Chapter 4 – Findings

4.1 Students' ICT Use and Dependency

4.1.1 Overview

In Chapter 1, I described how my personal observation and experience with students who showed an unusually keen interest in ICTs led me to undertake this study. In Chapter 2, I described in detail what literature has to say about the topic. Chapter 3 contained a description of the research plan, the research philosophy, the research methodology and the strategy that I used to answer the main research question of this study, namely:

> ***The role of Information and Communication Technology (ICT) in a higher education institution: with specific reference to disadvantaged students, cultural aspects and motivation***

In this Chapter, I describe and analyse the responses to the questionnaire which are divided into four categories. Section 4.1 examines technology (ICT) related findings. It includes ICT use and dependency. Section 4.2 extends the ICT use and examines it against academic performance. Section 4.3 examines the cultural variables of the study and finally section 4.4 looks at the motivational variables and the associated findings. It should be noted that the sequence in which these sections are presented are in the reverse order from Chapter 2 which follows a natural progression of ideas as they unfold throughout the study. In Chapter 2, I started with asking questions about the student. First, I looked at his/her culture and how it has an influence on motivation and therefore academic performance. In Chapter 4, I first have to measure the level of technology use which will enable me to relate it to academic performance followed by culture and motivation.

Before engaging in an in-depth discussion of the issues at hand, I offer a brief summary of the profile of the students who responded to the questionnaire.

The importance of the profile emanates from the fact that attributes such as age, nationality, race, home language and study level are all significant. The Hole-in-the-Wall project of which this study is an extension focused predominantly on children younger than 18 years old. It is important therefore to ascertain the age group of the participants in this study. Variables such as nationality, race and home language are critical cultural features that constitute important variables defining the composition of the participants.

4.1.2 Students' Profile

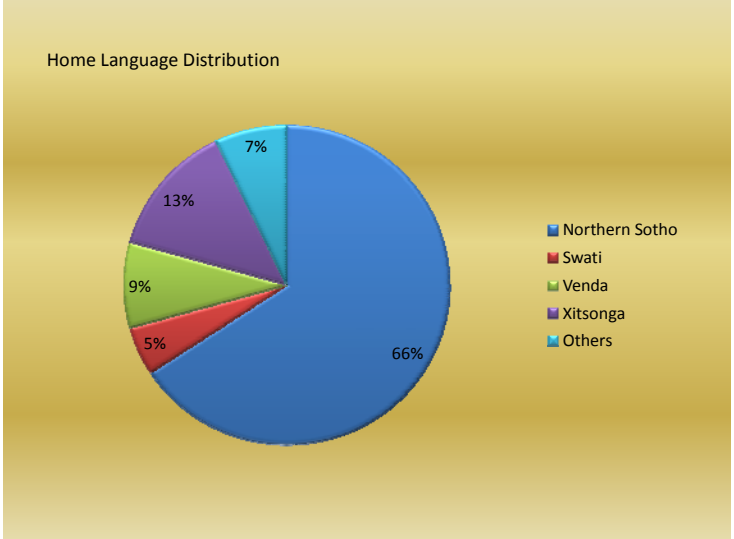
What follows in this section is an analysis of the 266 UL students who participated in the study. An analysis of the participants in terms of gender and schools' distribution has already been presented in Chapter 3, section 3.2. What follows below is a presentation of other related profile variables such as: nationality, home language, level of study, age and availability on campus.

4.1.2.1 Nationality and Home Languages

Because one of the main topics of interest in this study is culture and how a student's culture influences motivation and therefore his or her learning behaviour, this section will describe the cultural diversity represented by the participants.

Out of the 266 participants in the sample, only five reported their nationality as being non-South African, while two others gave no information about their nationality. Of the non-South Africans, one was from Zambia, one from Botswana, one from Zambia and two were from Zimbabwe. This means that 97.37% of the participants were from South Africa. What follows below is additional demographic information about the participants. Figure 4.1, below, illustrates the ethnic composition of the students in terms of their home languages. The same information is presented numerically in Table 4.1, below.

Figure 4. 1- The home language distribution of the participants (in percentages)



	#	%
Northern Sotho	175	65.7
Swati	13	4.8
Venda	23	8.4
Xitsonga	36	13.9
Others	19	7.2
	266	100.0

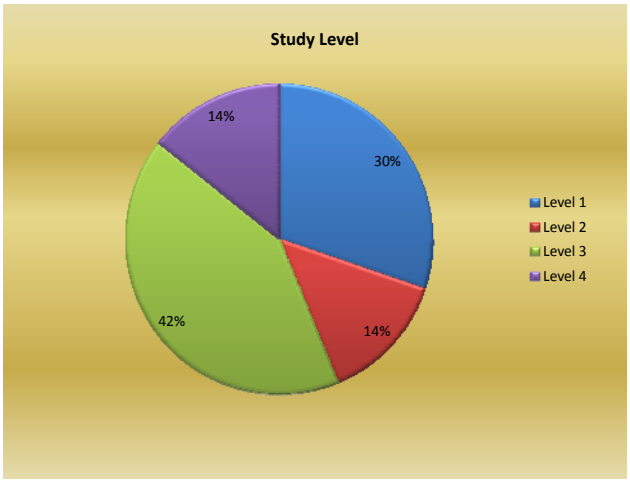
Table 4.1 - The home language distribution of the participants (Actual numbers and percentages)

Table 4.1, above, shows that the majority of the participants (175 of the total number of students or 65.7%) reported their home language as Northern Sotho. This is followed by 36 or 13.9% of the participants who reported their home language as Xitsonga. Venda-speaking students were represented by 23 or 8.4% of the total number of participants. Swati-speaking students constituted 13 or 4.8% of the participants. The remaining 19 students reported their home languages as follows: English – 1; Afrikaans – 1; Ndebele – 3; Seseto – 2; Setswana – 6; Shona – 1; Xhosa – 1; Zulu – 3. There was 1 student who did not specify his home language.

4.1.2.2 Level of Study

Of the 266 respondents only 1 did not specify his/her level of study. 80 or 30% of the students who responded were engaged in their first year of study. 36 students or 13.6% of the participants were in their second year of study, and the largest group (107 or 41.9%) were registered for their third year. 38 or 14.3% of the participants were in their fourth year of study. Figure 4.2, below, illustrates the year of study for which the participants were registered (in percentages). Table 4.2, below, presents the same information in table form (in actual numbers and percentages).

Figure 4. 2 - Year of study for which participants were registered (percentages)



	#	%
Level 1	80	30.2
2	36	13.6
3	111	41.9
4	38	14.3
	265	100.0

Table 4.2 - Participants Year of study (actual numbers and percentages)

This analysis shows that an unexpectedly high percentage of the participants, namely, 41.9%, were in their third year of study.

4.1.2.3 Age Analysis

Only one student out of the 266 participants did not report his/her age. One of the participants was less than 18 years old, and five were older than 28 years old. The oldest student was 36 years of age. Table 4.3, below, illustrates the age distribution of the students in terms of those older than 28, and those who were between 18 and 28 years old.

	#	%
Did not report	1	0.4
Less than 18	1	0.4
Between 18 and 28	259	97.4
Older than 28	5	1.9
	266	100.0

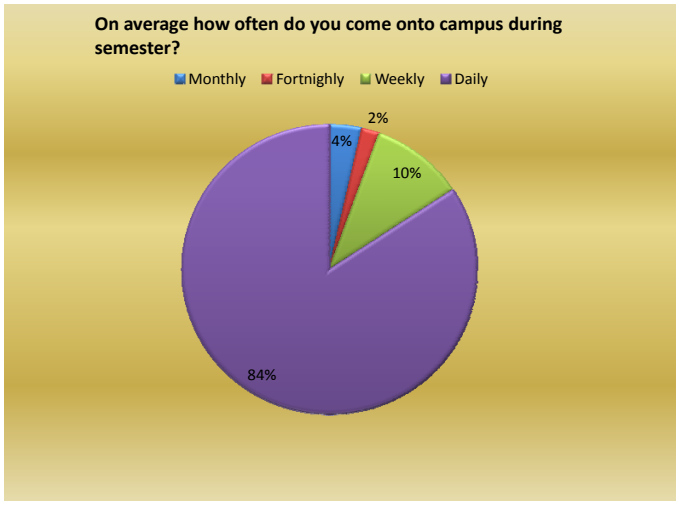
Table 4.3 - Age distribution of the participants

97.7% of the participants belonged in the 18-28 year-old age group, and only a total of 6 individuals or 2.3% were outside this range.

4.1.3 Availability on Campus (A1)

In response to the question “How often do you visit the campus?”, all of the respondents reported they visit the campus at least once a month. 84% of the 254 participants or 214 students stated that they were on campus on a daily basis. Nine students or 4% visited the campus once a month. Five students or 2% visited the campus at least fortnightly. 26 or 10% of the students from the sample reported that they visited the campus on a weekly basis. Figure 4.3 and Table 4.4, below, illustrate this information.

Figure 4. 3 - Frequency of visits to campus by participating students



	#	%
Monthly	9	3.5
Fortnightly	5	2.0
Weekly	26	10.2
Daily	214	84.3
	254	100.0

Table 4.4 - Frequency of visits to campus by participating students

The section above describes the demographic profile of the participating students. In the section that follows below, I shall describe and analyse the nature and extent of ICT usage among the participating students.

4.1.4 Extent of ICT Use and Dependency for Academic Purposes

In the sections that follow, I have attempted to identify the extent to which, the students in the sample, use ICTs and are dependent upon them. For this purpose, I have differentiated between the on-campus and off-campus availability of ICT facilities. I have also described the extent to which the participating students use ICT tools such as computers and the Internet, and how much of this use was for academic purposes.

4.1.4.1 On-Campus Computer Use (A2)

There were 261 respondents who answered the question, “What percentage of your academic time do you spend using a computer?” Their responses yielded the data illustrated in Figure 4.4, below.

Figure 4. 4 - Student academic time spent on using a computer on the campus (percentages)

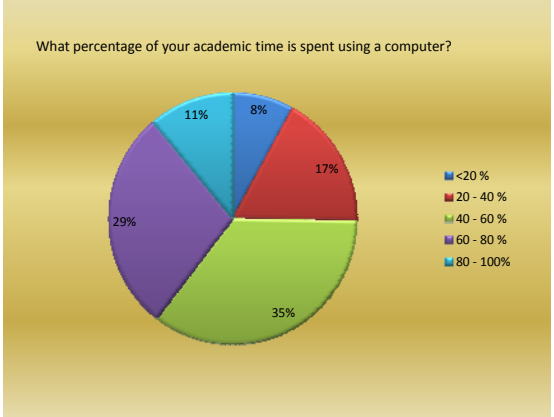


Table 4.5, below, shows the amount of academic time that the participating students spent on the computer on the campus (table shows actual numbers and percentages).

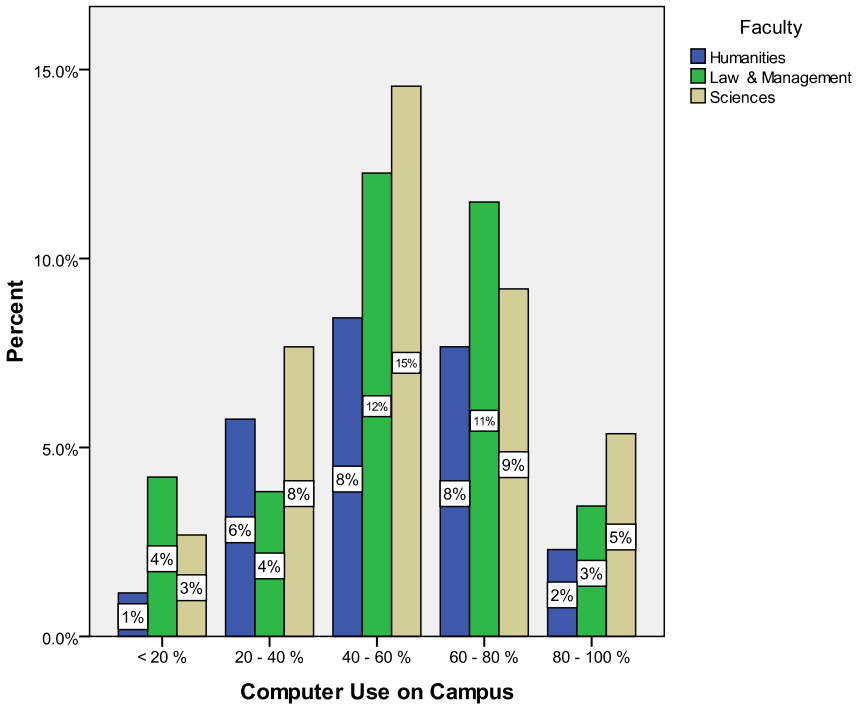
	#	%
<20 %	21	8.0
20 - 40 %	45	17.2
40 - 60 %	92	35.2
60 - 80 %	74	28.4
80 - 100%	29	11.1
	261	100.0

Table 4.5 - The amount of academic time spent by students on the computer on the campus

A number of observations need to be made. Firstly, every respondent uses a computer (this is not shown in the table directly). Secondly, a total of 92% of the respondents have reported they use more than 20% of their academic time on a computer for study-related purposes on the campus. This is surprisingly high and shows high level of dependency and interest to ICTs since most were first introduced to computers when they started at the University.

The next area of interest is to explore if there is a difference in use between the three faculties. The distribution of the amount of academic time spent using a computer across the various faculties of the university was tabulated and *statistically* tested. The distribution figures in Figure 4.5 and Table 4.6, below, illustrate the relative differences in the numbers of students using a computer for academic purposes in their academic time from different faculties of the university.

Figure 4. 5 - Computer use for academic purposes by faculties (percentages)



			Faculty			Total
			Humanities	Law & Management	Sciences	
Computer Use on Campus	< 20 %	Count	3	11	7	21
		% within Faculty	4.5%	12.0%	6.8%	8.0%
	20 - 40 %	Count	15	10	20	45
		% within Faculty	22.7%	10.9%	19.4%	17.2%
	40 - 60 %	Count	22	32	38	92
		% within Faculty	33.3%	34.8%	36.9%	35.2%
	60 - 80 %	Count	20	30	24	74
		% within Faculty	30.3%	32.6%	23.3%	28.4%
	80 - 100 %	Count	6	9	14	29
		% within Faculty	9.1%	9.8%	13.6%	11.1%
Total		Count	66	92	103	261
		% within Faculty	100.0%	100.0%	100.0%	100.0%

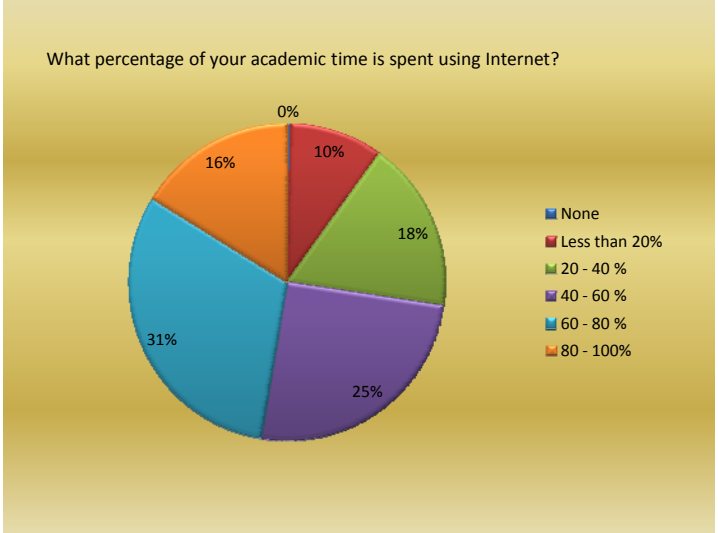
Table 4. 6 - Computer use for academic purposes by faculties

There are some differences in the percentage of students from different faculties that use a computer for academic-related purposes in their academic time on the campus. However, all three faculties have their highest relative use at 40 – 60 % category. The second highest, again, in all three faculties is the same and is at 60 - 80 % category. While some faculties might seem to show a higher level of computers use than others, a chi-square test, which is used when two categorical variables like the ones in this case are compared, gives a p-value of 0.32 indicating that there is no association between computer use and faculty. This implies that all three faculties may therefore be said to have responded in a similar fashion *statistically* to the use of computers for academic purposes on campus. Similar results were obtained based on gender with p=0.341 for male respondents and p=0.396 for female.

4.1.4.2 On-Campus Internet Use (A2)

In response to a similar question about the Internet use on campus, the following data emerged. Figure 4.6, below, illustrates the percentage of total academic time that students spend on the Internet. Table 4.7, below, shows the percentage of academic time that students spend on the Internet while on campus.

Figure 4. 6 - Student academic time spent on the Internet on campus (percentages)



	#	%
None	1	0.4
Less than 20%	23	9.5
20 - 40 %	42	17.4
40 - 60 %	61	25.3
60 - 80 %	75	31.1
80 - 100%	39	16.2
	241	100.0

Table 4. 7- Amount of academic time spent on the Internet

Compared to the previous question (computer use), fewer students (241) responded to this question. 75 respondents (or 31.1%) is the largest group and belongs to the (60%–80 %) category, followed by 61 respondents (or 25.3%) that

belongs to the (40%–60%) category. This, in a way, confirms the literature's expectation that the last decade has seen a phenomenal growth in the use of the Web in university education, with various factors influencing the adoption of Web-based technology (Singh, O'Donoghue, and Worton, 2005, p. 22). This shows that UL students are part of the global village and from an Internet point of view are linked with the rest of the world.

Figure 4. 7 - Shows the distribution of academic usage of the Internet across faculties.

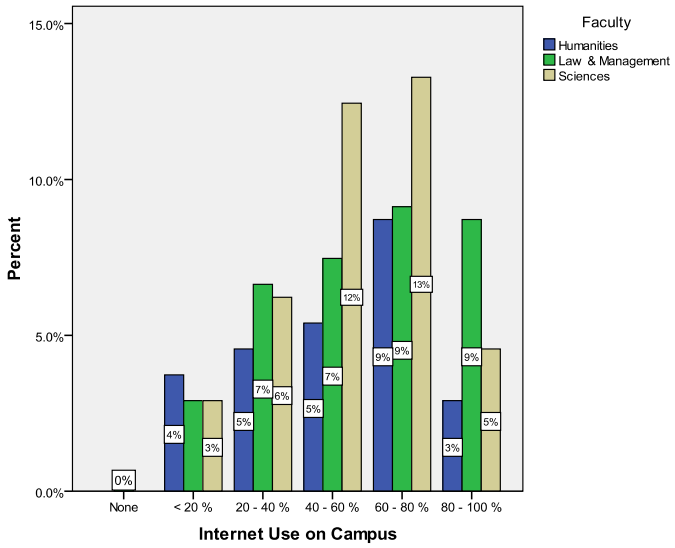


Figure 4.7 and Table 4.8 show the distribution of Internet use across faculties. A chi-square test which is used when two categorical variables are being analysed gives a p value of 0.176 indicating that there is no *statistical* association between Internet use and faculty. A similar test for each gender also did not show any level of association in use of Internet with p values of 0.340 (male) and 0.396 (female).

			Faculty			Total
			Humanities	Law & Management	Sciences	
Internet Use on Campus	None	Count	0	1	0	1
		% within Faculty	.0%	1.2%	.0%	.4%
	< 20 %	Count	9	7	7	23
		% within Faculty	14.8%	8.2%	7.4%	9.5%
	20 - 40 %	Count	11	16	15	42
		% within Faculty	18.0%	18.8%	15.8%	17.4%
	40 - 60 %	Count	13	18	30	61
		% within Faculty	21.3%	21.2%	31.6%	25.3%
	60 - 80 %	Count	21	22	32	75
		% within Faculty	34.4%	25.9%	33.7%	31.1%
	80 - 100 %	Count	7	21	11	39
		% within Faculty	11.5%	24.7%	11.6%	16.2%
Total		Count	61	85	95	241
		% within Faculty	100.0%	100.0%	100.0%	100.0%

Table 4.8 – Internet use by faculty on Campus for academic use

4.1.4.3 Venues for ICTs Access on Campus (A3)

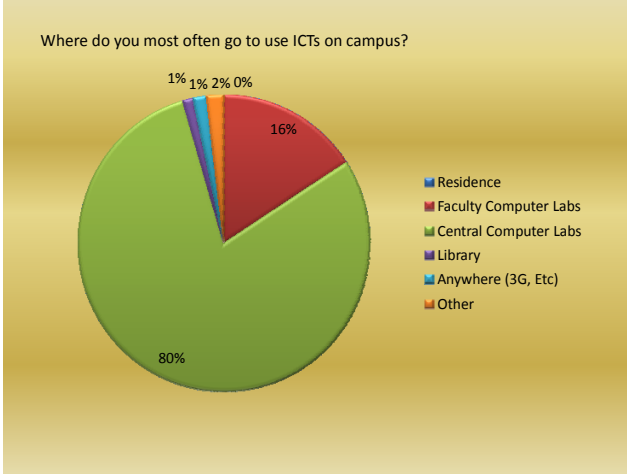
In general, there are two different types of venues that students can employ for ICT use. There are computer laboratories that are managed by ICT staff and others that are managed by various schools.

Of the first category, there are 9 such venues for general purpose ICT access. These venues host a total 600 PCs. The smallest computer laboratory has 20 PCs with the largest having 100. A typical venue is similar to a typical lecture hall with a white board and provision for a data projector. In addition, an open area in the reading section of the library hosts some 60 computers and this is available for 24 hours 7 days per week except during the Christmas break.

The second group of computer laboratories, managed by the schools, consists of a total of 400 PCs in various venues. These are scattered throughout the campuses. They could consist of only a few PCs in a room to the largest that hosts 100 PCs.

In response to the question, “Where do you most often go to use ICTs on campus?”, the following picture Figure 4.8, below, emerged.

Figure 4. 8 - Most frequently used venue for computer use



As can be seen from Table 4.9 below, a total of 265 students responded to this question 211 or 79.6% use the centrally managed Laboratories. This is followed by faculty based computer laboratories with 42 respondents or 15.8%.

	#	%
Residence	0	0.0
Faculty Computer Labs	42	15.8
Central Computer Labs	211	79.6
Library	3	1.1
Anywhere (3G, Etc)	4	1.5
Other	5	1.9
	265	100.0

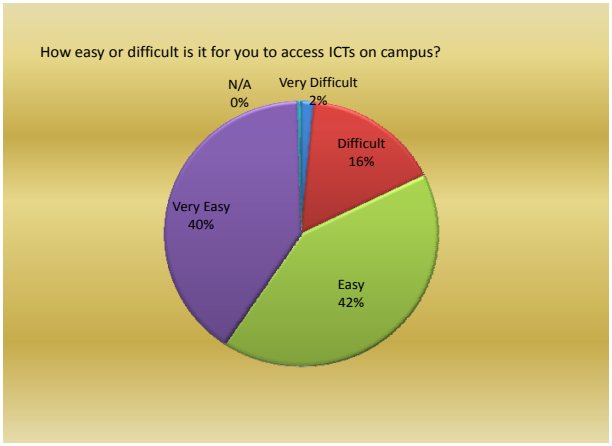
Table 4.9 – Venues used for ICT usage on campus

This clearly indicates that the computer laboratories that are managed by the faculties are utilized much less.

4.1.4.4 Ease of ICTs Access on-Campus (A5)

Figure 4.9 illustrates how the students responded to the question, “How easy or difficult is it for you to access ICTs on Campus?”

Figure 4. 9 – Student estimation of the ease or difficulty of accessing ICT facilities



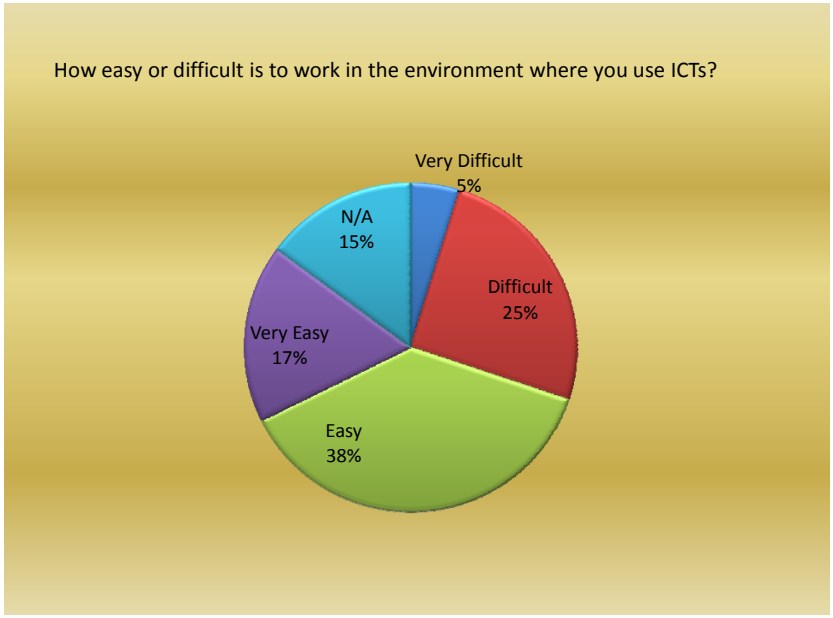
	#	%
Very Difficult	4	1.5
Difficult	42	16.2
Easy	108	41.7
Very Easy	104	40.2
N/A	1	0.4
	259	100.0

Table 4. 10 Student estimation of the ease or difficulty of accessing ICT facilities

Table 4.10, above, shows that 81.9% or 212 of the participants found the facilities either *easy* or *very easy* to use. 42 respondents or 16.2% found it difficult to access computer facilities.

In response to the question, “How easy or difficult is it to use the environment where you use ICTs?” the following picture emerged (Figure 4.10, below and Table 4.11).

Figure 4. 7 – The ease or difficulty that students experience when using the environment in which ICTs are situated



	#	%
Very Difficult	11	4.8
Difficult	58	25.3
Easy	86	37.6
Very Easy	40	17.5
N/A	34	14.8
	229	100.0

Table 4.11 - The ease or difficulty that students experience when using the environment in which ICTs are situated

69 respondents or 30.1% found the environment *difficult* or *very difficult* to use. The respondents were asked to comment on the reasons for any difficulties they may face. To this open question 179 students made some comments. Of these

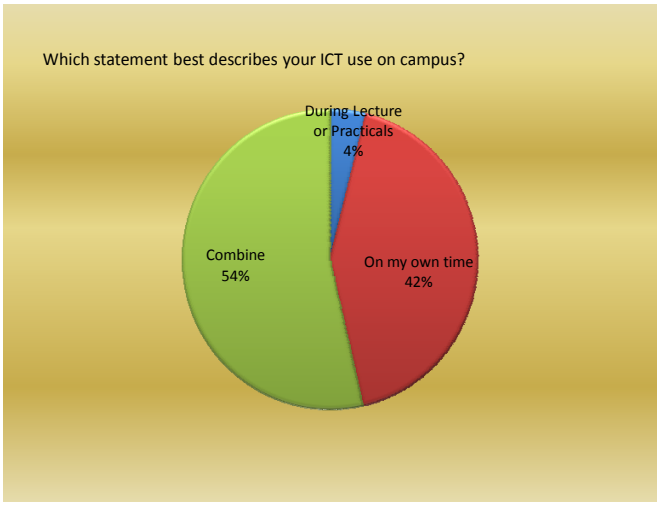
91 made generally positive comments. 24 made general comments. Of the negative comments that expressed a concern, 32 mentioned noise and another 32 complained about lack of adequate computers. There was one respondent that complained about both noise and inadequate computers.

It is interesting to note that while 80% of students reported using the centrally managed computer venues, 40% of the total number of computers were being controlled by the faculties (section 4.1.4.3). This seems to indicate that if the faculties were to make more effective use of their computers and manage their ICT environments more effectively, it is likely that more students would use faculty-managed computers, and that this would alleviate the stress caused by the reported shortage of computers.

4.1.4.5 Extent of Academically Initiated ICT Use (A4)

In this section, I aim to determine the extent to which ICT use is academically or individually driven. The respondents were asked to specify whether they use ICT tools during a formal lecture period (or practical) only or if it was initiated during their own unsupervised time or if it was a combination of both. Figure 4.11, below, demonstrates their responses.

Figure 4. 11– Extent to which ICTs were used either during formal academic periods or in the student's own time (or a combination of the two)



Computers were used	#	%
During lectures and practicals	10	3.9
On students' personal time	108	42.5
Combined	136	53.5
	254	100.0

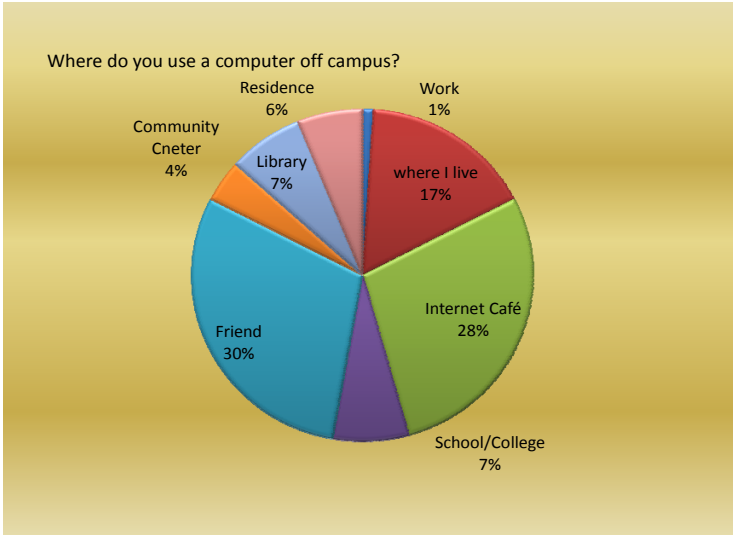
Table 4.12 – Extent to which ICT was used either during formal academic periods or in the student's own time (or a combination of the two)

Table 4.12, above, shows that only 10 respondents (or 3.9%) used ICTs during a lecture or a practical. The remaining 232 respondents or 96.1% use ICTs in their own time or in combination with an academic activity. This indicates that respondents enjoy a certain level of being self-starters and do not need to be asked to use ICTs.

4.1.5 Off-Campus ICTs Access (A9)

In this section, I aim to find whether ICTs are available to students off-campus and, if so, how and the extent to which ICTs are used and are accessible. In response to the question, "Where do you use a computer outside the campus?",

Figure 4. 12 – Venue for computer access off-campus



Access Venue	#	%
Work	2	1.0
Where I live	32	16.4
Internet Café	55	28.2
School/College	14	7.2
Friend	58	29.7
Community Centre	8	4.1
Library	14	7.2
Residence	12	6.2

Table 4.13 – Location of Computer access off-campus

Figure 4.12 and Table 4.13 were produced.109 out of 266 respondents or 41% indicated they had some sort of access to computers off-campus. This was followed by another question to establish where the access was located. 55 respondents or 29.7% of the total number of respondents have access to computers through friends outside the campus. Only two respondents or 1.0% have access to ICT tools at work.

4.1.5.1 Off-Campus Internet Access (A11)

In response to the question of whether the respondents can connect to the Internet while off-campus, Table 4.14, below, displays a summary of their responses.

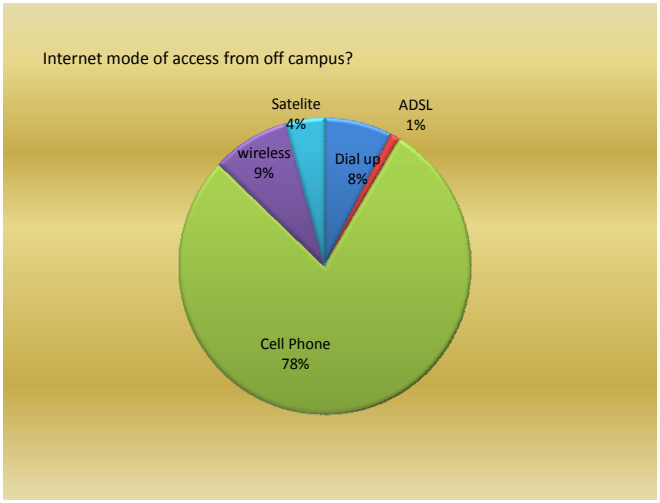
Can you connect to the Internet off-campus?	#	%
Yes	102	44.7
No	126	55.3
	228	100.0

Table 4. 14 - Respondents with Internet access off-campus

102 respondents or 44.7% out of a total of 228 students responded to this question by reporting that they enjoyed access to the Internet outside the campus.

Figure 4.13 and Table 4.15 indicate the reported mode of access that the students use.

Figure 4. 8 - Mode of Internet access



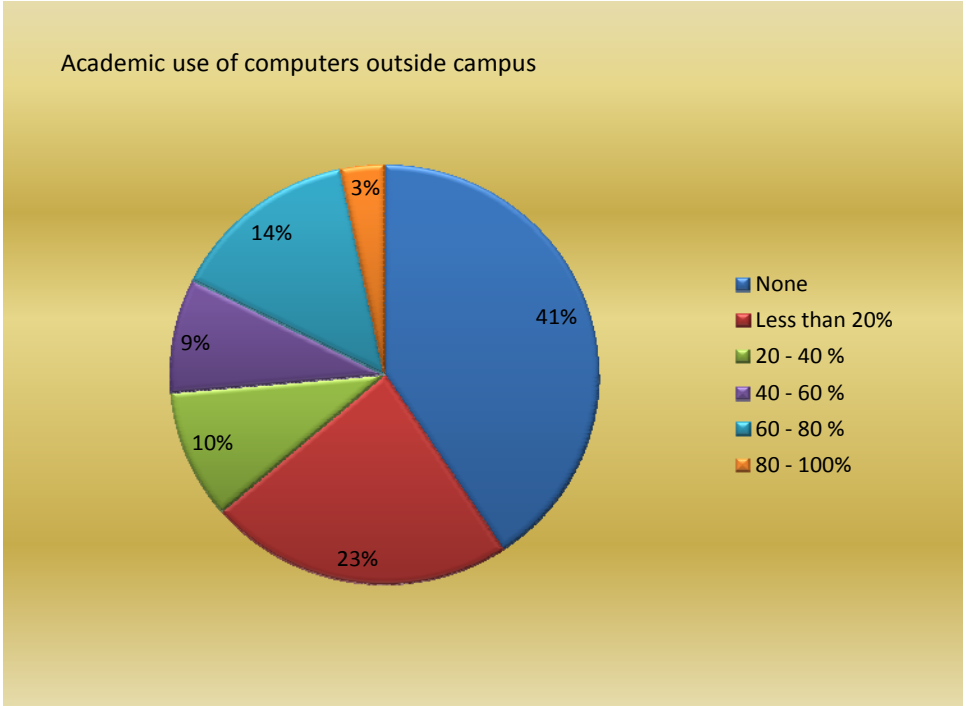
	#	%
Dial up	7	7.5
ADSL	1	1.1
Cell Phone	73	78.5
Wireless	8	8.6
Satellite	4	4.3
	93	100.0

Table 4.15 - Mode of Internet access.

Table 4.15, above shows that the most common means of Internet access is via cellular phone. This particular mode of the usage was reported by 73 respondents or 78.5% of the 93 respondents who answered this question.

Data obtained from the response to the question “Off campus, what percentage of your academic time do you spend using computers?”, is shown in Figure 4.14 and Table, 4.16, below.

Figure 4. 14 – Computer usage off campus for academic purposes



	#	%
None	37	40.7
Less than 20%	21	23.1
20 - 40 %	9	9.9
40 - 60 %	8	8.8
60 - 80 %	13	14.3
80 - 100%	3	3.3
	91	100.0

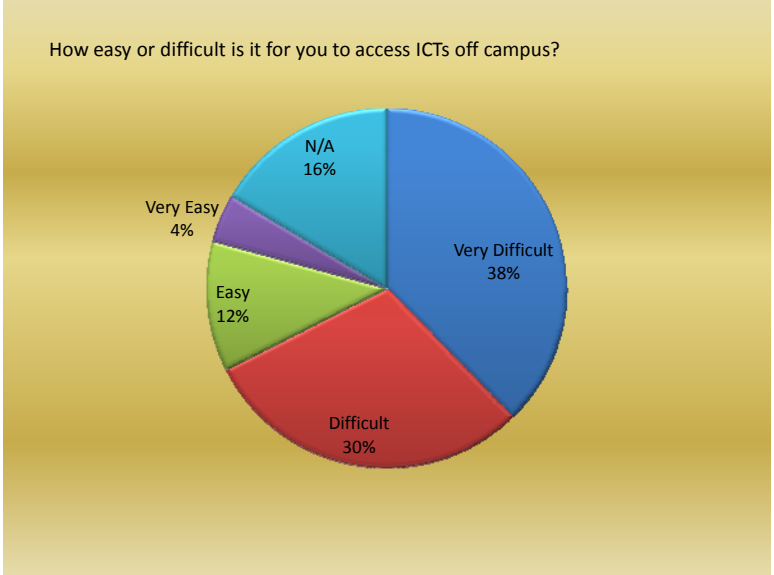
Table 4.16 - Computer usage outside the campus for academic purposes

Although only 91 respondents or 34% responded to this question, only 109 out of 266 respondents or 41% have some sort of access to computers off-campus

(section 4.1.5). This reinforces the findings of the responses to an earlier question about access to ICTs outside the campus for academic purposes. ICT access off-campus is limited.

Figure 4.15 and Table 4.17, below, reveal the responses to the question, "How easy or difficult is it for you to access ICTs Off-campus?". It was either difficult or very difficult for 67.6 % of students to access computers off-campus.

Figure 4. 15 - Ease or difficulty of accessing ICTs off-campus



	#	%
Very Difficult	87	37.7
Difficult	69	29.9
Easy	27	11.7
Very Easy	10	4.3
N/A	38	16.5
	231	100.0

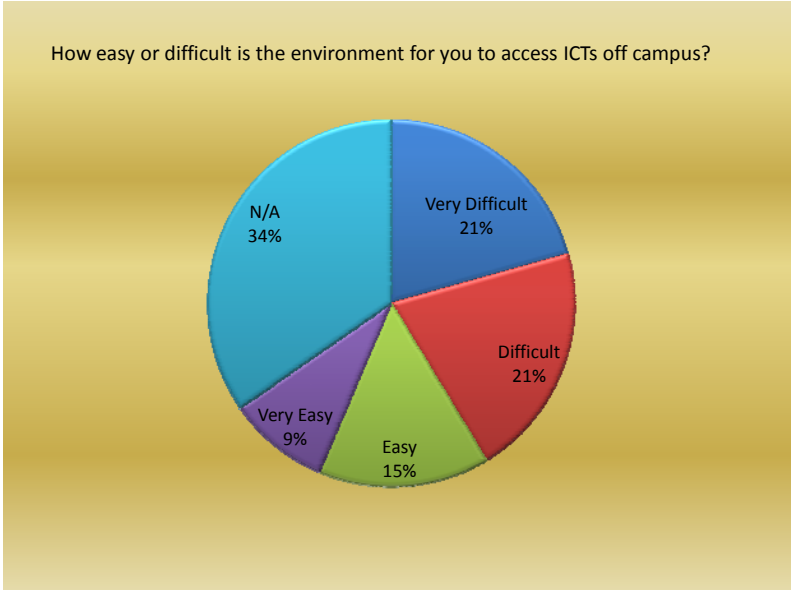
Table 4.17 – Ease or difficulty of accessing ICT tools off-campus

Only 37 or 16.0% of the respondents (out of a total of 231) who answered this question found it *easy* or *very easy* to gain access to computers off campus.

While some of the remainder of the respondents did not answer the question, those who did indicate that they found it either *difficult* or *very difficult* to access ICT tools off-campus.

The data from the response to the question "How easy/difficult is it to work in the environment where you use ICTs?" is shown in Figure 4.16 and Table 4.18.

Figure 4. 9 – Ease or difficulty of the ICT environment off campus



	#	%
Very Difficult	37	20.7
Difficult	37	20.7
Easy	27	15.1
Very Easy	16	8.9
N/A	62	34.6
	179	100.0

Table 4.18 – Ease or difficulty of ICT environment off-Campus

Table 4.16 reveals that, from a total of 179 respondents who responded to this question, only 43 or 24% found the ICT environment outside campus *easy* or *very easy* to operate. The remainder of the students who answered the question

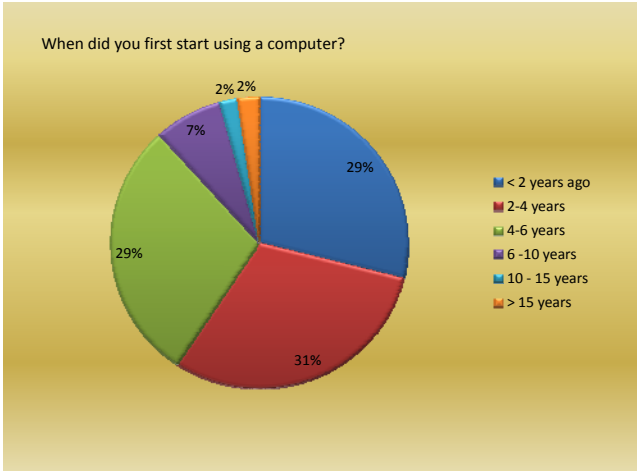
found the ICT environment outside the campus either *difficult* or *very difficult* to use.

The response to an open question on the reason for ICTs availability is analysed here. There were 143 respondents with many different responses. It was possible to separate the responses into five categories. 46 respondents complained about the general unavailability of access. 23 respondents attributed their lack of access to their financial situation. 25 complained about noise. It appears therefore that the main areas of concern are noise and finance. As expected in the case of students with disadvantaged background access to ICTs are mostly provided through the institution without which student becomes academically handicapped.

4.1.6 ICT Background and Academic Use (A18)

One of the critical assumptions that have been made in this study is that the students from University of Limpopo do not have computer experience when they start their education at the University. This question aims at verifying the accuracy of this statement. The respondents were asked when the first time was that they used a computer. Their responses are illustrated in Figure 4.17 and Table 4.19 below.

Figure 4. 17 – Time of students' first computer use



=

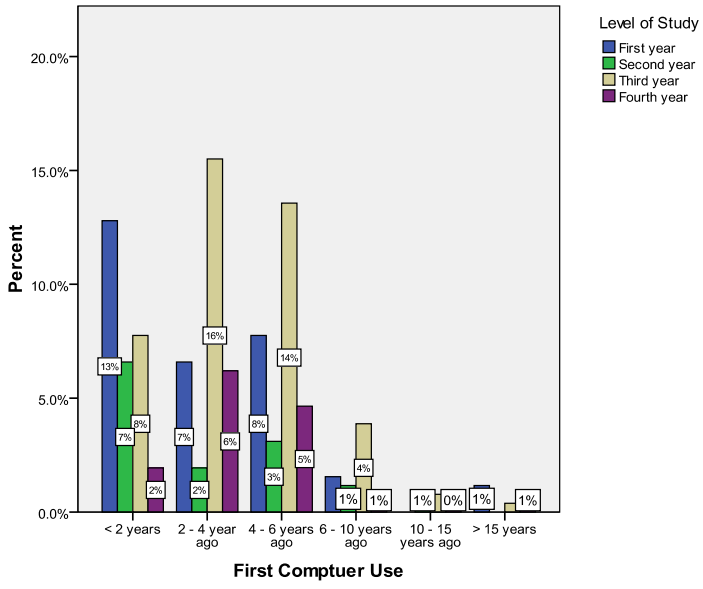
	#	%
< 2 years ago	74	28.9
2-4 years ago	78	30.5
4-6 years ago	74	28.9
6 -10 years ago	19	7.4
10 - 15 years ago	5	2.0
> 15 years ago	6	2.3
	256	100.0

Table 4.19 – Time of students' first computer use

Table 4.19, above, indicates that out of the 256 students who answered the question, 30 or 11.7% first began to use a computer more than 6 years previously.

In order to make these figures more meaningful, I compared the first reported use of computers among the respondents with the level of study in which they found themselves. The results are demonstrated in the following figures.

Figure 4. 1810 – Respondents' first reported computer use in conjunction with current study level in percentage.



It should be noted that there are 94 respondents with student numbers ranging from 2001 to 2004 indicating when they first started at the University. This means that although a student might have registered for a particular course and at a level of study, he or she is not necessarily taking the minimum years to complete it. This also means that majority of students starting their education in UL have not been exposed to computers, even though Figure 4.18, above, does indicate that this picture is changing and that the newer students are more experienced in computer use than their predecessors.

In order to confirm these findings, I used a chi square test which is used in comparing two categorical variables to determine the relationship between year of study and computer experience. Table 4.20 shows the corresponding n values. The p value is 0.001. This implies that computer experience is positively related to number of years of study on campus. In order to have a valid test I had to combine the number of cases with more than 6 years of experience.

			Level of Study				Total
			First year	Second year	Third year	Fourth year	
First Computer Experience	< 2 years	Count	33	17	20	5	75
		% within Level of Study	42.9%	48.6%	18.5%	13.2%	29.1%
	2 - 4 year ago	Count	17	5	40	16	78
		% within Level of Study	22.1%	14.3%	37.0%	42.1%	30.2%
	4 - 6 years ago	Count	20	8	35	12	75
		% within Level of Study	26.0%	22.9%	32.4%	31.6%	29.1%
	> 6 years	Count	7	5	13	5	30
		% within Level of Study	9.1%	14.3%	12.0%	13.2%	11.6%
Total		Count	77	35	108	38	258
		% within Level of Study	100.0%	100.0%	100.0%	100.0%	100.0%

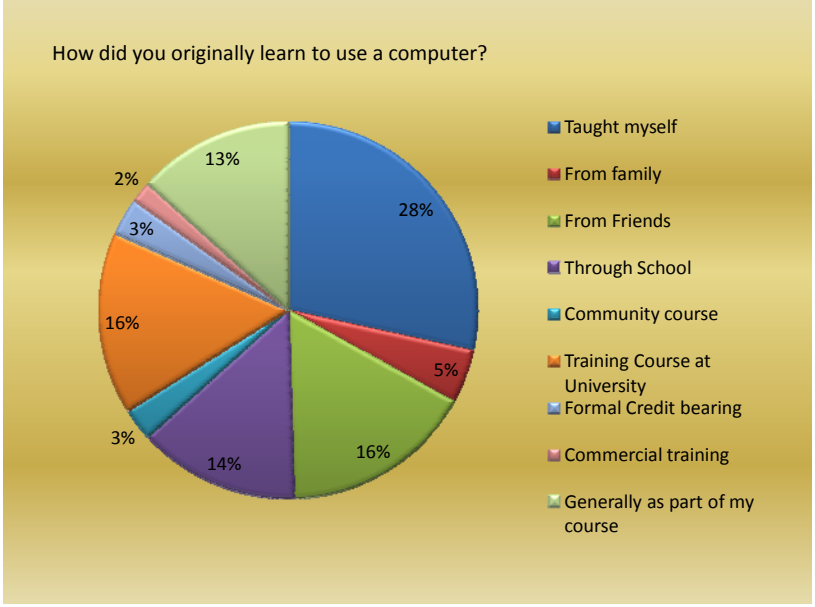
Table 4.20- Computer experience vs. year of study

Table 4.20, above, confirms the notion that most students who come to UL have not used a computer prior to their study at the University. 42.9% of the first year students and 48.6% of the second year students have stated their computer use is less than 2 years. However, 51.1% of the first year respondents have indicated that they have used computers for more than 2 years. This appears to contradict the understanding that students do not have exposure to ICTs prior to their study at the University. An examination of the student number for these students clears the puzzle. From the 77 first year respondents only 47 have a student number that starts with 2008. This means that even though a respondent might be in their first year of study, they actually started more than a year earlier. A total of 30 students were in this category. For the third and forth year study level the issue is easier to verify since close to 70% of the participants have indicated that they have between 2 – 6 years ICT experience.

4.1.7 Source of the First Computer Training (A19)

The questionnaire included a question to determine the source of students' first source of computer training. Figure 4.19 below, graphically depicts their responses, and Table 4.21 displays the same information in tabular form.

Figure 4. 19 - Source of students' first computer training



	#	%
I taught myself	62	28.4
My family	10	4.6
My Friends	36	16.5
My School	30	13.8
In a community course	6	2.8
In a training course at university	34	15.6
As part of a formal credit	7	3.2
From my commercial training	4	1.8
Generally as part of my present course	29	13.3
	218	100.0

Table 4.21 – The source for student's first computer training

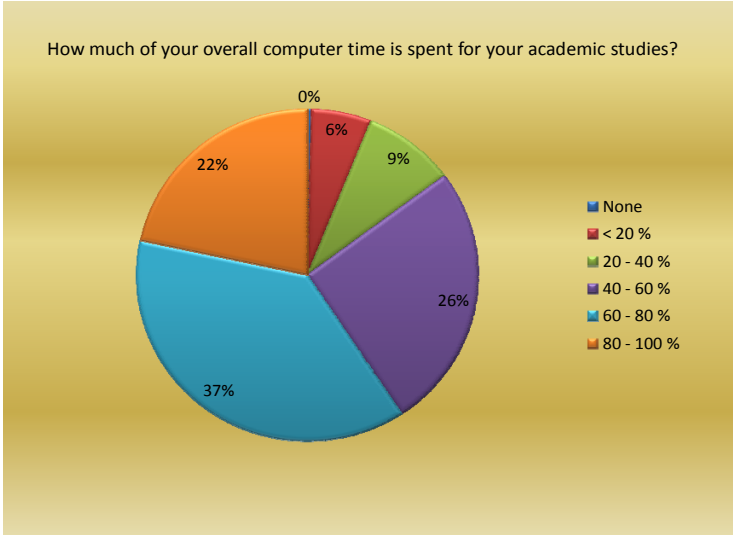
Table 4.21, above, shows that 62 of the 218 respondents or 28.4% were self-taught. 34 respondents or 15.6 % reported that they had acquired their computer skills in formal computer training courses at university. These respondents, together with those who acquired their skills as part of their course (the last category in the above table) constitute 28.9% of respondents who have been assisted by the university. Apart from the 28.4% who taught themselves, 14.4% learned their computer skills from their friends.

When examining the results from this and the last section (4.1.6), a number of conclusions can be made. Firstly, while the overwhelming majority of the participants did not use computers when they joined the university, at the time of the survey they all reported using them. Second, the University is responsible for 32.1% of this familiarization and, of the remaining, the highest percentage being the self-taught category, was made possible without any assistance from the University.

4.1.8 Extent of ICT Use for Academic Purpose (A22)

In response to the question, “How much of your overall computer use is spent for academic purposes?”, students responded in the ways depicted in Figure 4.20 and Table 4.22 below.

Figure 4. 20 – Percentage of time that computer is used for academic purposes



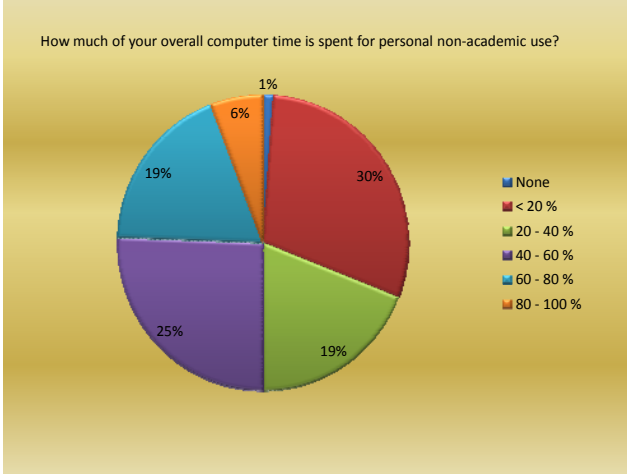
	#	%
None	1	0.4
< 20 %	15	5.7
20 - 40 %	23	8.7
40 - 60 %	68	25.9
60 - 80 %	99	37.6
80 - 100 %	57	21.7
	263	100.0

Table 4.22 – Percentage of time that computer is used for academic purposes

Table 4.20 , above, shows that only one respondent reported no time on the computer for academic purposes. 15 respondents or 5.7% reported that they used less than 20% of their time on the computer for academic purposes. The balance of the students (which constitutes 93.9% of the respondents) reported

that they used more than 20% of their time on the computer for academic purposes, with more than 20% of the respondents reporting that they used 60-80% of their time on the computer for academic purposes. The amount of computer time used for personal non-academic purposes is illustrated in Figure 4.21 below and in Table 4.23.

Figure 4. 21 – The amount of computer time used for non-academic purposes.



	#	%
None	3	1.2
< 20 %	77	29.8
20 - 40 %	49	19.0
40 - 60 %	66	25.6
60 - 80 %	48	18.6
80 - 100 %	15	5.8
	258	100.0

Table 4.23 – Computer time used for non-academic purposes (percentages)

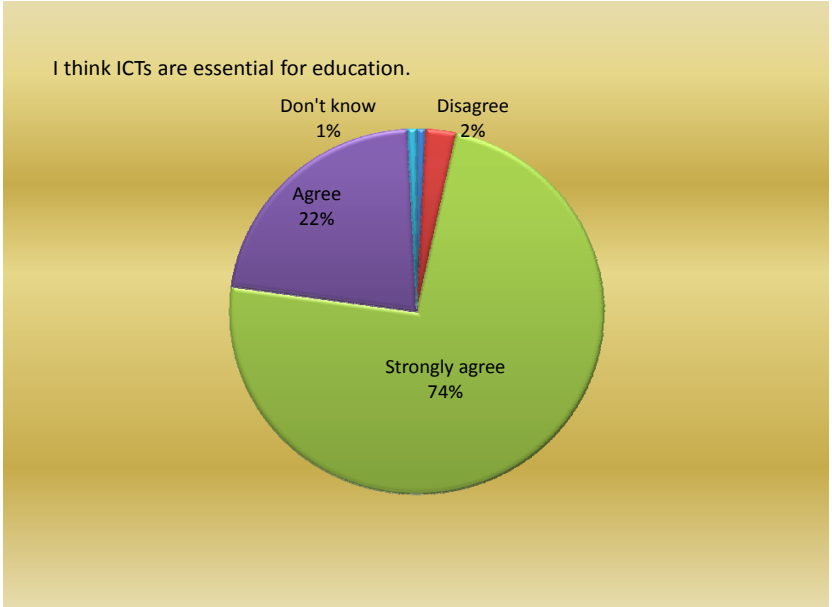
A comparison of Tables 4.22 and 4.23, above, shows a generally heavier usage towards academic use as compared to personal. It shows an almost a symmetrical usage with higher percentage of academic usage when personal usage is lower.

Based on the data presented above, a clear picture is emerging in terms of computer use and dependency for both academic and non-academic purposes. Those who responded to the survey are highly dependent to ICTs and use them heavily.

4.1.9 Attitude Towards ICTs

In this section, I aim to find what students think of ICTs. Figure 4.22 below graphically depicts the students' responses to the statement, "I think ICTs are essential for education".

Figure 4. 22 – Student's perception of the importance of ICTs for education.



As can be seen from Table 4.24, out of the 263 respondents who responded to this question, a total of 9 students or 3.5% either strongly disagreed or disagreed with the statement. Taking the 2 respondents who said they do not know, the remaining 252 or 95.7% of the respondents either agreed or strongly agreed with the statement.

"I think ICTs are essential for education."	#	%
Strongly disagree	2	0.8
Disagree	7	2.7
Strongly agree	194	73.8
Agree	58	22.1
Don't know	2	0.8
	263	100.0

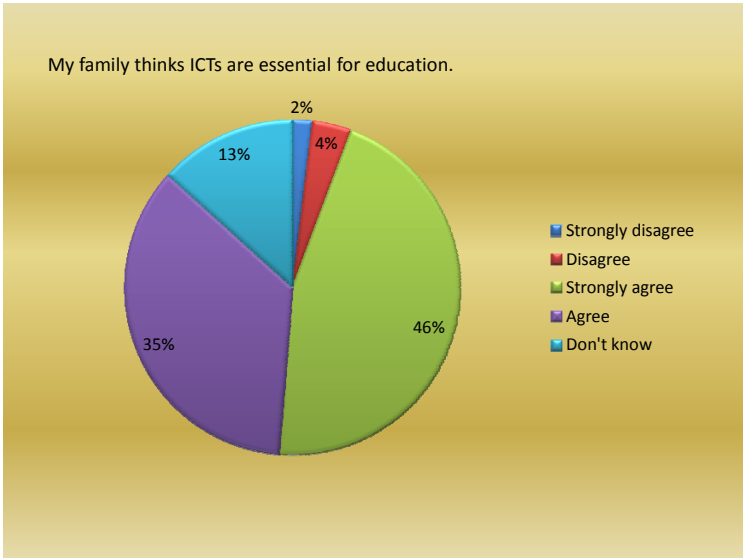
Table 4.24 - Student's perception of the importance of ICTs for education

These responses indicate a tremendous receptivity on the part of students to the role of ICT in education.

4.1.10 Respondents Views of their Family's Attitude Towards ICTs (A26)

In this section, I aim to find respondents' view of their family's attitude towards ICTs for education. Figure 4.23 and Table 4.23 below illustrate the question and their responses.

Figure 4. 23 11 – The attitudes of students' families toward the importance of ICT in education, as reported by respondents.



	#	%
Strongly disagree	5	1.9
Disagree	10	3.8
Strongly agree	120	45.6
Agree	93	35.4
Don't know	35	13.3
	263	100.0

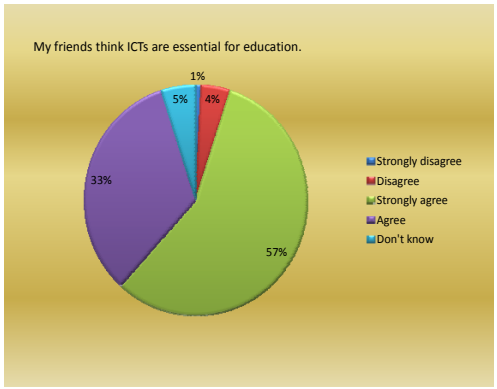
Table 4.25 – The attitudes of students' families toward the importance of ICT in education as reported by respondents

Table 4.25, above, shows a strong family support for ICT usage in education. A total of 81.0% of the respondents (or 213 of the 263 respondents), reported that their family "Strongly Agree" or "Agree" with the idea of ICTs being essential for education.

4.1.11 Respondents' View of their Friends' Attitude Towards ICTs (A26)

In this section, I aim to find the attitude of students' friends towards ICTs as perceived by respondents. Figure 4.24 and Table 4.24 illustrate the statement and respondents' view of the attitudes of the students' friends towards the importance of ICT in education.

Figure 4.24 – The attitudes of the students' friends towards the importance of ICT in education as reported by respondents



	#	%
Strongly disagree	2	0.8
Disagree	11	4.2
Strongly agree	147	56.8
Agree	86	33.2
Don't know	13	5.0
	259	100.0

Table 4.26 – The attitudes of the students' friends towards the importance of ICT in education as reported by respondents

Although the responses were not identical in the last three sections, one can detect a similarity between students' attitude towards ICTs for education, their family's (parents') and their friends'. It is interesting to note that 233 or 90% of the participants felt their friends "Agree" or "Strongly agree" with the idea that ICTs are essential for education.

4.1.12 **Relationship with Employment (A26)**

When the respondents were asked whether ICT skills are required for future employment, they responded in the following way.

	#	%
Strongly disagree	0	0.0
Disagree	4	1.5
Strongly agree	190	72.8
Agree	62	23.8
Don't know	5	1.9
	261	100.0

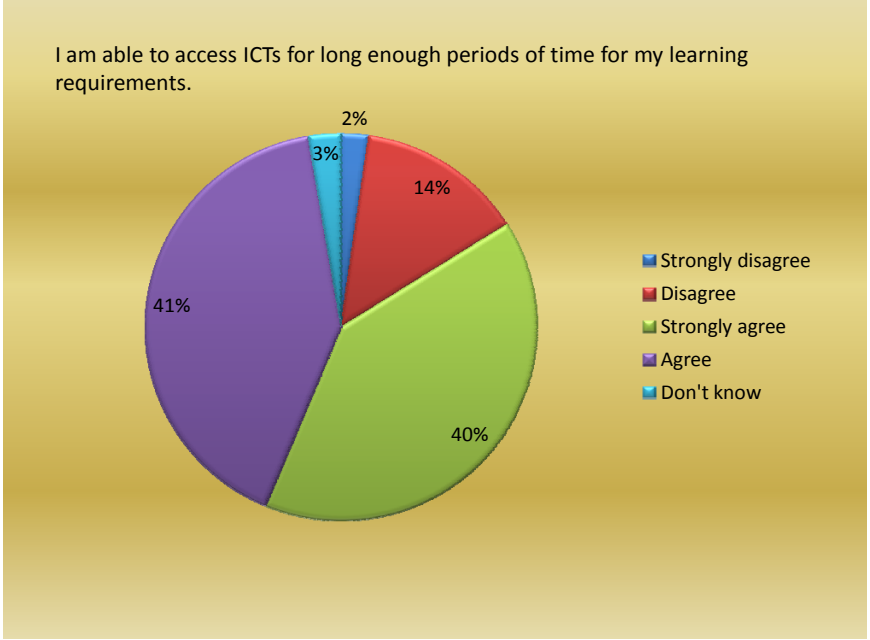
Table 4.26 – Student opinions about the importance of ICT skills for future employment

As can be seen from Table 4.27, 96.5 % of the participants agreed strongly or very strongly that ICT skills are important for future employment. Referring to ICTs, Saadé, and Molson (2003, p. 267) stated that 'perceived usefulness' was found to have a significant positive influence on intentions to use. An interesting observation can be made here. The high level of perceived usefulness, as confirmed also by the literature, could be responsible for high ICT use. The fact that the population in question comes from homogenous cultural background reaffirms this phenomenon which has resulted in such a similar response to these questions.

4.1.13 Access to ICTs for Teaching and Learning (A26)

In response to the statement, "I am able to access ICTs for long enough periods of time for my learning requirements", the students provided the following responses in Figure 4.25 and Table 4.28.

Figure 4. 25 12 – Student opinions about being able to access ICTs for long enough periods for their learning requirements



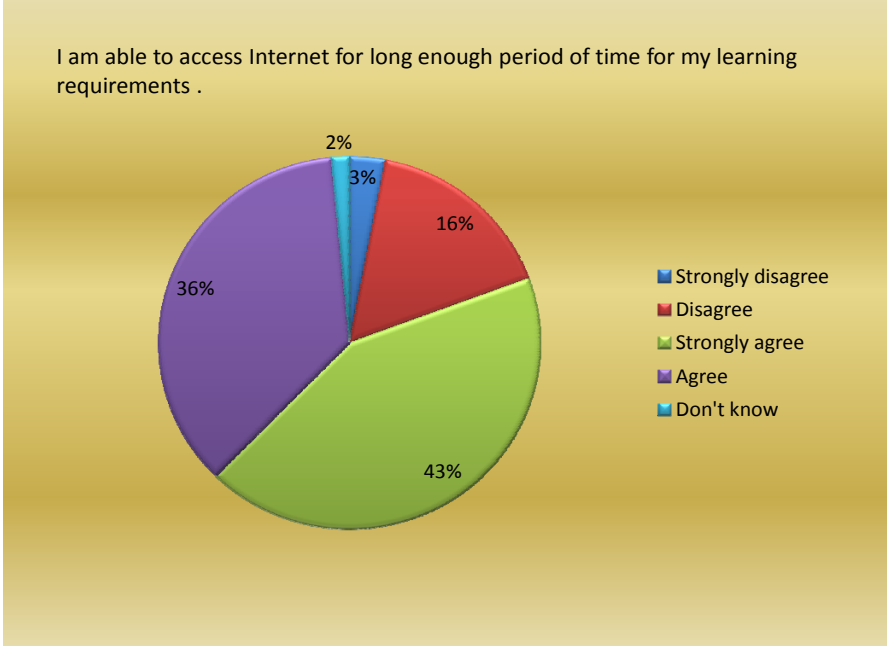
			6.0
		#	%
	Strongly disagree	6	2.3
	Disagree	36	13.8
	Strongly agree	105	40.2
	Agree	107	41.0
	Don't know	7	2.7
		261	100.0

Table 4.28 – Student opinions about being able to access ICT for long enough periods for their learning requirements

212 participants or 81.2% either agree or very strongly agree with the statement that they are able to access ICTs for long enough periods for their learning requirements.

The students' responses to a similar question about the availability of the Internet produced the following results as shown in Figure 4.26 and Table 4.29.

Figure 4. 26 – Students opinions about whether they are able to access the Internet for long enough periods for their learning purposes



			6.0
		#	%
	Strongly disagree	8	3.0
	Disagree	43	16.3
	Strongly agree	113	43.0
	Agree	95	36.1
	Don't know	4	1.5
		263	100.0

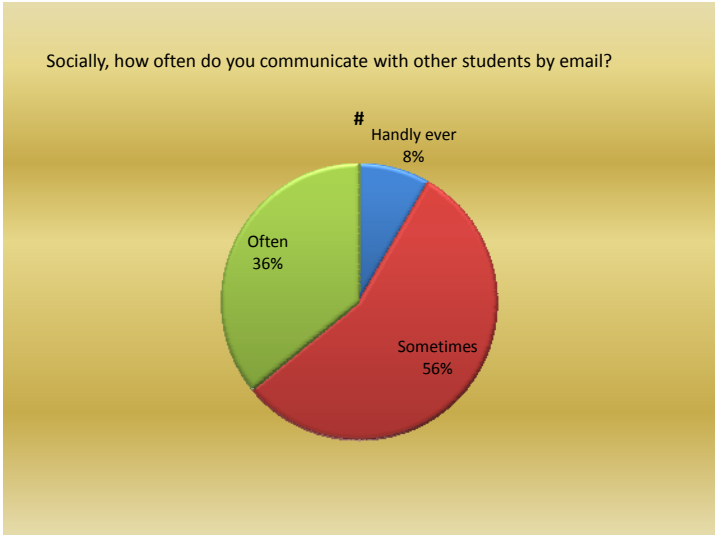
Table 4.29 – Students opinions about whether they are able to access the Internet for long enough periods for their learning purposes

79.9% of the respondents agreed or strongly agreed with the statement that they were able to access the Internet for long enough periods for their learning purposes. This clearly indicates the adequacy of access to ICTs on campus at least for close to 80% of those who responded to this question.

4.1.14 Students Social Use of ICTs (B1)

When students were asked how often they communicated with other students by email socially, they produced the following responses in Figure 4.27 and Table 4.30.

Figure 4. 27 – Frequency of student communication with fellow students by email



			6.0
		#	%
	Hardly ever	22	8.4
	Sometimes	146	55.7
	Often	94	35.9
		262	100.0

Table 4.30 – Frequency of student communication with fellow students by email

Only 8.6% of the respondents "*hardly ever*" use email to communicate with their fellow students. The remaining 91.6% of the respondents use e-mails to communicate with their friends either "*sometimes*" or "*often*".

When students were asked about the frequency of their use of email discussion lists, they responded as is reflected in Figure 4.28 and Table 4.31, below.

Figure 4. 28 – Frequency of participation in an email discussion socially

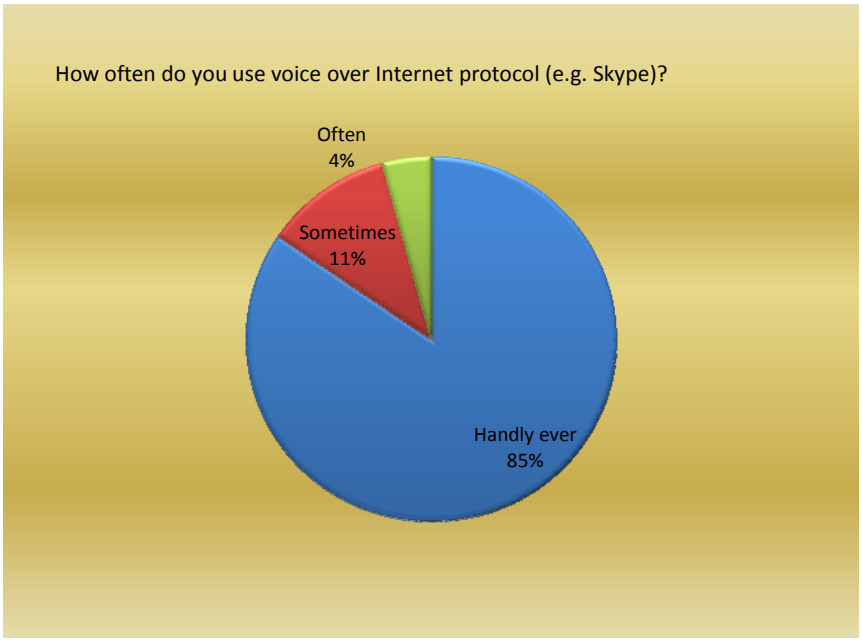
			6.0
		#	%
	Hardly ever	84	32.1
	Sometimes	125	47.7
	Often	53	20.2
		262	100.0

Table 4.31 – Frequency of participation in an email discussion socially

32.1% of the participants reported that they "*hardly ever*" engaged in list discussions by means of e-mails. 47.7% reported that they "*sometimes*" became involved in such discussions, while 20.2% reported that they "*often"* engaged in list discussions by means of e-mails.

When the respondents were asked how they used voice-over IP protocols such as Skype, their responses were as reflected in Figure 4.29 and Table 4.32, below.

Figure 4. 29– The frequency with which students use voice-over IP protocols such as Skype



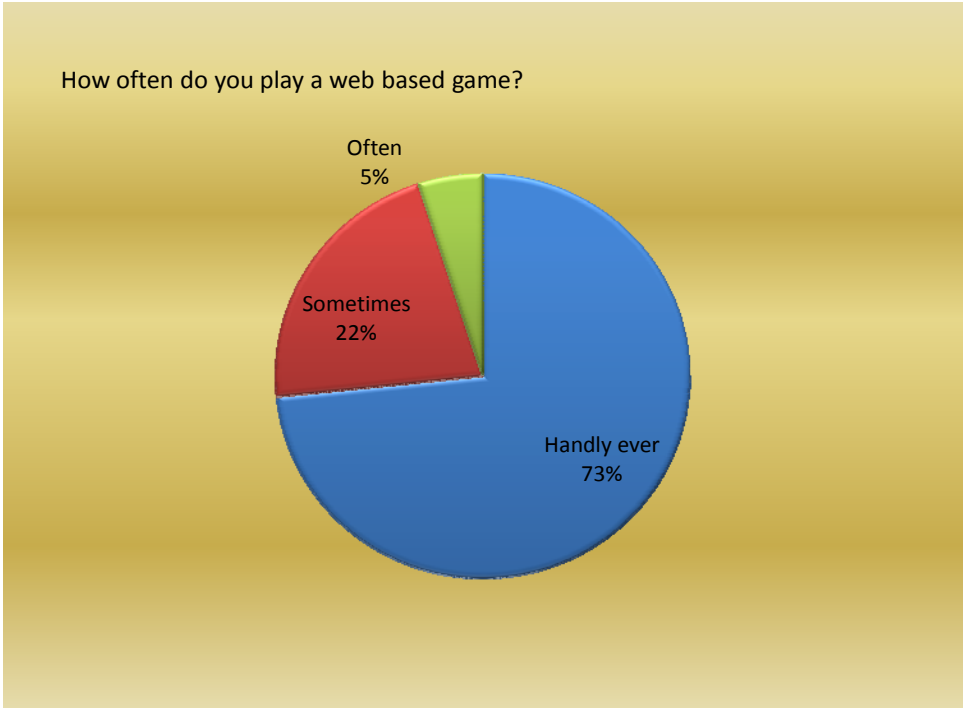
			6.0
		#	%
	Hardly ever	219	84.6
	Sometimes	29	11.2
	Often	11	4.2
		259	100.0

Table 4.32 – The frequency with which students use voice-over IP protocols such as Skype

Figure 4.29 and Table 4.32, above, show that only very few students (4.2% of the total number of respondents) makes use of this facility on regular basis. 84.6% of the respondents use Skype *hardly ever* and 11.2% use it *sometimes*.

Responses to a question about the frequency of students use of computer games, produced the following responses in Figure 4.30 and Table 4.33, below.

Figure 4. 30 – Frequency of student use of computer games



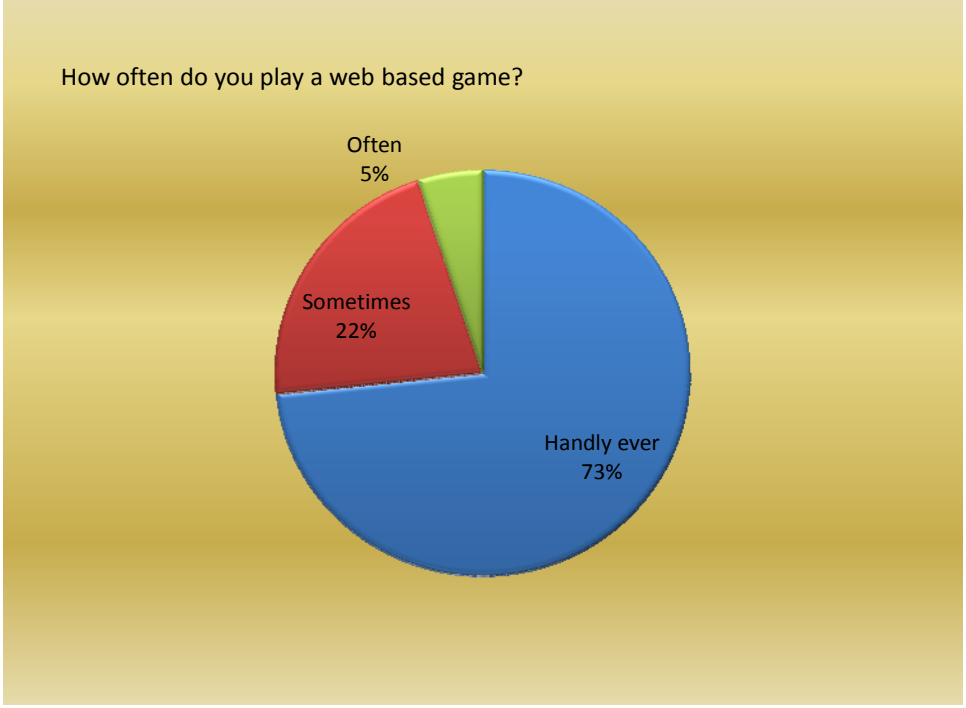
			6.0
		#	%
	Hardly ever	164	63.6
	Sometimes	78	30.2
	Often	16	6.2
		258	100.0

Table 4. 33 – Frequency of student use of computer games

Figure 4.30 and Table 4.33 show that only 6.2% of the total number of respondents play a computer game *often*.

When students were asked about how frequently they played computer games over the Internet, they reported an even lower frequency.

Figure 4. 31 – The frequency of student use of the Internet to play computer games



			6.0
		#	%
	Hardly ever	190	73.4
	Sometimes	56	21.6
	Often	13	5.0
		259	100.0

Table 4.34 – The frequency of student use of the Internet to play computer games

While the number of students who often use the Internet to play computer games is 5.0%, (Figure 4.31 and Table 4.34) the number of students who use the Internet to play computer games *sometimes* is 21.6% – approximately 20% less than those who merely use the computer alone (without the Internet) to play computer games.

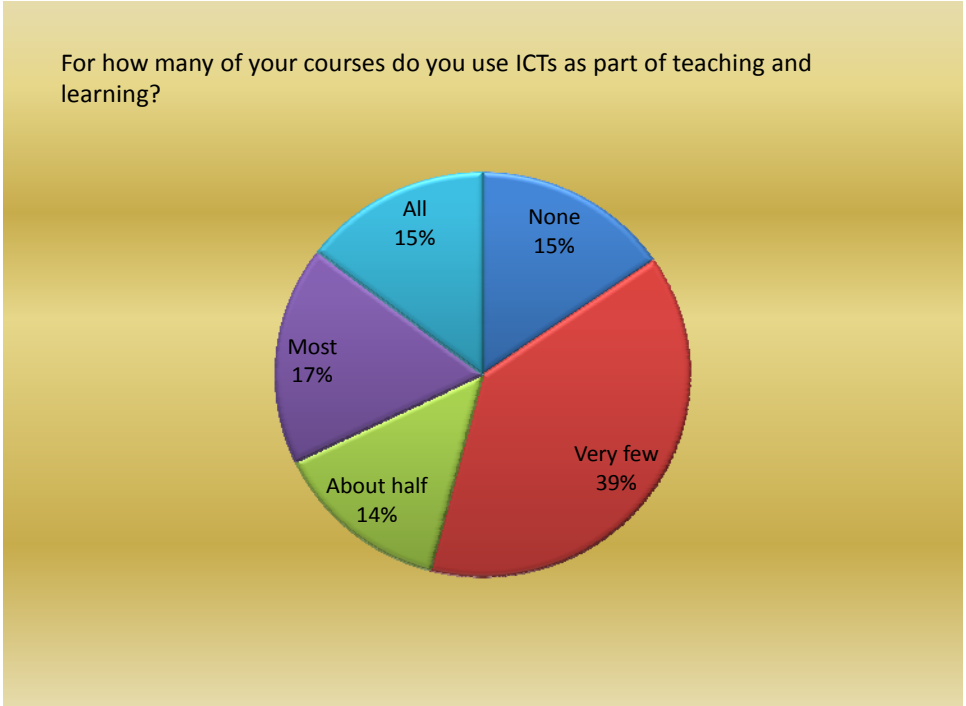
These results indicate an interesting phenomenon. The use of ICTs is predominately limited to the academic use and as yet does not play a dominant role in their social interactions. This is true even in the case of email which could have been in higher use considering the high level of ICT use. It is even less pronounced in discussion groups, the use of skype and computer games.

4.1.15 ICT Use as Encouraged by the Academic Community (B2)

> *Contemporary classrooms and lecture halls are being equipped with information and communication technology (ICT) and new media to support teaching and learning.*
>
> (Vallance and Towndro, 2007, p. 219)

In response to the question “For how many of your courses do you use ICTs as part of teaching and learning?”, the following responses were recorded in Figure 4.32 and Table 4.35.

Figure 4. 132 – The number of courses in which lecturers encourage the use of ICTs



		6.0
	#	%
None	38	15.4
Very few	95	38.6
About half	34	13.8
Most	43	17.5
All	36	14.6
	246	100.0

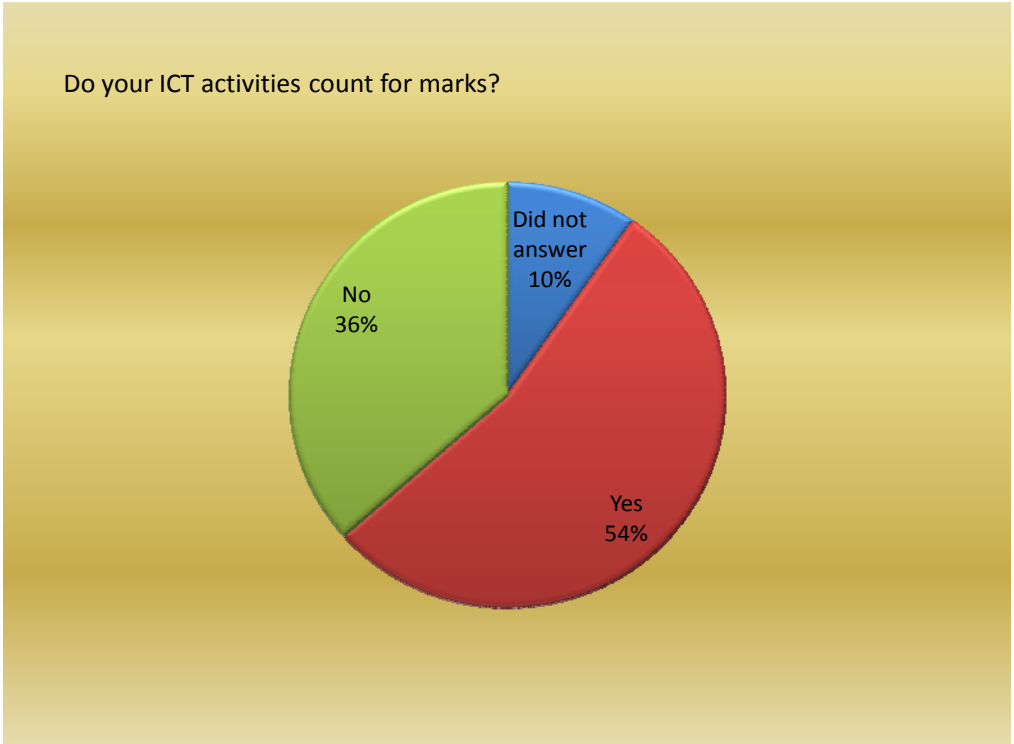
Table 4.35 – The number of courses in which lecturers encourage the use of ICTs

15.4% reported that they did not use any ICTs in their academic courses (and were thus not encouraged by lecturers to use ICTs as part of their courses),

while 38.6% reported that they used ICT in *very few* courses. 43 respondents (or 17.5%) reported that they used ICT in *most* of their courses. Alternatively, 45.9% (the sum of the last three categories in the Table 4.35) of the respondents are using ICTs as part of the teaching and learning experience. When one compares the data from this table with the responses in section 4.1.9, Table 4.24, which demonstrated that 95.9% of the student respondents either agreed or strongly agreed about the importance of ICT in education, it becomes evident that there is an enormous students' receptivity and potential for growth in the use of ICTs in academic courses – and that the students themselves would overwhelmingly welcome such an increase in usage.

In response to a question that asked whether ICT activities were awarded marks by lecturers, the students provided the following responses captured in Figure 4.33 and Table 4.36.

Figure 4. 143 – The extent to which ICT activities are awarded marks by lecturers



			6.0
		#	%
	Did not answer	26	9.8
	Yes	143	53.8
	No	97	36.5
		266	100.0

Table 4.36 – The extent to which ICT activities are awarded marks by lecturers

The majority of the respondents (53.8%) said that lecturers did indeed award marks for ICT activities.

To explore the extent of ICT integration with the academic programmes, a series of questions were presented to the students. They examined the use of presentation tools such a Power Point, office applications such as MS Excel and application programmes such as GIS. The response is captured in Table 4.37.

How often do your lecturers explain or demonstrate concept using:

Presentation tools (Power Point)			**Excel**			**GIS**		
	#	%		#	%		#	%
Hardly ever	61	23.6	Hardly ever	84	33.2	Hardly ever	140	55.6
Sometimes	98	38	Sometimes	99	39.1	Sometimes	65	25.8
Often	99	38.4	Often	70	27.7	Often	47	18.7
	258	100		253	100		252	100

Table 4.37 – ICT tools used by the academics

Table 4.37 demonstrate the use of ICT tools as perceived by the respondents. A general comment that can be made is that they are not used very often. In the case of Power Point one expects that the usage to be higher that 38.4%. There does not seem to be an alignment between the situation in UL and the views expressed by Vallance and Towndro (2007, p. 219) who say PowerPoint, the widely-used slide-show software package, is finding increasing currency in lecture halls and classrooms as the preferred method of communicating and

presenting information. Also it does not take advantage of what Adams (2006, p. 408) referred to as an excellent instrument of lecture presentation, allowing teachers to gather and organize an astonishing array of digitized materials for that purpose into a single file.

With each tool, respondents were asked to state the level of its helpfulness. Table 4.38 summarises the responses.

Presentation tools (Power Point)			**Excel**			**GIS**		
	#	%		#	%		#	%
Makes it harder	9	3.6	Makes it harder	9	3.7	Makes it harder	20	8.1
No help	12	4.7	No help	24	9.8	No help	34	13.8
Some help	53	20.9	Some help	57	23.3	Some help	54	21.9
Very helpful	157	62.1	Very helpful	121	49.4	Very helpful	75	30.4
N/A	22	8.7	N/A	34	13.9	N/A	64	25.9
	253	100		245	100		247	100

Table 4.38 – ICT tools degree of helpfulness

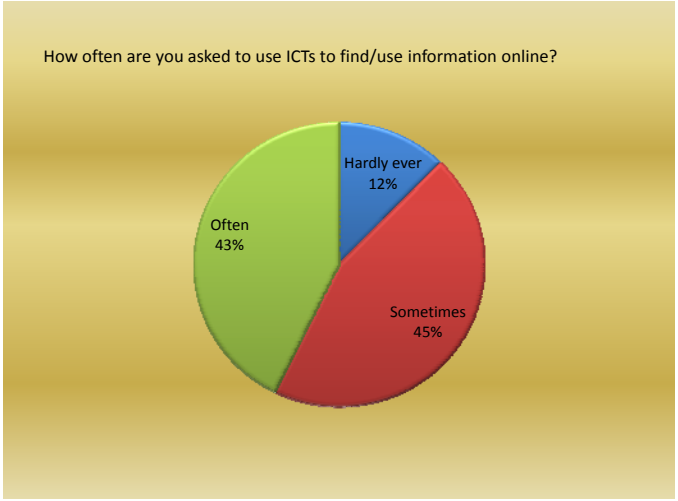
It can be seen from Table 4.38 that respondents have a positive overall response to these tools. If a tool is used by the lecturer it has a positive response from the students in the majority of the cases. In the case of Power Point where the highest number of responses is recorded, 83% of those who responded to this question found it helpful or very helpful. Once again these results demonstrate the potential and receptivity for higher level of ICT use. The feeling expressed here by respondents find justification in the literature where Admas (2004, p. 289) points out that survey data suggest students find PowerPoint a useful cognitive tool.

4.1.16 Expectations for Students' ICT use at University (B5)

In response to the question of "How often do you use ICTs to find general course information online?", the following responses are summarized in Figure 4.34 and Table 4.39 were collected.

45% or 117 of the respondents reported they "*sometimes*" used ICTs to find course information online. 42.7% or 111 respondents reported that they "*often*" used ICT to find course information online. The remaining 12.3% (32 respondents) reported they "*hardly ever* " used ICTs to find course information online.

Figure 4. 154 – Frequency of searching for online course material

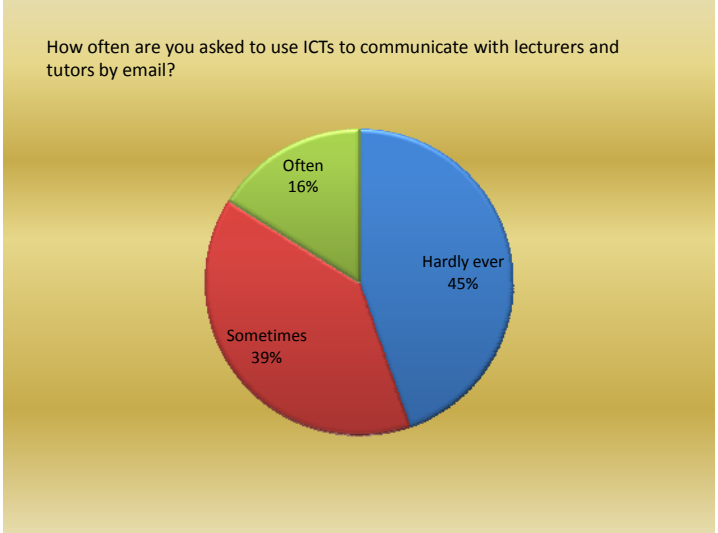


			6.0
		#	%
	Hardly ever	32	12.3
	Sometimes	117	45.0
	Often	111	42.7
		260	100.0

Table 4.39 - Frequency of searching for online course material

In response to the question, "How often are you asked to use ICTs to communicate with lecturers and tutors by email?", the following responses were noted.

Figure 4.35 – Frequency with which students engage in email interactions with their lectures and tutors



		6.0
	#	%
Hardly ever	114	44.7
Sometimes	100	39.2
Often	41	16.1
	255	100.0

Table 4.40- Frequency with which students engage in email interactions with their lectures and tutors ‘

16.1% reported that they “*often”* use email communications to correspond with their lecturers and tutors, while 39.2% use e-mail “*sometimes*” for the same purpose. 44.7% reported that they “*hardly ever*” used e-mail to communicate with their lecturers and tutors.

4.1.17 Students’ Perception of the Educational Benefits of ICTs (B16)

A number of questions in the questionnaire assessed students’ opinion regarding the usefulness of the role of ICTs in relation to their abilities to study. Students,

for example, were asked if they thought ICTs helped them with their learning by improving their ability to recall facts, basic concepts and answers or understand concepts or analyse information.

Table 4.41 contains the questions and their responses. It can be seen that in all cases there is more than 69.1% positive response where respondents think that ICTs can help them to improve their abilities.

Do you think ICTs help you with your learning by improving your ability to:						
	Recall facts, basic facts and answers		Understand Concepts		Analyse Information	
	#	%	#	%	#	%
Yes	177	69.1	201	79.4	193	76
Sometimes	63	24.6	41	16.2	45	17.7
No	9	3.5	7	2.8	9	3.5
Don't know	7	2.7	4	1.6	7	2.8
	256	100	253	100	254	100

Table 4.41 – Students' opinion on the helpfulness of ICTs for improving their study capabilities

In the case of ICTs helping to understand concepts, one sees the highest support from the respondents (79.4%).

These results confirm yet again a positive and almost total support for ICTs.

Summary of the Findings - ICT Use and Dependency

In this section, I summarize the findings which focused on students' use of ICTs and their extent of dependency on ICTs for achieving their academic goals.

4.1.17.1 Dependency on ICTs

The analysis of the results painted an interesting picture. On one hand, the overwhelming majority of the respondents had not used a computer prior to their

studies at the University. On the other hand, 91.9% reported they use a computer on campus for more than 20% of their time (section 4.1.4.1, Table 4.5). The fact that the University was responsible for only 32.1% of this familiarization (section 4.1.7, Table 4.21) and that of those remaining, 28.4% were self-taught is an indication of the respondents' level of interest and dependency on ICTs.

In addition, the findings reported in the following sections are indicative of a high level of dependency and receptivity towards ICTs:

- Section 4.1.4.2 (Internet use on campus) where it was shown that with one exception everyone uses the Internet.
- Section 4.1.4.5 where it was shown that most of the ICT use is self-initiated.
- Section 4.1.5, Tables 4.17 and 4.18 where inadequate off-campus access was shown to be a clear problem for the respondents.
- Section 4.16, where the extent of ICT use for academic purposes was measured and it was concluded that there was a high degree of dependency (Tables 4.22 and 4.23).
- Sections 4.1.9, 4.1.10 and 4.1.11 where attitude towards ICT was examined (Tables 4.24, 4.25, 4.26) indicating a high level of support from respondents and even from family and friends as reported by the respondents.
- Off-campus access to the Internet was shown to be more limited. Only 44.7% of respondents reported they enjoyed such access (Table 4.14). More significantly only 16.0% (section 4.1.5.1, Table 4.17) reported to have *easy* or *very easy* access to ICTs Off-campus. 78.5% of those with Internet access use their cellular phones for access to the Internet (Table 4.15). This shows the extreme urgency that students must feel towards

having Internet access since this cost is undertaken by students directly who come from financially challenged backgrounds.

- 85.2% of the respondents used more than 40% of their computer time for academic purposes (Table 4.22).
- 95.9% of the respondents (Table 4.24) agreed or strongly agreed that computers are essential for education.
- Section 5.1.15 demonstrated that the level of ICT use, e.g. tools such as Power point and Excel, by the academic community was not very high. However, Table 4.38 shows that a high percentage of respondents find them useful when they are used.
- Section 4.1.17, Table 4.41 showed how respondents think highly of ICTs as a tool that can help them improve their abilities.
- Section 4.1.12 showed respondents' opinion regarding the importance of ICT skills for future employment as being very high.

Previous research expects consequences for such a high level of perceived usefulness. Saadé and Molson (2003) reported that 'perceived usefulness' was found to have a significant positive influence on intentions to use which is confirmed in this study i.e. the perceived level of usefulness and use are both high. However these findings are in contrast to a study done by Olivier (2006) that indicates learners (at high school level who are from deprived conditions) having low levels of motivation for learning. From Olivier's study, one expects that students from disadvantaged (he uses the term deprived) background not to be motivated. In this study one sees the opposite. Students do not show any sign of lack of motivation to embrace learning or technology.

It should be noted that an exception to the high level of utilization of ICTs is in the realm of social use. This study did not find ICTs to play a dominant role in the social life of the respondents (section 4.1.14).

The picture that emerges from these findings is very interesting. There seems to be a high level of support and receptivity towards ICT use. It provides the academic structures of the University with a tremendous opportunity and at the same time a challenge to translate this receptivity into academic excellence.

4.1.17.2 Importance of Infrastructure

81.9 % of the respondents reported that they found it “easy” or “very easy” to gain access to ICTs on the campus (Table 4.10).

The situation off-campus is the exact opposite. 41% of those who responded to this question reported that they enjoyed only limited access to computers off-campus (section 4.1.5). Most of the respondents (67.6%), however, found it “difficult” or “very difficult”, while 16% reported that they found it “easy” or “very easy” (section 4.1.5.1, Table 4.17). In addition, the fact that 81.2% of students either agreed or very strongly agreed with the statement that they have access to ICTs for a sufficiently long time when they need to have such access (section 4.1.13, Table 4.28), suggests a positive picture about the availability and adequacy of the infrastructure from the point of view of the respondents. It is, however, necessary to balance this positive picture with the comments collected from those students who were not satisfied. Students in this category complained about environmental issues such as insufficient number of computers and noise (section 4.1.4.4, Table 4.11).

4.1.17.3 The Features of ICTs that were of Most Interest to Students

> *“The use of technology is not about replacing learner process, but enhancement and extension of such”*
>
> (Singh, O'Donoghue and Worton, 2005, p. 22).

One sees a clear realization of the above statement in this study where ICTs are clearly seen as instrument for the acceleration of the learning process. There seemed to be a general interest among most of the respondents in the available ICT services. This is supported by the following evidence:

- Judging by the response captured earlier (section 4.1.4.1, Table 4.5) every respondent uses a computer. More significantly, 92% of the respondents use a computer more than 20% of the time for an academically related purpose. This shows that computers are a critical and indispensable component of the life of a student. Furthermore, this applies to all students irrespective of the faculty from which they come from (Figure 4.5 and Table 4.6).

- Internet (section 4.1.4.2) seems to follow a similar pattern in terms of its popularity with students with only one student reporting not using it. 91.1% of respondents use Internet for more than 20% of their academic time (Tables 4.7). Again, in terms of Internet use there is no difference between different faculties statistically (Figure 4.7 and Table 4.8).

- Next in terms of popularity is the email service. 91.6% of the respondents reported that they use the e-mail either “sometimes” or “often” (Table 4.30) while 67.9% of respondents reported that they used it “sometimes” or “often” in discussions with one another (Table 4.31).

    - The responses of the students indicated that other technologies such as Skype, applications such as GIS, electronic discussion groups and computer-based games were not yet being used by the respondents extensively (Table 4.32, 4.33, 4.34).

4.1.17.4 Are Any Institutional Changes Necessary?

Integration of ICTs in the functions of any organization is a complex process that needs to be fully conceptualized and defined from the

> *beginning. However, this is not the case in many higher learning institutions in developing countries as most of them have embraced the ICT integration process without clear plans to guide the way. The institution ICT policy and strategic plan should be defined to provide a framework for the development and implementation of specific ICT projects* (Sife, Lwoga and Sanga, 2007, p. 6).

This section describes those areas in which the findings suggest that certain institutional changes are necessary.

- Although 40% of the computer laboratories are owned by faculties (section 4.1.4.3), only 15.8% of the respondents reported that they used the computers administered by the faculties (Table 4.9). By contrast, 79.6% indicated that they used the computer laboratories that were administered by the University's central administration. This indicates that faculty-administered computer laboratories are possibly underutilized and could therefore provide a solution to the problem of inadequate computers access mentioned under section 4.1.4.4, Table 4.11.

- Despite the high level of access (Table 4.10) and interest in computers, only 31.1% (Table 4.21) of the respondents reported that they had their ICT training from the university. This suggests that the current ICT training programmes made available by the formal academic structures of the university have room for improvements.

- In terms of ICT use in teaching and learning, 38.8% of the respondents reported “very few” of their courses (Table 4.35) used some form of ICTs. This seems to suggest that the university has not adopted an overall strategy to utilize ICTs’ potential in the realization of its teaching and learning objectives. On the other hand the intense interest in ICTs as demonstrated by the respondents suggests that with very little effort on the part of the institution, major progress could be made to turn the situation around.

> Referring to disadvantaged students Punie, Zinnbauer and Cabrera (2006, p. 16) stated that there is some evidence that ICT can give greater opportunities for accessing learning to those who need it the most.

The picture that emerges is that UL can go a long way towards embracing ICTs for teaching and learning to arrive at its fullest potential. These words from Selwyn **(**2007, p.82) provides a befitting conclusion for this section.

> *"Despite huge efforts to position information and communication technology (ICT) as a central tenet of university teaching and learning, the fact remains that many university students and faculty make only limited formal academic use of computer technology".*

4.2 ICT Use and Academic Performance

4.2.1 Introduction

In section 4.1, I documented the extent of ICT use and dependency as reflected in the students' responses. The purpose of section 4.2 is to establish whether there is a relationship between ICT use and academic performance. It should be noted that in this study academic performance is measured according to academic results. For the purpose of this exercise, I calculated the average result for each student for every year since 2006, if available. These results were then combined to produce one average mark for each student.

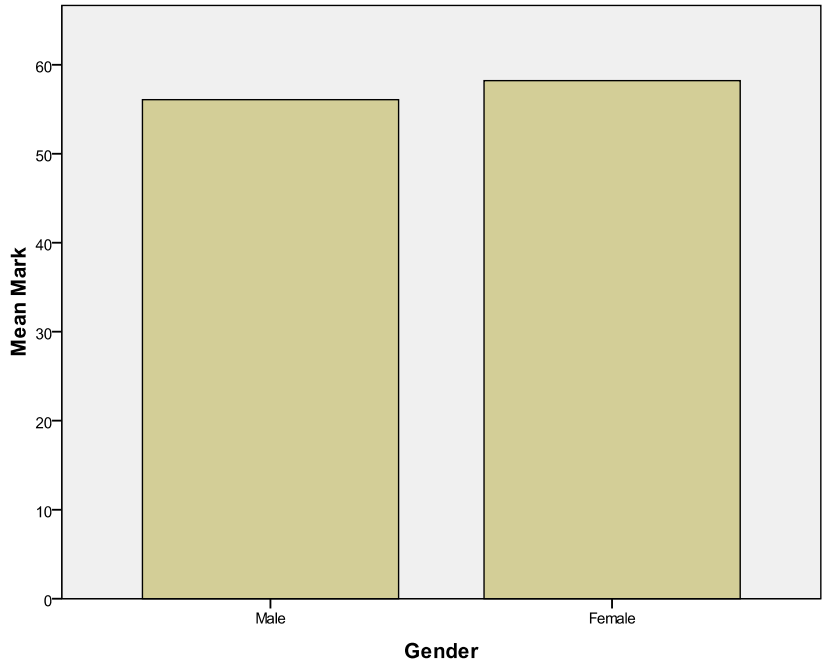
Prior to reaching any conclusion in terms of ICT influence on results, I needed to establish whether the differences in grades might be attributed to various factors such as gender, faculty or cultural background. The following section aims at addressing these possibilities.

4.2.2 Gender and Faculty based Influences

The purpose of this section is to establish whether there is an influence on the students' results that could be attributed to other factors such as gender or the faculty where the respondents came from.

Figure 4.2.1 and table 4.2.1 illustrates the academic performance of all participants on the basis of gender. The average mark for female students is slightly higher (58.22, SD = 8.094) than that of their male counterparts (56.09, SD= 7.213). The Independent-Samples t test with confidence level of 95%, produces a p-value of 0.037 and for male and female students respectively. This implies that gender has a statistically significant influence on results.

Figure 4.2. 1 – Comparison of gender and student results (campus-based analysis)



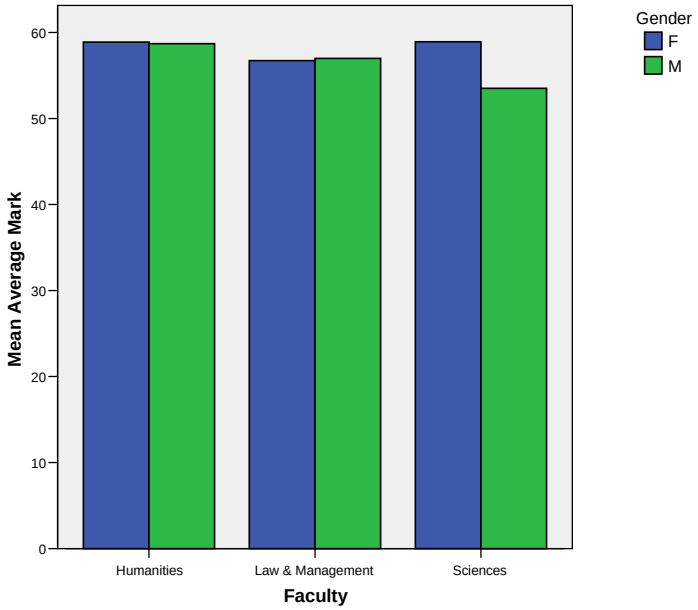
	Gender	N	Mean	Std. Deviation	Sig.(2-tailed)
Average Mark	Male	178	56.09	8.094	.037
	Female	88	58.22	7.213	

Table 4.2.1 shows gender based influences on average marks.

To further explore this analysis, I examined if this relationship also exists within each of the individual faculties.

T-tests at a 95% confidence level, within the three faculties revealed that a significant difference in the mean results of male and female students exists only in the Faculty of Sciences, with a p-value of 0.004 as shown in Figure 4.2.2 and Table 4.2.2. It therefore implies that the gender difference observed above and reflected in Table 4.2.1 occurs primarily in the faculty of Science.

Figure 4.2. 2 – Comparison of results within each faculty in terms of gender



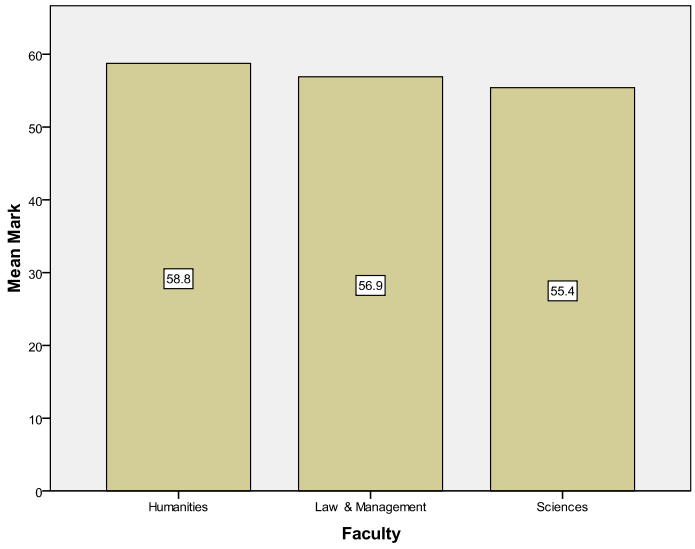
Faculty		Gender	N	Mean	Std. Deviation	Sig. (2-tailed)
Humanities	Average Mark	Male	44	58.70	7.065	.916
		Female	23	58.88	6.458	
Law & Management	Average Mark	Male	66	57.00	6.214	.852
		Female	28	56.73	6.587	
Sciences	Average Mark	Male	68	53.51	9.570	.004
		Female	37	58.93	8.073	

Table 4.2.2 – Shows in each of the faculties if gender has an influence on average marks.

Next, I explored if there is an inherent faculty based influence excluding gender.

The results are captured in Figure 4.2.3 and Table 4.2.3. An ANOVA gives a p-value of 0.024 indicating that the average marks in the three faculties are not all the same. The Bonferroni test indicates, a statistically significant difference exists in the mean scores between faculties of Science and Humanities with a p-value of 0.02 with Humanities scoring higher than Sciences.

Figure 4.2. 3 – Shows the faculty influence on results.



	N	Mean	Std. Deviation	Sig.
Humanities	67	58.76	6.814	.024
Law & Management	94	56.92	6.293	
Sciences	105	55.42	9.398	
Total	266	56.79	7.865	

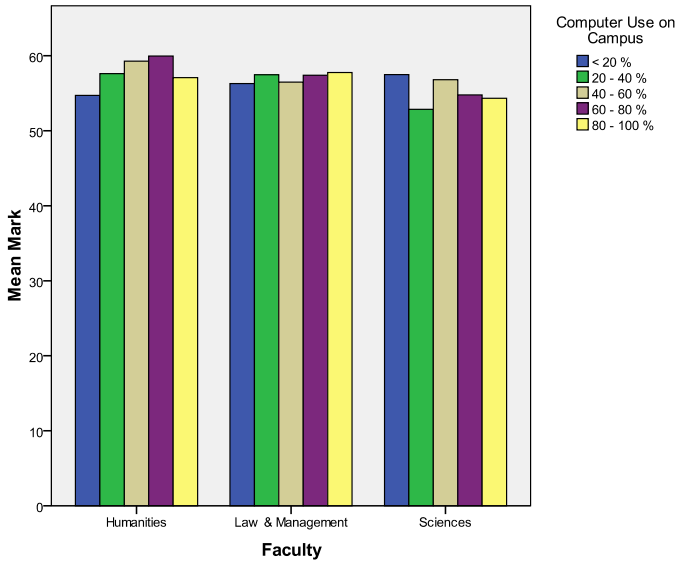
Table 4.2.3 – Shows faculty influences on results.

In summary, results are influenced by both gender and faculty. In the faculty of Sciences the gender difference is the sharpest, females scored higher than males with means of 58.9 and 53.5 respectively.

4.2.3 On-Campus Computer Use and Academic Performance (A2)

This section seeks to find whether there exists a relationship between on campus computer use and academic performance. Figure 4.2.4 and Table 4.2.4 contain the results from the responses.

Figure 4.2. 4 – Use of computers on-campus for academic purposes



Examining the findings using Figure 4.2.4, in the case of the faculty of Humanities, there appears to be a trend between computer use and academic performance for all levels except those in the 80% – 100 % category. In the faculty of Law and Management, with the exception of those in the 40% – 60% category, there seems also to be a trend, with a general improvement between the 56.30 % average and the 57.77%, as the usage increases from <20% to the heaviest usage. In the faculty of Sciences, there is no relationship between computer use and academic results.

Faculty		N	Mean	Std. Deviation	Sig.
Humanities	< 20 %	3	54.72	9.784	.647
	20 - 40 %	15	57.63	4.365	
	40 - 60 %	22	59.29	8.485	
	60 - 80 %	20	59.96	5.655	
	80 - 100 %	6	57.09	8.422	
	Total	66	58.71	6.853	
Law & Management	< 20 %	11	56.30	5.689	.960
	20 - 40 %	10	57.48	7.007	
	40 - 60 %	32	56.49	6.982	
	60 - 80 %	30	57.40	6.508	
	80 - 100 %	9	57.77	3.702	
	Total	92	57.00	6.325	
Sciences	< 20 %	7	57.50	5.175	.580
	20 - 40 %	20	52.86	9.887	
	40 - 60 %	38	56.81	10.355	
	60 - 80 %	24	54.79	7.779	
	80 - 100 %	14	54.34	10.505	
	Total	103	55.28	9.430	

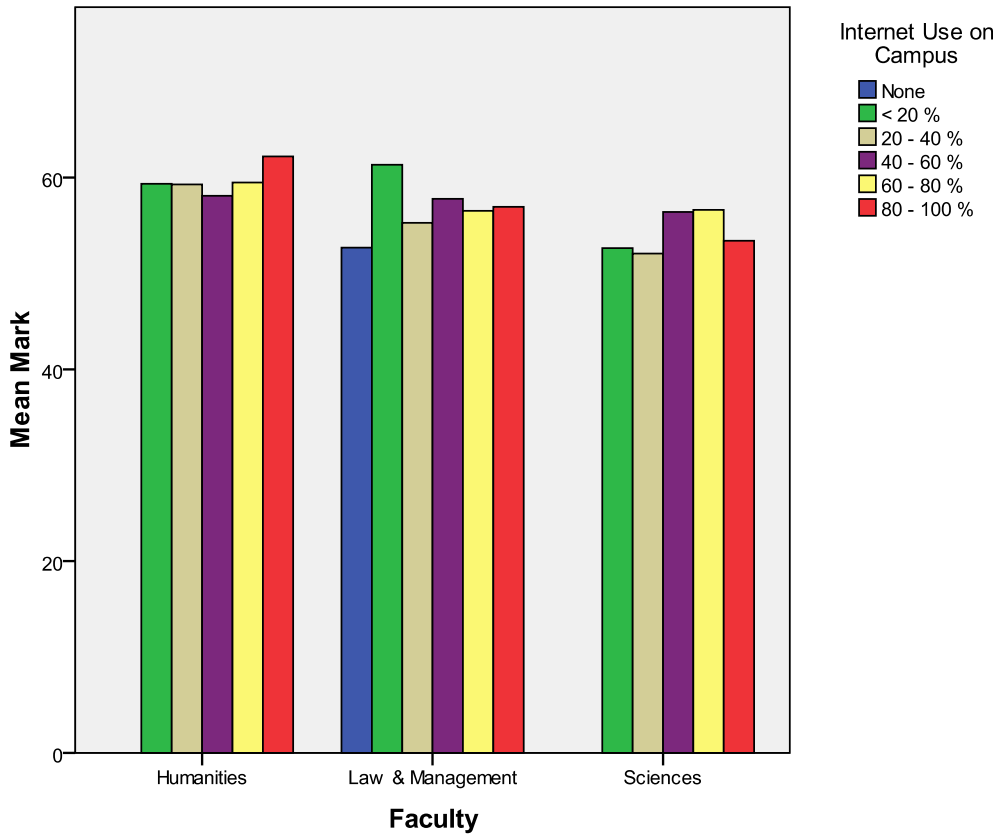
Table 4.2.4 - Use of computers on-campus for academic purposes.

However, ANOVA shows no *statistically* significant difference in mean scores between computer use on-campus and academic results for any of the three faculties based on the data collected. The p values for the three faculties in these tests were Humanities 0.647, Law and Management 0.960 and Sciences 0.580 as shown in Table 4.2.4. It could be argued that due to small n in some instances a Kruskal Wallis should be used. However, it showed very similar results with p values in all cases above 0.587.

4.2.4 On-Campus Internet Use and Academic Performance(A2)

The relationship between the amount of Internet use on-campus for academic purposes and the academic performance of students as reported by respondents, is illustrated in Figure 4.2.5 and Table 4.2.5 below.

Figure 4.2. 5 – Use of the Internet on-campus for academic purposes



Faculty		N	Mean	Std. Deviation	Sig.
Humanities	< 20 %	9	59.35	4.439	.762
	20 - 40 %	11	59.28	8.632	
	40 - 60 %	13	58.09	7.154	
	60 - 80 %	21	59.48	5.554	
	80 - 100 %	7	62.21	5.976	
	Total	61	59.44	6.359	
Law &	None	1	52.69	.	.364
Management	< 20 %	7	61.33	6.159	
	20 - 40 %	16	55.28	5.868	
	40 - 60 %	18	57.77	5.376	
	60 - 80 %	22	56.53	6.651	
	80 - 100 %	21	56.95	6.629	
	Total	85	57.01	6.226	
Sciences	< 20 %	7	52.64	5.664	.460
	20 - 40 %	15	52.08	10.904	
	40 - 60 %	30	56.41	9.698	
	60 - 80 %	32	56.63	10.422	
	80 - 100 %	11	53.41	5.877	
	Total	95	55.17	9.584	

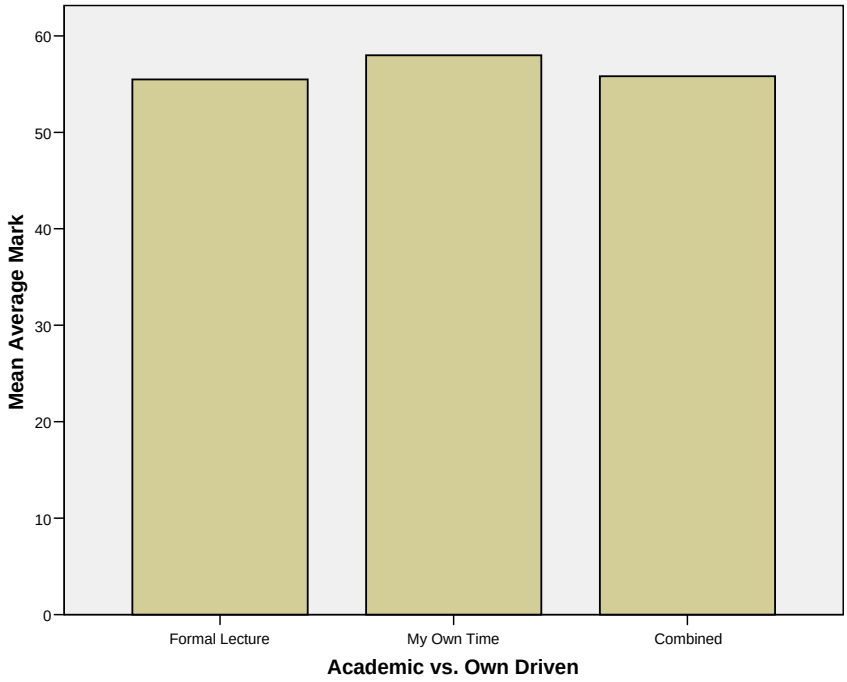
Table 4.2.5 - Use of the Internet on campus for academic purposes

A careful examination of the Table 4.2.5, above, and an ANOVA reveals that there is no statistically significant difference in mean scores between Internet usage for academic purposes and academic performance with p values of 0.762, .364 and 0.460 for the three faculties. Again due to smallness of n in some cases a Kruskal Wallis test was conducted with no significant association shown.

4.2.5 Student vs. Academic Driven-ICT Use

This section examines whether there is relationship between academic results and the manner in which students use ICT. The respondents were asked if they limit their ICT use only to periods supervised by a lecturer (or in a practical), or whether they use ICTs on their own, or whether the two modes are combined. The responses are captured in the Figure 4.2.6 below.

Figure 4.2. 6 – Student vs. Academic-Driven ICT Use



The three categories of ICT, namely “Formal lecture or practical”, “My own time” and “Combined” produce an average of 55%, 58% and 56% respectively. This shows that the highest average is reflected by the group that uses ICT in their own unsupervised time. One could explain this result by pointing out that those who prefer to use ICT in their own time are probably more highly motivated in their studies, i.e. they prefer to do things on their own initiative rather than have someone asking them to do something.

4.2.6 Length of ICT Use and Academic Performance (A18)

This section seeks to determine whether there is a relationship between the length of time (number of years) that a student has used ICTs and his/her academic performance.

The first test was ANOVA with Post Hoc option with all the participants i.e. all three faculties combined. Table 4.2.6 shows the results.

	N	Mean	Std. Deviation	Sig.
< 2 years	75	55.00	7.871	.040
2 - 4 year ago	78	59.17	7.412	
4 - 6 years ago	76	56.40	7.501	
6 - 10 years ago	19	56.27	9.431	
10 - 15 years ago	5	56.60	10.091	
> 15 years	6	58.14	3.262	
Total	259	56.86	7.827	

Table 4.2.6 – Performance difference influences by years of ICT experience.

The result shows that the mean marks for all groups are not the same with p value of 0.040. A Benferreni test indicates that the significant difference is attributed to two categories: those with < 2 years of ICT experience and 2 – 4 years.

Further analysis based on faculty differences confirms the same results for faculties of Sciences and Law and Management as shown in Figure 4.2.7 shows.

Figure 4.2. 7 – Computer experience analysis per faculty

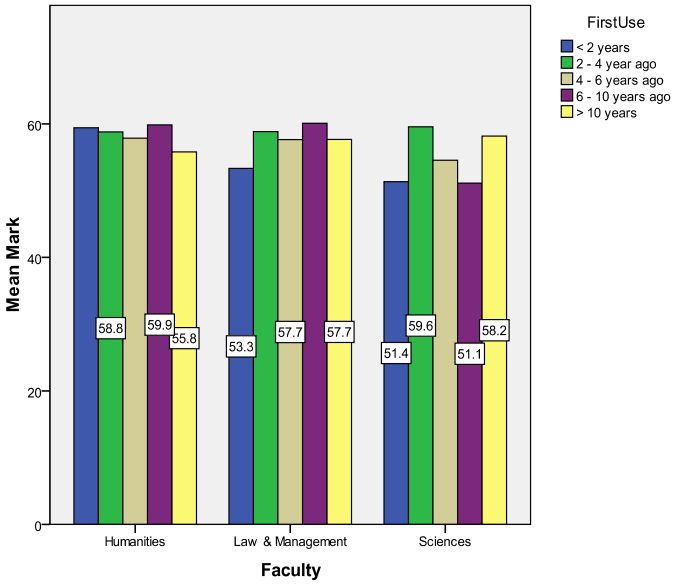


Table 4.2.7, below, shows that the difference in results are significant in the faculties of Law and Management and Sciences. Further analysis, table not shown here, indicates that this difference exist only between two gorups, that is, those with less than 2 years of experience and those between 2 – 4 years with a p value is 0.007 for Law and Management and 0.008 for Sciences.

Faculty	First Computer Use	N	Mean	Std. Deviation	Sig.
Humanities	< 2 years	27	59.42	7.622	.884
	2 - 4 year ago	17	58.81	6.153	
	4 - 6 years ago	16	57.86	7.377	
	6 - 10 years ago	4	59.87	4.473	
	> 10 years	3	55.81	2.805	
	Total	67	58.76	6.814	
Law & Management	< 2 years	28	53.33	5.728	.007
	2 - 4 year ago	26	58.85	6.469	
	4 - 6 years ago	28	57.67	6.012	
	6 - 10 years ago	7	60.09	5.044	
	> 10 years	2	57.68	6.475	
	Total	91	56.86	6.366	
Sciences	< 2 years	20	51.36	8.325	.008
	2 - 4 year ago	35	59.58	8.690	
	4 - 6 years ago	32	54.57	8.504	
	6 - 10 years ago	8	51.13	12.091	
	> 10 years	6	58.18	8.921	
	Total	101	55.61	9.325	

Table 4.2.7 - Computer experience analysis per faculty vs. results

Further analysis based on year of study is tabluted in Table 4.2.8 below. It seems the influence of ICT use is most noticable in the first year between two groups of less than 2 years and 2 – 4 years.

Level of Study		N	Mean	Std. Deviation	Sig.
First year	< 2 years	33	52.35	7.717	.021
	2 - 4 year ago	17	59.38	6.659	
	4 - 6 years ago	20	58.29	9.556	
	6 - 10 years ago	4	57.17	2.526	
	> 15 years	3	57.43	3.715	
	Total	77	55.89	8.230	
Second year	< 2 years	17	55.77	7.808	.690
	2 - 4 year ago	5	52.08	6.681	
	4 - 6 years ago	8	54.56	5.878	
	6 - 10 years ago	3	49.11	15.650	
	10 - 15 years ago	2	53.64	4.606	
	Total	35	54.27	7.766	
Third year	< 2 years	20	57.93	7.907	.260
	2 - 4 year ago	40	58.98	8.192	
	4 - 6 years ago	35	55.17	6.132	
	6 - 10 years ago	10	57.74	9.813	
	10 - 15 years ago	2	50.96	3.028	
	> 15 years	1	62.26	.	
	Total	108	57.32	7.701	
Fourth year	< 2 years	5	58.11	3.653	.121
	2 - 4 year ago	16	61.62	5.006	
	4 - 6 years ago	12	59.40	6.392	
	6 - 10 years ago	2	57.89	6.427	
	10 - 15 years ago	1	73.80	.	
	> 15 years	2	57.14	2.257	
	Total	38	60.34	5.696	

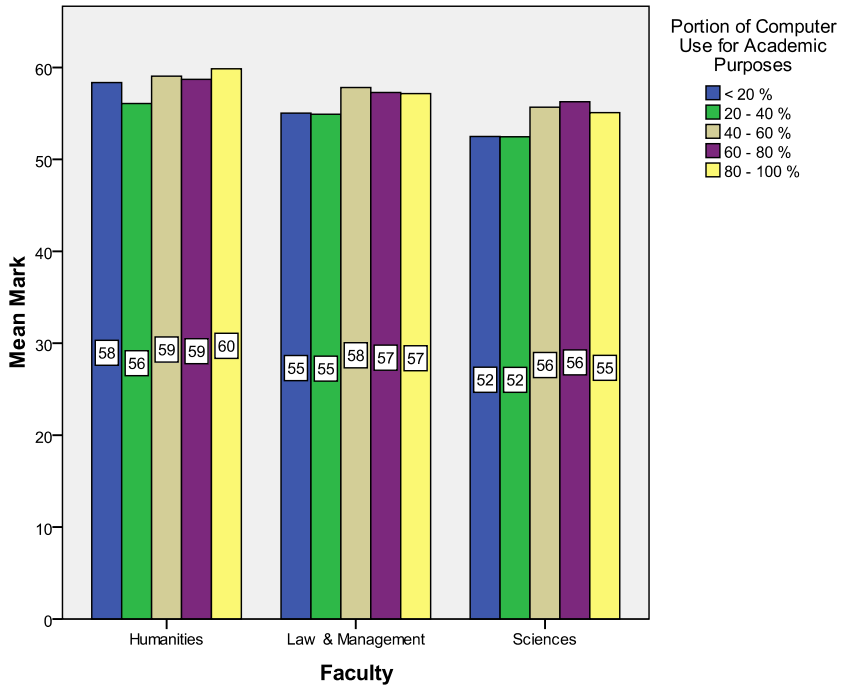
Tabel 4.2.8 – Results influenced by length of ICT used based on year of study

The implication of the above findings is that the length of ICT use does play a role in terms of its influence on results in the two groups of less than 2 years and between 2 – 4 years. This is significant for those respondents who are in their first year of study and are in faculties of Sciences and Law and Management.

4.2.7 ICT Use for Academic Purposes and Academic Performance (A22)

This section determines whether a relationship exists between ICT use for academic purposes and academic achievement. The respondents were asked "how much of their overall computer time is spent to help with their studies." Figure 4.2.8 and Table 4.2.9 , below, reveal the responses.

Figure 4.2. 8 – Comparison of academic achievement and computer usage per faculty



In faculty of Humanities, there seems to be a general upward trend in academic performance as computer usage increases. In the case of the remaining two faculties, those who reported a more moderate level of ICT usage obtained a better level of academic achievement (as is reflected in the percentages). While those who reported the highest ICT usage demonstrated better academic achievement in both cases than those who reported less usage, it is those students who reported a middle level of ICT usage who actually attained the best

academic results. Statistically, using ANOVA no significant differences were found.

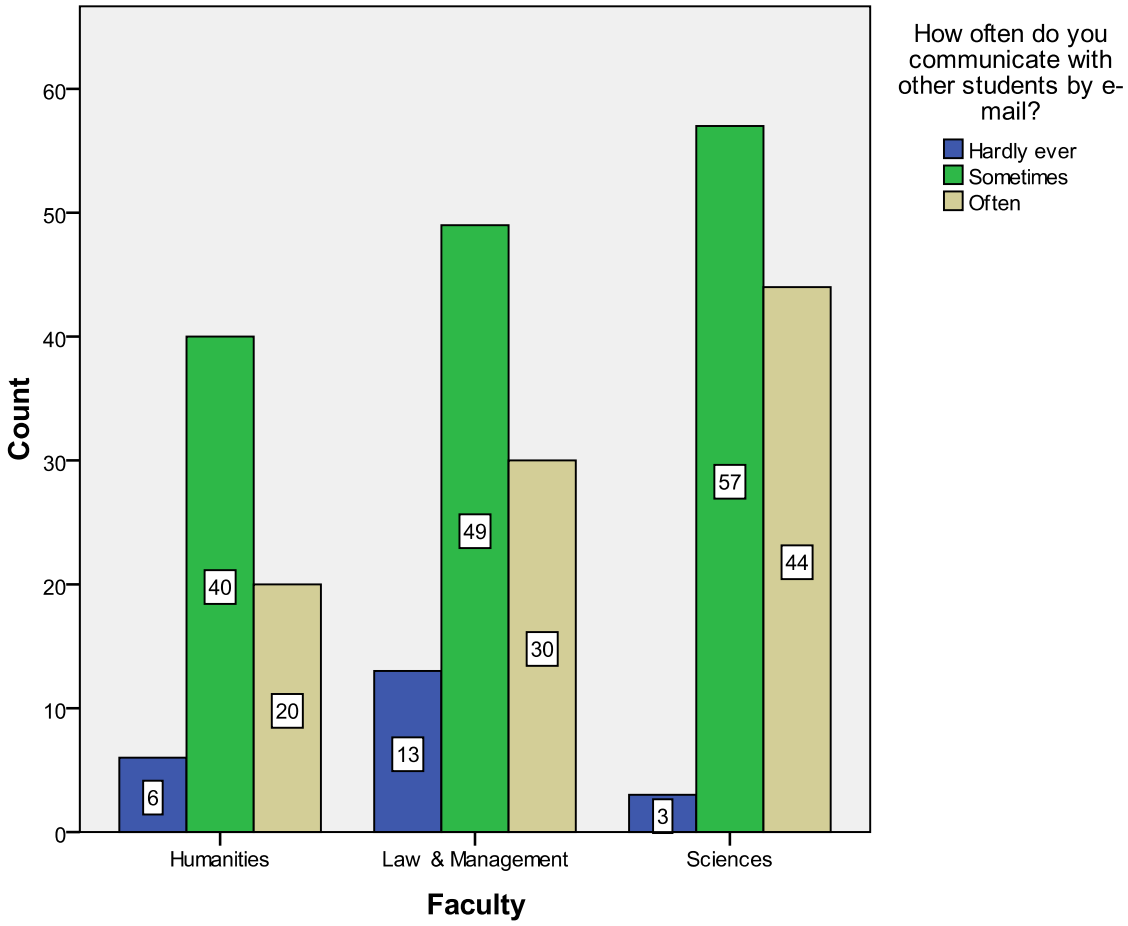
Faculty		N	Mean	Std. Deviation
Humanities	< 20 %	5	58.36	6.075
	20 - 40 %	6	56.09	3.682
	40 - 60 %	17	59.06	8.329
	60 - 80 %	26	58.71	6.825
	80 - 100 %	13	59.86	6.541
	Total	67	58.76	6.814
Law & Management	< 20 %	7	55.03	5.773
	20 - 40 %	9	54.91	4.802
	40 - 60 %	21	57.82	5.916
	60 - 80 %	36	57.29	6.990
	80 - 100 %	19	57.16	6.527
	Total	92	56.98	6.329
Sciences	< 20 %	4	52.49	9.821
	20 - 40 %	8	52.47	6.054
	40 - 60 %	30	55.69	8.526
	60 - 80 %	37	56.27	10.996
	80 - 100 %	25	55.08	9.181
	Total	104	55.38	9.433

Table 4.2.9 - Results vs. computer use analysis per faculty

4.2.8 Social Use ICTs and Academic Performance (B1)

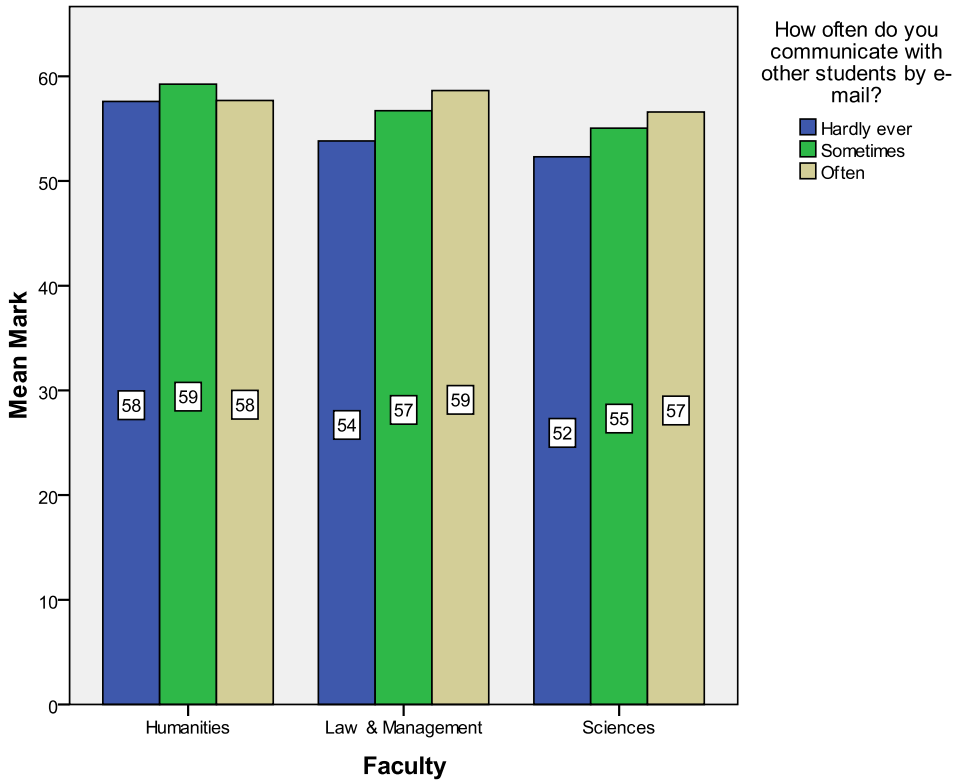
This section determines whether there is a relationship between the use of ICT tools by students for social purposes and their academic achievement. In section 4.1.14, it was noted that 91.6% of the respondents used email as means to communicate with other students either “sometimes” or “often”. Figure 4.2.9 below shows the same ratios for different faculties.

Figure 4.2. 9 – Frequency of email communication with other students (actual numbers)



Is there a relationship between extent of students communicate with other students by means of e-mail and their academic achievement? Figure 4.2.10 and Table 4.2.10 show the relationship.

Figure 4.2. 10 – Frequency of email communications with other students



At first, looking at figures in table 4.2.8, they seem to indicate a general relationship between the extent of email usage and academic performance. However, ANOVA does not indicate any significant difference in the academic performance between the three groups with lowest being p=0.070 for Law and Management - i.e. the different level of email use for social purpose does not have an influence on academic performance.

Table 4.2.10, below, reflects the responses.

Faculty		N	Mean	Std. Deviation	Sig.
Humanities	Hardly ever	6	57.60	4.581	.659
	Sometimes	40	59.24	6.754	
	Often	20	57.69	7.466	
	Total	66	58.62	6.774	
Law & Management	Hardly ever	13	53.83	6.013	.070
	Sometimes	49	56.71	5.621	
	Often	30	58.63	7.231	
	Total	92	56.93	6.360	
Sciences	Hardly ever	3	52.31	8.524	.582
	Sometimes	57	55.05	9.135	
	Often	44	56.59	9.441	
	Total	104	55.62	9.214	

Table 4.2.10 – Shows ANOVA results for academic performance and email frequency between students.

The questionnaire also explores the extent to which students used other applications such as Skype, SMS, VoIP, Web-based games, and so on. But since the number of students who responded to these questions was very low, the data obtained from them was excluded from further analysis in this section.

4.2.9 The Integration of ICTs into Academic Programmes (B2)

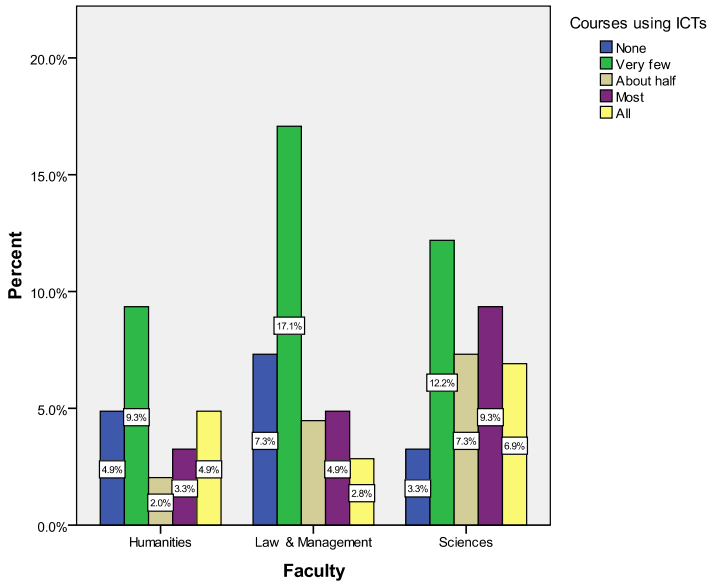
This section examines the extent to which ICTs are used by students as part of their academic programmes and whether these contribute towards their academic achievement. The students were asked to state the number of courses in which they use ICTs as part of their teaching and learning. Table 4.2.9 displays ANOVA with post hoc test results at combined faculty level.

	N	Mean	Std. Deviation	Sig.
None	38	57.03	5.617	.029
Very few	95	58.22	7.812	
About half	34	55.24	7.999	
Most	43	53.98	8.717	
All	36	56.98	6.154	
Total	246	56.70	7.599	

Table 4.2.11 – ICT integration into academic programs vs. academic performance

It can be seen that the mean marks between the groups are not all the same with a p value of 0.029. A Bonferroni test (not shown here) indicates that the significant difference lies between the "Very few" and the "Most" groups. This implies that those who have reported having very few courses using ICTs have scored higher than those who use them for most of their courses and that this data goes against expectation.

Figure 4.2. 11 – The integration of ICT into academic programs (number of respondents)



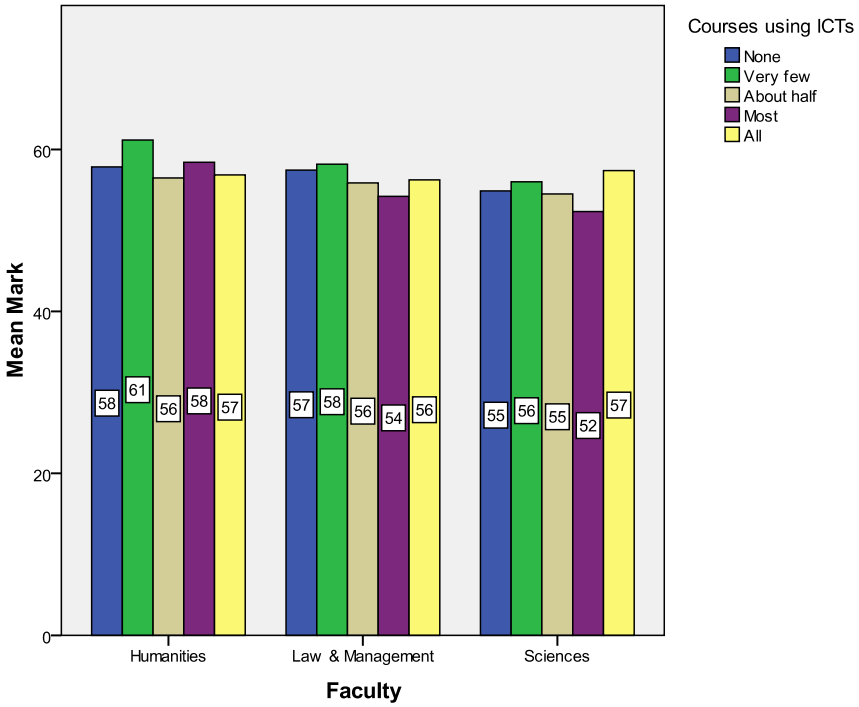
Section 4.1.15, above, documented the extent of ICT usage as an integral part of students' academic programs. It was noted in that section that half of the

respondents were registered for academic courses in which there was either no ICT content or very little ICT content. The same analysis is carried out here, but is broken down per faculty.

Figure 4.2.11, above, illustrates the results.

The faculty that uses ICTs the most for purposes of teaching and learning is faculty of Sciences. This is followed by the faculty of Law and Management Sciences and then by the faculty of Humanities. The question to explore is to find whether a difference exists in academic performance which might be due to the extent of ICT use in academic programmes. Figure 4.2.12 below reveals the findings.

Figure 4.2. 12 – ICT integration into academic programs vs. academic performance



The picture that emerges from this data is rather interesting. At faculty level, there is no significant difference in mean marks between various groups.

At the combined level, however, as shown above there is a difference between the “Very few” and the “Most” groups with the former group performing better

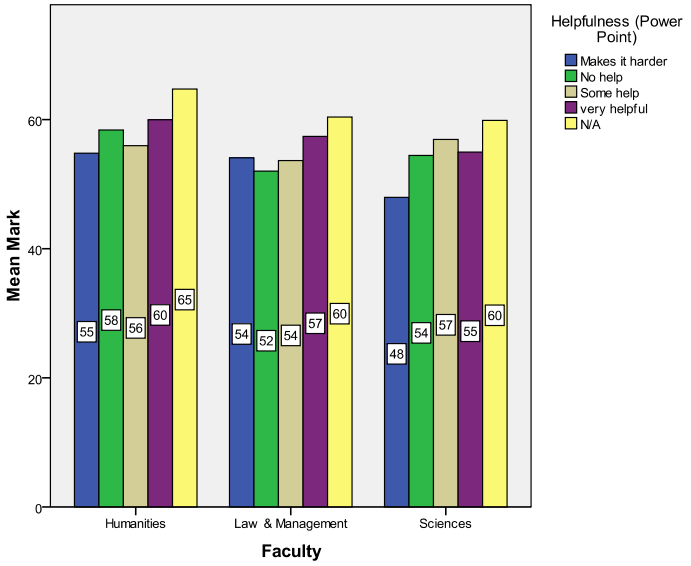
academically than the latter. A number of possible observations can be made in this regard. The first possible explanation is that, in all three faculties, the highest number of participants belong to the category “Very few”. In total the number of respondents who have reported they have ICTs in a very few of their courses (95) is nearly three time higher than those who have said all of their course use ICTs (36). This means that the integration of ICTs into teaching and learning is not a common feature of their academic *modus operandi*. A second possible conclusion is that the integration of ICT into teaching and learning is not a well-planned strategy in the university, and therefore needs attention. Further research is needed to be able to arrive at definitive conclusions.

The following sections explore the relationship between the lecturer’s use of ICT tools and the possibility of a corresponding effect on the academic performance of students.

4.2.10 Presentation Software (Power Point, B4)

In section 4.1.15, I documented the extent of use of various ICT tools such as MS Power Point, Excel and GIS by the academic community, and the extent to which respondents reported that the use of such tools was helpful to them. ANOVA indicated no significant difference between the mean marks and the use of such tools. In terms of helpfulness of these tools, the closest results were attributed to MS Power Point. Figure 4.2.13 , below, reveals the findings reported about the “Helpfulness of Power Point” for all three faculties vs. average results.

Figure 4.2. 13 – Relationship between helpfulness of presentations (such as Power Point) and academic achievement per faculty



What is observable is a general upward trend in academic achievement in nearly all those cases where the respondents found the tools more helpful. It is interesting to note that in all the three faculties, “Not Applicable” responses, with n=22, for all three faculties combined, have scored higher. Table 4.2.12, below, shows the results of ANOVA for the combined faculties. It excludes those who did not respond to this question and those who selected “N/A” response. The picture that emerges indicates that those who found the tools more helpful obtained higher scores.

	N	Mean	Std. Deviation	Sig.
Makes it harder	9	53.56	6.223	.075
No help	12	55.60	5.130	
Some help	53	55.77	7.103	
very helpful	157	56.90	8.188	
N?A	22	60.71	6.561	
Total	253	56.81	7.738	

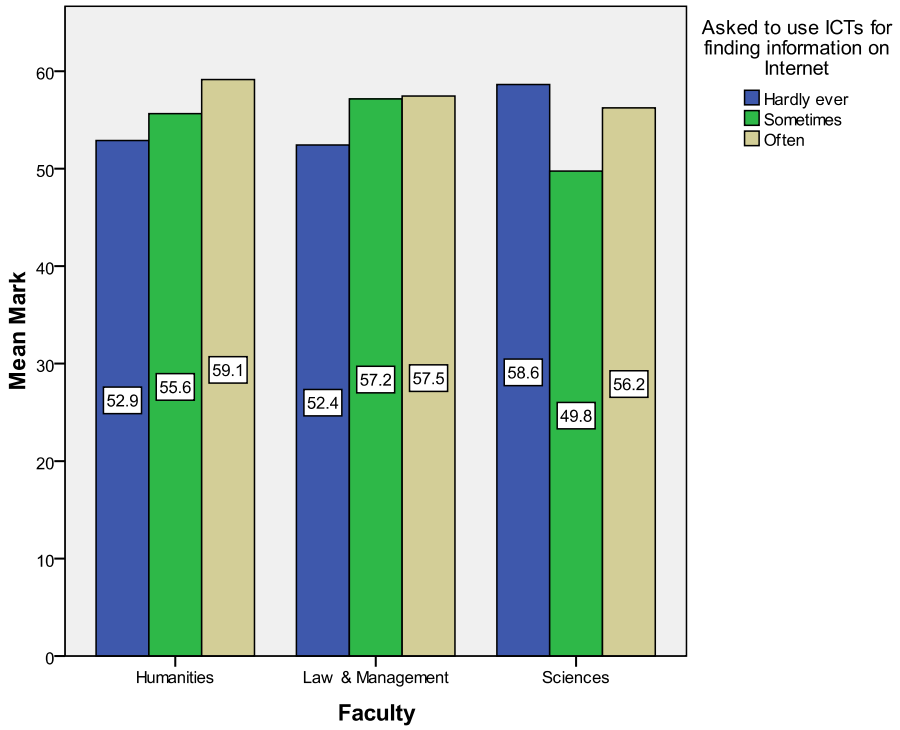
Table 4.2.12 - Comparison of helpfulness levels of ICT presentation tools (such as Power Point) and average marks for all three faculties combined.

The ANOVA between the two variables in question produced a p value of 0.075 as shown in Table 4.2.12. One may therefore conclude on the basis of the data that was collected that there is *statistically* no significant difference in the academic performance of students as the result of the presentation tools in question or their degree of helpfulness as reported by respondents.

4.2.11 An Academic Programme Initiated Use of the Internet (B5)

This section examines whether a relationship exists between the extent of Internet use, when this use is encouraged by the academic community, and students' academic achievement. Students were asked to state how often they are asked by the academic community to use Internet to search for information. Figure 4.2.14, below, reveals the results.

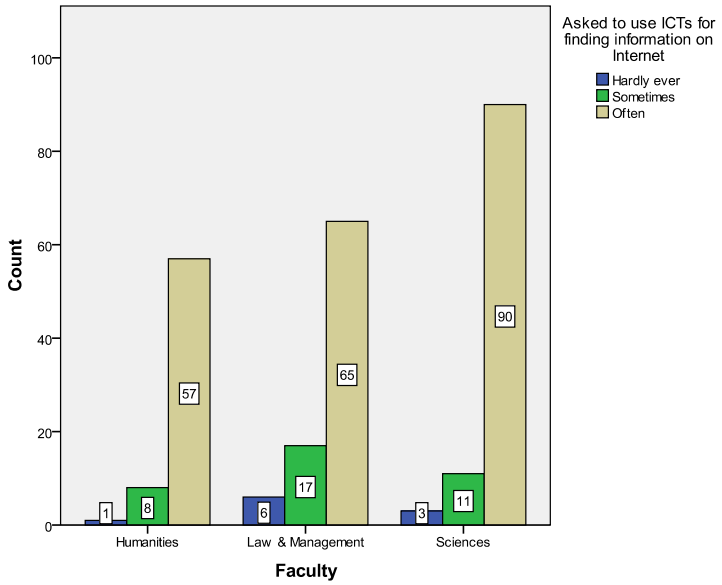
Figure 4.2. 14 – The Internet use influence on results when encouraged by an academic programme.



It shows that with the exception of the faculty of Sciences in the “Hardly ever” category, there is a relationship between the extent of the Internet use and academic performance. It should be noted that under section 4.2.5, above, the extent of Internet use was examined in general. The difference here is that the Internet use is as the result of an academic activity and that its usage is somehow encouraged by the academic community. Figure 4.2.15 shows the number of respondents in each category. It can be seen that there are very few students in the “hardly ever” and “sometimes” categories in all three of the faculties. In order to examine this relationship statistically, I have combined the first two categories and compared those who use the Internet often against the rest. Table 4.2.13 shows the results from a t-test. As can be seen, there is a statistically significant difference in academic performance based on Internet use when encouraged by the academic community with a p value of .023.

One may conclude from these results that those respondents who reported higher levels of Internet use when requested to do so by their lecturers, performed better (mean mark = 57.4 vs. 45.5) academically.

Figure 4.2. 15 - Number of respondents who were asked to find information on the Internet



		Internet Use Encouraged by Academic Community	N	Mean	Std. Deviation	Sig. (2-tailed)
	Mark	Hardly Ever, Sometimes	46	54.51	5.927	0.023
		Often	212	57.39	8.056	
Gender						
Male	Mark	Hardly Ever, Sometimes	35	54.7	6.103	.216
		Often	136	56.57	8.37	
Female	Mark	Hardly Ever, Sometimes	11	53.93	5.56	.034
		Often	76	58.86	7.284	

Table 4.2.13 – Encouraged by academic community internet use against marks.

Further analysis using a t-test was carried out based on gender and faculty. Table 4.2.13, above, shows the differences in academic performance based on gender. It can be seen that in the case of female students who reported they are "Often" asked by their lecturers to use Internet for finding course related information have performed significantly better with p value = 0.034 (58.9 vs. 53.9).

Faculty		Internet Use Encouraged by Academic Community	N	Mean	Std. Deviation	Sig. (2-tailed)
Humanities	Mark	Hardly Ever, Sometimes	9	55.34	5.332	.118
		Often	57	59.14	6.869	
Law & Management	Mark	Hardly Ever, Sometimes	23	55.93	5.403	.322
		Often	65	57.46	6.629	
Sciences	Mark	Hardly Ever, Sometimes	14	51.66	6.476	.084
		Often	90	56.24	9.448	

Table 4.2.14 - Encouraged by academic community internet use against marks (faculty based).

T-tests were performed to examine the same relationships between the two variables in question at faculty level. The results are shown in table 4.2.14 with no significant differences in the mean marks. As can be seen in this case, the number in some instances is too small for it to be meaningful and statistically reliable.

To complete the picture, further analysis included gender (Table 4.2.15).

Faculty	Gender		Internet Use Encouraged by Academic Community	N	Mean	Std. Deviation	Sig.(2-tailed)
Humanities	Male	Mark	Hardly Ever, Sometimes	8	55.65	5.615	.208
			Often	35	59.13	7.200	
	Female	Mark	Hardly Ever, Sometimes	1	52.89	.	.355
			Often	22	59.16	6.473	
Law & Management	Male	Mark	Hardly Ever, Sometimes	17	55.45	5.742	.174
			Often	44	57.87	6.324	
	Female	Mark	Hardly Ever, Sometimes	6	57.28	4.464	.829
			Often	21	56.59	7.313	
Sciences	Male	Mark	Hardly Ever, Sometimes	10	52.67	7.151	.682
			Often	57	54.00	9.723	
	Female	Mark	Hardly Ever, Sometimes	4	49.16	4.074	.008
			Often	33	60.12	7.639	

Table 4.2.15 - Encouraged by academic community internet use Relationship with average marks (faculty and gender based).

As can be seen from the above table, female students in faculty of Sciences with a p value of 0.008 indicates significant difference in results. Once again I took note of the small n in some cases. A Kruskal Wallis which can be used when n is small produced similar results with female students in Sciences with p value of 0.010 as the only group having statistically significant results.

In summary, Internet use when encouraged by the academic community as part of an academic program seems to have a significant influence on academic performance, at combined faculty level i.e. at faculty level there is no significant difference in academic performance between the groups. Female students seem to show a closer alignment than their male counterparts in this respect, especially in Sciences, but statistically not reliable due to the small value of n.

The implication of this is far reaching. When ICTs and, in this case the Internet are used as an extension of the educational environment and their use is encouraged by the lecturer there is a clear influence on the academic performance. This is in line with findings from Passey, Rogers, Machell,

McHugh(2004, p5) who found that more positive motivation resulted when ICT use was focused on both teaching and learning, than when ICT was used to support teaching alone. Here we also see that when ICTs are integrated with teaching and learning the results are visible. Further, Saadé, Weiwei, Nebebe and Molson (2008) believe that the impact of Internet technologies is significant on every aspect of people's life. This impact is felt in the ever increasing pace of transformation of the higher education sector, as more and more institutions are using the internet and web technologies in the classroom as part of the learning environment (p.1).

4.2.12 Students' Email Communication with their Lecturers (B6)

> *ICT can help to overcome two enemies of learning: "isolation and abstraction*".
>
> (Punie, Zinnbauer, and Cabrera, 2006, p. 18)

This section seeks to establish whether the extent of the respondents' email communication with their lecturers has an influence on their academic achievement.

In response to the question regarding the frequency of the communication with their lecturer, "Hardly ever", "Sometimes" or "Often" could have been selected indicating the level of their interactions.

Figure 4.2. 16 – The influence of email communication with lecturer on results.

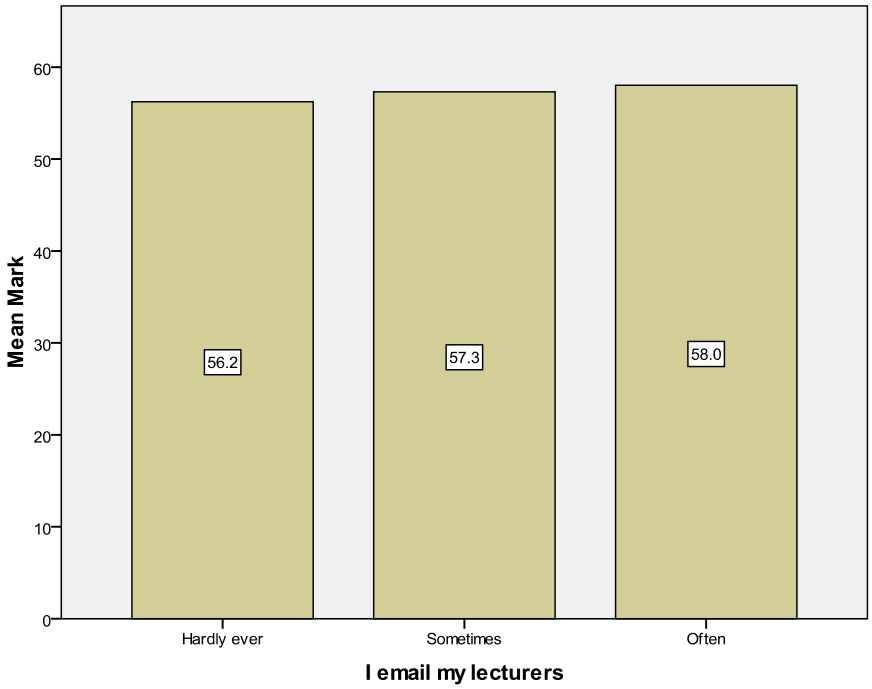


Figure 4.2.16, above, illustrates the responses graphically. Table 4.2.16 shows the results from ANOVA. While graphically there seems to be a difference in students' response based on the level of usage, statistically, results indicate no difference between the three different groups with p value being 0.371.

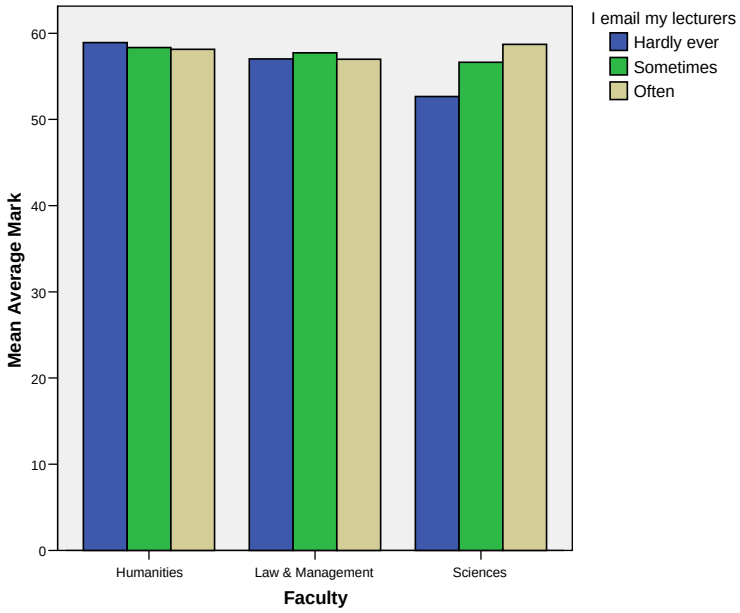
	N	Mean	Std. Deviation	Sig.
Hardly ever	114	56.23	8.238	.371
Sometimes	100	57.31	7.424	
Often	41	58.03	7.026	
Total	255	56.94	7.741	

Table 4.2.16 – The influence of email communication with lecturer on results

Further analysis that takes gender into consideration produces similar results indicating no significant difference between mean marks.

Next, I examined the faculty influence. Figure 4.2.17 shows the results if the respondents are grouped based on their faculties. It shows that the results are not the same in the three faculties. ANOVA only indicates a significant difference in the faculty of Sciences with p=.041 as shown in the table 4.2.11.

Figure 4.2. 17 – The influence of e-mail contacts with lecturers on results per faculty



Faculty		N	Mean	Std. Deviation	Sig.
Humanities	Hardly ever	35	58.93	5.584	.927
	Sometimes	21	58.34	8.374	
	Often	10	58.15	7.546	
	Total	66	58.62	6.774	
Law & Management	Hardly ever	43	57.02	6.813	.880
	Sometimes	29	57.73	5.451	
	Often	13	56.99	5.217	
	Total	85	57.26	6.093	
Sciences	Hardly ever	36	52.67	10.585	.041
	Sometimes	50	56.64	8.046	
	Often	18	58.71	8.092	

Table 4.2.17 – Faculty based marks statistical relationship

This relationship, as shown in figure 4.2.19 and Table 4.2.17, does not seem to exist equally in all faculties. While there is a significant difference between mean marks in the faculty of Sciences when considering the extent of email communication and academic achievement, this is not true for all the faculties concerned.

Further analysis of this phenomenon was carried out for each faculty with the addition of gender as a variable. ANOVA shows no differences in the group means.

In summary, the analysis of the evidence indicates a positive relationship between email usage with lecturer and academic performance in the faculty of Science.

In looking for conformity between these findings and with the findings reported in the literature one comes across similar trends. The literature does indicate a relationship between email use and academic success, especially in technology based learning (Hwang and Kim, 2007). Another evidence comes from Kim and Keller (2008, p. 37), Cifuentes and Shih (2001, p. 458) who found that emails have the potential for improving interactions between instructors and students by providing a means of sending supportive information with personal attention directly to each student. A benefit of using emails is that they enable one to overcome the time and space constraints that instructors might have.

Faculty	Gender		N	Mean	Std. Deviation	Sig.
Humanities	Male	Hardly ever	21	59.35	4.784	.599
		Sometimes	15	58.34	9.160	
		Often	7	56.21	7.934	
		Total	43	58.48	7.007	
	Female	Hardly ever	14	58.30	6.755	.575
		Sometimes	6	58.35	6.751	
		Often	3	62.67	4.853	
		Total	23	58.88	6.458	
Law & Management	Male	Hardly ever	35	57.69	6.891	.807
		Sometimes	15	57.10	4.468	
		Often	9	58.79	4.827	
		Total	59	57.71	6.012	
	Female	Hardly ever	8	54.08	5.978	.158
		Sometimes	14	58.39	6.449	
		Often	4	52.94	3.893	
		Total	26	56.23	6.267	
Sciences	Male	Hardly ever	24	50.41	10.618	.071
		Sometimes	33	55.24	7.653	
		Often	10	57.17	9.689	
		Total	67	53.80	9.349	
	Female	Hardly ever	12	57.18	9.350	.628
		Sometimes	17	59.37	8.316	
		Often	8	60.64	5.538	
		Total	37	58.93	8.073	

Table 4.2.18 – The influence of email communication with lecturer based on gender and faculty

4.2.13 Students' Email with other Students as Part of their Course

This section examines whether the extent of email communication between students has a positive effect on their academic achievement. Table 4.2.19 shows the result from ANOVA at combined faculty level. With a p value of .466

it shows no significant relationship between the level of email communications and academic performance.

	N	Mean	Std. Deviation	Sig.
Hardly ever	67	57.53	6.537	.466
Sometimes	125	56.38	7.644	
Often	63	57.65	9.256	
Total	255	56.99	7.805	

Table 4.2.19 – Influence of email communication between students on results.

In a further analysis taking into consideration the differences based on faculty and gender no statistically significant differences were found.

4.2.14 Self-Initiated Student Use of Internet for Academic Purpose (B7)

Under section 4.2.12, above, I examined the effect of Internet use on results when encouraged by the academic community as part of an academic course. In this case, the use of Internet is initiated as the result of students' own initiative. Table 4.2.20 shows the result of ANOVA.

	N	Mean	Std. Deviation	Sig.
Hardly ever	11	53.15	7.347	.005
Sometimes	50	54.33	6.243	
Often	195	57.79	8.018	
Total	256	56.92	7.812	

Table 4.2.20 – Internet use influence on results when initiated by students for academic purposes.

The result indicates that the three levels of responses are not the same. The students that have reported they use Internet "Often" scored significantly higher than the other groups with p=0.005. A Bonferroni test shows the difference of means is significant between all groups except "often" and "Sometimes".

Next, I examine this variable, taking into consideration the faculty influence.

Figure 4.2. 18 – Student initiated Faculty based use of the Internet

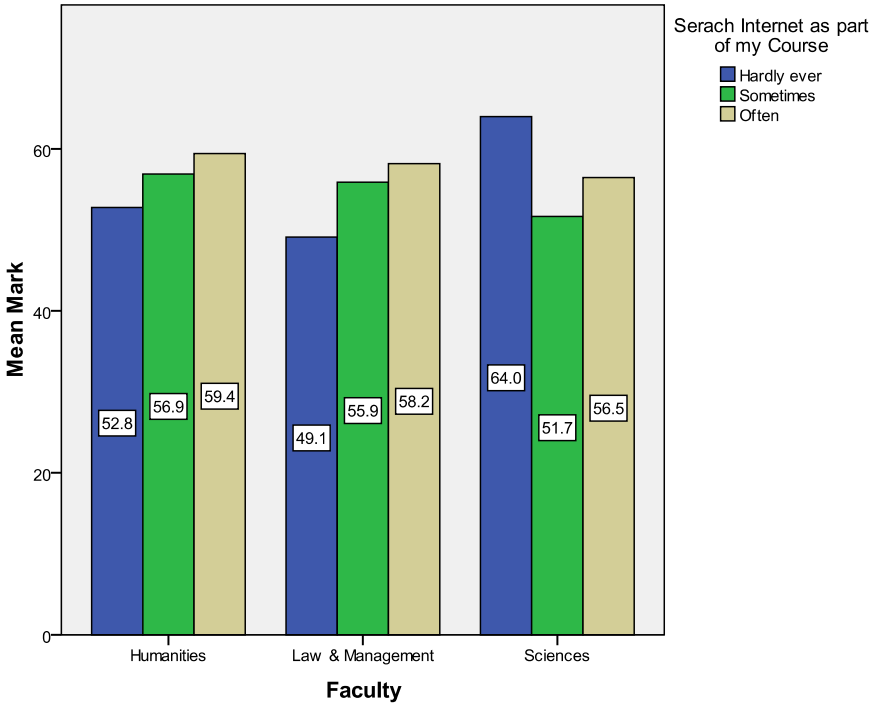


Figure 4.2.18, above, and Table 4.2.21, illustrate the relationship between students' use of Internet for academic purposes on their own initiative and their academic performance by each faculty. It shows that those who use the Internet for academic purposes on their own initiative perform better academically. The exception is in the case of the faculty of Sciences, in which the "Hardly ever" category appears to reveal the opposite of a general trend among the faculties.

Faculty		N	Mean	Std. Deviation	Sig.
Humanities	Hardly ever	4	52.77	4.343	.113
	Sometimes	11	56.90	4.548	
	Often	50	59.43	7.160	
	Total	65	58.59	6.822	
Law & Management	Hardly ever	5	49.11	6.420	.004
	Sometimes	18	55.88	4.688	
	Often	65	58.18	6.274	
	Total	88	57.19	6.323	
Sciences	Hardly ever	2	63.99	1.197	.045
	Sometimes	21	51.66	7.292	
	Often	80	56.45	9.516	
	Total	103	55.62	9.259	

Table 4.2.21 – Faculty based self-initiated student use of Internet for academic purpose

Further analysis provides an explanation of this phenomenon. The number of the students who are in the “Hardly ever” category in the Sciences is very low with n=2, as can be seen in Table 4.2.21. Further investigation clarifies this situation. The two students who chose the ‘Hardly ever’ option from the faculty of Sciences have average academic results of 63% and 65% respectively. In response to the question, “What percentage of your academic time do you spend using the Internet (A2 – 2)?”, one of these students indicated a frequency of between 60% and 80%. Their records also show that they only began to use ICT when they registered at the university. In response to the question, “How easy/difficult is it for you the access ICT on campus (A5 – 1)?”, one of these students selected the “Easy” option and included the comment, “People are busy, there is no noise, there are security guards in the lab.”. In response to the question, “How do you feel about ICTs for teaching and learning (A27)?”, one of these students responded, “I enjoy ICT, it is valuable, I feel I have adequate skills, I am concerned about my level of skills in relation to my peers, the support I receive meets my needs, I don’t have enough training.” Based on these facts, one may make the assumption that their responses are incorrectly intended and conclude

that there is a positive relationship between Internet usage and academic achievement.

Table 4.2.21, above, illustrates that only a few students have selected the "Hardly ever" option. For this test to be meaningful, the group "Hardly Ever" and "Sometimes" had to be combined. That means that the sample data was divided into two groups: those that used Internet "Often" and the rest. Since there are only now two categories and since they are being compared against a continuous variable (marks), I used a t-test to examine the relationships. Table 4.2.23 reveals the findings.

Group Statistics

	I use Internet for my studies	N	Mean	Std. Deviation	Sig. (2-tailed)
Mark	Hardly Ever, Sometimes	61	54.12	6.406	0.001
	Often	195	57.79	8.018	

Table 4.2.22 – T test result showing the relationship between internet usage and results.

The p value of .001 shows that students who reported they use the Internet on their own initiative often scored better than the rest.

In a further analysis, I examined faculty based data. Table 4.2.23 reveals the findings.

Group Statistics

Faculty	I use Internet for my studies	N	Mean	Std. Deviation	Sig (2-tailed)
Humanities	Hardly Ever, Sometimes	15	55.80	4.732	.070
	Often	50	59.43	7.160	
Law & Management	Hardly Ever, Sometimes	23	54.41	5.712	.013
	Often	65	58.18	6.274	
Sciences	Hardly Ever, Sometimes	23	52.73	7.812	.089
	Often	80	56.45	9.516	

Table 4.2.23 – T Test results between marks vs. student initiated Internet use.

At 5 % level of confidence only the faculty of Law and Management shows significant difference between mark means. However, at 10% all three faculties show this significance.

Next, I thought it would be interesting to examine the differences by gender. Table 4.2.24 shows the results. Here, at the combined faculty level the results are shown.

Group Statistics					
Gender	I use Internet for my studies	N	Mean	Std. Deviation	Sig. (2-tailed)
Male	Hardly Ever, Sometimes	46	54.13	6.939	.034
	Often	125	57.04	8.218	
Female	Hardly Ever, Sometimes	15	54.09	4.593	.002
	Often	70	59.13	7.519	

Table 4.2.24 – Gender and self-initiated Internet access influences vs. results.

As can be seen in both cases when students readily use internet to access information in the course of their study, they perform better compared to those who use them “Hardly” or “Sometimes”.

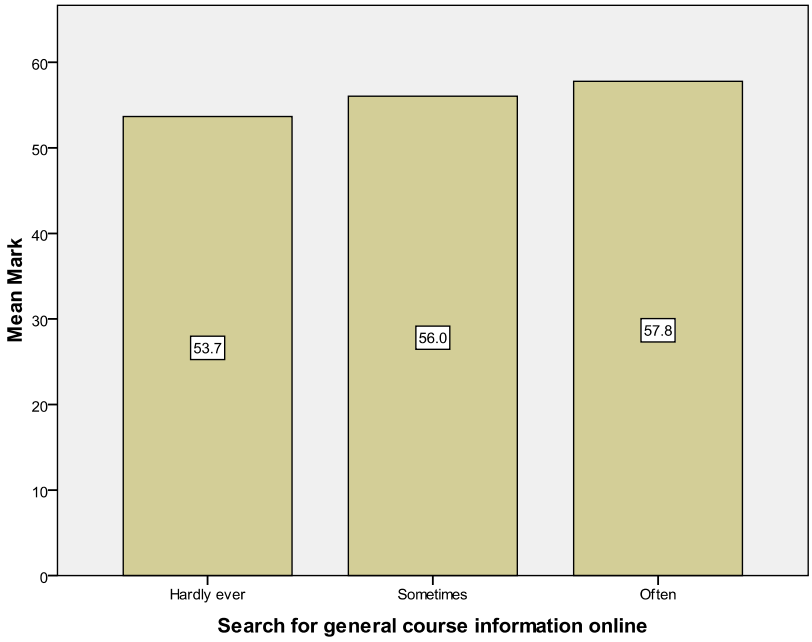
Once again, one sees a parallel between this study and the series of studies pioneered by Professor Mitra where the phenomenon of ICT as an instrument for self-directed learning was repeatedly confirmed (Mitra and Rana, 2001; Inamdar, 2004; Van Cappelle, 2004; Dangwal, JhaandKapur, 2006; Cronje and Burger, 2006; Gush, Cambridge and Smith, 2004).

Jackson, Zhao, Kolenic, Fitzgerals, Harold and Eye (2008) conducted a similar experiment with a younger group and found similar results where IT (Internet use) predicted better academic performance.

4.2.15 Online Access to Articles and Reports (Journals, B7)

This section seeks to determine whether a relationship exists between access to online information such as electronic journal articles and research reports, and academic achievement. Figure 4.2.19 illustrates the outcome pictorially and Table 4.2.25 shows the result from ANOVA. It can be seen that the three different groups are not the same with p value of 0.036 and that the higher the usage the better the academic performance.

Figure 4.2. 19 - Relationship between the use of online material and academic achievement



.	N	Mean	Std. Deviation	Sig.
Hardly ever	22	53.67	7.959	.036
Sometimes	79	56.05	6.775	
Often	150	57.78	8.203	
Total	251	56.88	7.833	

Table 4.2.25 – Search for information online influence on results

Further tests taking into consideration faculty and gender influences did not show any statistically significant changes in the results.

4.2.16 Summary - ICT Use and Academic Performance

Referring to the use of technology for the disadvantaged, Punie, Zinnbauer, and Cabrera (2006, p. 16) stated:

> *Motivation and self-esteem are important factors that can allow the less privileged to take up learning again*.

This section provides a summary of the findings about the relationship between the extent to which students use ICTs and their academic performance.

- Respondents' academic performances (results) in the three faculties were statistically different (section 4.2.2). In the case of faculty of Sciences, this difference also applied to gender.
- This study found that no statistically significant difference exists between academic performance and variables such as: extent of *computer use, extent of Internet use* and *the amount of time spent on using ICTs* for non-academic purposes and ICT usage for social purposes.
- The extent of ICT integration into academic programs (section 4.2.10) showed a negative correlation in some areas. Although this requires further investigation, one possible explanation is that the involvement of ICTs in education for purposes of teaching and learning is not well planned and executed. Further investigation needs to be carried out if improvements are to be made in this area.
- On the other hand, the use of the Internet as part of an academic program (sections 4.2.12) and when it is encouraged by the lecturer was found to relate positively to academic performance. The strongest evidence for this

occurred in the faculty of Sciences and more so amongst the female students. It is interesting to note that the findings in this study follows a different emphasis where usually it is the male students that have responded more positively to technology as found in a study by Passey, Rogers, Machell, McHugh (2004, p.6).

- The extent to which students correspond with their lecturers by means of e-mail (section 4.2.13) shows a positive relationship graphically with academic achievement for all faculties and statistically only with faculty of Sciences.

- The length of ICT use (section 4.2.7) does play a role in terms of its influence on results between two groups. Those who reported having used computers for between 2-4 years generally scored higher than those who used them for less than two years. This is more noticeable for those respondents who are in their first year of study and are in Faculties of Sciences and Law and Management.

- Student self-initiated internet access (section 4.2.14) showed the strongest influence on results. With a p value of 0.001 it showed a clear association between Internet friendly respondents and the rest. This relationship exists in all faculties but was strongest in Management and Law and in female students.

- A significant difference was also found in results of students who use online information such as journals often.

The picture that is emerging is rather interesting. Clearly, when students use ICTs as a tool and as an integral part of their studies, in nearly all cases, it influences their results positively. However, there is a clear sign that this potential is not recognized within the academic structures of the University.

Indeed the literature has provided ample warnings and examples that this has happened elsewhere.

Alexander and McKenzie (1998, p. 3) put the emphasis on the way a project is integrated into the learning experience and argue that it must be well thought through and implemented. On the problem of commitment the same authors stress that the individual members of the project team need to be committed to the project and have adequate time to carry out their roles and responsibilities in the project.

Bradbrook, Alvi, Fisher and Lloyd (2008, p. 50), following the detailed analysis of a series of research papers that had positive and negative comments about ICT, conclude that the crucial component in the use of ICT within education is the teacher and his or her pedagogical approaches.

As can be seen from the above, the successful implementation of technology in the academic program is a complex and involved process that necessitates a well-planned integration at all management levels. Education (using technology) is a way to overcome disadvantage, though this is complex to achieve (Bradbrook, Alvi, Fisher and Lloyd, 2008, p. 89).

In concluding this section and reflecting on the results, one is reminded of the similarities between these findings and those experiments conducted by Professor S. Mitra, where the role of instructor was minimal while the learners on their own accord took the interest and played a key role in the learning process. To some extent a similar pattern is observed here in that students take the larger share of the responsibility in the learning process and the results show that they succeeded.

4.3 The Cultural Influence

So far in Chapter 4, section 4.1, I examined technology and its usage. In section 4.2, I documented how ICT use affected academic performance. In this, section 4.3, I examine the role of culture and its influence on technology use, motivation and academic performance.

There are a number of variables in the questionnaire that aim at measuring motivational or cognitive intentions. Statements such as “I think ICTs are essential for education”, in paragraph A26 of the questionnaire, aimed at measuring what students think of ICTs in terms of their value for education. Other similar statements were aimed at discovering what family and friends think of ICTs and their importance for education and future employment. The last two variables could also be regarded as important variables that measure cultural influence, since both parents and friends constitute an important part of the cultural domain of influence.

4.3.1 Introduction

The focus of this section is culture, one of the key variables in this study. Its degree of influence on ICT use and academic performance are examined. Hwang and Kim (2007, p.232), Alavi, Kayworth and Leidner(2006, p.192), regard knowledge sharing as an important variable in the technology mediated learning (TML) and knowledge management (KM) literature incorporating social and cultural factors. Similarly Diamant, Fussell, and Fen-ly (2008, p. 389), point out that culture and technology interact not only in shaping communication but also in shaping how people think about their collaborative performance. One explanation for the reason for such influence is forwarded by Moos and Azevedo (2009. P. 587) when they state “Observing other people sustaining effort to achieve goals allows the observer to believe that he or she also possesses the capabilities to achieve a similar performance level. Social persuasion also assumes an important role in developing self-efficacy”.

Section 4.1.2.1, above, documented the differences in the nationalities and language groups of the students who participated in this study. Since 97.37% of the participants in the research were South Africans, it can safely be assumed that differentiation in nationality as a cultural variable could not have influenced the results in any significant way.

Another cultural variable that was examined for significance was between average results and home languages. Section 4.1.2.1, above, detailed the differences in the home language among the respondents. Here again, due to vast difference between the number of students that use any of these languages, i.e. 175 vs. 36 or 23, it is not practical to use a valid statistical test to measure result differences which could be attributed to difference in home languages.

Two other possible variables that were explored were responses to the statements “What does my family think of ICT?” and “What do my friends think of ICT?”. Here the notion that members of the family or friends as, perceived by the participants, might hold certain opinions about ICT was tested as a cultural variable to see whether it has any influence on academic performance. However, since more than 95 % of the participants have agreed or strongly agreed that ICTs are essential for education (Tables 4.22 and 4.23) it can be concluded that there is strong relationship between family and friends thinking that ICTs are essential for education. The conclusion is that the participants do indeed come from culturally similar backgrounds and that these will have similar influences and they therefore cannot be compared with each other in terms of different cultural groups.

Ideally such questions would have been asked directly from the family members and friends. However, this was not within the scope of the project and is regarded as one of the limitations of this study.

4.3.2 Students’ Perception of ICTs

In Chapter 4, section 4.1.9, students’ responses to the statement, “I think ICTs are essential for education.”, were documented. Here the same statement is examined from a motivational or, more precisely, a cognitive perspective, i.e., when students think very positively about ICTs, do they make more effective use of them? What sort of ICTs do they use? Ultimately, what relationship can be found between this attitude and academic performance? More significantly, what

students think to what extent is colored by their parents, friends and the larger society which will be a measure of the cultural influence.

The first variable that is examined is academic performance i.e. how does the variable in question relate to results. Table 4.3.1, below tabulates the analysis of the different groups.

It can be seen that from the total of 263 participants, only 7 disagreed and 2 strongly disagreed. Taking into consideration that the overwhelming majority of the participants come from similar cultural background, with a collective rather than individualistic approach, it is not surprising that they think alike in terms of the importance of ICTs in education.

I think ICTs are essential for education.			
	N	Mean	Std. Deviation
S Disagree	2	61.58	1.436
Disagree	7	58.43	9.121
S Agree	194	57.58	7.680
Agree	58	54.50	7.581
Don't Know	2	45.85	.678
Total	263	56.87	7.787

Table 4.3.1 – Response to the statement “I think ICTs are essential for education”.

However, since there are only a few students that think differently, we cannot conduct a statistical test to compare results between different groups. But, it is possible to examine the effect of the influence of what they think of ICTs according to their use. Here I used crosstab which is used when two categorical variables are being compared. Tables 4.3.2 and 4.3.3 tabulate the responses to “I think ICTs are Essential for Education” against Internet and computer use. Both tables have one thing in common. Students who think ICTs are important tend to use them more often i.e. the respondents that either agree or strongly agree with the statement have reported to use ICTs 40 – 60% of their

time in all three tables. In this analysis, a use of over 80% is assumed to be too high and not necessarily productive academically.

		I Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Internet Use on Campus	None	0	0	1	0	0	1
	< 20 %	0	2	13	8	0	23
	20 - 40 %	1	0	30	10	0	41
	40 - 60 %	0	1	45	13	2	61
	60 - 80 %	1	3	60	9	0	73
	80 - 100 %	0	1	30	8	0	39
Total		2	7	179	48	2	238

Table 4.3.2 – Shows the relationship of regards for ICTs with Internet use on campus.

		I Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Extent of Computer Use	None	0	0	1	0	0	1
	< 20 %	1	0	8	5	1	15
	20 - 40 %	0	1	15	5	1	22
	40 - 60 %	0	3	46	18	0	67
	60 - 80 %	0	2	78	19	0	99
	80 - 100 %	1	1	45	10	0	57
Total		2	7	193	57	2	261

Table 4.3.3 – Relationship of regards for ICTs with the Extent of Computer Use.

Further analysis is provided in Tables 4.3.4, 4.3.5, 4.3.6 and 4.3.7 where this variable is compared against other variables in this study. These include: Search for general information online, search on the Internet as part of a course, self-

initiated Internet search and email to the lecturer. As can be seen in each case the highest number of students who use ICTs "Often" are also in the "Strongly Agree" category. The implication is that when students think ICTs are essential for education they use them more often. It should be noted that in the case of these categories there was a statistically significant relationship with results. Section 4.2.12 discussed the use of the Internet when it is encouraged by the academic community. Section 4.2.14 discussed Internet search as part of an academic course when the use is based on students' initiative. Section 4.2.15 discussed the online search for course information. In all of these cases the higher frequency of ICT use resulted in better performance.

		I Think ICTs are Essential for Education				Total
		S Disagree	Disagree	S Agree	Agree	
Search for general course information online	Hardly ever	1	1	17	3	22
	Sometimes	0	3	51	24	79
	Often	1	2	118	28	149
Total		2	6	186	55	250

Table 4.3.4 – Relationship between regards for ICTs and search for general course information online.

		I Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Search Internet as part of my Course	Hardly ever	0	0	7	4	0	11
	Sometimes	1	1	33	15	0	50
	Often	1	6	150	36	1	194
Total		2	7	190	55	1	255

Table 4.3.5 –Relationship between regards for ICTs and Internet search as part of a course

		I Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
I use Internet for my studies	Hardly Ever, Sometimes	1	1	40	19	0	61
	Often	1	6	150	36	1	194
	Total	2	7	190	55	1	255

Table 4.3.6 –Relationship betweeb regards for ICTs and Internet for studies

It can therefore be argued that the positive approach to ICTs have had an indirect but positive effect on performance.

		I Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
I email my lecturers	Hardly ever	0	3	84	25	1	113
	Sometimes	2	4	69	25	0	100
	Often	0	0	34	7	0	41
Total		2	7	187	57	1	254

Table 4.3.7 –Relationship between regards for ICTs with email communication with lecturers

An exception is the case of email with the lecturer. Section 4.2.12 discussed the "I email my lecturer" statement. It was shown that students who reported they email their lectures for academic purposes scored higher and in the case of the faculty of Sciences it was statistically significantly higher as well. The information in Table 4.3.7, however, appears to be contradicting the pattern of the rest i.e. the "Often" category is the lowest (34) whereas it should have been the highest. It could be argued that email communication with lecturer is not always possible for students do not have the ultimate choice. The willingness and the lecturers' approach play the dominant influence. In other words, a student who thinks ICT is essential does not always have a chance to communicate via email with the lecturer, if the lecturer is not willing.

Therefore, there is clear evidence that those respondents who think highly of ICTs, when the opportunities avail themselves, whether it is in the form of Internet as encouraged by the lecturer, email communication with the lecturer or merely Internet research as the result of an academic goal, it does have an influence on their academic performance.

A number of other variables in this study were investigated in a similar manner. These were:

- My family thinks ICTs are essential for ICTs.
- My friends think ICTs are essential for ICTs.

In this study these variables are categorized as cultural variables and are used to measure the degree of influence from family and friends and their effect on academic performance.

Tables 4.3.8 to 4.3.15 show the results. As can be seen a very similar pattern as the one above has emerged. That is, there is a close relationship between the two statements. A crosstab test to compare the three statements produced a p value of 0.001 showing very close relationship between the three variables. Firstly, there is direct relationship between what respondents think of ICTs and what their family and their friends think of ICTs. This collective approach is an institutional phenomenon that is not necessarily the same in all cultures i.e. in some cultures the views of parents and children may not be so closely aligned. Secondly, when the respondents report that their family and friends think ICTs are essential for education, the respondents use ICTs more effectively and more frequently. Again, it should be noted that the 80-100% category is not regarded as productive and is an exception. A student that reports that he/she is using ICTs 100% of his/her time is bound to miss on other essential elements or is not being accurate unless he/she is a distance learner which is not the case for the respondents in this study.

Thirdly, in cases where respondents use ICTs “often”, their use is encouraged culturally. Provided it is also encouraged academically, whether self-initiated or institutionally based, it leads to better performance.

		My Family Thinks ICTs are Essential for Education					
		S Disagree	Disagree	S Agree	Agree	Don't Know	Total
Computer Use	< 20 %	0	1	14	4	2	21
on Campus	20 - 40 %	1	3	14	20	6	44
	40 - 60 %	2	2	42	29	15	90
	60 - 80 %	2	3	30	30	9	74
	80 - 100 %	0	1	17	9	2	29
Total		5	10	117	92	34	258

Table 4.3.8 – Relationship of the family’s regard for ICTs with computer use on campus.

		My Family Thinks ICTs are Essential for Education					
		S Disagree	Disagree	S Agree	Agree	Don't Know	Total
Internet Use	None	0	0	1	0	0	1
on Campus	< 20 %	0	1	12	9	1	23
	20 - 40 %	2	2	22	10	5	41
	40 - 60 %	0	1	24	27	9	61
	60 - 80 %	2	5	32	22	12	73
	80 - 100 %	0	1	17	17	4	39
Total		4	10	108	85	31	238

Table 4.3.9 – Relationship of the family’s regard with Internet use on campus.

		My Family Thinks ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Search for general course information online	Hardly ever	2	2	10	5	3	22
	Sometimes	0	4	32	33	10	79
	Often	3	2	73	51	20	149
Total		5	8	115	89	33	250

Table 4.3.10 – Shows the relationship of the family's regard with search for general course information online

		My Family Thinks ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
I email my lecturers	Hardly ever	3	5	47	38	20	113
	Sometimes	2	4	43	41	10	100
	Often	0	0	26	11	4	41
Total		5	9	116	90	34	254

Table 4.3.11 – Relationship of the family's regard with email communication with the lecturer.

A very similar pattern emerges in the respondents to "My Friends Think ICTs are Essential for Education", as can be seen in Tables 4.3.12 – 4.3.15.

		My Friends Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Computer Use on Campus	< 20 %	0	1	15	4	1	21
	20 - 40 %	0	4	20	16	3	43
	40 - 60 %	0	4	55	24	6	89
	60 - 80 %	2	2	36	32	2	74
	80 - 100 %	0	0	18	8	1	27
Total		2	11	144	84	13	254

Table 4.3.12 – Relationship of friends regard of ICTs with computer use on campus.

		My Friends Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Internet Use on Campus	None	0	0	1	0	0	1
	< 20 %	0	3	13	6	1	23
	20 - 40 %	0	2	26	9	3	40
	40 - 60 %	0	2	32	24	3	61
	60 - 80 %	1	2	39	24	4	70
	80 - 100 %	1	1	22	14	1	39
Total		2	10	133	77	12	234

Table 4.3.13 – Shows the relationship of friends regard of ICTs with Internet use on campus.

		My Friends Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
I email my lecturers	Hardly ever	0	6	58	42	5	111
	Sometimes	2	5	55	32	4	98
	Often	0	0	29	9	3	41
Total		2	11	142	83	12	250

Table 4.3.14 – Shows the relationship of friends regard of ICTs with email communication with the lecturer.

		My Friends Think ICTs are Essential for Education					Total
		S Disagree	Disagree	S Agree	Agree	Don't Know	
Search for general course information online	Hardly ever	0	2	9	8	2	21
	Sometimes	0	4	37	32	6	79
	Often	2	4	96	40	4	146
Total		2	10	142	80	12	246

Table 4.3.15 – Shows the relationship of friends regard of ICTs with search for general course information online

A number of conclusions can be drawn from these findings:

- The UL student community follows a predominantly collectivist approach and is mostly homogenous culturally.
- ICT receives highest levels of support culturally which leads to higher ICT use.
- The cognitive and motivational variables of this study are influenced by student culture.
- When the use of ICTs is encouraged through some sort of academic program, whether self-initiated or institutionally, it influences academic results positively.

These remarks are further elaborated in the concluding part of this chapter.

4.4 The Motivational Influences

> *There is some evidence that ICT can give greater opportunities for accessing learning to those who need it the most. Motivation and self-esteem are important factors that can allow the less privileged to take up learning again.*
>
> (Punie, Zinnbauerand, Cabrera 2006, *p.16).*

4.4.1 Introduction

In Chapter 2, the literature review, I illustrated how the three pillars in this study, namely, culture, motivation and technology, were investigated for their influence on the educational environment. In section 4.1, I documented the findings that focused on the technology variable, i.e., students' extent of ICT use and their dependency on ICTs, for achieving their academic goals. In section 4.2, I examined the relationship between students' ICT use and its effect on their academic performance. In section 4.3, I examined the cultural influences on technology use and academic performance. In this, section 4.4, I examine motivation and its influence over technology use or academic performance. In particular, there are three motivational variables that will be the focus of this examination. These are intrinsic, extrinsic and self-efficacy motivational orientation. In subsequent sections, I cover each of these motivational components separately.

4.4.2 Intrinsic Motivation

In this section, I examine intrinsic motivation and its influence on other variables of this study. Of particular interest is the association with academic results.

In Chapter 2, I documented the general expectation from the literature that research indicates that students show the most positive achievement patterns when they are focused on mastery goals (or intrinsically motivated) (Meece, Anderman and Anderman 2006, p.491).

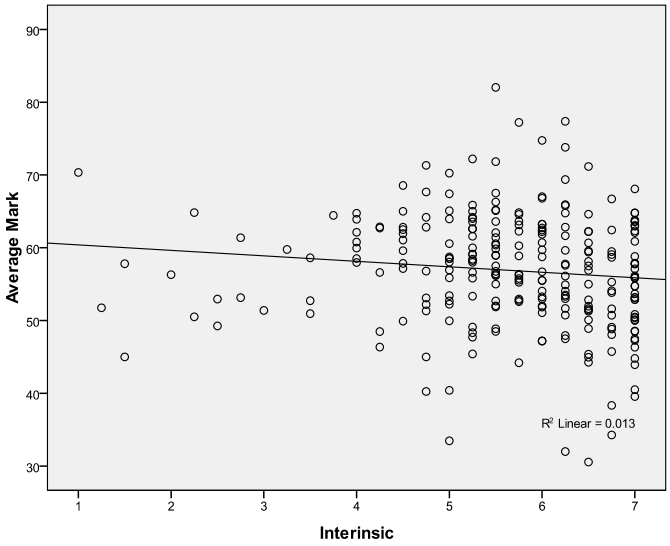
Before I start with this analysis, I would like to examine the associated data. Table 4.3.16, below, is the intrinsic score frequency distribution to the nearest digit. It shows the mean mark against each intrinsic group from 1–7. A number of observations can be made. Firstly, there seems to be no relationship between academic results and intrinsic motivation i.e. as intrinsic values increase there is no corresponding increase in results. In fact, when the intrinsic value is 7, the highest possible score, the corresponding mark average is 54.10 which is much lower than when the intrinsic value is 6.

	N	Mean	Std. Deviation
1	2	61.05	13.151
2	5	54.89	7.523
3	6	54.64	4.826
4	16	58.24	5.784
5	59	57.93	7.833
6	87	58.67	7.816
7	79	54.10	7.740
Total	254	56.90	7.845

Table 4.3.16 – Shows the results' frequency distribution for each intrinsic category.

Secondly, it is seems from the table that the respondents in this study are highly motivated intrinsically. Only 13 out of 254 respondents scored 3 or less in terms of the intrinsic motivation scale. This makes the group highly motivated and therefore it is difficult to determine the association between groups of differing levels of intrinsic motivation and academic performance. It could be argued that this could have been expected as the group was shown to be culturally homogenous and therefore is expected to be motivated in a similar degree. In order to examine the data statistically, I performed the correlation between average intrinsic score and results. It produced a Pearson correlation value of -0.104. The graphic representation of the data is shown in Figure 4.3.1 below.

Figure 4.3. 1 – Graphic representation of intrinsic values results.



It can be seen that there no relationship between intrinsic motivation and results. For a given intrinsic value a wide range of results are scored indicating no association between the variables in question. Similar correlation by gender, faculty and other variables in the study were obtained. However, since the culturally homogeneous group responded in similar manner to the questions they all more or less belong to the same group and the variation in results therefore must be attributed to other factors. This observation is not totally unprecedented in literature. "One intriguing anomaly in achievement goal research is the lack of strong relations between mastery goals and student achievement. Students who are master oriented report a desire to learn and to improve their abilities, yet this personal and classroom goal focus is generally unrelated to measures of academic performance, such as grades and test scores, when prior ability is controlled" (Meece, Anderman and Anderman 2006, p.499).

This suggests to an interesting conclusion. MSLQ typically expects that those with higher scores for intrinsic values would produce higher academic results. This is not shown to be the case in this study.

4.4.3 Extrinsic Motivation

In this section, I examine extrinsic motivation and its influence on other variables of this study. Of particular interest is the association with academic results.

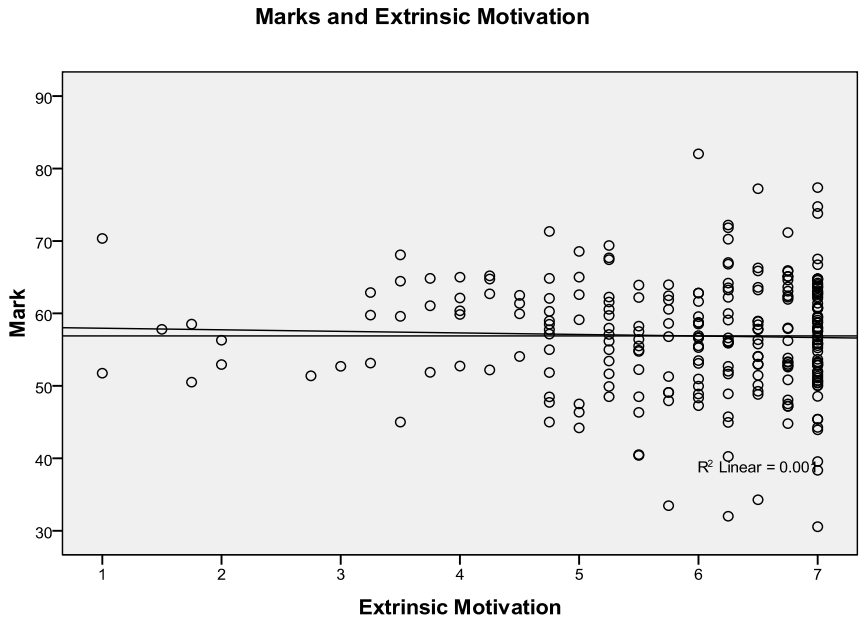
Table 4.3.17 reveals the findings for academic performance. As can be seen, it seems that there is no clear correlation between academic results and extrinsic motivation. Again, in a similar manner to the intrinsic motivation values discussed above, a majority of participants fall in the higher scales in their extrinsic orientation value.

Extrinsic Value	N	Mean	Std. Deviation
1	2	61.05	13.151
2	5	55.21	3.394
3	5	55.97	5.045
4	16	59.99	6.330
5	39	57.65	7.085
6	68	55.79	8.689
7	119	56.91	7.904
Total	254	56.90	7.845

Table 4.3.17 – Result against the corresponding extrinsic value.

The correlation between intrinsic values and results gave a Pearson correlation coefficient of -0.034. The graphic representation is shown in figure 4.3.2 below. As can be seen there is no relationship between marks and extrinsic motivation. Other tests for other ICT variables are not applicable for the same reason.

Figure 4.3. 2 – Mark vs. Extrinsic Motivation



Again as can be seen a wide range of marks are applicable for a particular extrinsic value indicating no correlation between the two variables.

4.4.4 Self-Efficacy

In this section, I examined self-efficacy and how it relates to results and other variables in this study.

In Chapter 2, ample and clear evidence was noted in the literature about self-efficacy and its relation with academic performance. Based on extensive previous research, it is clear that students' perceptions of their capabilities to meet situational demands are related to their performance, persistence, and choice. A vast body of research has focused on the relationship between self-efficacy and performance in various academic activities (Moos and Azevedo, 2009. p. 578). On the other hand Yi and Hwang (2003) in their research linked

self-efficacy with technology. They make reference to a concept called general computer self-efficacy (CSE) which is defined as an individual judgment of efficacy across multiple computer domains and application-specific. Self-efficacy is defined as an individual perception of efficacy in using a specific application or system within the domain of general computing (p. 434). In their research they talked about application-specific self-efficacy that exerts a significant effect on system use (p. 443). Is there an evidence to support what is expected in the literature with the findings in this study?

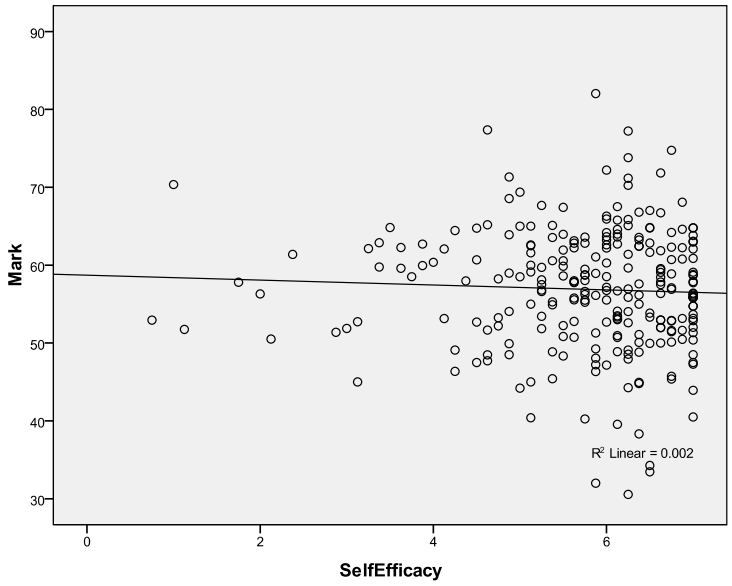
Table 4.3.18 shows the corresponding data regarding self-efficacy. As can be seen, it seems that there is no clear correlation that can be ascertained graphically between academic results and self-efficacy. Again, the majority of the participants scored towards the higher side of the efficacy scale i.e. 180 of the 254 of the participants or 70% belong to the 6 or 7 groups. This means that statistically there are no different groups that can be compared. It could be argued that the cultural influence is so dominant that it has created a homogenous group whose members all feel similar to one another and therefore could not be compared. In terms of correlation the Pearson correlation coefficient is -0.047 indicating no correlation between results and self-efficacy as represented in this study.

Self-Efficacy	N	Mean	Std. Deviation
1	3	58.35	10.411
2	4	56.50	4.526
3	7	55.11	6.626
4	13	58.56	5.713
5	47	57.42	7.887
6	102	57.04	8.627
7	78	56.25	7.338
Total	254	56.90	7.845

Table 4.3.18 Self-Efficacy and results

Graphically, the representation is shown in Figure 4.3.3. As can be seen, for a given self-efficacy value, a wide range of results are obtained indicating no possible correlation between the two variables.

Figure 4.3. 3 - Self-efficacy vs. marks graphical representation



The finding is similar to that of Cretchley (2007, p. 35) who found no evidence at all that computer confidence related to achievement on a wide range of course tasks, not even those that specifically required the use of technology. He therefore concluded that computer confidence may be a poor predictor of students' performance on course tasks (p.26).

4.4.5 Summary

In this section, the findings related to two pivotal variables of this study namely, culture and motivation as documented under sections 4.3 and 4.4 are summarized

- Section 4.3 demonstrated how students' attitude towards a series of questions such as "I think ICTs are essential for education" and "My family (friends) thinks ICTs are essential for ICTs" are closely aligned. It was noted that the former statement is a cognitive variable while the latter is a motivational one. Both of these are assumed to be influenced by the culture from which the student comes. The finding confirms Bandura's assertion (1977, p VII) that human behaviour (learning) is explained in terms of a continuous reciprocal interaction between cognitive, behavioural (motivation) and environmental (socio-cultural) determinants.

- This makes culture a very powerful force that must be taken into account when aiming to have effective and positive influence. At the outset of this study, culture was suspected to play a critical role in shaping the values, attitudes, thinking and ultimately the observable behavior (learning) of the students. The study has confirmed this fact and shown that the underlying current that shapes student behavior is indeed culture. This echoes the literature's finding such as Mansfield's where he explains that social goals, such as relationships, responsibility and status, have been shown to influence students' motivation and engagement in learning contexts (2007, p. 2). Bread and Senior (1980, p. 4) record similar findings with a special influence contributed from mothers, fathers and families in determining the levels of need for achievement motivation.

- A number of variables were identified as culturally oriented variables with the aim of examining their influence over the results and ICT usage. These included nationality and the language groups. In additions, responses to statements such as "what my family (or friends) think of ICTs for education (or employment)", were treated as cultural or social orientated variables. However, the examination of these variables and their associated responses demonstrated (section 4.2.3 above) a homogenous environment such that no meaningful differentiation could be established other than the fact that they predominantly responded in a

very similar manner to all of such questions. In terms of cultural influence on results therefore no differentiation could be found that influenced results or ICT usage. However, it was shown how these ideas have consequences in terms of level of usage, its quality and ultimately on academic performance. It was demonstrated that when a student feels strongly about ICTs, he/she uses it more frequently, more effectively and as such it is more likely to have an influence in terms of academic performance.

- More significantly, it was also demonstrated that strong support for ICTs has an indirect influence over the academic performance. This is supported by Wang and Newlin (2002, p. 160) who demonstrated the correlation that exists between self-efficacy for technology use and academic performance, i.e., students that showed confidence in their abilities to use technology also did well in their exams. Learner perceptions of personal efficacy, therefore, have a reciprocal relationship with the self-regulatory processes that affect motivation and performance (Lynch and Dembo, 2004)..

- In all areas where ICT use showed to have influence on results, the cultural variables also showed great support.

- Responses to the motivational questions such as intrinsic, extrinsic and self-efficacy were primarily scattered towards the higher end of the motivational scale (7) in the MSQL questionnaire. This could be yet another indication of the high level of cultural influence. As such these variables therefore could not be accurate predicators for academic performance or ICT usage. I therefore see evidence for a similar conclusion to that made by Kennedy (2002, p. 434) who found in his study in China. “Western ways of categorizing motivation … do not travel well, at least not to the Orient”.

- This high level of motivation for ICT use, for a student population that predominantly was not experienced with it, contradicts the finding from Bates and Khasawneh (2007, p. 188) who concluded that previous success with online learning systems may be a critical factor in the development of self-efficacy and attitudes about online learning system use. In contrast, this study found the respondents very confident to use the ICTs even though mostly inexperienced at first.

- Fortunately, therefore, there was no evidence in this study to support the concern expressed by Covington (1998, p. 44–47) that the main contributor to low academic performance and high dropout rates amongst some ethnic groups is their cultural background that inculcates values that are not conducive to high achievement in the minds and hearts of children. Indeed, the study recorded a high level of motivation that is influenced heavily by the cultural background which in turn affects positively the use of technology with a positive influence on academic performance.

- The cultural influence, is therefore by far is the most dominant variable and has a penetrating influence on all other variables. This confirms many assertions captured in this study such as McInerney, Hinkley and Dowson's (1998, p. 622) that academic achievement may be influenced by a complex array of motivational determinants related not only to students' mastery and performance goal orientation but also to their social goal orientation. In this study there is ample evidence that culture does provide such a predictable influence on motivation, ICT use, the learning process and therefore academic performance.

- The study also provides evidence for what the literature refers to as the "flow state". It was shown in psychological terms why students might be attracted to use computers. The challenge therefore, for an educational technologist, must be to facilitate a learning environment that takes advantage of this phenomenon.

- The study therefore provides evidence that ICTs can act as a motivational tool to accelerate learning in a disadvantaged student environment of higher learning.