitutions that feature the dispositions of the users which are likely to be important in explaining users' behaviour. Venkatesh et al. (2003) also suggested that potential constructs could be considered in to the UTAUT to better explain the variance in BI.

As a result, many UTAUT-based studies have applied the UTAUT model with other theories, through integration or extension, to study technology use in various contexts (Venkatesh, Thong, & Xu, 2016). Among the past studies that have modified the UTAUT model are Abbas et al. (2018), Dwivedi et al. (2017), Musleh, Marthandan, and Aziz (2015), Hsu, Chen, Lin, Chang, and Hsieh (2014), Rajapakse (2011), Slade, Dwivedi, Piercy, and Williams (2015), Šumak and Šorgo (2016), Yueh, Huang, and Chang (2015).

In line with this, the present study seeks to develop a more comprehensive depiction of the undergraduates' BI to use technology by examining the measures in the Malaysian higher education setting. Therefore, the UTAUT model was selected as a ground theory to develop a research model for exploring teachers' potential variables related to students' learning that would better match the current research context.

Pertaining to learning, there are various factors that may motivate students' involvement in learning activities, which may ultimately affect their learning performances. According to Elliot and Church (1997), motivation can be viewed in different forms while goal orientations for achievement vary across individual differences. Achievement Goals (AG) are often related to competence and motivation which are believed to affect BI (Elliot et al., 2000; Elliot & Murayama, 2008).

On the other hand, as student learns in different ways by employing different Learning Styles (LS), technology can be a key element which directs a more personalised approach to learning. Students' unique personal attributes have to be taken into account in order to address the gap in the learning preferences (Reiff, 1992). LS are driven by integrated factors such as cognitive, biological and environmental characteristics (Dunn, 1984) to their actual intention to use of technology.

Consequently, AG and LS which previous researchers attempted using to explain behaviour intention were integrated into the base model to analyse undergraduates' BI to use technology. The main objective of this study was to examine the antecedents that influence undergraduates' BI to use technology through the UTAUT model. Specific objectives of the present study are as follows:

(i) To explore influence of the existing antecedents in the UTAUT model (performance expectancy, effort expectancy and social influence), and the additional variables (AG and LS) on undergraduates' behavioural intention to use technology.
(ii) To investigate the best predictor of undergraduates' BI to use technology.

2. Literature review

2.1. Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al. (2003) formulated the UTAUT model (Figure 1) based on nearly twenty years of research and studies on technology acceptance and adoption. The model was founded with integration of eight theoretical models: (i) Motivational Model, (ii) Theory of Planned Behaviour, (iii) Technology Acceptance Model, (iv) Theory of Reasoned Action, (v) Model of PC Utilization, (vi)

Innovation Diffusion Theory, (vii) Combined TAM-TPB, and (viii) Social Cognitive Theory (Dwivedi et al., 2017; Liebenberg et al., 2018; Slade et al., 2015; Šumak & Šorgo, 2016; Venkatesh et al., 2003, 2016; Williams, Rana, & Dwivedi, 2015; Yueh et al., 2015).

The UTAUT model is one of the most recent and extensively used models in explanation of technology acceptance and in consideration of individual differences (Cruz, Boughzala, & Assar, 2014; Marchewka et al., 2007). Abbas et al. (2018) and Olatubosun, Olusoga, and Shemi (2014) also echoed that the UTAUT model is one of the most comprehensive, powerful and robust technology acceptance and adoption models to present.

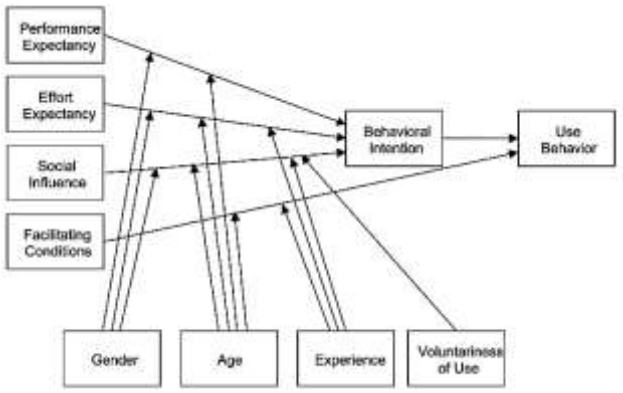

Figure 1. The UTAUT Model

The UTAUT model is most commonly used in business-related and organisational research to examine technology acceptance and utilisation. Its application in the education research field has become popular in recent years (Birch & Irvine, 2009; Marchewka et al., 2007; Venkatesh, 2016; Williams et al., 2015). Some of the research done in education using the UTUAT model are Cruz et al. (2014), Dulle and Minishi-Majanja (2011), Lewis, Fretwell, Ryan, and Parham (2013), Liebenberg et al. (2018), Lin, Lu, & Liu (2013), Olatubosun et al. (2014), Raman et al. (2014), and Thomas, Singh, and Gaffar (2013). In recent years, the UTAUT model has been used widely in the context of education, particularly on the topics related to e-learning and mobile learning (Cruz et al., 2014; Lin, Lu et al., 2013; Thomas et al., 2013).

The UTAUT model has been widely employed to investigate educational technology acceptance and adoption in both developed and developing countries across the globe (Mtebe & Raisamo, 2014). Despite developed countries like Australia (Lynch, Debuse, Lawley, & Roy, 2009), Slovenia (Šumak & Šorgo, 2016) and the United States (Solvie & Kloek, 2007), many of the previous studies have also been carried out in developing countries. Among them included Mexico (Cruz et al., 2014), Thailand (Bhrommalee, 2012), Nigeria (Agbatogun, 2013) as well as Malaysia (Raman et al., 2014), where the implementation of technology in education is still in their infancy. This implies that these developing countries are expecting a new leap, and are striving to explore educational technology adoption.

However, the four contingencies (age, gender, experience and voluntariness of use) in UTAUT were exempted in this study as majority of the past studies found that with the exclusion of the moderators, there were significant relationships among the antecedents (Decman, 2015).

Behavioural intention (BI)

BI is defined as the likelihood whether an individual will perform or execute a particular behaviour (Ajzen, 1991; Mathieson, 1991; Van Schaik, 2009; Yueh et al., 2015; Zawawi, Jusoff, Rahman, & Idris, 2009). BI is also described as an individual's behaviour that can be explained by a person's BI as it involves personal decision to perform certain future behaviour (Cruz et al., 2014; Šumak & Šorgo, 2016). Venkatesh et al. (2003) suggested that BI has significant influence on use behaviour. It is a direct determinant and behavioural disposition of actual behaviour (Ajzen, 1991; Liebenberg et al., 2018; Mathieson, 1991).

Besides, based on Ajzen's (1991) review of literature, evidence in relation to the association between intention and behaviour has started since the 1980s. It explained the dispositional prediction effect of intention towards behaviour. Therefore, intention can represent behavioural usage with considerable accuracy (Ajzen, 1991). This is supported by Yueh et al. (2015) and Zawawi et al. (2009) which underscored BI as an immediate determinant of an individual's behaviour and the association between BI and behaviour whereby BI will lead to actual behaviour. Therefore, the present study measured the undergraduates' BI to use technology instead of their use behaviour, and focused to explore the factors that influence BI to use technology. In this study, BI indicates the undergraduates' intention or plan to utilise technology.

Performance expectancy (PE)

Venkatesh et al. (2003) defined PE as the degree to which an individual believes on the use of a system in helping him or her to gain attainments in job performance. In this study, it refers to how much the undergraduates believe in the use of technology to boost their studies and task productivity. The majority of the previous studies found that PE has significant influence towards BI in the UTAUT model (Dulle & Minishi-Majanja, 2011; Mtebe & Raisamo, 2014; Raman et al., 2014; Venkatesh et al., 2003). According to Lin, Lu et al. (2013) PE has been consistently proven to be the most robust and the strongest predictor of BI. This is supported by Almatari, Iahad, and Balaid (2013), Jambulingam (2013), Mtebe and Raisamo (2014), Šumak and Šorgo (2016); Slade et al. (2015), Teo and Noyes (2014), and Williams et al. (2015).

H1: Performance expectancy will have a significant influence on the undergraduates' behavioural intention to use technology.

Effort expectancy (EE)

EE is defined as the degree of ease pertaining to the use of the system (Venkatesh et al., 2003). In the present study, EE means the degree of ease associated with the undergraduates' use of technology in the institution. EE has also been proved to be a significant predictor BI in the past studies (Bandyopadhyay & Fraccastoro, 2007; Liebenberg et al., 2018; Jairak, Praneetpolgrang, & Mekhabunchakij, 2009; Nassuora 2012; Venkatesh et al., 2003).

H2: Effort expectancy will have a significant influence on the undergraduates' behavioural intention to use technology.

Social influence (SI)

SI refers to the degree to which an individual perceives people who are important to them believe that the individual should use the system (Venkatesh et al., 2003). Thus, in this study SI is defined as the degree to which the undergraduates perceive that important people in their lives think they should use technology. The previous studies have noted the positive influence of SI towards BI (Bandyopadhyay & Fraccastoro 2007; Im, Hong, & Kang, 2011; Jairak et al. 2009; Slade et al., 2015; Šumak & Šorgo, 2016; Venkatesh et al., 2003).

H3: Social influence will have a significant influence on the undergraduates' behavioural intention to use technology.

2.2. Achievement goals (AG)

AG represent an individual's focus, engagement and purpose on a particular task (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Hanham, Ullman, Orlando, & McCormick, 2014). According to Bernacki, Aleven, and Nokes-Malach (2014), an individual is directed by certain kinds of AG as the individual engages in learning.

The importance of goal orientations has been highlighted in the context of education since the 1980s for its potential to boost learning, skills, competency and achievement (Elliot & Harackiewicz, 1996). According to Ames (1992) and Weiner (1985), AG can lead to intentions of a particular behaviour. A research conducted by Bulus (2011) proposed the relationship between students' goal orientations and the influence on their learning behaviours. Previous studies suggested that goal orientations are important elements that influence students to pursue intentional performance in order to achieve a learning target (Bulus, 2011; Miksza, Tan, & Dye, 2016; and Yi & Hwang, 2003).

Furthermore, the influence of AG on physical activity intention was also studied in a recent study conducted by Wang, Morin, Liu, and Chian (2016). In Wang et al. (2016), AG theory was used to examine students' physical activity intentions. The research identified 1810 school children's AG profiles from 13 Singaporean schools using the Elliot and McGregor's 2 x 2 AG framework (2001), to investigate the influence of AG profiles on their intentions to pursue physical activities. The overall results indicated that students with higher level of AG showed greater likelihood of pursuing physical actions and intentions in participating physical activities (Wang et al., 2016).

In this study, the AG theory is based upon Elliot and McGregor's 2 x 2 AG framework (2001) as shown in Figure 2, which has been proved feasible to be implemented in academic contexts (Finney, Pieper, & Barron, 2007; Ganesan, Mamat, Mellor, Rizzuto, & Kolar, 2014; Miksza et al., 2016).

Figure 2. The 2 x 2 Achievement Goal Framework

AG refers to the students' purpose in adopting technology which is measured by Elliot and Murayama's Achievement Goal Questionnaire-Revised (AGQ-R) (2008) with four orientations, namely mastery approach, mastery avoidance, performance approach, and performance avoidance (Elliot & McGregor, 2001; Ganesan et al., 2014;; Koh & Wang, 2015; Miksza et al, 2016; Muis, Winnie, & Ranellucci, 2016).

For this study, AG is measured with the revised AGQ (AGQ-R) which is tailored to be used in the context of studying students' AG. Elliot and McGregor first developed the 2 x 2 AG framework with the Achievement Goal Questionnaire (AGQ), while Elliot continued revising the questionnaire in order to help students to attend carefully to the items. As a result, Elliot and Murayama (2008) revised and designed another 12-item questionnaire based upon the original 2 x 2 AG framework.

H4: Achievement goals will have a significant influence on the undergraduates' behavioural intention to use technology.

2.3. Learning styles (LS)

Huang (2015) described LS as personalised psychological behaviour that indicates the way learners perceive, interact, and respond to the learning environments. Similarly, Balakrishnan & Gan (2016), defined LS as the approach of how individual interact, attain knowledge, or respond to external stimuli in their learning environments. LS emerged as early as in the 1960's with much attention in research pertaining to students' learning (Huang, 2015). Understanding students' LS is believed to offer insights to develop better interventions that tailored to students' needs

(Truong, 2016; Willingham, Hughes, & Dobolyi, 2015). Thus, many higher learning institutions are still attempting to personalise students' learning experience through the implementation of technologies in order to support teaching-learning.

A number of previous studies were conducted to investigate the influence of LS on BI. According to Bostrom, Olfman, and Sein (1990), LS have influential effect on learning processes. The relationship between LS and BI to use technology has been studied in different settings worldwide such as in Thailand (Bhrommalee, 2012), Libya (Elkaseh, Wong, & Fung, 2014), Taiwan (Huang, 2015), Brunei (Seyal & Rahman, 2015) and South Korea (Park, 2009). In Malaysia, Balakrishnan and Gan (2016) used the Social Media Acceptance Model to examine the influence of tertiary education students' LS on their intentions to use social media for learning. The results indicated that students' LS influenced their intentions to use social media for learning purposes.

Elkaseh's et al. (2014) research studied the influence of LS on BI to use e-learning in Libyan higher education institutions. The respondents were 318 university students from four Libyan universities. Results of the study indicated that students of all LS showed similar BI to use e-learning in Libyan higher education (Elkaseh et al., 2014). In Seyal and Rahman (2015), the research investigated the influence of LS on BI to use e-learning system among 120 students from computing and business faculties in a Bruneian tertiary learning institution. The results showed that LS had a significant influence on the students' BI to use e-learning (Seyal & Rahman, 2015).

Generally, LS is understood as the ways in which learners are in favours to retrieve, comprehend and conceptualise information (Cheng & Chau, 2016; Sternberg & Grigorenko, 2001). It is described as cognitive behaviours or habits which an individual demonstrates in his or her learning processes (Pritchard, 2009). In this study, LS refer to the undergraduates' preferred ways in learning based on the Visual-Auditory-Kinaesthetic (VAK) learning style.

Visual learning style refers to visual learners who learn well from seeing (Dunn 1984; Willingham et al., 2015). Auditory learning style is defined as learners who prefer discovering information via listening (Dunn 1984; Willingham et al., 2015). Kinaesthetic learning style refers to learners who learn best through hands-on experience and classroom activities (Dunn 1984; Willingham et al., 2015).

H5: Learning styles will have a significant influence on the undergraduates' behavioural intention to use technology.

3. Methodology

Technology evolution has led to ubiquitous use and access to technology. This study employed a quantitative survey research methodology. A survey was designed based on three existing questionnaires to investigate if the antecedents that influence the undergraduates' behavioural intention to use technology in line with the research objectives.

The UTAUT model questionnaire (Venkatesh et al., 2003) was used to measure BI to use technology. On the other hand, AG was measured with AGQ-R (Elliot & Murayama, 2008); while LS was measured using the VAK LS questionnaire (Chislett & Chapman, 2005). This survey questionnaire consisted of four parts with a total of 125 items.

A panel of two experienced experts in educational technology in relevant research areas were invited to review the questionnaire for its content and face validity. Modifications and amendments were made according to the experts' comments to improve the questionnaire.

Table 1 shows the Cronbach's Alpha, item loadings, average variance extracted (AVE), and composite reliability (CR) values. The Cronbach's Alpha values for all the constructs in this study are above 0.7, showing a good reliability. According to Comrey and Lee (1992), the factor loading greater than 0.55 are considered good, thus, all item loadings as shown in Table 1 are acceptable. Besides, Hair, Black, Babin, and Anderson (2010) recommended that the value of AVE should be greater than 0.5, while for CR is 0.7 and above. The result of the analysis as listed in Table 1 indicates that all the constructs have AVE values greater than 0.5 and a CR value more than 0.7. Therefore, the constructs have good convergent validity. Overall, these results show that the instrument used has a good internal reliability and validity.

Subsequently, a total of 699 usable questionnaires were collected from undergraduates in a university in Malaysia for the present study.

Table 1. Reliability and Validity of the Constructs

Construct	Item	Cronba-ch's Alpha	Load-ings	AVE	CR
Performance Expectancy		.841		0.570	0.841
	PE1		.768		
	PE2		.775		
	PE3		.799		
	PE4		.673		
Effort Expectancy		.859		0.534	0.818
	EE1		.554		
	EE2		.714		
	EE3		.796		
	EE4		.828		
Social Influence		.757		0.619	0.702
	SI1		.677		
	SI2		.865		
	SI3		.806		
Behavioural Intention		.900		0.629	0.893
	BI1		.791		
	BI2		.877		
	BI3		.872		
	BI4		.757		
	BI5		.646		
Achievement Goal		.903		0.613	0.864
	AG1		.818		
	AG2		.812		
	AG3		.775		
	AG4		.724		
Learning Style		.948		0.787	0.917
	LS1		.911		
	LS2		.887		
	LS3		.862		

4. Results and findings

A Hierarchical Multiple Regression (HMR) analysis was employed to assess the ability of PE, EE, SI, AG and LS to predict undergraduates' BI to use technology. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. HMR was employed to assess the independent variables which were entered into the equation in order based on the theoretical grounds (Pallant, 2013). According to Pallant (2013) and Cohen et al. (2011), HMR allows the researcher to examine the predictive ability of the independent variables on the dependent variable in sequence, after the effect of a variable is being controlled for.

As shown in Table 2, PE, EE and SI were entered at Step 1, explaining 32.7% (R Square = .327) of the variance in BI in the UTAUT model. After the entry of AG and LS at Step 2, the variance explained by the model as a whole was 35% (R Square = .350). Table 2 also demonstrates that AG and LS explained an additional 2.3 % of the variance in BI after controlling PE, EE and SI, R squared change = .023, F change (2, 693) = 11.61, $p < .0005$.

Besides, four out of five of the antecedents of BI showed statistically significance. Results yielded in Table 3 indicates that EE ($\beta = .32$, $p < .0005$) is the strongest predictor of BI, followed by PE ($\beta = .19$, $p < .0005$), AG ($\beta = .16$, $p < .0005$) and SI ($\beta = .07$, $p < .05$). The results revealed that LS ($\beta = .02$, $p = .647$) was not a statistically significant predictor of BI in this study.

Table 2. Model Summary[c]

Mod-el	R Squ-are	Adjust-ed R Square	Change Statistics				
			R Square Change	F Change	df1	df2	Sig. F Chang-e
1	.327	.324	.327	113.311	3	695	.000
2	.350	.345	.023	11.612	2	693	.000

a. Predictors: (Constant), SI, PE, EE
b. Predictors: (Constant), SI, PE, EE, LS, AG
c. Dependent Variable: BI
b. Predictors: (Constant), SI, PE, EE
c. Predictors: (Constant), SI, PE, EE, LS, AG

Table 3. Coeffients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.947	.222		8.779	.000
	PE	.260	.044	.236	5.958	.000
	EE	.356	.041	.350	8.746	.000
	SI	.097	.032	.102	3.062	.002
2	(Constant)	1.438	.272		5.280	.000
	PE	.212	.044	.192	4.804	.000
	EE	.334	.041	.329	8.262	.000
	SI	.069	.032	.072	2.165	.031
	AG	.177	.039	.162	4.587	.000
	LS	.032	.069	.015	.458	.647

a. Dependent Variable: BI

Table 4 lists the summarised results yielded based on the hypotheses proposed in this study. Overall, four out of the five hypotheses were supported by the data (Figure 3). Hence, H1, H2, H3 and H4 are supported by the statistical results. However, H5 is not supported by the statistical results in this study.

Table 4. Summary of Results

Hypothesis	Description	*P*-value	Result
H1	PE → BI	.000*	Supported
H2	EE → BI	.000*	Supported
H3	SI → BI	.031*	Supported
H4	AG → BI	.000*	Supported
H5	LS → BI	.647	Not Supported

* p < .05

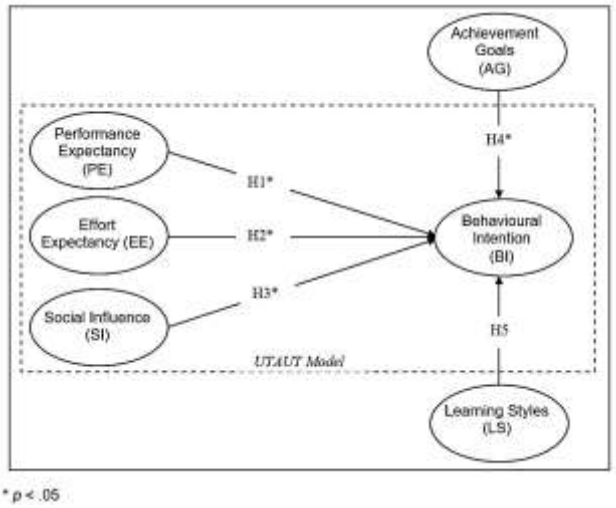

Figure 3. Final Research Model for Undergraduates' Behavioural Intention to Use Technology

5. Discussions

Overall, the hypothesis testing showed that out of the five hypotheses, four were supported by the results yielded, while H5 was not supported. As a result, a number of conclusions can be drawn related to the hypotheses.

In general, the UTAUT model fits this study well as all the original antecedents in the original UTAUT model are statistically significant. PE, EE and SI are significant antecedents that influence undergraduates' BI to use technology. On the other hand, AG is the only one additional variable that is statistically significant in predicting BI.

5.1. Performance expectancy has a significant influence on undergraduates' behavioural intention to use technology

Based on this study outcome, PE is a significant predictor that impacts the undergraduates' BI. This result echoed many previous studies done by Almatari et al. (2013), Decman (2015), Jambulingam (2013), Mtebe and Raisamo (2014), Raman et al. (2014), Slade et al. (2015), Šumak and Šorgo (2016), Teo and Noyes (2014), and Williams et al. (2015). Align with the past studies, this finding further confirmed that PE has a significant influence on the undergraduates' intention to use technology as they believed technology is a useful tool to improve their studies and academic achievement, as well as tasks completion and productivity.

This is likely due to conveniences that technology has brought about to undergraduates' daily routines as well as for education implications. Technology allows the undergraduates who are able to operate and have access to technology, to approach broader access of rich resources and perform multiple tasks. Thus, the undergraduates can expect higher performance efficiency by integrating technology throughout their learning process. This is an optimistic phenomenon because the undergraduates have identified the growing potential of technology in their transforming learning into a more self-regulated and active process.

5.2. Effort expectancy has a significant influence on undergraduates' behavioural intention to use technology

EE is a significant determinant that influences the undergraduates' BI. This finding reaches a consensus with the research findings reported by Bandyopadhyay and Fraccastoro (2007), Birch and Irvine (2009), Cruz et al. (2014), Dulle and Minishi-Majanja (2011), Im et al. (2011), Jairak et al. (2009), Liebenberg et al. (2018), Lin, Zimmer, and Lee (2013), Mtebe and Raisamo (2014), and Nassuora (2012).

Surprisingly, EE stands out as the strongest predictor of BI in this study, while PE was commonly the most robust predictor in the literature. This is likely because the undergraduates in this study were confident and skilful in using and operating technology which it did not require laborious effort in using technology. This suggests that the undergraduates in Malaysia are becoming more technology-savvy as they grow up alongside technology development which advances globally (Abbas, et al., 2018; Liebenberg et al., 2018). Moreover, the ubiquity of modern technology such as smartphones, internet, tablets and laptops consolidates their familiarity with technology and use them for academic purpose (Liebenberg et al., 2018; Thomas et al., 2013). Hence, there is no doubt that educational technology utilisation is welcomed as the undergraduates have already embraced technology with confidence.

5.3. Social influence has a significant influence on undergraduates' behavioural intention to use technology

In this study, SI is a significant determinant that influences the undergraduates' BI. This finding is in consistence with several previous studies such as Bandyopadhyay and Fraccastoro (2007), Im et al. (2011), Jairak et al. (2009), Raman et al. (2014), and Tan (2013).

This finding implies that the people whom the undergraduates perceived important in their lives play a vital role in their technology utilisation. The undergraduates use technology because people whom they perceived important, such as lecturers, were supportive and encouraging on their use of technology. In other words, the undergraduates' intention to use technology is influenced by important people around them and can be affected by others' perception.

5.4. Achievement goals have a significant influence on undergraduates' behavioural intention to use technology

In addition to existing determinants in the original UTAUT model, an additional variable, AG in this study established significant influence on undergraduates' BI to use technology. This finding is in line with the research conducted by Wang et al. (2016) which suggested that the greater the students' AG goals, the greater their intention to perform actions. Hence, this finding implies that the undergraduates' AG are important in their technology utilisation intention, especially for academic purpose.

The undergraduates are most likely to use technology to boost mastery towards the content of course materials and to avoid learning less than they are possible to. Therefore, the finding suggested that the undergraduates intend to use technology for personal attainment instead of for the sake of completing a task. Moreover, it also implies that the undergraduates possess higher self-confidence and belief for self-development (Bulus, 2011). Hence, they show great positive behaviours towards learning, and have much confidence and motivation to utilise technology as a useful tool to develop and pursue interest in learning. Besides, this finding also implies that the undergraduates perceived technology as a convenient tool that can boost their academic performance by improving their learning processes. It entails that the undergraduates who intend to use technology do so because they are likely to gain or avoid judgement towards their performance (Elliot & Church, 2008; Goraya & Hasan, 2012).

5.5. Learning styles do not have significant influence on undergraduates' behavioural intention to use technology

The results in this study indicates that LS do not have significant influence on undergraduates' BI to use technology. It is in contrast with previous studies done by Balakrishnan and Gan (2016), Cruz et al. (2014), Elkaseh et al. (2014), Huang (2015), and Seyal and Rahman (2015).

This finding suggests that an individual's preferred learning mode (Sternberg & Grigorenko, 2001) as well as cognitive behaviour and habits (Chang et al., 2015; Pritchard, 2009) in learning do not influence undergraduates' BI to use technology. Given that the respondents in this study are undergraduates, they are the members from the Generation Y who are generally considered to be technology-savvy and tend to be diverse in their learning stages and processes (Lynch et al., 2009). Besides, Lynch et al. (2009) also proposed the possibility that these individuals from the Generation Y are not using technology as learning tools and effective pedagogies, but mostly as social tools. Hence, it might also be because the undergraduates' lack of awareness on the usage of technology as an effective learning tool.

5.6. The best predictor of undergraduates' behavioural intention to use technology is effort expectancy

In contrast to the literature which reported that PE is the strongest and most robust predictor of BI, the present study discovered that EE is the strongest antecedent that influences undergraduates' BI to use technology. The results of this study showed that both PE and EE are significant predictors of BI. However, EE ($\beta = .32$, $p < .0005$) is a stronger predictor than PE ($\beta = .19$, $p < .0005$), and has the strongest predicting power among all predictors of BI in this study.

This finding is supported by Cruz et al. (2014), similar to the finding of the present study, the research found that EE is the strongest predictor of BI as compared to PE and SI. According to Cruz et al. (2014), this finding suggests that the students are willing to invest the time to use technology as it does not require laborious effort. Mtebe and Raisamo (2014) also reported EE as a significant predictor of BI indicating that students are familiar with technology and believe that they do not need any assistance to use technology. Therefore, it is most likely that undergraduates perceive using technology is simple and easy, and they perceive themselves to be competent in dealing with technology, thus the students are more likely to use technology.

6. Conclusion

In summary, the objectives of this study have been generally achieved. Four out of the five hypotheses were supported in this study. The undergraduates' PE, EE, SI and AG are significant determinants of the undergraduates' BI to use technology. This also implies that all the antecedents in the original UTAUT model are significant determinants in the present study. For the additional variables that were introduced in this study, AG proved to

improve predictability of BI to use technology among undergraduates, while LS did not.

Overall, this study explored the UTAUT model by integrating 2 x 2 AG framework and VAK LS in order to capture a more comprehensive view towards the BI to use technology. The findings could help to enhance the understanding of the undergraduates' use of technology in a Malaysian higher education context. It offers theoretical contributions by integrating three different theoretical perspectives, namely, the UTAUT model, AG and LS with contextual values.

Hence, this study could serve as a reference for the education policy makers and stakeholders to understand technology use from the undergraduates' point of view. The needs of the undergraduates should be addressed explicitly across individual differences so that pedagogical methodologies could be designed by considering the factors that lead to the undergraduates' intention to use technology, specifically EE, followed by PE, AG and SI. In line with the educational goals, educators could identify the importance of adopting technology for pedagogical purposes. Policy makers could invest in elevating teachers' technology competencies by providing useful and practical training in order to educate teachers to fully utilise technology as a strong basis for consolidating educational technology enhancement.

The findings in this study might be encouraging and useful, but there are several methodological limitations that shall not be overlooked. The HMR was employed to examine the undergraduates' BI to use technology through the UTAUT model with additional variables, namely AG and LS. Methodologically, future researchers are encouraged to employ qualitative research methodology to obtain an in-depth view of the undergraduates' intention to use technology using other external variables. Future researchers may also improve the study by enlarging the scope of study by including data from diverse institutions and contexts in order to fit the actual setting in Malaysia. Future studies may consider other potential analysis techniques such as Structural Equation Modelling to better improve the similar research.

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