A Study On In-service English Teachers' Perceptions Towards The Use Of Augmented Reality (AR) In ESL Classroom: Implications for TESL Programme in Higher Education Institutions

Mohd Sufi Amin bin Salmee[1*], Faizah Abd Majid[2]

[1]Sunway Foundation Programme, Sunway College,
Jalan Universiti, Bandar Sunway, 47500 Selangor, Malaysia
mohdsufis@sunway.edu.my
[2]Faculty of Education, Universiti Teknologi MARA,
UiTM Puncak Alam Campus, 42300 Puncak Alam, Selangor, Malaysia
faiza404@uitm.edu.my
[*]Corresponding Author

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Abstract: In meeting the needs of the new generation of learners, the idea of implementing the use of new technology such as Augmented Reality (AR) in English as a Second Language (ESL) classrooms can be a step toward in refining the teaching and learning atmosphere. Nevertheless, the use of this technology relies heavily on the teacher's level of acceptance and skills for it to be successful in classrooms. TESL Programme is one of the popular programmes in higher education institutions. In line with the advancement of technology in education and current transformation happening at schools, it is essential for the TESL curriculum at higher education institutions be revised according to the current training needs of the in-service teachers. Thus, this study intended to determine the English language teachers' perceptions towards the use of AR by applying the Technology Acceptance Model (TAM) as the base of the research model. A survey was conducted on 180 English teachers from 20 schools in the district of Petaling Perdana. The items in the questionnaire elicited information on the levels of AR acceptance of the respondents based on the four variables of TAM, that are perceived usefulness (PU), perceived ease of use (PEoU), attitude towards use (ATT) and behavioural intention (BI) to use AR in ESL classroom. Findings indicate that the levels of AR acceptance of the English teachers are relatively high, as the respondents recorded a high level of PU, ATT and BI towards the use of AR while PEoU was at moderate level. The results from multiple regression analysis indicate that PU and ATT of the English teachers directly influence their BI to use AR in ESL classroom. The findings suggest that English teachers are acceptive and ready for the implementation of AR technology. These finding provide the much needed information for the TESL curriculum review in ensuring the higher education institutions provide programmes fulfil the demand of the technology transformation taking place at schools. Several implications derived from the salient findings were presented for curriculum developers and TESL instructors to consider in revising the curriculum and programme delivery strategies.

Keywords: AR (Augmented Reality), ESL teacher, higher education institutions, TAM (Technology Acceptance Model), TESL curriculum

1. Introduction

The growth of inventive and collaborative technology in today's world have changed the learning methods in schools. The need to keep up with the technological innovation has contributed to a revolution in the development of today's educational systems. The advancements in information technology (IT) today have also led to the expansion of various applications that help in better understanding of concepts, phenomenon and theories by learners in learning. These days, it is more challenging to teach young learners as their motivation is low whenever teaching is conducted in a traditional way. Kamarulzaman, Ghani and Daud (2018) stated that lack of motivation towards activities in class are one of the major problems in academic among youth today. This is said to be primarily due to the lack of creativity and innovative methods in sustaining learners' participation in every activity in the lesson. Recent studies revealed that learners stated that it was boring to just hear the teacher or lecturer talking in front of them (Marcus, 2018). In this case, learners are seeking for the integration of technologies in the class to assist them in the learning process instead of just teacher's talk. Today's students came from a generation who grew up alongside the emerging internet and ICT. Based on the current level of development in technology in education, it is only relevant that the creation of ideal atmosphere in teaching and learning, which includes the enhancing interactivity in the media content of web and the growing quality of delivery e-learning platforms, are established.

In the field of English teaching and learning, there are various methods of teaching that can involve the incorporation of technology. Currently, among the newer types of digital media, there has been a growing attention in the application of Augmented Reality (AR) in creating a unique educational atmosphere (Chen, Liu, Cheng & Huang, 2017). AR is an emerging technological tool that could afford varieties of learning opportunities to expand new interactive learning environments. At present, there are collective number of studies in investigating numerous facets of this technology implementations in education, ranging from the technical features to the pedagogical and user related aspects (Hafizuddin & Abu Bakar, 2021, Noradila, Nur Rasyidah & Wafa, 2021).

Research shows that the use of AR in education has proven to be beneficial in increasing students' motivation in the learning process. Motivation has been one of the key elements in the determining individual differences in language learning and has been recognised by scholars and teachers as a major factor in shaping a successful second language learning (SLA) (Al Othman & Shuqair, 2013). In fostering motivation in learning language, the effort has to be taken since the early stage of learning and numerous tools have been developed in order to facilitate the process. Similar claim was supported by another major study by Solak and Cakir (2015), which set out to explore the effect of the designed AR tool on the learners' vocabulary learning. In this case, the motivational aspect of learning vocabulary was taken into account. The findings depict that the use of AR tool foster students' motivation in vocabulary learning in English classroom. However, studies in the field of AR are essentially focusing on the current state of the technology in which the needs and effectiveness of the use of the technology for educational purposes remain a minor concern (Akcayir & Akcayir, 2017).

In Malaysia, the Malaysian Ministry of Education (MOE) has invested billions on ICT in education initiatives (Gryzelius, 2015). However, there is still no specific curriculum specifications that demands the need for new technologies such as AR to be used in Malaysian classrooms. There is recognition that the traditional chalk and talk teaching method and the use of textbooks alone are failing to engage students and leading to poor learning outcomes. English teachers, especially, need to be more innovative in their approach of teaching the subject as learners of today are no longer able to comprehend the traditional way of teaching since they have been surrounded by these technological advancements all their lives. Thus, the idea of implementing the use of new technology such as AR in English as a Second Language (ESL) classrooms can be a step toward in refining the teaching and learning atmosphere. In this case, English teachers need to be equipped with the knowledge and acceptance towards these technologies in order for it to be used in classrooms. Hence, the primary concern of the study was to investigate the English teachers' perceptions towards the use of AR in ESL classrooms, by using a theoretical model called Technology Acceptance Model (TAM) (Davis, 1989) as the base of the research model. The model suggests that when users are presented with a new

technology, a number of factors influence their decision about how and when they will use it (Davis, 1989).

Teacher education programmes including the Teaching of English as a Second Language (TESL) programme in the higher education institutions are constantly revising their curriculum to ensure the relevance and recognition of their programmes in fulfilling the demands of the industry. In this instance, curriculum developers need to keep abreast of the constant and rapid changes taking place at shoools. As all teacher education curriculum designs begin with the needs analysis of the end-users, it is only essential that the technology acceptance level of in-service English teachers be determined in order to identify areas that could be imbedded in the existing TESL programme. Pre-service English teachers trained under the curriculum which is based on the industry's needs could be prepared to be ready in accepting the use of technology when they receive their teaching posting upon successful completion of their TESL programme.

Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) is a theory that is widely used to explain individual's use and acceptance of a new technology or an information system. The model has been developed by Fred Davis in 1989 and has been verified by different studies in examining individual technology acceptance behaviour. There are many versions of TAM that specifies causal relationship between perceived usefulness (PU), perceived ease of use (PEoU) and other extended variables (Davis, 1993). In this study, the first version of TAM (Davis, Bogozzi and Warshaw, 1989) is used to determine the English teachers' acceptance and their perceptions towards the use of AR technology in the ESL classroom. By using TAM, the level of teachers' acceptance is determined by four variables which are perceived usefulness (PU), perceived ease of use (PEoU), attitude towards using (ATT) and behavioural intention to use (BI). In this research, PU was defined as the extent to which the teachers believe that using AR could be helpful in improving their teaching, while PEoU was defined as the degree to which teachers found that using the AR application as easy and did not cause any difficulty. In relation to that, the ATT showed teachers' beliefs and opinion regarding the use of AR and finally, BI in the study was defined as the teacher's inclination in using AR in their English class. In this case, the potential actual use of AR application in ESL classrooms was predicted and determined by the English teachers' behavioural intention to use (BI), in which it was influenced by their PU, PEoU and ATT towards the technology. Figure 1 depicts the conceptual framework that guided the present study.

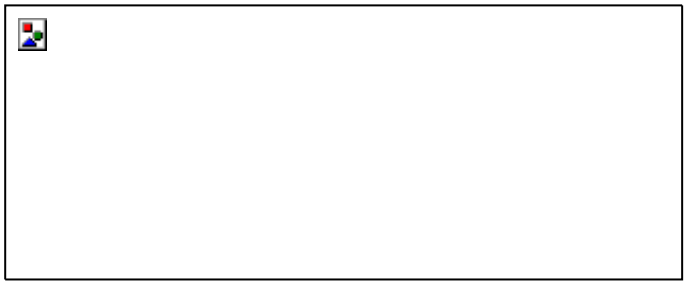

Fig. 1 Conceptual Framework of the study

Essentially, this study intended to determine the English language teachers' perceptions towards the use of AR in secondary school ESL classroom in the area of Petaling Perdana district, Selangor by applying the first version of TAM (Davis, Bogozzi and Warshaw, 1989) as the base of the research model. This was done to investigate different sets of variables, as mentioned in TAM, that are perceived usefulness (PU), perceived ease of use (PEoU), attitude towards use (ATT) and their behavioural intention to use (BI) that might have a significant influence on English teachers' acceptance toward the actual use of AR in secondary school ESL classroom. In essence, by identifying the teachers' actual level of acceptance according to the variables, the study could gain

beneficial insights in the steps can be taken in order to improve both in-service and pre-service teachers' readiness in the implementation of this technology. Therefore, this study intends to answer the following research questions:

1. What is the level of Augmented Reality (AR) acceptance of in-service English teachers based on their perceived usefulness (PU), perceived ease of use (PEoU), attitudes towards use (ATT) and their behavioural intention (BI) to use the technology in secondary school ESL classroom?
2. What is the level of influence of in-service English teachers' perceived usefulness (PU), perceived ease of use (PEoU), attitude towards use (ATT) on their behavioural intention (BI) towards the use of Augmented Reality (AR) in secondary school ESL classroom?
3. What are the implications on the TESL curriculum for the pre-service teachers?

2. Methodology

Population and Sampling

The target population for the study was the English language teachers in secondary schools in the district of Petaling Perdana, Selangor. The reason behind choosing the schools in the district of Petaling Perdana, Selangor as the population was due to the high number of secondary schools in the district. On top of that, the researcher had the convenient access to the secondary schools within the district for the purpose of collecting data.

From the population, 180 English teachers from a total of 20 secondary schools in the district of Petaling Perdana were used as the sample of the study. The sample size was determined based on Krejcie and Morgan's (1970) table for determining the sample size of a known population. This study employed purposive sampling in selecting the respondents.

Research Instrument

For the purpose of this study, the research employed a survey design in which a set of questionnaire was used as the instrument in determining the teachers' acceptance level towards the use of AR in ESL classrooms. The process of designing the questionnaire for this study was guided by the study's theoretical framework in order to maintain consistency with the research objectives and research questions. Relevant literature was reviewed to collect applicable questionnaire items that contribute to meet the objective behind the survey. The items used in this questionnaire were adapted from scholars such as Davis (1989), Wang, Wu, Wang, Chi and Wang, (2018), Coskuncay & Özkan (2013), and Ngai, Poon and Chai (2007).

The first section of the questionnaire intended to obtain the demographic profile of the respondents. There were five items in this particular section in which the respondents were asked about their personal information concerning their gender (male and female), types of English teacher (optionist (in which they were TESL graduates) and non-optionist (other graduates)), ethnic (Malay, Chinese, Indian and others), their academic qualifications (Master's Degree, Bachelor's Degree, Diploma, teaching certificate or others) and the years of experience in teaching English in school (more than 5 years and less than 5 years).

The second section included the four variables that the researcher wanted to explore in relation to TAM. Three of the variables were defined as exogenous factors (independent variables) that are perceived usefulness (PU), perceived ease of use (PEoU) and attitude towards using AR (ATT), while the variable, behavioural intention to use AR (BI) was identified as the endogenous factor (dependent variable). In the section, each individual variable consisted of five items that were related to the use of AR in ESL classroom.

In determining the reliability of the questionnaire, Cronbach's alpha test was carried out on the items from the four variables studied based on the TAM. The four variables, PU, PEoU, ATT and BI towards the use of AR in ESL classroom indicated Cronbach's alpha coefficient of more than 0.70. The Cronbach's alpha for PU was at 0.754 for the 5 items, PEoU recorded a score of 0.861, ATT at

0.809 and BI revealed a Cronbach's alpha score of 0.825. Based on the results of the Cronbach's alpha, it can be concluded that the data collecting instrument of the present study was reliable and data collection could proceed.

Data Analysis Procedures

The data from the questionnaire were converted from string data to numerical data using the Statistical Package for the Social Science (SPSS) software. In order to determine the acceptance level of English teachers' perceived usefulness (PU), perceived ease of use (PEoU), attitude towards use (ATT) and their behavioural intention (BI) towards the use of AR in ESL classroom, the level of acceptance was separated into three levels which were: high, moderate and low in terms of the mean score, taken from Arif, Rosnanini, Noraini, Jamil and Jasmy (2011). Table 1 shows the acceptance level table used in this study.

Table 1. Level of Acceptance Table (Arif et al, 2011)

Level	Average mean score (range)
Low	1.00 – 2.33
Moderate	2.34 – 3.66
High	3.67 – 5.00

In determining the level of influence of English teachers' perceived usefulness (PU), perceived ease of use (PEoU), attitude towards use (ATT) on their behavioural intention (BI) to use Augmented Reality (AR) in secondary school ESL classroom, multiple regression analysis was used to understand and identify which of the independent variables have a significant influence on the dependent variable. In this study, the level of influence of PU, PEoU and ATT on BI was examined.

3. Results and Discussion

The Level of Augmented Reality (AR) Acceptance Of English Teachers

This section contains the results relating to the first research question, 'What is the level of Augmented Reality (AR) acceptance of English teachers based on their perceived usefulness (PU), perceived ease of use (PEoU), attitudes towards use (ATT) and their behavioural intention (BI) to use the technology in secondary school ESL classroom?'. The level of Augmented Reality (AR) acceptance of English teachers was determined by the respondents' levels of agreement of 20 items based on the four variables, PU, PEoU, ATT and BI. The mean score and standard deviation for each of the items were calculated and the arithmetic mean and standard deviation of each of the variables and the overall acceptance were also determined.

The level of AR acceptance was determined based on three levels which were; high, moderate and low as taken from the level of acceptance table by Arif et al (2011), in which a high distribution between the mean score of 1.00 to 2.33 was considered as low, distribution between the mean score of 2.34 to 3.66 as moderate and 3.67 to 5.00 was categorised as high. Thus, the frequency and the percentage of the respondents' distribution in this study were determined based on the three levels of acceptance and presented in Table 2.

Table 2. Level of Augmented Reality (AR) Acceptance

Variable	Frequency (Percentage)			Mean	Standard Deviation	Level
	Low (1.00 – 2.33)	Moderate (2.34 – 3.66)	High (3.67-5.00)			
Perceived Usefulness (PU)	0 (0.0%)	36 (20.0%)	144 (80.0%)	4.14	.569	High
Perceived Ease of Use (PEoU)	13 (7.2%)	100 (55.6%)	67 (37.2%)	3.55	.774	Moderate
Attitude Towards Use (ATT)	6 (3.3%)	33 (18.3%)	141 (78.3%)	4.18	.786	High
Behavioural Intention (BI)	6 (3.3%)	46 (25.6%)	128 (71.1%)	4.02	.706	High
Overall Acceptance	0 (0.0%)	29 (16.1%)	151 (83.9%)	3.97	.526	High

The results in the Table 2 reported that majority of the respondents in this study showed a high level of overall acceptance towards the use of Augmented Reality (AR) in ESL classroom (N=151, 83.9%). The remaining respondents were categorised under having a moderate level of acceptance towards the use of AR in ESL classroom with 29 respondents, 16.1%. The arithmetic mean value for the overall acceptance towards the use of AR in ESL classroom was 3.97 with the standard deviation value of 0.526. This shows that the English teachers in this study have a high level of acceptance towards the use of AR in ESL classroom.

The possible explanation that was deduced from the findings of this study is that the high level of overall acceptance towards the use of AR could be influenced by external factors such as demographic and social factors. In this case, the high level of acceptance in the use of AR among the respondents were probably due to the fact that the population of this study centred around an urban area, Petaling Perdana district. Hence, they were more prone to accept the use of new technology, such as AR in classrooms as teachers in the urban area are more exposed to current trends on technologies as compared to those in rural area. This corresponds with studies made by scholars from Malaysia (Idris, Hashim & Zainan Abidin, 2011, Faizah and Nurshamshida, 2019) that revealed there was a digital gap in the use of technologies in urban and rural schools, in which the user acceptance towards technology in urban schools were found to be higher than the rural areas.

From the aspect of acceptance in terms of English teachers' perceived usefulness (PU), the descriptive analysis reported that the PU level of the respondents of this study was high and highest compared to other variables. The majority of the respondents, that is 144 out of 180 respondents, with the percentage of 80.0% were at the high PU level. This shows that the English teachers in this study had a high level of AR acceptance based on its PU. The high level of PU in using AR in ESL classroom indicated that English teachers believed that using AR application could be helpful in improving their teaching and was useful in ESL classroom.

The descriptive analysis on the respondents' perceived ease of use (PEoU) revealed that majority of respondents in this study possessed a moderate level of PEoU towards the use of AR in ESL classroom, with 100 out of 180 respondents (55.6%) were categorised under the category. The arithmetic mean score for the respondents' PEoU was 3.55, with the standard deviation of 0.774. The result revealed that the English teachers in this study had a moderate level of PEoU towards the use of AR in ESL classroom. The moderate level of PEoU among the English teachers found in this study might due to the lack of exposure that the teachers had on current technology. Uche, Kaegon and Chiemezie (2016), and Faizah and Nurshamshida (2019) found that teachers were lack of awareness

regarding current 21st century technology and that they also faced the issue of lack of encouragement by the school in using technology in the classroom. Another plausible explanation is that this finding might have resulted from teachers' lack of training in operating technological devices that hindered their positive perceptions towards the ease of use of a technology.

In terms of the respondents' attitude towards the use (ATT) of AR in ESL classroom, a total number of 141 respondents (78.3%) were at the high level of ATT of AR in ESL classroom. The arithmetic mean score for the ATT level of AR acceptance was 4.18 with the standard deviation score of 0.786. The data shows that English teachers in this study had a high level of ATT of using AR in ESL classroom. As depicted in the result, a high level of ATT shows the English teachers' positive beliefs and opinion regarding the use of AR in ESL classroom.

Based on Table 2, the descriptive analysis on the respondents' behavioural intention to use (BI) AR application in ESL classroom showed that the BI level of the respondents was high. Majority of the respondents, with 128 respondents (71.1%) were at the high level as their mean range of BI in using AR was between 3.67 to 5.00. The arithmetic mean score of the respondents' BI was 4.02, with the standard deviation of 0.706. The findings reflect that English teachers in this study were ready to use AR in ESL classroom as they had a high intention to use the technology, given the technology was available for them.

Level of Influence of English Teachers' Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Attitude Towards Use (ATT) on Their Behavioural Intention (BI) to Use Augmented Reality (AR) in Secondary School ESL Classroom

In order to answer the second research question, which is on the level of influence of English teachers' perceived usefulness (PU), perceived ease of use (PEoU), attitude towards use (ATT) on their behavioural intention (BI) towards the use of Augmented Reality (AR) in secondary school ESL classroom, a multiple regression analysis was used to test the coefficient between independent variables and dependent variable. In the present study, the exogenous factors (independent variables) were PU, PEoU and ATT, while the BI to use AR was identified as the endogenous factor (dependent variable). Based on the results, an interesting finding emerged as only PU and ATT were found to be significant in influencing the English teachers' BI to use AR in ESL classroom context, while the variable PEoU did not have a significant influence on English teachers' BI to use AR in ESL classroom. English teachers' ATT provided the highest contribution towards the behavioural intention (BI) to use AR in ESL classroom followed by perceived usefulness (PU), while PEoU were found insignificant in influencing BI to use AR in ESL classroom. The results were summarised in the Figure 2 below.

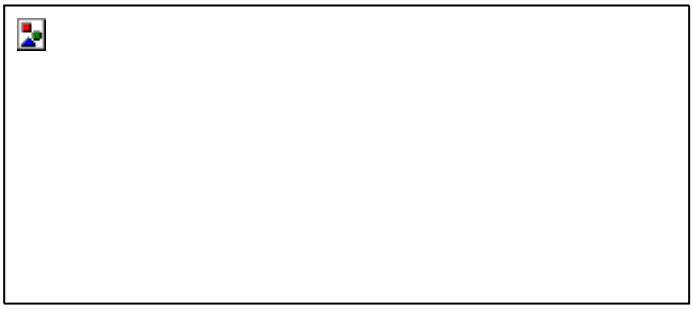

Fig. 2 Multiple Regression Results, *: denotes significant difference p <0.01; →: coefficient (path analysis)

This finding is consistent with previous studies done on TAM in the context of AR usage in educational context. Previous findings indicated that PEoU was insignificant towards influencing BI to use the technology (Balog & Pribeanu, 2010 and Faizah and Nurshamshida, 2019). A plausible explanation to the finding could be made by referring to the first modified version of TAM in Figure 3 (Davis, Bagozzi and Warshaw, 1989), in which Davis, Bagozzi and Warshaw (ibid.) found that there was no direct linkage between PEoU and BI as the PEoU acted as the factor that only influenced PU and ATT. In other words, BI to use a technology could only happen through indirect influence of PEoU.

Fig. 3 First modified version of TAM (Davis, Bagozzi and Warshaw, 1989)

Overall, the results from multiple regression analysis accounted for 48.0% of the variance of behavioural intention to use AR in ESL classroom from the perceived usefulness (PU) and attitude towards use (ATT) of AR among English teachers in this study. According to the result of goodness-of-fit test, the findings of this study led to the conclusion that the analysis of level of influence among variables in AR acceptance did represent the actual theoretical framework of this study that is the Technology Acceptance Model (TAM).

The implications on TESL programme at higher education institutions

The final research question focuses on the implications that could be derived from the salient findings on the current TESL programme. Interestingly, the salient findings have revealed several areas of concern that could be referred to by TESL curriculum developers. Based on the findings, it could be concluded that the overall level of Augmented Reality (AR) acceptance of the secondary school English teachers in Petaling Perdana district was relatively high. The English teachers in this study mostly possessed a high level of acceptance on perceived usefulness (PU), attitude towards use (ATT) and behavioural intention (BI) towards the use of AR in ESL classroom. However, they had problems in perceiving the AR application as easy to use as the respondents recorded a moderate level of perceived ease of use (PEoU). The results from the multiple regression analysis indicate that PU and ATT of the English teachers directly influenced their BI to use AR in ESL classroom. Hence, there were indications that the English teachers were aware about the AR technology and had an idea on the positive implications AR had on the process of teaching and learning. However, the teachers were uncertain on whether the technology would be 'easy' to use or not. This salient finding is implied as a potential lack of confidence in using AR in their classes.

Learning from the in-service teachers' experiences and perceptions, it is apparent that pre-service teachers should be exposed to the use of AR technology in order to encourage a higher degree of confidence in using AR in their teaching. In preparing the pre-service teachers to face the challenges of using AR in their English classess, trainings on the use AR and its pedagogical applications in classroom are much needed. Sufficient trainings in handling AR while teaching the

four skills in English language (Listening, Speaking, Reading and Writing skills) can help encourage the pre-service teachers' familiarity with the technology as well as reducing their anxiety in handling such technological devices in the classroom when they start teaching later. Thus, the trainings should be more focused on hands-on, in which the pre-service teachers could have opportunities to actually experience the use of the AR devices and application themselves. Mueller, Wood, Willoughby, Ross and Specht (2008), and Faizah and Nurshamshida (2019) mentioned teachers who have more experience with technology tools and computers have a more positive attitude that in turn it increases their confidence in using the technology tools.

Pedagogy courses are among the potential courses within the TESL programme curriculum that could seriously embed the need for AR in the students' learning experiences. The course delivery should include lecturers using AR themselves while teaching the pre-service teachers. Some topics in the pedagogy courses must be related to the use of technologies such as AR. This could also include topics on materials development and assessing the four language skills using AR. Besides the pedagogy courses, theoretical courses such as Psychology in Education and Assessment and Evaluation in English Language need to cover topics that relate to the application of AR in education. Pre-service teachers need to be exposed to potential psychological issues as AR become a common technology platform in teaching and learning delivery. Likewise, in preparing the pre-service teachers to assess and evaluate their students later, elements of AR in the Assessment and Evaluation course could exhibit how the technology is a potential tool for assessment and evaluation without compromising the assessment integrity.

All in all, the entire TESL programme itself must embrace the technology culture in their programme delivery. The lecturers teaching respective courses could themselves introduce and encourage familiarity of AR to the pre-service teachers by using AR in their course delivery. In this essence, the faculty will require facilitation and support in terms of infrastructure and infostructure. The environment in the faculty could be inclusive in terms of technology-friendly. The bottom line is, a proper training programme for student teachers should be introduced and implemented in higher education to provide the pre-service teachers with the understanding and practical use of AR technology. This is to ensure that they are comfortable and well-prepared when they enter the teaching profession.

4. Conclusion

Much have been deliberated on the existing English language teachers' acceptance of AR in this study. The TAM Model was referred to as an attempt to uncover the in-service teachers' perceptions of AR in the classes. Learning from the in-service teachers'experiences and perceptions, much then could be done in the existing TESL programme. Curriculum developers could reflect on the findings and consider the implications. Along the line of staying relevant and recognized by the industry which in this case are the schools where the pre-service teachers would be posted to later, it is inevitable to learn from the in-service teachers' experiences. The lessons learned could guide curriculum developers in refining the existing TESL programme.

Principally, the needs of teachers, in-service and pre-service alike, are vital to be taken into perspective in considering a change in our national education system and higher education curriculum as teachers are the key performer in ensuring the sustainability of the society, parallel to the quotes by George Couros: "*Technology will never replace great teachers, but technology in the hands of great teachers is transformational*".

5. Co-author's contributions

The first co-author contributed significantly to the study's design and were in charge of data gathering and analysis while the second co-author provided substantial information on previous literatures, conceptual framework, implications as well as critically reviewing the work.

6. Acknowledgement

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