Perceptions of Information Communications Technology Education: A Supply-Side Case of Malaysian Private Education

G.Y. Mui  
HELP University, graceymui@gmail.com

Y.J. Tee  
HELP University, teeyj@help.edu.my

V.Y. Sien  
HELP University, sienvy@help.edu.my

Follow this and additional works at: http://aisel.aisnet.org/pacis2013

Recommended Citation
http://aisel.aisnet.org/pacis2013/208

This material is brought to you by the Pacific Asia Conference on Information Systems (PACIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in PACIS 2013 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
PERCEPTIONS OF INFORMATION COMMUNICATIONS TECHNOLOGY EDUCATION: A SUPPLY-SIDE CASE OF MALAYSIAN PRIVATE EDUCATION

Mui, G.Y., Centre for Business Forensics, HELP University, Kuala Lumpur, Malaysia, muiyc@help.edu.my

Tee, Y.J., Department of Psychology, HELP University, Kuala Lumpur, Malaysia, teeyj@help.edu.my

Sien, V.Y., Department of Information Technology, HELP University, Kuala Lumpur, Malaysia, sienvy@help.edu.my

Abstract

The shortfall of workers for the Information Communication and Technologies (ICT) industry has prompted the need to better understand factors contributing to the decline of enrolments in this field at the tertiary education level. Most of previous research examining these factors have been conducted within Western contexts with less attention paid to the decline of enrolments within Asia. In this study, we attempt to address this gap and understand the factors that encourage and discourage enrolment in information technology (IT) undergraduate studies amongst Malaysian students. In an interpretative study, focus-groups were conducted with 61 undergraduate students enrolled in an IT undergraduate degree program at a large Malaysian private university. Our results indicate that encouragement from the participants’ immediate social contacts was the primary factor encouraging enrolment in IT studies. We found that role models have a strong influence in encouraging enrolment in IT education amongst Malaysian students. The evident influence of social factors and social influencers is highlighted in our study, reflecting the collectivist influence that drives Malaysian students’ intentions to pursue IT education at the tertiary education level. The implication for universities and industry is the need to create awareness and educate students’ immediate social contacts about ICT careers.

Keywords: IT Education, Student Perceptions, Qualitative.
1 INTRODUCTION

The global shortfall in the supply of workers for the Information and Communication Technologies (ICT) industry has been linked to the decline in post-secondary and university enrolments in IT undergraduate degree programs (Babin et al. 2010; Riemenschneider et al. 2009). Recent research seeking to identify the factors contributing to this supply-side shortfall has tended to focus on the ICT industry in Western countries such as Canada, the United States, and Australia (see The Conference Board of Canada 2009; Babin et al. 2010; von Hellens et al. 2009; Zweben 2011; Downes and Looker 2011; Heinze and Hu 2009). These studies have focused on factors such as gender (Adya and Kaiser 2005; Adya 2008); student access to and usage of computers (Adya and Kaiser 2005; Downes and Looker 2011); personal interest (Babin et al. 2010; Heinze and Hu 2009); influencers of students’ choice of ICT education (Adya and Kaiser 2005; Heinze and Hu 2009; The Conference Board of Canada 2009), and career image (The Conference Board of Canada 2009). The Asian participants in Western studies perceived ICT careers differently from their Western counterparts. The difference stemmed from cultural factors. For example, Asian women did not consider an ICT to be ‘masculine’ (Adya 2008) and Asian women perceived ICT careers to provide security and status (Nielsen et al. 1997, 1998).

Malaysia faces the same problem of the shortfall in the supply of ICT workers. However, little is known about the factors that encourage and discourage Malaysian students to pursue IT education, and hence ICT careers. In this study, we conduct a series of focus-groups to capture the perceptions of 61 undergraduate students enrolled in an IT undergraduate degree program at a Malaysian private university. Identifying these factors enables us to address the specific issues and identify strategies to increase the supply of ICT workers in Malaysia.

2 BACKGROUND

2.1 The declining supply of ICT workers in Malaysia

The Malaysian government has identified the ICT services sector as the next engine of growth (PIKOM et al. 2010) contributing towards Malaysia becoming a fully developed country by the year 2020 (Mahathir 1991). Government initiatives such as the Digital Transformation Program have increased the demand for ICT workers. Despite this demand, the supply trend for ICT workers has been declining (Woon 2012; MDeC 2011). The primary supply source for ICT workers is the domestic tertiary education sector, which comprises public and private higher education institutions (HEI) (Woon 2012). The decline in ICT enrolments has been attributed to misconceptions about ICT: (1) the lack of job opportunities; (2) relative difficulty of computing programmes; (3) low passing rates; (4) narrow scope; and (5) the lack of proper facilities at universities. Further, the negative perception of the dot-com bust could contribute to the negative feelings of parents and students towards ICT education and careers (Woon 2012).

2.2 Existing research

Existing research on student enrolment in computing degree programs has been limited to Malaysian public HEI (Mellström 2009; Lim 2010; Lagesen 2008; Wong and Hanafi 2007). However, private HEI is more suitable for this study and for comparison to Western research for the following reasons: First, men dominate the enrolment and graduates in Science, Mathematics and Computing degree programs at private HEI as is the case in Western research (MOHE 2012). Comparatively, public HEI tends to be female-dominated (MOHE 2012). A contributing factor to the high enrolment of women is the race-based quota system for HEI admission that has provided Malay women the opportunity to enrol in computer science degrees (Mellström 2009).

Second, students enrolled at private HEI are able to enrol in degree programs that are of interest to them as long as they meet the necessary entry requirements. However, students enrolled at public HEI
do not necessarily enter into the degree program of their choice because of the limited capacity of public HEI to absorb students (Wilkinson and Yussof 2005).

Finally, in recent years, the Malaysian government has recognized the important role that private HEI play in cultivating human capital required for the future growth of the Malaysian economy (MAMPU 2009). Previously, private HEI were perceived to be the lesser alternative to public HEI in terms of quality of delivery and facilities (Wilkinson and Yussof 2005). This perception arises because many private HEI are profit-driven businesses. However, this perception is changing with private HEI adopting quality assurance standards such as the International Organisation for Standards (ISO) 9000 series standards (Lim 2010) and the accreditation of academic programs offered by private HEI by the Malaysian Qualifications Agency (MQA 2012).

2.3 Factors that impact IT education and ICT career choices

Existing Western models for the decision to enrol in an IT undergraduate degree program (Downes and Looker 2011; Heinze and Hu 2009; Babin et al. 2010) or to enter into an ICT career (Adya and Kaiser 2005) suggests the following profile of students who enrolled in IT undergraduate degree programs:

- usually male students (Downes and Looker 2011);
- have greater access to computers (Downes and Looker 2011; Adya and Kaiser 2005);
- are more likely to use computers (Downes and Looker 2011; Adya and Kaiser 2005);
- have a personal interest in ICT (Babin et al. 2010; Heinze and Hu 2009); and
- received encouragement to study ICT (Adya and Kaiser 2005; Heinze and Hu 2009; The Conference Board of Canada 2009; Babin et al. 2010).

Gender stereotyping of IT education and ICT careers could be influenced by parental education levels and parental influence on the choice of study program or career (Adya and Kaiser 2005); and the student’s ability to use computers (Downes and Looker 2011). In Malaysia, ICT careers are not perceived to be ‘masculine’ particularly among Malay women (Mellström 2009; Lagesen 2008). More importantly, the Malaysian women in Mellström’s (2009) study generally perceived computer science to be a suitable career for women as it allowed women to work indoors.

Greater access to computers also provides students with greater exposure to computers and can result in higher usage of computers. Student access to computers at home and at school is measured by the ownership of computers at home (Adya and Kaiser 2005; Downes & Looker 2011) and the presence of computers at school (Adya and Kaiser 2005). The usage of computers is measured by the number of hours spent using computers in class or at home within a period of time, e.g. a week (Adya and Kaiser 2005; Downes and Looker 2011). The Malaysian government has increased usage of computers by providing Internet access and a virtual learning environment to all schools (MOE 2012) and has also distributed netbooks to students from low household income families (Najib 2010).

Babin et al. (2010) identified personal and career interests as the top two factors that students equally ranked as influencing their decision to pursue an ICT career. Heinze and Hu (2009) found that the attitude towards an IT major has a statistically significant impact on the intention to pursue an IT major.

Influencers include parents, peers, teachers, school counsellors, and media (Adya and Kaiser 2005; Heinze and Hu 2009; Babin et al. 2010; The Conference Board of Canada 2009). Babin et al. (2010) and the Conference Board of Canada (2009) ranked influencers by level of influence as: (1) parents; (2) friends; (3) teachers; and (4) counsellors. Further, Adya and Kaiser (2005) suggest that siblings or other relatives should be recognized as influencers. Heinze and Hu (2009) identified that the student’s level of satisfaction with an IT career is partly influenced by the student’s perceived social expectations from family and friends. Lagesen (2008) reported that Malaysian women identified their parents, and specifically fathers, as the primary influencers of their decision to pursue a career in ICT. Other women currently in ICT jobs were identified as role models, and hence influencers of female students’ decision to pursue ICT careers (Mellström 2009). Female ICT lecturers and alumni in ICT careers were also identified as influencers (Mellström 2009).
3 METHODOLOGY: AN INTERPRETATIVE APPROACH

In this study, we adopt an interpretative approach to understanding the underlying motivators, influencers and perceptions of IT education amongst Malaysian students. Our qualitative research design allows us to understand at a deeper level the underlying factors that drive Malaysian students towards pursuing IT as a field of study at the tertiary education level, and how they make sense of their choices in pursuing this area of study. Further, the inductive nature of the qualitative research process allows for theory building that aids in the understanding of the phenomena of interest (Strauss and Corbin 1998).

Our rationale for adopting an interpretative paradigm is also informed by the nature of the researched phenomena. Motivators and influencers towards a field of study are highly subjective, and likely influenced by factors that reside not only within an individual, but also through their interactions with the environment around them. In this regard, the nature of such perceptions cannot be examined independently from the individuals that experience them, and that both the research subject (i.e. participant) and the research object (phenomena, i.e. choice of area of study) co-exist, interact, and are intertwined together in the creation of reality (Taylor and Bogdan 1998). This key reason informs our decision to employ the use of qualitative methods, i.e. focus-groups, in order to better capture the phenomena as it resides within the relevant social context. From a methodological point of view, our study also allows us to elicit a broader range of responses from our sample. Given that we adopt a series of focus-groups as opposed to pre-determined questionnaires, our questions serve as a loose, non-constraining guide towards eliciting responses from the participants in our study. The utilization of focus-groups as a data collection method thus does not pre-impose or create a researcher-based boundary on which prevents a varied, holistic understanding of the phenomena of interest (Patton 2002).

3.1 Participant demographics

Sixty-one students enrolled in the Bachelor of Information Technology degree program at a Malaysian private university participated in this study. Students voluntarily participated in these focus-groups that ranged from two to six students and lasted between 36 minutes and 100 minutes. The focus-groups were audio-recorded for transcription and further analysis.

<table>
<thead>
<tr>
<th>Participant demographics</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender: Male</td>
<td>53</td>
</tr>
<tr>
<td>Gender: Female</td>
<td>8</td>
</tr>
<tr>
<td>Nationality: Malaysian</td>
<td>51</td>
</tr>
<tr>
<td>Nationality: Non-Malaysian</td>
<td>10</td>
</tr>
<tr>
<td>Enrollment: Diploma</td>
<td>2</td>
</tr>
<tr>
<td>Enrollment: Year 1</td>
<td>23</td>
</tr>
<tr>
<td>Enrollment: Years 2 and 3</td>
<td>36</td>
</tr>
</tbody>
</table>

Table 1. Participant demographics

Ten international students and 51 Malaysian students participated in this study (see Table 1). Of these, 53 were male and eight female. Eight of the international students are Asian while the others are African. These students were included for comparison. However, caution is required in interpreting the results as the international student sample is small.

The high percentage of male students is consistent with western research. There were two diploma program students, 23 Year 1 students, and 36 students in Years 2 and 3. Diploma program students entered into the program directly after the completion of the 11 years of primary and secondary
education. The duration of the diploma program is 2 years. As such, the students were not required to complete a pre-university program. The Year 1 students had completed a pre-university program before commencing this program.

The focus-group questions were designed to capture participants’ perceptions of IT education. Questions aimed at identifying the factors that impact on participants’ choice of IT education and the reasons for these factors. The focus-group questions were:

- What or who encouraged you to study IT at university?
- Why were you encouraged to study IT at university?

In addition to these primary questions, participants were asked further questions to allow them to elaborate on their answers.

3.2 Coding and analysis

Data from this qualitative study totalled 98,007 words, which comprised responses from 61 undergraduate IT students from various levels of enrolment. Content analysis was used to systematically categorise the participants’ statements. The content analysis process involved examining all the transcripts and placing words or statements of significance into specific categories that answer the focus-group and research questions. In accordance with suggestions by Saunders (2008), words or statements that were deemed relevant in response to the research questions were then placed (i.e. coded) under their respective categories to make coherent sense of the data. For this study, the categories were predetermined by the focus-group questions.

Upon completion of the transcript coding, we reviewed the coded textual segments and collectively discussed the recurring categories. The sub-categories for this study were based on more detailed analysis of the responses placed in each of the coding categories. For instance, in response to Question 1 (what or who encouraged you to study IT at university?) we found that participants’ accounts could be grouped into one of seven categories (See Table 2). Each participant account was then placed into either one of these seven categories. These categories consist of all influencers within the participants’ social environment, who encouraged them to pursue IT as an area of further study for their tertiary education. Table 2 also denotes the frequency of occurrence for each category and are derived from participant accounts pertaining to the research questions.

3.3 Reliability and validity

The approaches taken to establish validity and reliability of the qualitative data follows Sandberg’s (2005) approaches to justifying new understandings derived from interpretative research methods. Sandberg’s (2005:54) framework outlines the need to establish both communicative validity (i.e. the extent to which the researcher has achieved a truth claim) and pragmatic validity (i.e. the extent to which the researcher coherently interprets the participants’ accounts). In establishing communicative validity, Sandberg (1995: 54) recommends: (1) sharing a mutual understanding with the participants in relation to the research phenomenon; (2) understanding participants’ accounts as a whole (as opposed to in parts); and (3) discussing the participants’ accounts with other researchers/professionals. The following sections details all the steps taken to establish communicative and pragmatic validity, as well as the reliability of the interpretative data according to Sandberg’s standards.

For this study, participants were first given an information sheet detailing the study and its objectives before the study was conducted. This helped ensure that the participants are aware of the research topic, creating a ‘community of interpretation’ where the researcher and research participants share a mutual understanding of the research topic before attending the focus-groups. This criterion fulfils the first requirement for establishing communicative validity (Sandberg 2005). Validity during data collection was also achieved by making notes regarding the participants’ non-verbal cues upon completion of each focus-group session (Minichiello et al. 1995). This supplements the recorded focus-group sessions and allows the researcher to reflect more discerningly on participants’ responses (Rabiee 2004; Marshall and Rossman 2006). Reliability during data collection was achieved by using
summarising statements. As suggested by Patton (2002), we made summarising statements to check our understanding of the participants’ accounts before moving on to a different participant. Summarising statements were used in this study as a transitory statement when the focus-groups moved from one question to the next.

The steps taken to ensure validity during data analysis are based on guidelines by Sandberg (2005) and Silverman (2005) for justifying the authenticity of qualitative data. First, we withheld interpretations and assumptions regarding the data. According to Silverman (2005), this counteracts forming interpretations based on anecdotes, and is consistent with Sandberg’s (2005) recommendation that researchers should hold back their own prejudices to understand the researched phenomenon from the participants’ perspective. Second, we treated all responses with equal importance, and accounted for all statements from all participants in this study. This fulfils Silverman’s (2005) ‘comprehensive data treatment’ and Sandberg’s (2005) ‘horizontalisation’ requirements, which is also the second step for ensuring communicative validity when analysing qualitative data. To ensure reliability of the analysis, we read each completed transcription at least twice, together with the recordings, to better understand the informants’ responses in relation to their verbal pitch and tone. We then manually coded all the transcripts to ensure that all statements were coded accurately according to their respective categories.

Two of the authors coded the transcripts according to the categories in Table 1. Both researchers coded the transcripts independently and only met to discuss the results of the coding. Inter-rater reliabilities were calculated for all transcripts, resulting in a high level of agreement between both researchers across the initial coding categories. We discussed the results of the coding task and found that in most instances, we coded the transcripts accurately, but overlooked words and textual segments of interest that may only have been picked up after several re-readings of the transcripts. The omissions and inaccurate categorisations were later discussed and corrected to ensure agreement in the coding between both researchers across all coding categories.

4 RESULTS

The results identify the factors that influenced participants to enrol in an IT undergraduate degree program and their reasons for enrolling in an IT undergraduate degree program. The inclusion of the ten international students did not affect the results. The Asian students faced the same challenges, especially in terms of culture. The African student sample was too small to determine the challenges that they faced.

4.1 What or who encouraged you to study IT at university?

The primary factor influencing participants’ decision to enrol in an IT undergraduate degree program is social influencers. This study uniquely reports the positive and negative perceptions of these factors by the number of participants who raised the factor. Table 2 lists these factors by strength of positive contributions. Participants usually reported multiple influencers.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Positive (frequency)</th>
<th>Negative (frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Influencers: Parents</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>2 Influencers: Siblings</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>3 Influencers: Extended family</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>4 Influencers: Peers</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>5 Influencers: School teachers/university lecturers/career guidance counsellors</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>6 Influencers: Superior at workplace</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>7 Influencers: Media</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

*Table 2. Factors for enrolling in IT education*
Influencers include parents, siblings, extended family members, peers, secondary school teachers, career guidance counsellors, university lecturers, superiors in the workplace, and the media. Consistent with previous research, parents had the most influence on participants’ decision to enrol in an IT undergraduate degree program (see Babin et al. 2010; The Conference Board of Canada 2009).

This study identified two groups of influencers not previously identified in earlier research. The first group is family members other than immediate family, i.e. parents and siblings. This group comprises extended family members, such as brothers-in-law, uncles, aunts, and cousins. Although the influence of family members other than parents and siblings were not measured in previous research, Adya and Kaiser (2005) suggested that they must be recognized as influencers.

The second group is workplace superiors who were identified by participants who were previously in the workforce. A participant identified his employer from an IT company as the person who encouraged him to complete an IT degree program to increase his marketability before returning to the workforce (Participant A, focus-group 3).

Influencers are a positive or negative influence at two different levels:

- The influencer can encourage or discourage participants to learn about IT.
- The influencer can encourage or discourage participants to enrol in IT or non-IT undergraduate degree programs.

At both levels, the attitude of influencers towards IT impacted their perceptions. Participants usually faced negative influencers at this second level, i.e. enrolment in an undergraduate degree program. In some cases, influencers who encouraged participants to learn about IT did not encourage them to study IT. In such cases, influencers were aware of the importance of being technology-savvy but were of the opinion that an ICT career was not suitable for the participant. As such, they discouraged participants from enrolling in an IT undergraduate degree program. One such negative perception was that an ICT career was not an ‘acceptable’ career compared to law and medicine, which parents considered to be ‘traditional’ careers.

I think the people nowadays still didn’t see the IT industry [as the] same level as other industry, such as lawyer, doctor industry... (Participant B, focus-group 4)

We always have this perception [and] even my parents told me that, “you know, IT is not the right path”, because they always wanted me to be a pharmacist ... But they think that IT’s not [a] professional [career]. (Participant B, focus-group 12)

Some participants faced parental objection to participants’ choice to enrol in an IT undergraduate degree because these parents had negative perceptions of ICT careers. One such negative perception was the perceived difficulty in finding a job in the ICT industry (Participant C, focus-group 2). ICT careers were also perceived to be clerical in nature.

In IT - to old people’s point of view - they think “IT people, what can they do? Powerpoint? Typing for other people?”... (Participant A, focus-group 11)

I think parents ... need to get rid of the whole mindset. After the dotcom bubble burst, people only have the perception that you work for - let’s say, a bank - you help them with first level support – [for example] “my computer hang, what should I do?” (Participant C, focus-group 12)

Although some participants faced parental objection they still chose to enrol in an IT undergraduate degree. For example, the father of one participant (Participant A, focus-group 11) forced the participant to enrol in a business degree. However, this participant switched to the IT degree program without his father’s knowledge and only informed his father after a few semesters. By then the father accepted his son’s choice.

My dad ... forced me to study Business [degree] first, then I secretly moved to IT [degree] ... then after two or three semesters I told him and he said, “What can I do because you already studied [IT].” (Participant A, focus-group 11)
Consistent with previous research, school teachers and career guidance counsellors had less influence over participants’ decision to enrol in an IT undergraduate degree (see Adya and Kaiser 2005; Babin et al. 2010; Heinze and Hu 2009; The Conference Board of Canada 2009). Primary and secondary school teachers; university lecturers; and career guidance counsellors influenced participants by the way they depicted ICT careers to participants. Participants highlighted two common misconceptions propagated by school teachers and career guidance counsellors. First, ICT careers should be avoided because they have “this perception that IT will get you nowhere, it’s better to be a lawyer, a pharmacist, a doctor … ’ (Participant B, focus-group 12). Next, ICT careers are only for students enrolled in the science stream at secondary school. Therefore, secondary school students in the arts stream should not pursue an IT degree, and hence should not pursue an ICT career (Participant A, focus-group 2).

Where school teachers lacked the skills to utilise IT in the classroom, they were perceived to be negative influencers (Participants B and C, focus-group 12). This is usually compounded by environmental factors in secondary school such as the lack of functional computer laboratories or computer laboratories that are not fully utilised (Participant B, focus-group 12). Comparatively, a design competition using computers in primary school aroused the curiosity of participant E (focus-group 8) to learn about IT. Four participants (Participants A and D, focus-group 2; participant C, focus-group 6; participant B, focus-group 12) commented that their interest in IT was sparked at pre-university level by an IT lecturer. Prior to those IT lectures, they were unsure of the degree they intended to pursue at tertiary level.

Friends who are positive influencers are usually those who have an ICT career. They are usually perceived to be role models. For example, participant A (focus-group 12) had intentions to emulate his programmer friend who encouraged him to pursue an ICT career. Friends were also identified as negative influencers of the decision to enrol in an IT degree. Participant B (focus-group 2) reported that friends told him that it was difficult to find a job in the ICT industry, and hence he should not pursue an ICT career. However, the strength of their influence was comparatively less than the influence of parents. The low impact of friends’ negative influence could possibly be the result of the relatively weaker influencer-participant relationship.

The strength of the influence was based on the:
- relationship of the influencer with the participant;
- the participant’s perception of the influencer as a role model;
- the number of role models; and
- the influencer’s economic contribution to the participant’s studies.

The influence was not limited to the participant’s decision to enrol in an IT undergraduate degree program or to pursue an ICT career but is usually preceded by the influence over the participant’s decision to learn about IT. The participant’s IT learning process was usually their early experiences and exposure to IT such as computer hardware, software, and games. For many participants, this sowed the seed to the development of their personal interest in IT.

4.1.1 The influencer-participant relationship

The strongest influencer-participant relationship is that of the parent and child. Therefore, parental advice is perceived by participants to be the most influential in their IT education and career decision. Participant B (focus-group 9) explained that his mother’s advice for him to explore ICT careers resulted in him changing his original plan to enrol in a business degree program.

4.1.2 The influencer as a role model

When the participant regarded the influencer as a role model, the participant was more likely to enrol in an IT program. Role models have an ICT career, are well-known and respected by the participant, and the participant intends to emulate the role models. Therefore, role models have a strong influence on the participant’s decision to enrol in an IT undergraduate degree program. Participants commonly
identified the following as their role models: (1) a parent; (2) siblings; (3) extended family members; (4) peers; and (5) IT university lecturers.

For participants with some work experience in the ICT industry, their workplace superiors proved to be role models and influencers. In one case, the role models were television or movie characters who were hackers. This participant considered hackers to be ‘cool’ (Participant B, focus-group 2).

Role models were not necessarily male. Several male participants identified their mother, sister or aunt as role models and primary influencers of their decision to enrol in an IT program. Participant E (focus-group 10) cited his sister as a role model. She has an IT degree, lectures in IT and stirred his interest in IT. He sought to emulate her success in his IT education and ICT career.

4.1.3 Multiple role models

When there are more than one role model, the participant has a higher propensity to pursue an IT undergraduate degree, and hence an ICT career. Participant E (focus-group 2) comes from a family of ICT professionals. He considered his brothers, cousins and brother-in-law to be his role models.

4.1.4 Influencer’s economic contribution

When the influencer is the primary contributor to the cost of the participant’s studies, the influencer had the greatest impact on the participant’s decision to enrol in an IT undergraduate degree program. One participant commented that his tertiary studies were funded by an aunt who has a successful ICT career. She did not restrict his choice of IT specialisation but insisted on the institution where he was to pursue his IT degree (Participant D, focus-group 2).

4.2 Why were you encouraged to study IT at university?

This question sought to understand the reasons for participants’ choice to enrol in an IT undergraduate degree program. Table 3 lists these reasons by the number of participants who identified these reasons. Participants usually reported multiple reasons.

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Personal interest in IT</td>
<td>25</td>
</tr>
<tr>
<td>2 Positive early experiences and exposure to IT</td>
<td>17</td>
</tr>
<tr>
<td>3 Curiosity and fascination with technology</td>
<td>14</td>
</tr>
<tr>
<td>4 Mismatch with other courses</td>
<td>6</td>
</tr>
<tr>
<td>5 Perceived benefits</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 3. Reasons for enrolling in an IT undergraduate degree program

4.2.1 Personal interest

Personal interest plays an important role in participants’ decision to enrol in an IT degree. Personal interest in IT leads to increased usage of technology. All participants owned and used computers at home. Most participants remembered having a computer in their home when they were growing up. This early exposure to technology led to a personal interest with computers. Participants did not identify parental and sibling usage of technology at home as a factor that contributed to their decision to enrol in an IT degree (see Adya and Kaiser 2005).

Participants did not always have access to computers at school. Access to computers at school includes the availability of functional computer labs, the existence of an IT club, and the use of computers in the classroom by teachers.

A participant recognized that in future, everything will be based on IT (participant E, focus-group 2). Therefore, it was worth pursuing an ICT career. Participants described IT as ‘important for our lives’, ‘interesting’, ‘fun’, ‘constantly changing so it is constantly challenging’ in a positive manner. The fundamental basis for their personal interest is summed up in the statement: I have a passion for IT.
Five participants linked their personal interest in IT to their interest in problem solving, logic, and mathematics (Participants B and C, focus-group 11; participant D, focus-group 14; participant D, focus-group 10; and participant E, focus-group 12). Participants’ personal interest in IT goes beyond an enthusiasm for the subject. It usually inspires them to utilise their skills to create a useful result. For example, participant D’s (focus-group 8) was inspired at secondary school to develop a smart house. Another participant (participant E, focus-group 8) was inspired to start a cyber café that would also function as an IT training centre for customers. Two participants aspired to become online game designers based in Japan (Participant C, focus-group 4; and participant C, focus-group 14).

4.2.2 Positive early experiences and exposure to IT

Participants’ early exposure to IT proved to be positive experiences that contributed to their decision to enrol in an IT undergraduate degree. Usually these early experiences occurred when participants were at primary school-going age. Most participants remembered having a computer in their home during their growing up years. The common experience was when an influencer introduced the participant to computer hardware or games. They cited that parents or extended family member such as an uncle brought the computer into their home. This led to participants playing computer games and progressing to repairing hardware and troubleshooting software problems. These positive experiences resulted in participants’ ability to relate to IT and some participants developed a flair for IT. Negative experiences of IT were related to environmental factors at school such as the lack of functional computer laboratories or computer laboratories that are not fully utilised.

4.2.3 Curiosity and fascination with IT

Participants’ curiosity and fascination with technology contributed to their choice to enrol in an IT undergraduate degree. For example, a participant who regularly played online computer games was curious about the mechanics behind designing computer games (participant B, focus-group 8). The inspiration to design games led to the participant enrolling in an IT undergraduate degree program as a stepping stone to working in his favourite online game design company in Japan.

One participant’s curiosity about his friend’s computer and his friend’s encouragement to study IT resulted in him pursuing an IT degree program (participant A, focus-group 8). He admitted his initial fears about technology. However, his curiosity about technology overcame his initial fears and led him to pursue and IT degree program.

Some participants identified that they liked electronic gadgets and enjoyed hands-on experience with repairing hardware. Others reported their fascination with specific fields of IT such as robotics and artificial intelligence.

4.2.4 Mismatch with other courses

Some participants enrolled in other degree programs before deciding that IT was their field of choice. The other degree programs that participants identified were business, law, interior design and engineering. Most completed at least one semester in another degree program before switching to the IT undergraduate degree program. Reasons for their choice to pursue IT were:

- Participant A (focus-group 2) enjoyed the IT subjects at pre-university level. In contrast, he found that he did not like the other subjects such as accounting.
- Participant D’s (focus-group 2) enjoyed studying IT at pre-university level and his mother persuaded him to pursue his interest in IT.
- Participant D (focus-group 4) found IT easier to understand and learn compared to the earlier course he was enrolled in.
- Participant B (focus-group 4) found IT subjects interesting and business-related subjects boring.
- Participant F (focus-group 8) liked playing computer games and computers. However, he did not enjoy the earlier course he was enrolled for.
- Participant E (focus-group 11) felt that IT was challenging but manageable. Comparatively, he felt that he could not catch up with computer engineering, which he was studying earlier.
4.2.5 Perceived benefits

Some participants perceived that pursuing an IT undergraduate degree program, and hence an ICT career results in a higher salary. However, the consensus was that salary scales were better in other countries such as Singapore, Dubai, and South Africa. Apart from financial benefits, they identified that they will have a better experience of learning technology, e.g. anime and games development technology, in countries such as Japan, the United States, and Singapore.

5 DISCUSSION

In this study, we have sought to identify the reasons behind the low student enrolment in IT undergraduate degree programs in Malaysia. As expected, our results show that parents, families (immediate and extended), peers, school teachers and career counselors have significant influence over the choice of undergraduate programs. This study also highlights the misconceptions about IT education and ICT careers held by parties with significant influence over students’ choice of undergraduate degree studies.

5.1 Misconceptions about IT education and ICT careers

We also identified common misconceptions for secondary school students not choosing an IT undergraduate degree and an ICT career.

- Misconception 1: There are no jobs in the ICT industry. It is interesting to note that the effects of the dot com crash continue to have a negative effect on parents who are the primary party that funds a student’s tertiary education. The belief about the lack of jobs available in the ICT industry is a primary reason for parents not encouraging their children to study IT. However, Malaysian government initiatives have increased demand for ICT workers (MDeC 2011; PIKOM et al. 2010). In terms of entry-level monthly average salary scales, the ICT industry ranked as one of the top five of twenty-five industries (PIKOM et al. 2010; 2012).
- Misconception 2: ICT careers are not an acceptable career choice. Among some Malaysian parents, teachers and career counsellors, careers such as medicine, law, and accountancy are associated with prestige. However, ICT careers are considered to be less prestigious and even clerical in nature (see Section 4.1). Therefore, there is societal pressure not to pursue an ICT career. This misconception contradicts Nielsen et al. (1998, 1997) where Asians in a Western context considered that ICT careers provide security and status.
- Misconception 3: IT undergraduate degrees are only available to secondary school students in the science stream. This misconception precludes secondary school students in the arts stream who may have an interest in IT from enrolling in an undergraduate degree program. Further, the secondary school examination system does not allow arts stream students from sitting for the information technology subject in the Fifth Form, which is the most common exit point from secondary school.

5.2 Addressing these misconceptions

Participants proposed the following strategies to address these misconceptions. They specifically identified that parents, other family members (immediate and extended), and teachers are the primary negative influencers behind these misconceptions. These parties need to be informed of the following:

- The career opportunities and career progression within the ICT industry;
- ICT careers are more highly paid than ‘traditional’ careers that these parties seem to favor;
- There are many opportunities available in the ICT industry, i.e. there is demand for ICT workers;
- ICT professionals are for students who are more academically inclined;
- An ICT career is flexible because there are opportunities to start a business, work anywhere in the world and work in any industry;
- The people behind IT success stories such as the Malaysian inventor of the thumb drive.
These misconceptions can be addressed at the secondary school level by improving teacher’s IT literacy skills and upgrading the curriculum. The revised curriculum should focus on how technology - both hardware and software – works in addition to how to use devices. Both IT teachers and students will benefit from this exposure to “what IT really is” (participant C, focus-group 12) We propose that the Ministry of Education revise the curriculum and make IT a compulsory subject at secondary schools.

Tertiary education providers can collaborate with industry to address these misconceptions by creating awareness and educating secondary school students’ immediate social contacts, especially when these immediate social contacts exert influence over the student’s education choice by virtue of funding the student’s tertiary education. The strength of this influence of social contacts is relational in nature, as is expected in Asian culture.

The involvement of industry lends strength to correcting the misconceptions because it provides parents and students with ‘proof’ of the result of IT education. Babin et al. (2010) recommended that ICT professionals speak directly with students and their parents. We recommend that the collaboration between industry and tertiary education providers provides a complete progression path from secondary school to ICT career, specifically, the identification of the specific IT tertiary program that will lead to the desired ICT career.

The proposed strategies that tertiary education providers and industry can adopt are:

- To conduct IT education fairs to provide information about the types of IT courses that lead to specific ICT careers;
- To conduct seminars with ICT professionals to create awareness about the ICT industry;
- To conduct workshops and courses for students and teachers to educate them about how IT works, e.g. programming languages, and present the outcomes of using and applying IT;
- To run competitions, particularly for secondary schools.

6 CONCLUSION

This paper was a focus-group study of factors that encouraged or discouraged students to enrol in IT tertiary education. The results suggest that family relations are an important factor in a Malaysian student’s education and career decisions. Malaysian families tend to favour careers that are perceived to have higher prestige, higher status, and higher income. Therefore, families will exercise their influence over the student’s tertiary education choice by financing the tertiary education program that meet these criteria.

This study extends Western research into Asian students’ choice of IT education and/or ICT careers by studying Asian students in an Asian context. Western research highlighted that cultural factors, such as the need for security and status, impacts on Asian students’ choice to study IT and/or pursue ICT careers (Adya 2008; Nielsen et al. 1997, 1998). The influence of the family (immediate and extended), as highlighted in our study, is the underlying factor that contributes to the need for security and status as expressed by Asian students in a Western context (Nielsen et al. 1997, 1998).

These results imply that increasing the IT student enrolment starts with tertiary education providers and the ICT industry creating awareness and educating secondary school students and their families, particularly parents, about ICT careers. Specifically, they need to be informed of the types of ICT careers, basic-level requirements for an entry-level ICT worker, demand for ICT workers, growth potential in the ICT industry, and ICT industry salary scales. Further, the Ministry of Education can revise the IT curriculum to focus on how technology works, i.e. a software and basic programming focus, and upskill IT teachers to prepare them to deliver the revised curriculum.

As a result of this paper, further research might include non-IT undergraduate students from public and private HEI, IT undergraduates from public HEI, and school children to provide an in-depth and complete representation of factors contributing to the low enrolment of students in IT undergraduate programs.
References


