

CHAPTER 4

RESULTS, INTERPRETATIONS, AND DISCUSSIONS

4.1 Introduction

The results of this study, their interpretations, and discussions are divided into the following two sections: Descriptive Statistics and Inferential Statistics Analyses of Relationships

4.2 Descriptive Statistics

4.2.1 Mean Scores of The Seven Categories of Computer Competency

The means of the seven categories of Computer Competency (CC) are shown in Table 4.1 below.

Table 4.1
Means, Standard Deviations, Medians, Minimums and Maximums of
Seven Categories of Computer Competency
(N = 186)

	BS	WP	DM	GR	PR	IN	MU
Mean	3.24	3.02	2.84	2.31	1.68	3.12	2.10
Std Deviation	1.18	1.10	1.03	1.01	0.96	1.29	1.25
Median	3.00	3.00	3.00	2.17	1.00	3.33	2.00
Minimum	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00	5.00

BS = Basic Skills

WP = Word Processing

DM = Data Management

GR = Graphics Presentation

PR = Programming

IN = Internet

MU = Multimedia

All the ranges of values are from 1 to 5 following the 5-point Likert scale. As explained in Section 3.4, the mean score of a category is obtained by averaging all the means of the corresponding subscales. For example, the mean score of Basic Skills is obtained by averaging the means of 3 subscales: 1) load and run a program; 2) format a new floppy disk and 3) copy a disk or computer file.

Table 4.1 shows that the highest means score of 3.24 is from the category of Basic Skills. This result is expected because the computer basic skills of copying a file, loading and running a program, formatting a floppy disk are necessary for beginners. It can also be seen that the means score, 3.12, of the Internet category is higher than that of the Word Processing category, 3.02. This indicates that generally the students' Internet usage is better than their word processing skills. In other words, Internet is more popular than word processing among the Form IV students in Sekolah Menengah Kebangsaan Subang Jaya (SMKSJ). This can be understood from the fact that student users like to communicate with each other using e-mail and also from the publicity of Internet projects promoted by the Ministry of Education. The general feeling is that if a person who has a computer and does not know how to use Internet, he is already 'behind time' or his computer is out-dated. The increasing use of Internet is reported world-wide. For example, Kenneth C. Green's 1997 Campus Computing Survey reported that almost one-third (32.8%) of all college-course students used e-mail in 1997 compared to 25% in 1996, and 24.8% drew on resources available on the Internet in 1997 compared to 15.3 % in 1996 (Green, 1997).

However, what was popular in computers in the eighties, i.e., programming, was found to be the most unpopular field among the sample students today as this was reflected in the mean score of 1.68 of this category, the lowest among the seven categories.

4.2.2 Mean Scores Based on the Three Independent Factors: Gender, SES and Ownership of Computers

The mean scores of CC are tabulated according to gender, SES and ownership of computers. The results are presented in Table 4.2a and Table 4.2b below:

Table 4.2a
Means, Standard Deviation, Medians, Minimums, Maximums of
Seven Categories of CC by Gender, SES and Ownership
(N = 186)

Category	Statistics	Gender		SES		Ownership	
		Boys	Girls	High	Low	Yes	No
Basic Skills	Mean	3.73	2.77	3.37	3.12	3.35	1.58
	Std Deviation	1.24	.89	1.15	1.15	1.13	.50
	Median	4.00	2.83	3.33	3.00	3.00	1.67
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	5.00	5.00	5.00	5.00	2.33
Word Processing	Mean	3.13	2.91	3.22	2.75	3.12	1.45
	Std Deviation	1.18	1.01	1.01	1.14	1.04	.75
	Median	3.13	3.00	3.25	3.00	3.00	1.25
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	5.00	5.00	5.00	5.00	3.50
Data Management	Mean	2.97	2.70	3.01	2.60	2.91	1.59
	Std Deviation	1.13	.91	.99	1.00	1.00	.66
	Median	3.00	3.00	3.00	3.00	3.00	1.50
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	5.00	5.00	5.00	5.00	3.00
Graphics Presentation	Mean	2.41	2.21	2.39	2.22	2.37	1.30
	Std Deviation	1.08	.92	1.00	.97	1.00	.43
	Median	2.33	2.00	2.33	2.00	2.33	1.00
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	4.67	5.00	5.00	5.00	2.00
Programming	Mean	1.86	1.51	1.76	1.56	1.72	1.09
	Std Deviation	1.05	0.82	.97	.91	.97	0.30
	Median	2.00	1.00	2.00	1.00	1.00	1.00
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	5.00	5.00	5.00	5.00	2.00

Table 4.2b
Means, Standard Deviation, Medians, Minimums, Maximums of
Seven Categories of CC by Gender, SES and Ownership
(N = 186)

Category	Statistics	Gender		SES		Ownership	
		Boys	Girls	High	Low	Yes	No
Internet	Mean	3.21	3.10	3.35	2.78	3.24	1.24
	Std Deviation	1.50	1.28	1.16	1.38	1.23	.62
	Median	3.67	3.00	3.67	3.00	3.33	1.00
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	5.00	5.00	5.00	5.00	3.00
Multimedia	Mean	2.13	2.06	2.13	2.10	2.15	1.27
	Std Deviation	1.33	1.16	1.25	1.25	1.26	.65
	Median	2.00	2.00	2.00	2.00	2.00	1.00
	Minimum	1.00	1.00	1.00	1.00	1.00	1.00
	Maximum	5.00	5.00	5.00	5.00	5.00	3.00

From Table 4.2a and Table 4.2b it can be seen that the minimum and maximum scores of 1.00 and 5.00 respectively were attained by both SES groups in all categories and also by both sexes in all categories except the Graphics Presentation. In this category, the maximum score attained by girls is 4.67.

The two table above also reveal that none of the non-owners of computers scored 5 in any category. The highest score of this group is 3.50 in the Word Processing category. Most of them obtained mean scores below 1.58, indicating that non-owners of computers are very poor in the skills concerned.

The mean scores of CC categories under the influence of the three factors of gender, SES, and ownership of computers will be discussed separately later in this chapter.

The mean Basic Skills score of boys is 3.73 with a standard deviation of 1.24 while that of girls is 2.77 with a standard deviation of 0.89. The *t*-test analyses show that these means are significant. The result indicates that boys score higher in Basic Skills of computer usage, which includes subscales of installing, loading and running a program, formatting and copying a floppy disk. Thus it can be said that boys, in general, have better computer basic skills than girls. In fact, the mean score obtained by boys in this category is the highest among the seven categories.

In the Word-processing category, boys and girls do not differ significantly in the mean scores. The boys scored a mean score of 3.13 with a standard deviation of 1.18 whereas the girls scored a mean score of 2.91 with a standard deviation of 1.01. The results suggest that boys and girls are similar in their word processing skills which include subskills such as producing a page of text, re-arranging the text, checking spellings and producing a number of typefaces.

In the category of Data Management, although the boys' mean score of 2.97 is slightly higher than the girls' mean score of 2.70, it has not reached the significant level. It can be said that boys and girls are similar in the data management skills which include the subskills of sorting and selecting data, and manipulating lists or tables of numbers.

Similarly, in the category of Graphics Presentation, boys and girls do not differ significantly in the mean scores. The *t*-values obtained are not significant. The result shows that boys and girls are similar in the graphic presentation skills which includes the subskills of producing or designing graphs or charts, using several well-known graphic programs such as Corel Draw, Adobe Illustrator and Auto Cad.

4.3.2 Influence of Socioeconomic Status on Computer Competency

Table 4.4 shows the *t*-test comparisons of the two means between the low and high SES groups and their corresponding significant levels being set at $p < .05$. In the sample of 186 subjects, there are 8 subjects who did not complete their SES (father's occupation) items, leaving the valid sample of only 178.

Table 4.4
The *t*-test Comparisons between Categories of CC and SES
(N = 178)

Category	SES	Mean	Std. Deviation	<i>t</i> value	Sig $p < .05$
Basic Skills	High	3.37	1.15	1.35	Non Sig
	Low	3.12	1.15		
Word Processing	High	3.22	1.01	2.80	Sig
	Low	2.75	1.14		
Data Management	High	3.01	0.99	2.60	Sig
	Low	2.60	1.00		
Graphics Presentation	High	2.39	1.00	1.11	Non Sig
	Low	2.22	0.97		
Programing	High	1.76	0.97	1.39	Non Sig
	Low	1.56	0.91		
Internet	High	3.35	1.16	2.96	Sig
	Low	2.78	1.38		
Multimedia	High	2.13	1.25	0.20	Non Sig
	Low	2.10	1.25		

It can be seen that the high SES group ($n = 115$), in general, obtained higher mean scores than the low SES ($n = 63$) group, particularly in the categories of Word Processing, Data Management, and Internet. The results of each category are discussed below:

The mean Basic Skills score of the high SES group is 3.37 with a standard deviation of 1.15 while that of the low SES group is 3.12 with a standard deviation of 1.15. The *t*-test analyses show that these means are not significantly different. The result indicates that both high and low SES groups are not different in basic skills

better in the data management skills which include the subskills of sorting and selecting data, and manipulating lists or tables of numbers. This can be explained by the fact that the new features of data management require high-end machines to operate. Thus, it is an advantage to the high SES group.

In the category of Graphics Presentation, the two groups do not differ much in the mean scores. The high SES group have a slightly higher mean score of 2.39 with a standard deviation of 1.00 whereas the low SES group have a mean score of 2.22 with a standard deviation of 0.97. The *t*-values obtained are not significant. This indicates that both groups have similar graphics presentation skills which includes producing or designing graphs or charts, using several well-known graphic programs such as Corel Draw, Adobe Illustrator and Auto Cad.

The mean score of 2.31 (Table 4.1) obtained in this category is relatively low compared to those of other categories. In other words, Graphics Presentation is not a popular field among the Form Four computer users of SMK SJ.

Similarly, in the category of Programming, the two groups do not differ significantly in the mean scores. The high SES group scored a slightly higher mean score of 1.76 with a standard deviation of 0.97 compared to the mean score of 1.56 and a standard deviation of 0.91 obtained by the low SES group. The *t*-values obtained are not significant. Table 4.4 shows that the mean scores of both SES groups in this category are the lowest among the seven categories of CC.

The results imply that programming skills of the sample students are independent of their SES. This can be explained by the fact that some simple programming languages such as BASIC and LOGO can be learned by users from high and low SES as they do not require high-end machines to operate.

correlation ($p > .001$) between these two variables. Thus, it can be said that the CC level of the students increases with their father's education level. In other words, father's education or SES is an important factor in influencing the child's CC level.

Certainly the CC level of a particular category are higher among the users of that category than the non-users. Thus the survey data of the CUUS concurs with the researcher's finding that CC of students increases with their fathers' education level.

4.3.3 Influence of Ownership on Computer Competency

Table 4.5 shows the *t*-test comparisons of two means between the computer owner group and the non-owner group and its corresponding significant levels set at $p < .05$.

Table 4.5
The *t*-test Comparisons between Categories of CC and Computer Ownership
(N= 186)

Category	Owner-ship	Mean	Std. Deviation	<i>t</i> value	Sig $p < .05$
Basic Skills	Yes	3.34	1.13	5.16	Sig
	No	1.58	0.50		
Word Processing	Yes	3.12	1.00	5.20	Sig
	No	1.45	0.75		
Data Management	Yes	2.91	1.00	4.34	Sig
	No	1.59	0.66		
Graphics Presentation	Yes	2.37	1.00	3.50	Sig
	No	1.30	0.43		
Programing	Yes	1.72	0.97	2.13	Sig
	No	1.09	0.30		
Internet	Yes	3.24	1.23	5.33	Sig
	No	1.24	0.61		
Multimedia	Yes	2.15	1.26	2.30	Sig
	No	1.27	0.65		

It can be seen that the Owner group scored significantly higher mean scores in all the categories than the non-owner group. The results strongly indicate that computer owners gain advantages over non-owners in CC levels. This can be explained by the fact that computer owners can access their home machines more easily and more frequently than non-computer owners.

The results also occur with the findings of Loyd et al. (1987) and Levin and Gordon (1989) that home ownership of computers helped in the development of computer competency. Underwood et al. (1994) also found that children's home computer experience was positively related to the computer competency techniques.

The data collected were analysed using SPSS 7.5 for Windows. In the analysis, descriptive statistics and the *t*-tests were used to generate the means of seven categories of CC and significant differences between categories of CC and gender, SES and ownership of computers.

The descriptive statistics comprising the means, standard deviations, medians, minimum and maximum scores of categories of CC were obtained. This was done to answer the first research question.

The second research question asked about the significant differences of categories of CC levels in relation to i) gender, ii) SES, and iii) computer ownership. To answer this question, The *t*-tests were used to analyse the data and obtain the means, standard deviations, medians, minimums and maximums, *t*-values and *p* (significant 2-tail) respectively for the three independent variables.

The findings of this study are grouped into two parts:

- a) Descriptive analyses
- b) The *t*-test Comparisons of CC based on gender, SES and ownership of computers.

5.2 Descriptive Analyses

From the descriptive statistics it was found that the levels of categories of CC in terms of Likert 5-point scale are:

- 1) Basic skill : 3.24
- 2) Word processing skill: 3.02

It can be said from the results that in most popular categories such as word processing and Internet, boys and girls do not show any significant differences.

5.3.2 Influence of Socioeconomic Status on Computer Competency

The *t*-test statistics reveal that the high SES group have higher means than the low SES group in the categories of Word Processing, Data Management, and Internet. These are popular software categories as can be seen from the relatively higher means obtained by the high SES group. This can be attributed to the better home facilities enjoyed by them.

The only exception to this finding is the high-mean category of Basic Skills, which does not require sophisticated software or hardware for operation. The skills in this category can be acquired by both low and high SES groups regardless of the type of machines they own. Both groups can master some basic computer operation skills such as copying and formatting a floppy disk, loading and running a program. So the mean scores of both groups do not differ much.

5.3.3 The Influence of Ownership on Computer Competency

The *t*-test statistics reveal a highly significant difference of CC levels between owners and non-owners of computers in all categories. As owners of computers can access their machines much more easily than non-owners, their long exposure to computers would help them to acquire more skills than the non-owners.

The results also show that the sample subjects filled in their perception of CC quite honestly.

5.5 Conclusions

It should be noted that the findings are restricted by the limitations mentioned in Section 5.4 above. The general findings can be summarized as follow::

- i) In general, the 186 sample students in Subang Jaya National Secondary School (SMKSJ) scored relatively high in Basic Skills, Internet usage, and Word Processing compared to other categories of CC. The lowest mean score among the categories is Programming which is 1.68 compared to the mean score of 3.24 of Basic Skills.
- ii) Boys, in general, obtained higher mean scores than girls in all categories. There are significant differences between boys and girls in:
 - a) Basic Skills
 - b) Programming
 - c) Multimedia
- iii) There are no significant differences between boys and girls in:
 - a) Word Processing
 - b) Data Management
 - c) Graphics Presentation
 - d) Internet
- iv) The high SES group, in general, scored higher mean scores than the low SES group in all categories of CC. There are significant differences between the high and the low SES in:
 - a) Word Processing
 - b) Data Management
 - c) Internet

- v) There are no significant differences between the high and the low SES groups in:
- a) Basic Skill
 - b) Graphics Presentation
 - c) Programming
 - d) Multimedia
- vi) There are significant differences between owners and non-owners of computers in all seven categories of CC with the owners scoring significantly higher than the non-owners.

5.6 Implications

From the findings, there are several implications for education in the future. As evidenced by the findings of the study, students' mean scores in computer basic skills, Internet and word processing were quite high compared to other categories. It is suggested that future implementation of computer projects based on elementary levels of computer basic skills, word processing and Internet usage in urban schools should be minimised, as the majority of these students are familiar with these fields. Focus of such programs should instead be made in rural schools where competency in these elementary skills are lacking.

As boys, in general, scored higher than girls in all categories of CC, future teachers of information technology (IT) in schools should pay more attention to girls in computer classes.

It is evidenced from the findings that the high SES group scored higher means than the low SES group in all categories of CC. This implies that students of low SES

should require more attention as far as IT education is concerned. Future implementation of computer education should aim to improve the CC levels of students from low SES background, particularly those schools from poor rural areas.

As computer owners scored significantly higher than non-computer owners in all categories of CC, it is recommended that parents of well-to-do families purchase computers for their children to improve their CC levels. As computers are becoming more affordable, they should be within the purchasing power of families with average incomes. Parents are encouraged to purchase personal home computers because they certainly increase the computer competency levels of children.

5.7 Recommendations for Further Research

This study focussed mainly on the CC levels and the influence of gender, SES and computer ownership on categories of CC which may provide some useful information to computer educators and curriculum planners. In view of Malaysian government intention to establish smart schools and Computer in Education Project all over the country, the CC levels of students may provide useful background information for educators to know the level of students' performance in the computer skills identified in this study. It is recommended that future studies should focus on the relationship between CC and academic achievement to ascertain whether computer usage can help to improve the children's academic performance in certain subjects. The results may be important to curriculum planners and computer educators.