

# An Online Survey: Studying the Antecedents of Technology Use through the UTAUT Model among Arts and Science Undergraduate Students

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**Abstract:** Students need to be well-equipped with the necessary information, understanding, capabilities, skills and awareness to learn a subject and simultaneously to optimize the use of technology. For that reason, this research studied the antecedents of students' technology use through Unified Theory of Acceptance and Use of Technology (UTAUT) model. Besides that, this paper sought to explore whether there is a difference between Arts and Science undergraduate students in terms of technology use. There were 38 Arts and 30 Science undergraduate students who participated in this online survey. Based on the independent-samples t-test, there was no significant difference ( $t(66) = .558, p = .579$ ) found in terms of technology use among the Arts ( $M = 5.772, SD = .653$ ) and Science ( $M = 5.661, SD = .980$ ) students. The magnitude of the differences obtained was very small. Therefore, the findings of the study suggest that both the Arts and Science students make use of the technology regardless of their major.

**Keywords:** Antecedents, technology use, UTAUT model, online survey

## 1. Introduction

One of the key players to successfully integrate technology into the education system is the student. They need to be well-equipped with the necessary information, understanding, capabilities, skills and awareness to learn a subject and simultaneously to optimize the use of technology. Technology is not only a medium to deliver or receive knowledge, but it also acts as a vehicle that helps students to travel along the pathway to prepare them for their future. According to Godin and Goette (2013), students who graduate these days regardless of their major, need to have the capabilities to work in a global marketplace and use whatever technology that is needed to work virtually.

There is also an increasing need for educators to incorporate technology in teaching and learning in universities in Malaysia. Identifying the differences would help the educators to address the challenges faced by Arts and Science students in the teaching pedagogy. A study conducted among undergraduates found that there was no significant difference in the overall scores between undergraduates from the Arts and Science disciplines in an ICT literacy course (Wong & Cheung, 2012). However, Liberal Arts and Business students were found to use less applications in their laptops compared to students who are in the Science disciplines (Percival & Percival, 2009). Despite the greater use of applications, another study reported that there was no significant difference in problem solving skills between Arts and Science students (Williamson, 2011).

Hence, this study sought to study the antecedents that influence the students' technology use through the Unified Theory of Acceptance and Use of Technology (UTAUT) model as a research framework. An online survey was employed to measure six constructs: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC),

Behavioural Intention (BI), and Use Behaviour (UB). Additionally, this study tested whether field of study (Arts and Science) plays a role among undergraduates' technology use.

## 2. Literature review

### 2.1 *The UTAUT Model*

Quite a number of theoretical models have been suggested to facilitate the understanding of factors impacting the user acceptance and usage behaviour of information technology. These models are universally used to predict and explain individuals' behaviours towards technology acceptance (Dulle & Minishi-Majanja, 2011), such as Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Motivational Model (MM) and so forth were incorporate in the area of perceived ease of use as a determinant of acceptance (Liu & Kostiwa, 2007). Among all the models, Technology Acceptance Model (TAM) is one of the most widely applied and influential models in explaining information technology adoption behaviour (Venkatesh & Davis, 2000).

Venkatesh, Morris, Davis, and Davis (2003) formulated the more recent instrument, Unified Theory of Acceptance and Use of Technology (UTAUT) model in which they included the eight well-known models - Motivational Model (MM), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), Model of PC Utilization, Innovation Diffusion Theory, Combined TAM-TPB, and Social Cognitive Theory. The UTAUT model does not only describes the main individual-level factors that influence technology acceptance, but the possibilities that would limit and amplify the influence of these factors (Venkatesh & Zhang, 2010). The credibility of the UTAUT model is established in explaining a large portion of variance in the user behaviour intention towards the use of technology (Venkatesh & Zhang, 2010) and it has been validated outside the origin where it was first proposed (Teo & Noyes, 2012). Besides, there are four constructs in UTAUT model which play key roles as direct determinants of user acceptance and usage behaviour - performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh et al., 2003).

The UTAUT model presents three direct determinants (see Figure 1) to assess behaviour intention towards the use of technology (performance expectancy, effort expectancy, social influence), two direct determinants of technology use (behaviour intention and facilitating conditions), and four contingencies (age, gender, experience and voluntariness) affecting behaviour and/or intention towards the use of technology (Venkatesh & Zhang, 2010). However, the four contingencies in the UTAUT model were excluded in this research because they are moderating variables which affect the relationship between the determinants and technology use behaviour; while the focus in this research is to examine the direct factors that affect the undergraduates' technology use behaviour (Baron & Kenny, 1986; Brown, Dennis, & Venkatesh, 2010). In the present study, the researchers also sought to explore if field of study plays a role in technology use.

Over the last decade, the UTAUT model has been widely used to examine technology use in educational context, especially in e-learning and mobile learning (Cruz, Boughzala, & Assar, 2014; Lin, Lu, & Liu, 2013; Thomas, Singh, & Gaffar, 2013). According to Cassidy et al. (2014), technology evolution has impacted education as students' exposure to technology has increased dramatically including computer, mobile software, electronic gadgets and social networks. As Cassidy and her colleagues reported, students' technology use for academic purpose, such as the use of e-reader, has doubled in four years. Hence, technology evolution has also contributed to ubiquitous use and access in education. As said by Godin and Goette (2013), future studies should be conducted to examine the virtual learning and technology acceptance with the intention to comprehend better on how to prepare the students to collaborate virtually in a global environment by incorporating these determinants.

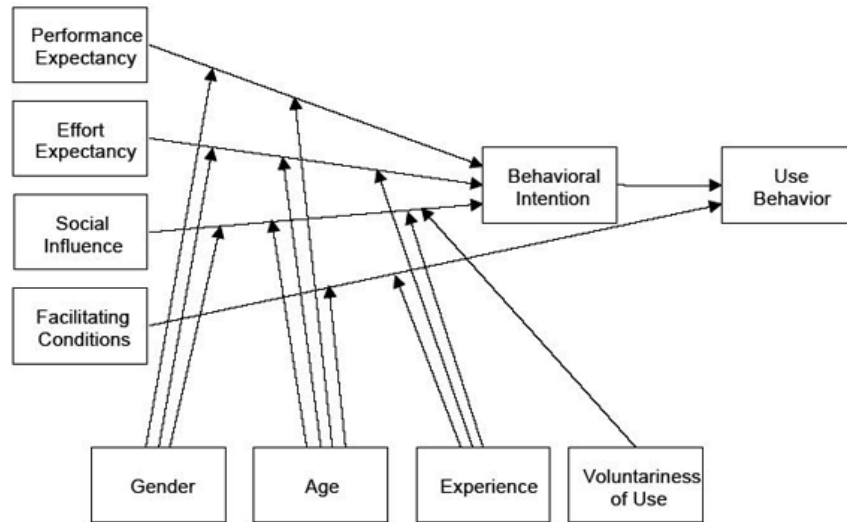


Figure 1. Unified Theory of Acceptance and Use of Technology (UTAUT) Model.

### 3. Purpose of the study

This study aims to achieve the following objectives: (a) to explore the antecedents that explain the students' technology use through the UTAUT Model, and (b) to test whether there is a significant difference in technology use between Arts and Science undergraduate students.

### 4. Methodology

#### 4.1 Participants

The sample consists of 68 Arts and Science undergraduates from a private university located in peninsula Malaysia. There were 18 males (26.5%) and 50 females (73.5%) who participated in the online survey. Table 1 provides a summary of the undergraduates' ages. The undergraduates' age ranges from 20 to 27. The mean age of the participants is 22.26 with standard deviation of 1.39.

Table 1: Age

| Age   | Frequency | Percentage |
|-------|-----------|------------|
| 20    | 8         | 11.8       |
| 21    | 9         | 13.2       |
| 22    | 21        | 30.9       |
| 23    | 23        | 33.8       |
| 24    | 5         | 7.4        |
| 27    | 2         | 2.9        |
| Total | 68        | 100.0      |

In addition, Table 2 shows the undergraduates' majors. There were 38 (55.9%) Arts undergraduates from Faculty of Arts and Social Science while the remaining 30 (44.1%) were Science undergraduates from the Faculty of Science.

Table 2: Majors

| Major                              | Frequency (f) | Percentage (%) |
|------------------------------------|---------------|----------------|
| Faculty of Arts and Social Science | 38            | 55.9           |
| Faculty of Science                 | 30            | 44.1           |
| Total                              | 68            | 100.0          |

#### 4.2 Research Instrument

The online survey was adapted from the UTAUT model instrument which was developed by Venkatesh, et al. (2013). In this research, the online survey was designed using Google Form. There were two sections in the online questionnaire with a total of 28 items. The respondents filled in their age and major in the first section and clicked on an appropriate option (7-point likert scale from “Strongly Disagree” to “Strongly Agree”) for the second section. Subsequently, their responses were recorded and submitted to a Web server, which was used to administrate the online survey.

Besides that, a reliability analysis was executed for the scales using Cronbach’s Alpha. As summarised in Table 3, all of the scales tested in the UTAUT constructs were reliable as each computed statistic showed a value above .70 ranging from .70 to .96. The Cronbach’s Alpha value of the questionnaire with 28 items was reported to be .95.

**Table 3: Instrument Reliability**

| Scales                  | Number of Items | Cronbach’s Alpha |
|-------------------------|-----------------|------------------|
| Performance Expectancy  | 4               | .85              |
| Effort Expectancy       | 4               | .88              |
| Social Influence        | 4               | .79              |
| Facilitating Conditions | 5               | .88              |
| Behavioural Intention   | 5               | .96              |
| Use Behaviour           | 6               | .70              |

#### 5. Results and Discussion

A descriptive statistical analysis describing the antecedents of undergraduates’ technology use is presented in Tables 4, 5, 6, 7, 8 and 9. Table 4 is a summary of descriptive analysis for the undergraduates’ performance expectancy. As demonstrated in Table 4, the statistics suggest that the undergraduates perceive technology as an effective tool that enhances their studies and task accomplishment and productivity. Nevertheless, it appears that the undergraduates tend to be more neutral with respect to the perception that using technology will improve their academic grades.

**Table 4: Descriptive Statistics for Performance Expectancy (PE) (n= 68)**

| Questionnaire Item                                                         | 1<br>Strongly Disagree | 2<br>Disagree | 3<br>Slightly Disagree | 4<br>Neither Agree Or Disagree | 5<br>Slightly Agree | 6<br>Agree    | 7<br>Strongly Agree | Mean | Std. Dev. |
|----------------------------------------------------------------------------|------------------------|---------------|------------------------|--------------------------------|---------------------|---------------|---------------------|------|-----------|
| SI1: People who influence my behaviour think that I should use technology. | 0<br>(0%)              | 3<br>(4.4%)   | 14<br>(20.6%)          | 21<br>(30.9%)                  | 18<br>(26.5%)       | 8<br>(11.8%)  | 4<br>(5.9%)         | 4.38 | 1.23      |
| SI2: People who are important to me think that I should use technology.    | 2<br>(2.9%)            | 5<br>(7.4%)   | 8<br>(11.8%)           | 21<br>(30.9%)                  | 15<br>(22.1%)       | 13<br>(19.1%) | 4<br>(5.9%)         | 4.43 | 1.43      |

|                                                                                       |             |             |             |               |               |               |             |      |      |
|---------------------------------------------------------------------------------------|-------------|-------------|-------------|---------------|---------------|---------------|-------------|------|------|
|                                                                                       |             |             |             |               |               |               |             |      |      |
| SI3: The administration of this university has been helpful in the use of technology. | 1<br>(1.5%) | 2<br>(2.9%) | 6<br>(8.8%) | 26<br>(38.2%) | 20<br>(29.4%) | 10<br>(4.7%)  | 3<br>(4.4%) | 4.53 | 1.17 |
| SI4: The university has supported the use of technology.                              | 1<br>(1.5%) | 1<br>(1.5%) | 4<br>(5.9%) | 18<br>(26.5%) | 19<br>(27.9%) | 19<br>(27.9%) | 6<br>(8.8%) | 4.97 | 1.23 |

Table 5 provides the descriptive analysis for undergraduates' effort expectancy. It shows that the undergraduates are confident in using technology as they believe that learning and operating technology is easy and understandable for them.

**Table 5: Descriptive Statistics for Effort Expectancy (EE) (n= 68)**

| Questionnaire Item                                                   | 1<br>Strongly Disagree | 2<br>Disagree | 3<br>Slightly Disagree | 4<br>Neither Agree Or Disagree | 5<br>Slightly Agree | 6<br>Agree    | 7<br>Strongly Agree | Mean | Std. Dev. |
|----------------------------------------------------------------------|------------------------|---------------|------------------------|--------------------------------|---------------------|---------------|---------------------|------|-----------|
| EE1: My interaction with technology would be understandable.         | 1<br>(1.5%)            | 3<br>(4.4%)   | 2<br>(2.9%)            | 15<br>(22.1%)                  | 21<br>(30.9%)       | 20<br>(29.4%) | 6<br>(8.8%)         | 5.00 | 1.28      |
| EE2: It would be easy for me to become skilful at using technology . | 0<br>(0%)              | 1<br>(1.5%)   | 4<br>(5.9%)            | 13<br>(19.1%)                  | 19<br>(27.9%)       | 19<br>(27.9%) | 12<br>(17.6%)       | 5.28 | 1.22      |
| EE3: I would find technology easy to use.                            | 0<br>(0%)              | 2<br>(2.9%)   | 4<br>(5.9%)            | 16<br>(23.5%)                  | 18<br>(26.5%)       | 17<br>(25.0%) | 11<br>(16.2%)       | 5.13 | 1.28      |
| EE4: Learning to operate technology would be easy for me.            | 0                      | 3<br>(4.4%)   | 4<br>(5.9%)            | 13<br>(19.1%)                  | 21<br>(30.9%)       | 17<br>(25.0%) | 10<br>(14.7%)       | 5.10 | 1.30      |

Table 6 represents the undergraduates' perceptions on social influence towards their technology use. The descriptive statistics suggest that the undergraduates are neutral in terms of their perception that important people around them and the university administration might affect their technology use.

Table 6: Descriptive Statistics for Social Influence (SI) (n= 68)

| Questionnaire Item                                                                    | 1<br>Strongly Disagree | 2<br>Disagree | 3<br>Slightly Disagree | 4<br>Neither Agree Or Disagree | 5<br>Slightly Agree | 6<br>Agree    | 7<br>Strongly Agree | Mean | Std. Dev. |
|---------------------------------------------------------------------------------------|------------------------|---------------|------------------------|--------------------------------|---------------------|---------------|---------------------|------|-----------|
| SI1: People who influence my behaviour think that I should use technology.            | 0<br>(0%)              | 3<br>(4.4%)   | 14<br>(20.6%)          | 21<br>(30.9%)                  | 18<br>(26.5%)       | 8<br>(11.8%)  | 4<br>(5.9%)         | 4.38 | 1.23      |
| SI2: People who are important to me think that I should use technology.               | 2<br>(2.9%)            | 5<br>(7.4%)   | 8<br>(11.8%)           | 21<br>(30.9%)                  | 15<br>(22.1%)       | 13<br>(19.1%) | 4<br>(5.9%)         | 4.43 | 1.43      |
| SI3: The administration of this university has been helpful in the use of technology. | 1<br>(1.5%)            | 2<br>(2.9%)   | 6<br>(8.8%)            | 26<br>(38.2%)                  | 20<br>(29.4%)       | 10<br>(4.7%)  | 3<br>(4.4%)         | 4.53 | 1.17      |
| SI4: The university has supported the use of technology.                              | 1<br>(1.5%)            | 1<br>(1.5%)   | 4<br>(5.9%)            | 18<br>(26.5%)                  | 19<br>(27.9%)       | 19<br>(27.9%) | 6<br>(8.8%)         | 4.97 | 1.23      |

Table 7 is a summary of descriptive analysis for the facilitating conditions in undergraduates' technology use. It suggests that the undergraduates agree they have the necessary resources and knowledge to use technology. However, the undergraduates' perceptions are rather neutral toward the available assistance when they encounter technology use difficulties.

Table 7: Descriptive Statistics for Facilitating Conditions (FC) (n= 68)

| Questionnaire Item                                      | 1<br>Strongly Disagree | 2<br>Disagree | 3<br>Slightly Disagree | 4<br>Neither Agree Or Disagree | 5<br>Slightly Agree | 6<br>Agree    | 7<br>Strongly Agree | Mean | Std. Dev |
|---------------------------------------------------------|------------------------|---------------|------------------------|--------------------------------|---------------------|---------------|---------------------|------|----------|
| FC1: I have the resources necessary to use technology.  | 0<br>(0%)              | 3<br>(4.4%)   | 4<br>(5.9%)            | 12<br>(17.6%)                  | 26<br>(38.2%)       | 15<br>(22.1%) | 8<br>(11.8%)        | 5.03 | 1.23     |
| FC2: I have the knowledge necessary to use technology.  | 0<br>(0%)              | 1<br>(1.5%)   | 8<br>(11.8%)           | 10<br>(14.7%)                  | 17<br>(25.0%)       | 22<br>(32.4%) | 10<br>(14.7%)       | 5.19 | 1.28     |
| FC3: When I encounter difficulties in using technology, | 0                      | 0             | 13                     | 18                             | 11                  | 14            | 7                   | 4.54 | 1.46     |

|                                                                                          |             |               |               |               |               |               |              |      |      |
|------------------------------------------------------------------------------------------|-------------|---------------|---------------|---------------|---------------|---------------|--------------|------|------|
| a specific person is available to provide assistance.                                    | (0%)        | (0%)          | (19.1%)       | (26.5%)       | (16.2%)       | (20.6%)       | (10.3%)      |      |      |
| FC4: When I encounter difficulties in using technology, I know where to seek assistance. | 0<br>(0%)   | 4<br>(5.9%)   | 6<br>(8.8%)   | 16<br>(23.5%) | 17<br>(25.0%) | 17<br>(25.0%) | 8<br>(11.8%) | 4.90 | 1.36 |
| FC5: When I encounter difficulties in using technology, I am given immediate assistance. | 1<br>(1.5%) | 10<br>(14.7%) | 12<br>(17.6%) | 21<br>(30.9%) | 15<br>(22.1%) | 5<br>(7.4%)   | 4<br>(5.9%)  | 4.03 | 1.40 |

The undergraduates' behavioural intention in technology adoption is statistically described in Table 8. As demonstrated, the undergraduates will use technology in the future. Moreover, they also agree that they have positive intention to use technology often in future or in the next few months.

**Table 8: Descriptive Statistics for Behavioural Intention (BI) (n= 68)**

| Questionnaire Item                                            | 1<br>Strongly Disagree | 2<br>Disagree | 3<br>Slightly Disagree | 4<br>Neither Agree Or Disagree | 5<br>Slightly Agree | 6<br>Agree    | 7<br>Strongly Agree | Mean | Std. Dev. |
|---------------------------------------------------------------|------------------------|---------------|------------------------|--------------------------------|---------------------|---------------|---------------------|------|-----------|
| BI1: I intend to use technology in the next few months.       | 0<br>(0%)              | 1<br>(1.5%)   | 5<br>(7.4%)            | 9<br>(13.2%)                   | 15<br>(22.1%)       | 14<br>(20.6%) | 24<br>(35.3%)       | 5.59 | 1.36      |
| BI2: I predict I would use technology in the next few months. | 0<br>(0%)              | 2<br>(2.9%)   | 3<br>(4.4%)            | 7<br>(10.3%)                   | 19<br>(27.9%)       | 13<br>(19.1%) | 24<br>(35.3%)       | 5.62 | 1.34      |
| BI3: I plan to use technology in the next few months.         | 0<br>(0%)              | 1<br>(1.5%)   | 5<br>(7.4%)            | 8<br>(11.8%)                   | 12<br>(17.6%)       | 19<br>(27.9%) | 23<br>(33.8%)       | 5.65 | 1.34      |
| BI4: I will use technology in the future.                     | 0<br>(0%)              | 1<br>(1.5%)   | 0<br>(0%)              | 5<br>(7.4%)                    | 11<br>(16.2%)       | 20<br>(29.4%) | 31<br>(45.6%)       | 6.09 | 1.08      |
| BI5: I plan to use technology often.                          | 0<br>(0%)              | 2<br>(2.9%)   | 4<br>(5.9%)            | 6<br>(8.8%)                    | 15<br>(22.1%)       | 17<br>(25.0%) | 24<br>(35.3%)       | 5.66 | 1.36      |

The descriptive statistics in Table 9 entails the undergraduates' use behaviour. The analysis suggests that the undergraduates use technology for leisure, studies and daily communication. Interestingly, according to the statistics shown, the undergraduates' technology use for course-related work overrides the use for other purposes.

**Table 9: Descriptive Statistics for Use Behaviour (UB) (n= 68)**

| Questionnaire Item                                | 1<br>Strongly Disagree | 2<br>Disagree | 3<br>Slightly Disagree | 4<br>Neither Agree Or Disagree | 5<br>Slightly Agree | 6<br>Agree    | 7<br>Strongly Agree | Mean | Std. Dev. |
|---------------------------------------------------|------------------------|---------------|------------------------|--------------------------------|---------------------|---------------|---------------------|------|-----------|
| UB1: I check my email.                            | 0<br>(0%)              | 6<br>(8.8%)   | 5<br>(7.4%)            | 3<br>(4.4%)                    | 13<br>(19.1)        | 22<br>(32.4%) | 19<br>(27.9%)       | 5.42 | 1.55      |
| UB2: I communicate via instant messaging.         | 0<br>(0%)              | 0<br>(0%)     | 4<br>(5.9%)            | 7<br>(10.3%)                   | 14<br>(20.6%)       | 22<br>(32.4%) | 21<br>(30.9%)       | 5.72 | 1.18      |
| UB3: I use the Internet for course-related work.  | 0<br>(0%)              | 1<br>(1.5%)   | 0<br>(0%)              | 4<br>(5.9%)                    | 10<br>(14.7%)       | 25<br>(36.8%) | 28<br>(41.2%)       | 6.08 | 1.01      |
| UB4: I use the Internet for leisure.              | 0<br>(0%)              | 1<br>(1.5%)   | 4<br>(5.9%)            | 1<br>(1.5%)                    | 11<br>(16.2%)       | 27<br>(39.7%) | 24<br>(35.3%)       | 5.92 | 1.16      |
| UB5: I talk on the phone.                         | 0<br>(0%)              | 3<br>(4.4%)   | 7<br>(10.3%)           | 8<br>(11.8%)                   | 21<br>(30.9%)       | 12<br>(17.6%) | 17<br>(25.0%)       | 5.22 | 1.44      |
| UB6: I use technology to communicate with others. | 0<br>(0%)              | 1<br>(1.5%)   | 3<br>(4.4%)            | 4<br>(5.9%)                    | 10<br>(14.7%)       | 22<br>(32.4%) | 28<br>(41.2%)       | 5.95 | 1.20      |

Moreover, Table 10 is the summary of descriptive analysis for the UTAUT model. As shown in the table, use behaviour and behavioural intention scored the highest mean value ( $M = 5.72$ ) followed by performance expectancy ( $M = 5.37$ ,  $SD = 1.00$ ) and effort expectancy ( $M = 5.13$ ,  $SD = 1.09$ ). Meanwhile, social influence indicated the lowest mean value ( $M = 4.58$ ,  $SD = 1.00$ ) whereas facilitating conditions demonstrated the second lowest mean value ( $M = 4.74$ ,  $SD = 1.12$ ). This shows that most of the students either use or have the intention to use the technology for course-related work, relaxation, and communication regardless of their social influence and facilitating conditions.

**Table 10: Descriptive Statistics for UTAUT Model (n= 68)**

| Variables               | Mean | Standard Deviation |
|-------------------------|------|--------------------|
| Performance Expectancy  | 5.37 | 1.00               |
| Effort Expectancy       | 5.13 | 1.09               |
| Social Influence        | 4.58 | 1.00               |
| Facilitating Conditions | 4.74 | 1.12               |
| Behavioural Intention   | 5.72 | 1.20               |
| Use Behaviour           | 5.72 | .81                |

Findings of this study also reported that there is a strong positive correlation between performance expectancy ( $r = .695$ ,  $p < .0005$ ), effort expectancy ( $r = .635$ ,  $p < .0005$ ), social influence ( $r = .544$ ,  $p < .0005$ ) and behavioural intention to use technology. In addition, there is also a positive correlation between facilitating conditions ( $r = .538$ ,  $p < .0005$ ) and use behaviour; and medium positive correlation between behavioural intention ( $r = .496$ ,  $p < .0005$ ) and use behaviour. Thus, the credibility of the UTAUT model in investigating the antecedents that influence technology use among Arts and Science undergraduate students is continuously being proven (Venkatesh & Zhang, 2010). This is also consistent with the research done by Venkatesh et al. (2003) a decade ago.

Lastly, an independent-samples t-test was carried out to compare the technology use between the Arts and Science undergraduate students. There was no significant difference ( $t(66) = .558, p = .579$ ) found in terms of technology use for Arts ( $M = 5.772, SD = .653$ ) and Science ( $M = 5.661, SD = .980$ ) students which found to be concurrent with Williamson's study (2011). The magnitude of the differences in the mean values (mean difference = .111) was very small (eta squared = .005).

## 6. Conclusion

Integrating technology in teaching and learning is to some extent an expectation in tertiary education. Technology is no longer regarded as novelty but a standard feature in the delivery of a course in tertiary institutions in Malaysia. However, there is a need to understand and identify the antecedents of technology use among graduates to help educators and education managers address the challenges and concerns experienced by them.

However, this study was conducted with a modest sample size from two faculties within a university in Malaysia. Therefore it is not representative of the scenario in Malaysia. However, future research could explore the possibility of expanding the sample size or comparing Arts and Science undergraduates from different universities located in different countries.

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