CHAPTER 6: DISCUSSION

6.1 Use of computers

When asked when they were first exposed to information and communication technology (ICT) the majority (60.2%) said that they were exposed to ICT in secondary school [Table 4.1]. This is to be expected as the introduction of ICT into primary schools is fairly recent and would not have affected most of these students. Some 15 of them claimed to be exposed during the preschool period, answers which are doubtful given that personal computers were not prevalent in the mid-1980s when these students were in preschool and this answer is unlikely to be right. It is however, impossible to check all the responses, as the survey is anonymous in nature.

The source of knowledge for ICT is rather varied with several reporting various sources [Table 4.2]. The most important sources are friends with 54.0% reporting this as a source, the school (52.0%) while the media was reported as a source by 44.4%. Parents were not considered an important source of knowledge, with only 17.4% reporting this as a source of knowledge. This is again not surprising, as studies elsewhere have demonstrated the same finding. Young people tend to rely on friends for such knowledge and this reflects the so-called "generation gap".

Most students (94.6%) had used a computer before entering university although the majority (60.0%) reported only minimal knowledge of computers before entering university [Table 4.3]. Almost a third (32.8%) reported intermediate knowledge, with very few reporting advanced knowledge. Again, this is not surprising, given the government's drive to make the population ICT-savvy and as technically proficient as possible. The Internet-connected population in Malaysia has grown tremendously

over the past 5 years and some 15% of the Malaysian population have accounts with one or more Internet Service Providers (ISPs) in the country. This augurs well for the future and should be taken note of by education planners in the university. More and more students are becoming ICT and Internet savvy, and it is surprising to find a university student who has never used a computer in his or her life. The introduction of so-called "smart schools" in Malaysia should ensure that all students entering tertiary education in 5 years time would have some basic knowledge on how to operate computers.

Slightly more than half of all respondents i.e. 366 (56.0%) reported owning a personal computer, with majority owning desktops while few have laptops and palmtops [Table 4.4]. There is some overlaps here as some students have more than one type of computer. This is promising as it shows that awareness of the need to have a computer to be high among students despite the cost such ownership entails. It has to be remembered here that the majority of respondents are on some kind of scholarship or loan (59.4% on scholarships while 21.3% received some sort of loan). It is unlikely that the expense of buying a computer is included in the scholarship or loan and would actually be an extra burden on the student. This is a point to be taken by the faculty and there should be some sort of incentive or easy-payment scheme whereby students can be encouraged to own computers.

Although there appears to be a very high level of exposure to computers by medical students, their use of computers appears to be very rudimentary. Surprisingly, about 14.1% of the respondents reported that they did not spend any time on the computer at all. However, 59.6% reported spending between 1-4 hours per week using the

computer [Table 4.5]. As expected, word-processing is the most popular computer activity with 80.3% reported to use the computer for this purpose [Table 4.6]. Word processing appears to be popular because of the need for reports in their studies to be sent in printed form. Presentation using PowerPoint is the second most popular activity with 30.9% reporting that they use the computer for this purpose while only 14.4% use spreadsheets. Very few (5.2%) reported programming with computers, which seems to agree rather well with the reported level of computer skills. An overwhelming majority (85.3%) utilise the computer for Internet use, reflecting a high awareness of the Internet for the respondents.

6.2 Perception of computer use and availability in the faculty

Students were asked to rate the use of ICT by fellow students and academic staff. The mean rating for students and staff are fairly similar being 3.13 and 3.28 respectively (out of a possible maximum of 5). While not particularly low, it is nothing to shout about, indicating that perhaps more needed to be done in this area to improve usage. A study among academic staff would be helpful to understand the reason for the rather average rating. It is the author's belief that some factors are related to this average rating by students of computer use among academic staff. It is the university's policy to equip all academic staff with computers but these are mainly desktops and not notebooks. What the students perceive to be a lack of computer usage is probably what they see in the lecture halls. Few departments in the medical faculty have notebooks for classroom use and the number of LCD projectors being provided is limited. The bottom line is, there just aren't enough projectors and notebooks to go around and this is reflected in the students' perception. Some departments have taken steps to address this situation and thus ensure that there are

common-use notebooks and LCD projectors to go around. When ICT is used for teaching, the usefulness of ICT in terms of understanding and knowledge is similar to its overall rating [Table 4.11]. Student understanding was rated with a mean score of 3.52 out of 5 while knowledge received a mean score of 3.45. The opportunity to take down notes, however, may not have been really helped by the use of ICT as it received a mean score of only 2.92.

The majority i.e. 471 of 639 respondents or 73.7% think that there are inadequate ICT and computer facilities in the faculty (14 did not answer the question). Printing facilities too are considered inadequate by 509 (80.8%) of 630 respondents (23 did not answer). When asked on the ideal student to computer ratio, there were a variety of answers but the mean ratio was calculated as 1:10.3 computers. Despite the large numbers who are already using computers, a large proportion (76.8%) believe that ICT should be incorporated in the current training programme. It would also be better that basic IT skills are taught as early as possible in the medical curriculum as late teaching is unlikely to be very useful (Osman and Muir, 1994).

The use of computer-assisted instruction (CAI) in medical education has increased steadily in the last decade with the availability of personal computers (Holt et al., 2001;Kerecsen and Pazdernik, 2002;Lieberman et al., 2002;Lonwe and Heijl, 1993;Slotte et al., 2001;Steinberg et al., 2002). Medical students experienced with microcomputers prior to medical school were much more likely to use them while in medical school (Bresnitz et al., 1986) but notably most students use computers for telecommunications and word processing with few being interested in their use for

office management or database purposes. Indeed many lack the skills necessary to search the medical literature or to use CAI programs.(Hollander, 1999).

The university would do well to take note of these findings, as there is certainly some truth to the matter. The faculty has 874 medical students (students undergoing other courses in the faculty are not included) but there are only 80 computers for student use. Of the 80, 40 are usually reserved for classroom teaching, thus effectively leaving 40 computers for 874 students; a ratio of 1:21.85, which is far from ideal. Even after discounting the 167 Year 3 students who stay and study in Klang, there are only 40 computers for 707 medical students, giving rise to ratio of 1:17.68, which is still not satisfactory. It is unfortunate that this is the case as the University of Malaya has a 34 Mbps connection to the Internet and every effort must be made to fully utilise this enormous bandwidth.

The situation is worse at the Klang campus, where the Year 3 students live and study. Here there are very few computers for their use, and no connection to the Internet is available for these students. In this era of problem-based learning (PBL), it is essential that adequate ICT facilities be made available to students to ensure that they do not miss out on the power of the Internet and are able to study to the best of their ability. The author has proposed a plan to equip the Klang campus with a computer and connect every hostel room to the Internet so as to ensure that all students can have fast and stable connections to the Internet. It remains to be seen whether this proposal will be adopted in its entirety.

6.3 Skills, knowledge and use of ICT

In a survey such as this, one has to rely on self-reporting to assess the level of skills. Students were asked to rate their own skills on a scale of 0-5, with 0 the lowest and 5 the highest. The highest mean was for e-mail followed by surfing the World Wide Web and word-processing [Table 4.9]. Spreadsheet, database and statistical software use were rated the lowest among the students, reflecting some unease with the use of computers for such purposes. The highest possible total is 30 and only 3 students reported this. Again, this is not surprising as word-processing and the ability to use e-mail and the Web would seem to be most relevant to students in medical studies. Nevertheless, the low ability to use spreadsheet, database and statistical software is of concern. Perhaps the faculty should take this into account when drafting any new changes to the current medical curriculum. With the increasing emphasis on evidence-based medicine in the New Integrated Curriculum (NIC) being implemented by the faculty, it is high time for the faculty to offer some instruction in the use of these types of software. One stumbling block that has to be overcome, however, is the lack of computers in the faculty. With only 40 computers for training means that a maximum of only 80 students can be accommodated at any one time. This would mean repeating the same lesson for every class as a typical class of medical students would number some 160. This would not be a good approach and makes the case of having more facilities all the more urgent.

The self-reported ICT literacy score was examined with respect to several factors [Table 5.2]. Males appeared to have a significantly higher mean score compared to females ($p<0.001$). This is not surprising and has been reported in other studies.

During the early part of the ICT revolution, males tend to be the early adopters with females picking up later.

Only slight differences in the mean score on ICT literacy were reported between ethnic groups [Table 5.2] and although in some cases, the difference was statistically significant; it is probably insufficient to draw any firm conclusion. Place of residence did not appear to affect the mean score at all. Neither having scholarships nor previous experience with computers appears to influence the score. However, significant differences exist between the various years of study. Year 1 and Year 3 students had higher mean scores than Year 4. This kind of difference has been demonstrated in Monash University in 1991 whereby the junior students, having been recently exposed to the ICT revolution were definitely better equipped to handle ICT compared to their more senior counterparts.

To supplement the use of self-reported skills, students were also tested on their knowledge on 9 terms commonly used in ICT. Some terms are very commonly used, with others being less common. Only 8 managed to identify all the terms asked of them [Table 4.10]. A quarter did not manage to identify a single term. The mean score was 2.17 (SD 2.21) out of a maximum of 9. If the passing mark for this "test" was taken as 5 out of 9, then 83% of all students failed the "test of knowledge". Does this mean that the self-reported skills are not true or there is something wrong with the so-called "test"? What can be interpreted from this is that, possibly, for most students and perhaps for most people, these terms are not important and thus few even bother to find out the meaning. What is perhaps more important to them is that they know

how computers can be used and are less interested in learning about how computers work.

There appears to be some relationship between the self-reported ICT score and some variables [Table 5.3]. There is a significant correlation between parents' income and ICT score ($p<0.001$). The higher the parents' income, the higher the ICT score ($r=0.165$). This could be related to the ability of parents to purchase computers for their children but one has to be cautious with such small correlation coefficients before drawing conclusions. One drawback of this kind of survey is the inability of researchers to verify such information as information about income is not usually easy to obtain from respondents and some students may have really no idea how much their parents are really earning.

As expected, self-reported rating of knowledge appeared to be significantly correlated with the self-reported ICT score ($r=0.577$, $p<0.001$) and there is also some relationship between the ICT identifier score and self-reported ICT score ($r=0.283$, $p<0.001$).

There is however, a negative correlation with the number of years of study. The more senior the student, the lower is the ICT score ($r = -0.139$, $p<0.001$). This could be explained by the severe lack of computers available for student use a few years ago and the low emphasis on the use of computers in the curriculum unlike now. Thus a student in his/her final 2 years of study (at the time of survey) was probably undergoing the old curriculum which has now been changed to the New Integrated Curriculum.

Ethnicity and place of residence do not appear to be related to Internet use. Male students are more likely to use the Internet compared to female students (OR 2.15, 95% CI 1.23, 3.74) and those who have used computers before entering university are also more likely to use the Internet compared to those who have not (OR 8.46, 95% CI 3.83, 18.70). This is again, not really surprising as past studies have indicated that male medical students tend to adopt ICT earlier than females (Herskovic et al., 2000;Kidd et al., 1993) but given time, females will eventually catch up with males.

There are significant differences between ethnic groups, sexes and year of study in the use of word-processing software [Table 5.5]. Malays are more likely to use word-processing software compared to Chinese (OR 0.48; 95% CI 0.31, 0.75) and Indians (OR 0.47; 95% CI 0.23, 0.98) but males are less likely to use word-processing software compared to females (OR 0.42; 95% CI 0.28, 0.64). Year 2, 3 and 4 students are more likely to use word-processing software compared to Year 1 students. It is difficult to explain these findings and they are perhaps related to something else not discovered in the survey. However, as far as spreadsheets are concerned, there are no differences between the various ethnic groups, sexes and years of study [Table 5.6]. As for presentation software, significant differences exist between ethnic groups and years of study [Table 5.7]. Chinese students are less likely than Malay students to use presentation software (OR 0.55; 95% CI 0.31, 0.95) and Year 4 and 5 students are less likely to use them compared to Year 1 students. Less use of presentation software among the more senior clinical students could be related to the New Integrated Curriculum only being followed by the pre-clinical students while the more senior

students were still following the older curriculum. The newer curriculum has increased emphasis on presentations and written reports, thus making the use of presentation software higher among these students. It is difficult to explain the difference between the ethnic groups but it is not large and may have occurred purely by chance.

Place of residence and having used a computer before entering university do not appear to be related to being comfortable with computer software [Table 5.8]. It would seem that having used a computer before entering university is not related to being comfortable with software. It could be that access to computers in the university tends to even the odds between those having had exposure and those who have not had the exposure. Being comfortable with software does not appear to make students feel that ICT facilitate their studies or research but it does seem to facilitate presentations (OR 1.73, 95% CI 1.04, 2.88). Indian students appear to be most comfortable with software compared to other races and are twice as likely to be comfortable with software compared to Malay students (OR 2.27, 95% CI 1.20, 4.29). Male students are twice as likely as female students to be comfortable with software (OR 2.07, 95% CI 1.49, 2.87) reinforcing the belief that males tend to be early adopters of technology.

Ethnicity, place of residence and having used a computer before entering university do not appear to be related to being comfortable with computer hardware [Table 5.9]. Being comfortable with hardware does not appear to make students feel that ICT facilitates their studies or research but it does seem to facilitate presentations (OR 1.73, 95% CI 1.04, 2.88).). Those staying at home are twice as likely as those staying

in college to be comfortable with hardware compared to those staying in college (OR 2.35, 95% CI 1.07, 5.13). This could be because these students are from the Klang Valley and may have been more exposed to computer hardware than others. Again, as with software, male students are twice as likely as female students to be comfortable with computer hardware (OR 2.14, 95% CI 1.46, 3.12).

Analysis was done on factors which influence students perception on whether ICT facilitated their studies, research and presentations. Four factors were analysed to see whether they had any bearing on this perception. Ethnic group and gender do not influence their perception on any of these [Tables 5.10-5.12]. The place of residence influences only the perception on the use of ICT for presentations. However, having used a computer before entering university seems to be definitely related to their perception that ICT facilitates studies, research and presentations. The reason is unclear but it seems to signal that early exposure to computers has a positive influence on their acceptance of ICT during university life.

Stepwise multiple linear regression was performed for 10 independent variables with the ICT score as the dependent variable. Of the 10 variables, only 4 were found to be significant and appeared in the final model [Table 5.14]. The 4 variables are:

- Self-reported rating of computer knowledge
- Number of siblings
- Parents' monthly income
- Gender

This gives rise to the conclusion that perhaps self-reported rating of computer knowledge may give a good indication of the level of ICT literacy possessed by the students. Number of siblings and parental monthly income do appear to be significant

factors in the model. The negative sign for number of siblings and positive sign for parents' monthly income appears to point to economic reasons behind this. It could be that the more siblings there are, the lower the availability of money for them to purchase computers for the children but the higher the income, the easier it is for the parents to be able to afford computers for their children. The model fit is also not very good with an adjusted r^2 of 0.218. Thus only 22% of the data fits the model, leaving most of the data not fitting the model.