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EVALUATING STUDENTS' ACCEPTANCE FACTORS ON CHATBOT FOR LEARNING USING UTAUT MODEL

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Abstract:

Past studies have shown that e-learning has been widely used in education. Nowadays, e-learning has become a culture for gaining knowledge online. The problem faced by conventional e-learning is the lack of student's interest when they are using it. Therefore, some researchers have shown that Chatbot for learning has the potential to change the way students learn and search for information. Many students are aware of Chatbot technology, however, not many students have used it. Past research has indicated that only a few numbers of studies have been done on students' acceptance of Chatbot in education. Besides, past research has indicated that the usage of Chatbot for learning is still insufficient. The first objective of this research is to identify the factors that influence students' acceptance of Chatbot for learning while the second objective is to identify the most influential factor in students' acceptance of Chatbot for learning. This research adapts the Unified Theory of Acceptance and Use of Technology (UTAUT) research models which consist of constructs such as Performance Expectancy (PE), Effort Expectancy (EE), Lecturer's Influence (LI), Behavioural Intention (BI) with two additional constructs which are Quality of Service (QS) and Personal Innovativeness (PI). A total of 303 respondents from different levels of education such as Diplomas, Degrees and Masters students from one of the public higher learning institutions in Selangor participated in this study. Pearson correlation was used for the first objective and multi-linear regression for the second objective. The findings from this study reveal that there are relationships between constructs such as PE, EE, LI, QS, PI with BI of students' acceptance of Chatbot for learning and the most influential construct is EE. This research outcome will be one of the

guidelines for higher learning institutions to consider the implementation of Chatbot for learning as a supplementary platform for e-learning.

Introduction

Learning is important to achieve information society. The revolution of technology has enabled the process of information exchange (Reisman, 2014). The internet is essential for educators and students to obtain the information they need online (Hartshorne & Ajjan, 2009; Haleem et al., 2022). Technologies and internet growth have influenced the development of electronic learning in education. According to Rawashdeh et al. (2021), E-learning is a technique using electronic things that will help learning activities become more interesting. E-learning also offers flexibility for the learners to access the materials anytime and anywhere through the internet. E-learning can be used as distance learning for students who are not available in the class to convey the lessons online. Nowadays, e-learning has become a culture to gain knowledge as it has been proven to be an effective learning method.

Although conventional e-learning methods have many benefits, there are some challenges faced by the users. The challenges in conventional e-learning are a lack of student interest and a lack of motivation (Oluwalola, 2015). This is supported by a preliminary study of the i-Learn system (an e-learning system) in one of the public universities in Selangor on five part-time postgraduate students through interviews. The results from the interview found that four students were not interested in using the system while one student was interested. Nonetheless, it is also important to note that the respondents rarely used the system.

Past studies believed that Chatbot e-learning could overcome these problems. Chatbot for learning has become one of the e-learning platforms to support users to gain knowledge. Through Chatbot, communications can be done the way humans interact which means it will gain the user's interest to use it as it can directly interact with the users (Chen et al., 2018). Despite all Chatbot advantages, the implementation of Chatbot in education is still in its infancy. Reviews from previous studies (Van Eeuwen, 2017; Keryl et al., 2007; Huang et al., 2017; Fryer et al., 2017; Τέγος et al., 2013; Colace et al., 2018; Shawar et al., 2007; Pham et al., 2018; Pereira, 2016) showed that research on acceptance of Chatbot for learning is still inadequate. Besides, the main factors of acceptance of Chatbot for learning are unclear. Chatbot is considered as difficult to use and some of the users ended the conversation too soon during learning (Pham et al., 2018; Fryer et al., 2017). Therefore, it is essential to do research on the acceptance of Chatbot for learning. The first objective of this research is to identify the factors that influence students' acceptance of Chatbot for learning and the second objective is to identify the most influential factor of students' acceptance of Chatbot for learning. The significance of this study is the findings from this study may become a guideline for higher learning institutions to consider the implementation of Chatbot for learning as a supplementary to conventional e-learning to support students' learning.

Literature Review

Definition of Chabot
Chatbot is a conversational agent that conducts conversation through text or voice commands with users in natural language in information-seeking and task-oriented dialogs (Shawar et al., 2007; Keryl et al., 2007). Chatbots have different names such as intelligent agents, digital assistants or virtual agents (Vincze, 2017). Chatbots are recommended in media and scholarly journals as the next digital transformation to engage and delight consumers (Følstad et al., 2021). Chatbot is capable to interact with human and act as human to reply the users' queries based on their specialties in the field (Vincze, 2017).

Comparison Elements in Chatbot for Learning with Conventional E-Learning
Table 1 shows comparison of the elements in Chatbot with conventional e-learning. Chatbot has special elements that conventional e-learning does not have where it can provide better services to the students when they use it for learning purpose. Therefore, Chatbot is chosen for this study. Most of the participants use mobile phones over 4 hours a day based on the survey performed, therefore Chabot for learning is suitable for learning purpose as the students can interact directly with Chatbot for learning through their mobile phones.

Table 1: Comparison Elements Of Chatbot And Conventional E-Learning

Element	Chatbot for Learning	Conventional E-Learning
Responsiveness (Chen et al., 2021)	Can interact with users regardless of time and place	Not interact with users
Memory (Chen et al., 2018)	Has ability to retrieve or store the last information or conversation with users for future action	Does not have ability to retrieve or store the last information or conversation with users for future action
Empathy (Chen et al., 2021; Chen et al., 2018)	Able to identify users' emotion and manage to adapt to the environment	Not able to identify users' emotion
Intelligent (Chen et al., 2018)	Has ability to generate information such as calculation, text summary, users' opinion, vocabulary quantity and others	Does not have the ability to generate information such as calculation, text summary, vocabulary quantity and others
Mobile friendly (Pham et al., 2018)	Most of Chatbots are mobile friendly and users have option to download application to be installed in their mobile phones	Most of the conventional e-learnings are not user friendly where users need to access through desktop or laptop to get better view

Chabot in Different Industries
The study by Colace et al. (2018), described that Chatbot technology has been used in different kinds of industries such as E-Commerce, Airlines, Support Systems, Entertainment, Library, Automotive, Finance, Healthcare, Travel and others. In Malaysia, many industries have used Chatbot in their operations such as Malaysia Airlines. Chatbot is used to replace humans where it can interact with users 24 hours a day. For example, Chatbot has been used in the library to improve reference services (Vincze, 2017). Figure 1 shows the general Chatbots that are used

in airlines industry through Facebook. Below are the uses of Chatbot (Chen et al., 2021; Hsu and Lin, 2023):

- **Customer service**: Chatbot is used to answer customers' general questions regarding service and product. For example, how to configure a product.
- **Guided selling**: Help potential customers to choose the service or product which is the best to fulfill their needs and give them guidance on buying decision.
- **Help desk**: Respond to employee's questions. For example, question about pay slips and others.
- **Technical support**: Provide user assistance about technical problems such as diagnosing software problems.

Website navigation: Give direction to customers on complex websites
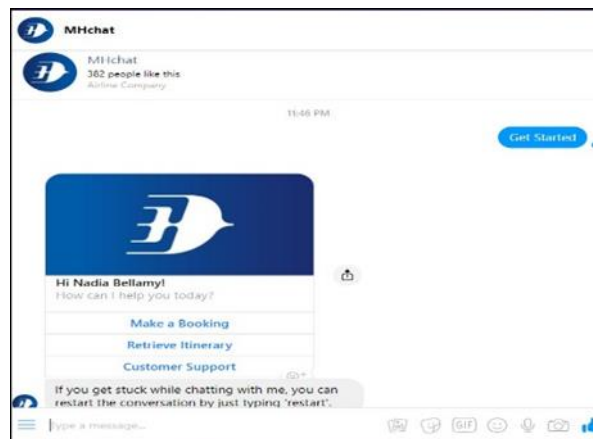

 Figure 1: Chatbot Interface through Facebook Messenger for Malaysia Airlines Berhad
Source: (Malaysia Airlines, 2018)

Chabot for Learning in Education
Chatbot has made a change and impact in education (Pham et al., 2018). Particularly, Chatbot is precious to education field as they can be adopted to an individual's abilities and learning style (Chen et al., 2021; Smutný & Petra, 2020). However, the implementation of Chatbot in education is still in the beginning phase compared to the other fields (Dutta, 2017; Huang et al., 2017; Keryl et al., 2007). The example of Chatbots for learning are English Practice Chatbot, Jill Watson and Nerdy Bot. Figure 2 shows Chatbot for learning's interface for English Practice application.
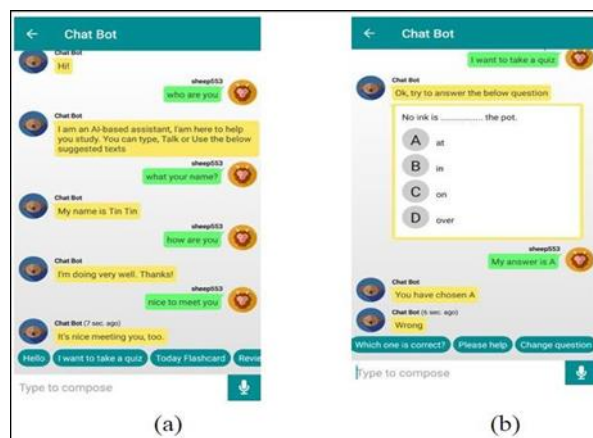

Figure 2: English Practice Chatbot Interface

Unified Theory of Acceptance and Use of Technology (UTAUT)
The UTAUT model is one of the most widely used model in information technology acceptance theory field which was created by Venkatesh et al., (2003). It is about the user's purpose to use the system. This model consists of four constructs which are Effort Expectancy (EE), Facilitating Conditions (FCs), Performance Expectancy (PE) and Social Factors (SFs) which have effects on intention to use. UTAUT can explain about 70% on technology acceptance or system acceptance (Jairak et al., 2009). It was also proved that UTAUT exceeds to perform than the past models (Venkatesh et al., 2003). UTAUT model by Abu-Al-Aish and Love (2013) is used in this research as it is appropriate and fit for the respondents of this study. The proposed UTAUT model of Abu-Al-Aish and Love (2013) with additional constructs of quality of service and personal innovativeness is shown in Figure 3.
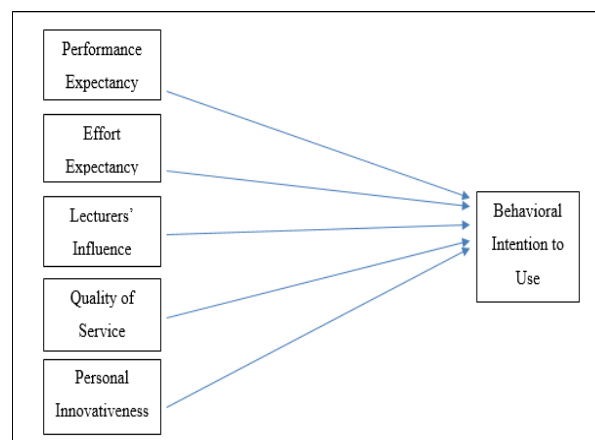

Figure 3: UTAUT Model
Source: (Abu-Al-Aish and Love, 2013)

The hypotheses of this study are created based on the analysis of the literature. Below are the hypotheses of this research.

H1: There will be a positive impact of performance expectancy on behavioural intention to use Chatbot for learning.
H2: There will be a positive impact of effort expectancy on behavioural intention to use Chatbot for learning.
H3: There will be a positive impact of lecturers' influence on behavioural intention to use Chatbot for learning.
H4: There will be a positive impact of quality of service on behavioural intention to use Chatbot for learning.
H5: There will be a positive impact of personal innovativeness on behavioural intention to use Chatbot for learning.

Research Method
The target respondents for this study are part time Diplomas, Degrees and Masters students in one of the public higher learning institutions in Selangor, where the age range is in between 18 and 40 years old. The questionnaire link was distributed through social media such as specific WhatsApp groups, Facebook groups and Instagram which are only joined by the part time students who study at the university from different programs in Selangor, Malaysia. The target population are e-learning users in the university. They are expected to use Chatbot for learning as a supplementary of e-learning to support learning activities. A total of 303 respondents

participated in this study. The purposive sampling to choose the target respondents so that they are familiar with the e-learning environment.

Data are collected from structured questionnaire created from Google form platform. Each of the respondents took about 3-5 minutes to answer all the questions. The structure of questionnaire is made up of two sections. Part A is demographic information of the respondents. Part B consists of measurement questions on the acceptance on Chatbot for learning. Part B uses Likert scale from 1 (Disagree) to 5 (Strongly Disagree). The questions are adapted from previous studies as shown in Table 2.

Table 2: Measurement Mode

Construct	Item	Measurement Scale
Performance Expectancy (PE)	PE1	I find Chatbot for learning useful for my studies.
	PE2	Using Chatbot for learning increases my learning productivity.
	PE3	Using Chatbot for learning enables me to accomplish learning activities more quickly
	PE4	Chatbot for learning allows me to make good use of my leisure time.
Effort Expectancy (EE)	EE1	I find Chatbot for learning as flexible and easy to use.
	EE2	Learning to operate Chatbot for learning does not require much effort.
	EE3	My interaction with Chatbot for learning is clear and understandable.
	EE4	It is easy for me to become skillful at using Chatbot for learning.
Lecturers' Influence (LI)	LI1	I would use Chatbot for learning if it is recommended to me by my lecturers.
	LI2	I would like to use Chatbot for learning if my lecturers support the use of it.
	LI3	Lecturers in my department are not helpful in the use of Chatbot for learning systems.
Quality of Services (QS)	QS1	It is important for Chatbot for learning services to increase the quality of learning.
	QS2	I would prefer Chatbot for learning services to be accurate and reliable.
	QS3	It is preferable that Chatbot for learning services are easy to navigate.
Personal Innovativeness (PI)	PI1	I like to experiment with new information technologies.
	PI2	When I hear about a new information technology, I look forward to examine it.
	PI3	Among my colleagues, I am usually the first to try out a new innovation in technology.
Behavioural Intention (BI)	BI1	I plan to use Chatbot for learning in my studies.
	BI2	I predict that I will use Chatbot for learning frequently.
	BI3	I will enjoy using Chatbot for learning.
	BI4	I would recommend others to use Chatbot for learning.

Result And Discussion

The data obtained were analysed using IBM SPSS Statistics software. Demographic data for this study are discussed in terms of items which are gender, age, level of education, experience level on using Chatbot technology and average time spent per day on mobile phones. Table 3 shows the result of each item obtained from the survey. Majority of the participants are male students of the university which is 52.8% while female is 47.2%. Majority of the respondents who have experience using Chatbot technology is 30.4% and majority of the students spend time using mobile phone more than 4 hours per day which is 30.7 %. Chatbot for learning is suitable for students as it can be used in mobile phone regardless of time and place which is convenient for part-time students.

Table 3: Demographic Data

Item	Frequency	Percentage (%)
Gender:		
• Female	143	47.2 %
• Male	160	52.8 %
Level of education:		
• PhD	0	0 %
• Master	80	26.4 %
• Degree	159	52.5 %
• Diploma	64	21.1 %
• Other	0	0 %
Age		
• 24 or below	37	12.2 %
• 25-27	91	30 %
• 28-36	164	54.1 %
• 37 and above	11	3.6 %
Experience level on using Chatbot technology.		
• No experience	42	13.9 %
• Very little experience	47	15.5 %
• Little experience	55	18.2 %
• Average experience	55	18.2 %
• Experienced	92	30.4 %
• Very experienced	12	4.0 %
Average time spent per day on mobile phone.		
• 0 – 1 hour	5	1.7 %
• 1 – 2 hours	46	15.2 %
• – 3 hours	73	24.1 %
• – 4 hours	86	28.4 %
• More than 4 hours	93	30.7 %

Table 4 shows the descriptive statistics for each items of this study. The highest value for mean is 4.34 for BI4 and the lowest is 4.02 for LI3. For standard deviation, the highest value is 0.940 for LI3 and the lowest is for QS1 which is 0.652.

Table 4: Descriptive Statistics

Item	Question	Mean	Std. Deviation
Performance Expectancy (PE)			
PE1	I find Chatbot for learning useful for my studies.	4.17	0.767
PE2	Using Chatbot for learning increases my learning productivity.	4.15	0.738
PE3	Using Chatbot for learning enables me to accomplish learning activities more quickly.	4.19	0.739
PE4	Chatbot for learning allows me to make good use of my leisure time.	4.24	0.694
Effort Expectancy (EE)			
EE1	I would find Chatbot for learning flexible and easy to use.	4.23	0.666
EE2	Learning to operate Chatbot for learning does not require much effort.	4.25	0.715
EE3	My interaction with Chatbot for learning would be clear and Understandable.	4.21	0.760
EE4	It would be easy for me to become skillful at using Chatbot for learning.	4.20	0.765
Lecturers' Influence (LI)			
LI1	I would use Chatbot for learning if it is recommended to me by my lecturers.	4.17	0.913
LI2	I would like to use Chatbot for learning if my lecturers support the use of it.	4.20	0.870
LI3	Lecturers in my department would not be helpful in the use of Chatbot for learning system.	4.02	0.940
Quality of Services (QS)			
QS1	It is important for Chatbot for learning services to increase the quality of learning.	4.29	0.652

Pearson analysis was conducted to achieve the first objective in order to identify factors influencing students' acceptance on Chatbot for learning. Pearson analysis is used to determine correlation between independent and dependent variables. The independent variables are Performance Expectancy (PE), Effort Expectancy (EE), Lecturers' Influence (LI), Quality of Service (QS), and Personal Innovativeness (PI) while dependent variable is Behavioural Intention (BI). The correlation for each of the independent variables with dependent variable is shown in Table 5 where all the r values are positive and within range of -1 to 1. The range value in Pearson correlation analysis is -1 to 1 and if the r value is positive, it means that the variables are directly related (Mukaka, 2012). The strength of correlation can be described based on the r value where 0.00-0.19 is "very weak", 0.20-0.39 is considered as "weak", 0.40-0.59 is "moderate", 0 .60-0.79 is "strong" and 0.80-1.0 as "very strong" (Evans, 1996). The p-values for each construct are 0.000 where it is considered significant when $p<0.005$.

Table 5: Pearson's Correlation Analysis

Correlation (N=303)	Dependent Variable- Behavioural Intention (BI)		Hypothesis Support
	Pearson Correlation (r)	Sig. (2-tailed) (P-Result Indicate value)	
Independent Variable Performance Expectancy (PE)			
	.620**	.000	Strong	Significant
Effort Expectancy (EE)			
	.680**	.000	Strong	Significant
Lecturers' Influence (LI)			
	.351**	.000	Weak	Significant
Quality of Services (QS)			
	.649**	.000	Strong	Significant
Personal Innovativeness (PI)			
	.565**	.000	Moderate	Significant

*** Correlation is significant at the level 0.01 (2 tailed)*
Ho: If p>.005: No significant
H1: If p<.005: Significant

Multiple linear regression is used in order to achieve second objective of this study which is to analyse the most influential factor to students' acceptance on Chatbot for learning. When the value of r is closer to 1 or -1, the stronger the relationship between dependent and independent variable (Schneider et al., 2010). Meanwhile for R square value, it is to determine the proportion of variation in dependent variables.

Table 6 indicates that R square value is 0.587 where it specifies that 59% variation of dependent variable (BI) can be described by other independent variables which are PE, EE, LI, QS and PI. The remaining 41% variation may be described by other factors that are not used in this research. Table 4.8 shows that overall significant value (sig.) is 0.000 which indicates that regression model is fit for the study when p<0.005.

Table 6: Multiple Correlation Analysis

R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
.766[a]	.587	.581	1.37242	.587	84.596	5	297	.000	1.897

Table 7 shows multiple correlation for all independent variables such as Performance Expectancy (PE), Effort Expectancy (EE), Lecturers' Influence (LI), Quality of Services (QS) and Personal Innovativeness (PI) with dependent variable Behavioural Intention (BI). It is pertinent to identify which of the independent variables give the highest influence to dependent variable. The Beta and Sig. value for PE (Beta=0.126, Sig=0.036), EE (Beta=0.280, Sig.=0.000), LI (Beta=0.042, Sig.=0.302), QS (Beta=0.273, Sig.=0.000) and PI (Beta=0.224, Sig.=0.000). Tolerance values are above 0.1 and VIF are below 10 where these are indicated as acceptable values and no multicollinearity. Multicollinearity is a kind of data disruption (Tabachnick et al., 1983).

Table 7: Regression Coefficient Analysis

Model	Unstandardized Coefficients		Standardized Coefficient			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
(Constant)	2.365	.738		3.202	.002		
PE	.115	.054	.126	2.105	.036	.389	2.568
EE	.264	.060	.280	4.412	.000	.345	2.900
LI	.041	.040	.042	1.033	.302	.824	1.214
QS	.361	.068	.273	5.346	.000	.531	1.884
PI	.253	.050	.224	5.025	.000	.698	1.434

Table 5 shows that P-value for construct PE, EE, LI, QS and PI are 0.000 where P<0.005 indicates that the correlation is significant. Therefore, it is proven that each of the construct has positive impact on Behavioural Intention (BI) of the students to use Chatbot for learning which approves all hypotheses in this study. Among these constructs, EE has become the most influential factor for students' acceptance on Chatbot for learning with the highest value of Beta and lower significant value which is EE (Beta=0.280, Sig.=0.000) compared to other constructs, PE, LI, QS and PI where the values are stated as: PE (Beta=0.126, Sig=0.036), LI (Beta=0.042, Sig.=0.302), QS (Beta=0.273, Sig.=0.000) and PI (Beta=0.224, Sig.=0.000) which are shown in Table 7. Therefore, it shows that effort expectancy is very important to acceptance of students on Chatbot for learning.

Conclusion

In conclusion, the objectives of this study have been achieved. The first objective of this study is to identify the factors that influence students' acceptance of Chatbot for learning and to identify the most influential factor in students' acceptance of Chatbot for learning. To achieve the first objective, Pearson Correlation statistical method was used to identify factors influencing students' acceptance of Chatbot for learning. The result shows that Performance Expectancy (PE), Effort Expectancy (EE), Lecturers' Influence (LI), Quality of Service (QS), and Personal Innovativeness (PI) have significant relationship with Behavioural Intention (BI) which approved all the hypotheses. Multiple Linear Regression was used to analyse the second objective of this study which is to identify the most influential factor on students' acceptance of Chatbot for learning. The findings show that Effort Expectancy (EE) is the most influential factor in students' acceptance of Chatbot for learning. This shows that the majority of the students expect that Chatbot for learning would be easy to use where it is easy to become skillful when they use it. Based on the findings of the first and second objectives, it can be concluded that this research has achieved the first objective and second objective for the students' acceptance of Chatbot for learning study. Some of the limitation of this study is the respondents only from university students from one university. For future research, it is recommended to obtain data from other universities' respondents in Malaysia. Other than that,

the investigation of the acceptance factors of Chatbot for learning can be continued using other theories or models.

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