

Delving into the Cognizance of Information and Communication Technology (ICT) among Undergraduate Students

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Abstract: *We cannot deny the significant influence of Information and Communication Technology (ICT) in one's lives. The impact is highly acknowledged, and the education field is at no exception. The advancement of ICT has indirectly affected students and their learning process. However, there lies a question as to how much undergraduate students utilise ICT in their daily lives. Are they prone to using it for recreational as compared to the educational purpose? Thus, this study aims to fathom undergraduate students' perspectives in regard to their ICT usage, perceived ICT competencies, perceptions of ICT, and attitudes towards ICT. In addition, the difference based on gender factor was also investigated besides the correlation between the variables. This quantitative study employed a questionnaire as the research instrument and open-ended questions to unearth the respondents' views concerning the issue. 283 undergraduate students were involved in this study. The findings showed mixed results pertaining to the elements investigated. In detail, the respondents asserted that ICT is synonymous with their undergraduate lives as it equips them with the necessary skills for their prospective careers. However, few elements need to be rectified and solidified to meet the expectation of ICT. This is crucial as it may inform the higher authority the current state of ICT cognizance and usage among the higher learning institutions students.*

Index Terms: *education, ICT, perceived competency, social networking, undergraduate students*

I. INTRODUCTION

The proliferation of Information and Communication Technology (ICT) has led to reliance and dependency on this tool in an individual's daily life. The impact of ICT is inevitable in various fields such as banking, commerce, aviation, and even education. In the field of education, ICT has been greatly utilised by teachers and students to assist the teaching and learning process [1-4]. It is acknowledged as a tool that promotes and assists the development of the education system and the benefits of using it are acknowledged. Holding to that notion, the utilisation of ICT tools among students at all levels is highly encouraged and recommended.

Various implementations related to ICT have taken place in the education system. In fact, the Ministry of Education Malaysia has even highlighted the importance of ICT in the Malaysia Education Blueprint by acknowledging it as the seventh shift of transformation which is 'Leveraging ICT to

Scale Up Quality Learning Across Malaysia'. This is due to the changes that occur in ICT as asserted by [5] that it is an ever-changing subject. Similarly, both education and technology are evolving through the changes in the dependency of mobile learning [6]. ICT will be a ubiquitous part of education, with no urban-rural divide, and with all teachers and students equipped with necessary skills to use this technology meaningfully and effectively [7].

With regard to utilising ICT in the teaching and learning process of undergraduate students, the integration of the tools may either be an assistance or a disturbance. Initially, ICT is meant to aid the learning process. Unfortunately, it can also be a distracting factor should there is no control over its use as posited by [8] that smartphones can be a distraction and students use technology in class for non-study related matters. This supports [3] that language learners are attracted to a large number of distracters including chatting, irrelevant games and other irrelevant issues. In fact, students nowadays are very much ICT-savvy in using gadgets like smartphones or tablets to seek information via Google, Internet Explorer, Facebook or even YouTube. Therefore, it is essential to develop undergraduate students' understanding to maximise the use of ICT tools for the sake of their learning.

II. REVIEW OF THE LITERATURE

The rapid advancement and proliferation of Information and Communication Technology (ICT) are indubitably significant to the vision of Malaysia in becoming a developed nation by 2020. The needs to utilise ICT is deemed crucial as educational institutions are required to equip students with relevant ICT skills and knowledge which would ensure quality human capital [9]. It is commonly known that we are now living in the era of multimedia and many aspects of our lives are affected by the Internet and the World Wide Web. ICT influences many fields such as medicine, business, science, engineering, entertainment and with no doubt, the education field. [10] stated that ICT has not only evolved as an innovative tool by educators, but its importance can be recognised in every sector either retail, aviation, tourism, railway, IT, banking or medical sciences. ICT is also used as a word processor, presentation means, documents compiler, timetable preparation and even graphics template designer [11].

As for the education field, ICT assists students in their learning process and change their learning styles. Conversely, it aids teachers in varying and enhancing their teaching strategies, rather than focusing on the traditional method. Most teachers and experts have explored new

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methods of teaching and believe that it is better than the traditional method of teaching [12]. In line with this, the Ministry of Education has called upon educational institutions to maximise the potential of ICT for the future workforce. Students will be armed with relevant ICT skills and knowledge, which will then contribute to human growth and ensure the best human capital. As indicated by [13], efforts to promote ICT have been undertaken at every level including schools and universities. This poses the idea that ICT is a big factor influencing the education system. The existence of ICT in one's life cannot be denied as stated by [14] that Information and Communication Technology (ICT) is becoming increasingly widespread, influencing many aspects of an individual's social and work lives, as well as leisure. Thus, ICT benefits lives in many ways.

ICT enhances teaching and learning quality. [15] asserted that there are three important characteristics needed to develop good quality teaching and learning with ICT. The three characteristics are autonomy, capability, and creativity. Under autonomy, students will be in control of their own learning via the use of ICT. Teachers will be responsible to assign students in completing their works either with peers or groups. The second characteristic denotes that students are capable to integrate the transmission of knowledge and utilise the new technology whenever they feel comfortable and confident with it. ICT also enables students to be creative. This can be done via new multimedia devices or even the creation of new materials using the readily prepared templates. According to [16], employing ICT assists in developing and maximising students' language acquisition and substantially increases their motivation in learning besides stimulating their creativity and passion. Thus, ICT improves teaching and learning through the integration of students' autonomy, capability, and creativity.

In addition, ICT also contributes to the development of higher order thinking skills. The advent of the digital and information age has developed critical and creative thinking, and higher-order thinking skills vital for future success [17]. It enables users to be very analytical and critical about certain issues such as requiring users to differentiate between what is good and bad. It also trains the students to access beneficial information and discard any misleading point from the sources retrieved. [12] even stated that ICT improves students' perception and understanding of the world. It allows students to have in-depth thinking and view before evaluating and giving judgment on a certain topic. [17] stressed that technology is a promising tool to engage students in critical and creative thinking. ICT in higher education provides an opportunity for the faculty members to transform their practices by providing them with improved educational content and more effective teaching and learning methods [18]. It provides the students and teachers with the medium to decide based on the principles they uphold. As a consequence, this may also help in fostering higher order thinking skills.

ICT also contributes to efficient and effective teaching by easy and continual data sharing, effective use of time, and helping teachers in career advancement [10]. In another view, [16] explained that the use of blogs, podcasts, and digital videos increases motivation and engagement in the language classroom. Students will be more lively whenever ICT is employed. They would be very much engaged in the learning process as ICT is familiar to them. This is even supported by

[19], claiming that the increased use of ICT has created a more student-centred learning environment within a teacher's classroom wherein she finds her students engagement. To add, ICT can increase learners' motivation, accelerate the knowledge transmission process, and facilitate information access [20].

III. A GLIMPSE OF GLOBAL STUDIES

In Belgium, the Internet and computers are part of a university student. As claimed by [21], one could almost claim that the Internet and computers are part of daily life as much as food or air. Due to that, their study found that students possessed a high level of ICT skills and mastery of using computers. In addition, a study by [18] on 724 undergraduate students in Jordan found that ICT is highly crucial in the academic disciplines as it improves learning effectiveness. Furthermore, ICT tools are perceived to be significantly useful to enhance the teaching and learning process.

[19] in their study set in Northern Ontario revealed that the students in this research had the most interesting perspective of their learning with ICT as some have 'grown-up' in the 21st century wherein the digital age is the norm. 82% had been using computer technology for more than 3 years and were actively online indicating that they used the Internet for social networking, searching information online, watching video clips, downloading music, and playing computer games. They used the Internet to seek information almost every day while in school and were engaged in using ICT at least once a week. [22 – 24] have also conducted research on the positive impacts of ICT.

On the other hand, [25] asserted that social media and ICT tools were helpful in school learning and future employment in Taiwan. The respondents could create Google documents, spreadsheets and presentations by working in an online environment and engaging via instant messaging. [9] distributed a survey to more than one thousand students from four public universities in Malaysia. They found that students from all four universities generally felt that technology is useful for learning. However, their usage was more for recreation than learning. It further revealed that though the teachers in the study used technology moderately, the students felt their teachers were competent in the use of technology. This may indicate their unwillingness to criticise their teachers openly.

ICT is a powerful tool for the development of quality teaching and learning; it is a catalyst for radical change in existing university practices and a veritable vehicle for preparing students for the future [18]. ICT in education is seen as a multi-function system allowing for information retrieving, managing, manipulating access and communication in diverse means. Concerning the Malaysian context, it is also generally believed that the current generation of undergraduates is ICT-savvy. This then requires the use of technology in teaching and learning and hence initiates the Government to promote the use of technology in schools and universities [9 & 26]. Thus, concerning the importance of ICT nowadays, this study aimed to investigate the influence of ICT tools among pre-university students in Malaysia. In order to achieve this aim, this



study addressed the following research questions:

- What do the undergraduate students use ICT for?
- What is the undergraduate students' perceived ICT competency level?
- How do the undergraduate students perceive ICT?
- What are the undergraduate students' attitudes towards ICT?
- Is there any significant difference between ICT usage, perceived ICT competency, perceptions of ICT and attitudes towards ICT based on gender?
- Is there a relationship between ICT usage, perceived ICT competency, perceptions of ICT and attitudes towards ICT?

IV. METHODS

The research design of this study is quantitative in nature. Data were collected through a survey and open-ended questions. It employed a cross-sectional survey research design as this is done by collecting and analysing data at one point in time only [27]. This helped the researcher to gather the needed data and analyse them without taking a long time. The instrument was adapted from [28]. It is a five-point Likert-scale questionnaire (strongly disagree up to strongly agree). [29] said Likert-scale is a good instrument of choice because it is relatively easy to construct and a liable instrument because respondents would have to answer each statement in the instrument. Then, each statement is given an empirical test for discriminating ability, ensuring its ease of use and less time to construct.

The instrument has five sections, the demographic profile of the respondents, followed by ICT usage, level of perceived ICT competency, perceptions of ICT and attitudes towards ICT. In total, there are 33 items in the questionnaire. At the end of the questionnaire, the respondents would need to answer open-ended questions, 'How do you benefit from the use of ICT' and 'Why do undergraduate students need to use ICT'. These open-ended questions presented the views of the respondents pertaining to the issue discussed. In addition, these questions were designed to capture the unheard voices of the respondents.

The respondents consisted of 283 undergraduate students in Malaysia. They were chosen based on purposive sampling, focusing on those in the public higher education institutions in Malaysia. The details are shown in the following table.

Table 1. Profile of the Respondents

Gender	Male	34.6%
	Female	65.4%
ICT Exposure	1 – 5 years	18.4%
	6 – 10 years	56.9%
	11 – 15 years	20.8%
	16 – 20 years	3.9%
Owning PC/Laptop	Yes	95.1%
	No	4.9%
Owning Internet Access	Yes	88.7%
	No	11.3%

Regarding the data collection, the researcher distributed the instruments and gave an explanation to the respondents. Due to time constraint, the instruments were only available to be collected a week later. The findings were then analysed using statistical software and descriptive statistics involving frequency, percentage and mean. For the open-ended

responses, content analysis approach was utilised. The findings will be discussed in the following section.

V. FINDINGS

ICT Usage

There were twelve activities pertaining to ICT usage. The findings indicated that students rarely used ICT for educational purposes. They usually spent about one to five hours weekly on ICT tools. To note, the three lowest scoring items recorded that a big number of the respondents had never used it at all. As for writing blogs, 75.6% of the respondents claimed that they had never used it while 37.1% of the respondents revealed that they had never played online games. Meanwhile, 29.7% of the respondents did not read the online newspaper. Conversely, the most favoured activity was online chatting (3.55) as demonstrated by "*socialise with my friends when I face difficulty in my studies by using ICT*". This is then followed by surfing for leisure (3.52), surfing for information (3.34), downloading songs and movies (3.28), watching YouTube (3.23) and using MS Word (3.28). Surprisingly, accessing Facebook was ranked seventh, with a mean score of 3.10. Students were also found to use ICT in designing presentation (3.04) as mentioned by the respondent, "*need to use ICT to do PowerPoint for presentation*" and "*to do presentations*". In relation to the educational purpose, the mean score for downloading lecture notes was only 2.70.

Perceived ICT Competency

There were six aspects involved in the perceived ICT competency. Overall, majority of the respondents claimed that they were averagely competent in all six skills. The students were found to be most competent in social networking. This involves the use of Facebook, Twitter, Instagram, and YouTube. In fact, 47% of the respondents claimed that they were skilful in social networking. Students were also found averagely competent in using MS PowerPoint (3.20) and writing emails (3.18). Students were also moderately competent in world wide web (2.85), MS Word (2.80) and MS Excel (2.60).

Perceptions of ICT

There were six items under this construct. Overall, the respondents were highly positive about ICT. The respondents believed that ICT is a convenient way of getting information (4.53). In addition, 97% of the respondents agreed to that statement. This is supported by some excerpts like "*to find more information for presentation in the class*", "*to search for important information and find some global issues*" and "*to find information, download past year questions, find information out of the book*". This is then followed by "ICT allows me to obtain up-to-date information", with 4.49 mean score and 96.5% agreement. With 4.35 mean score, "ICT broadens my knowledge in general" was ranked third and generated 92% agreement. The respondents also viewed ICT as a means to improve their English competency and ICT skills (4.12) as explained by "*increase my ICT skills and my English language*". The other two items had mean scores lower than 4 but still on high positive perceptions. These two items are more into the respondents' learning process – "ICT helps to identify the important areas in my learning" (3.92) and "ICT increases my motivation in learning" (3.94).



Attitudes towards ICT

Overall, the findings showed positive attitudes among the respondents in this study. The highest score was from item “ICT is very important in this era of globalisation”, with 4.45 mean score. This is followed by “it is convenient to get information using ICT”, with 4.43 and “I like to use ICT to get information”, with 4.40. This is further illustrated via “to get more information and general knowledge about things we need for everyday lives”, “I usually access the Internet to search for information that I can hardly find in books” and “to get information, references and short notes or practices in each subject for our coursework”. The respondents also revealed that they liked to use ICT in life (4.35), it is beneficial to use ICT in everyday life (4.28) and ICT has improved their English language (4.28). They also believed that they can continuously use ICT in everyday life (4.13). The remaining items scored lower than 4. They felt confident in using ICT (3.97) and they had the skills to use ICT (3.87). Thus, the section has shown that the respondents in this study were highly positive towards the use of ICT.

From the responses, it is believed that ICT assists undergraduate students in their learning. Among the benefits gained from using ICT include helping students to obtain information needed in their studies besides for presentation or typing purposes. It is also meant to help them in communicating with their peers or lecturers. It is promising to note that the students are aware of the ICT importance in their lives as students.

Difference Between the Four Variables Based on Gender

Scrutinising into the fifth research question, the study attempts to investigate if there is any significant difference between ICT usage, perceived ICT competency, perceptions of ICT and attitudes towards ICT based on the gender factor. However, the T-test results indicated that there was no significant difference in the four variables measured based on the gender factor.

Relationship between ICT Usage, Perceived ICT Competency, Perceptions of ICT and Attitudes towards ICT

In addition, this study also attempts to investigate the relationship between the four variables. Thus, Pearson correlation test was conducted. Only two relationships revealed positive correlation, ICT usage and perceived ICT competency besides perceptions of ICT and attitudes towards ICT. The result is presented in the following tables.

Table 2. Pearson correlation between ICT usage and perceived ICT competency

		Perceived ICT Competency
ICT Usage	Pearson correlation	.474
	Sig. (2-tailed)	.000
	N	283

The correlation between ICT usage and perceived ICT competency was investigated by using the Pearson correlation coefficient. There was a medium positive correlation between the two variables ($r=0.474$, $n=283$, $p<0.05$).

Table 3. Pearson correlation between perceptions of ICT and attitudes towards ICT

		Attitudes towards ICT
Perceptions of ICT	Pearson correlation	.654
	Sig. (2-tailed)	.000
	N	283

The correlation between perceptions of ICT and attitudes towards ICT was investigated using the Pearson correlation coefficient. There was a large positive correlation between the two variables ($r=0.654$, $n=283$, $p<0.05$).

VI. DISCUSSIONS

In this study, the respondents have demonstrated highly positive perceptions and attitudes towards the use of ICT in their lives. However, their usages and competencies demonstrated the opposite. Undeniably, the undergraduate students have been exposed to ICT for quite some time since ICT is integrated into the schools’ curriculum. This emphasises that they are experienced in using ICT tools. In fact, about 64% of the respondents claimed that they have more than five years of ICT exposure. With that, the experience gained in using ICT tools should arm the respondents with necessary ICT competencies. To reiterate, 93% of the respondents own either a laptop or a personal computer, and around 88% of the respondents have access to the Internet. This further strengthens the idea that the respondents should be ICT-competent. As put forward by [26], the fast growth of a new generation of mobile devices, as well as the progression in wireless technology, has intensified the great potential of technology in becoming an effective tool for learning. Undeniably, the ownership and existence of laptops, mobile phones, tablets, and personal computers have exposed students to the use of these ICT tools.

In discussing the respondents’ ICT usage, it is very clear that the respondents employed less ICT for educational purpose. They usually use it for recreation. This resembles the findings by [18 & 1] wherein students used social networking tools regularly for recreation and rarely for an educational reason. This is also in line with other studies, denoting the fact that ICT is generally less employed in the learning process [19 & 28]. The findings proposed that although the respondents were very positive about the use of ICT tools, they were merely practising it by integrating the tools in the learning process. In the utilisation of ICT tools, majority students used Microsoft Words more than other Microsoft Office software. From another point of view, [30] claimed that social networks are used by millions of users, most of whom are students and adolescents, for a variety of purposes but with a heavy emphasis on social needs. The emergence of social networking has somehow diverted students’ attention from using ICT as a means to support their learning process. As asserted by [13], social influence (such as peer pressure) and instructors’ personal factors (such as instructors’ confidence, competence, and attitudes) might contribute to the lack of ICT integration. This reinforces that students need more pressure to make serious efforts to integrate ICT tools in the learning process.



Glancing into the perceived ICT competencies, it replicates the earlier findings on ICT usage. The respondents were found to be highly competent in social networking as compared to other skills. This reflected [26 & 1] in which majority of the respondents were more competent in dealing with social networking. Furthermore, this strengthens the findings by [2] that a Malaysian with a social networking account spends 2.8 hours per day on social networking platforms. A comparison between the competency in MS Word and MS PowerPoint showed the respondents connoted higher competency in the latter one. Despite the fact that the students have to utilise more MS Word to complete their coursework, presentation skill seems to matter more. This might be due to the fact that students find pleasure in boosting their creativity skill by accomplishing a PowerPoint presentation rather than typing assignments. [16] said that the use of instructional technology and ICT can improve and optimise students' language acquisition and substantially motivate them to continue their learning and stimulate their creativity and passion.

In regard to the students' perceptions of ICT, it was found that the respondents were aware that ICT eases them to search for information. This implies that technology provides students with unlimited access to different resources and tools to facilitate language learning [4]. In addition, gaining new knowledge is an important learning style attributed to social networking [2]. Even though they denoted that ICT eases information searching, it does not mean solely meant for educational purpose. This opposes [31] who claimed that students regard ICT as an essential tool in helping them going through their learning process and interactive activities. They believed that ICT is a powerful tool that aids their learning culture, but it is not being institutionalised. Perhaps, the students need to be reminded of the essential role played by ICT in the teaching and learning, rather than acknowledging its benefits in recreational purposes.

The respondents affirmed positive and promising attitudes towards ICT. Again, the idea that ICT eases life in seeking information is reiterated here replicating [8] findings on the positive attitudes among Japanese students towards ICT. The respondents identified ICT as a means that supports them in getting the information needed. The respondents also believed that ICT is important in the era of globalisation. This is in view with [9] that the use of Information and Communication Technology (ICT) is central to Malaysia's vision to be a developed nation by the year 2020. In fact, [28] argued that ICT is very prominent as it provides mediums to explore and develop the teaching and learning process. The issue raised is, though the importance of ICT is greatly acknowledged, the usage of ICT tools remains on the satisfactory level.

In discussing the correlation between ICT usage and perceived ICT competency, there exists a positive medium relationship between the two. Students who frequently use ICT may polish their ICT competency skills. Those who need to work on their projects via MS Word or MS PowerPoint would need to utilise the tools more often. This may make them more familiar with the tools. This relationship is also found in [1] believing that computer competencies had a significant relationship with the use of ICT. As students possess computers and smartphones, they become extensive users of the ICT tools and this serves as an indirect practice for them. On the same vein, [21] ascertained that allowing

students to experiment with computers tools enables them to acquire ICT competencies. On top of that, it is indubitably that the perceptions of ICT and attitudes towards ICT are parallel to each other. There is a strong positive relationship between the two variables. This supports [25] in the study examining the attitudes towards ICT. They found that attitudes assist students in perceiving ICT tools. When the students possess positive attitudes towards ICT, it indirectly develops positive perceptions of ICT. This result is also aligned to [14 & 4]. Hence, it may be affirmed that attitudes affect students' perceptions towards the use of ICT. When they possess negative attitudes, they may somehow perceive ICT negatively.

VII. CONCLUSION

This study has imposed that undergraduate students' usage of ICT tools is still on a moderate level. Undeniably, the students have high positive perceptions and attitudes towards ICT. In fact, they affirmed that ICT aids in obtaining information and admitted that they were highly competent in social networking skills, similar to other previous studies. The study has depicted that more exposure and pressure are needed to encourage students' integration of ICT tools in the learning process. The exposure and pressure may come from the lecturers. This study also has its own limitations as it involved only a small number of respondents besides only elucidating respondents' perceptions regarding the issue and employing two questions to investigate the difference and correlation. Future study may involve a bigger number of samples, employ semi-structured interviews and compare the students' perceptions in regard to locality, types of courses and other reasonable variables.

Integrating ICT tools in the lesson via Google Docs, Kahoot, Prezi, Powtoon and Padlet may increase students' interest. These applications entitle the integration of ICT tools in the real-life learning environment. Out of the formal learning situation, blended learning can be executed by getting students to participate in non-formal learning activities to ensure students' continuous ICT integration. What matters is the initiatives to ensure the utilisation of ICT tools in their lives. This may also contribute to independent learners who are ready to face the future. Students have to be proactive and self-reliant in integrating ICT. Hence, they should be well-equipped with the skills and competencies to practice autonomous learning.

To sum up, undergraduate students should maximise their potential in becoming self-directed learners. With the rapid growth of ICT tools in the education field, they should balance between the use of learning and recreational purpose. Contextualising into the Malaysian education system, many efforts have been advocated to promote the use of ICT. However, due to certain circumstances especially the accessibility issue, the move is still far from satisfactory. The gap is widening especially between those in the central of the city and those in the heart of the jungle. This entails a serious effort to maximise the utilisation of ICT tools and it begins with the individual himself. We cannot merely depend on the school to provide students with the access. It takes everyone to work together. The higher authority has to better the facilities provided to ensure more students' engagement



with technology in the learning process. Making Malaysian students ICT-literate is possible and we may do so if serious cognizance is nurtured.

Undeniably, students nowadays are IT-savvy but social purpose defeats the educational needs in terms of usage. It is crucial to balance the usage as the integration of ICT tools in the teaching and learning process is deemed vital. The importance of ICT is also highlighted in Goal 4 of the Sustainable Goals Development, which is to ensure inclusive and equitable quality education and promote lifelong learning opportunities to all. This accentuates how ICT should be integrated and utilised in the teaching and learning process. Thus, the relevance and significance of ICT tools in the education system cannot be denied.

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