A Comparative Study of Cognitive and Affective Outputs of Students with Computer Prior-Knowledge (CPK) and Students without Computer Prior-Knowledge in Their Computer Studies

Lockias Chitanana (Corresponding author)
Department of Educational Technology, Midlands State University
P. Bag 9055, Gweru, Zimbabwe
Tel: 263-773-533-758 E-mail: chitanana@yahoo.com

Musingarabwi Starlin
Mkoba Teachers College
P.O. box MK20, Mkoba, Gweru, Zimbabwe
E-mail: musingarabwi2000@yahoo.co.uk

Maeresera Jones
Mkoba Teachers College
P.O. box MK20, Mkoba, Gweru, Zimbabwe
E-mail: joemaeresera@breakthru.com

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Abstract

The study sought to establish the kind of computer prior knowledge (CPK) students in a teacher training college possessed before enrolling with college. It also analyzed the differences in students' cognitive and affective outputs in their computer studies between students with CPK and those without it. Participants were 168 students from a teachers' college (males = 63; females = 105; average age = 31; SD =6, 74). Data were collected using a structured survey questionnaire. Data were analyzed statistically using SPSS to determine differences in students' perceived computer self–efficacy (CSE) and academic performance in their computer studies between the two groups. Almost half the students were computer illiterate before joining college. A majority of students with CPK had little experience in using the computers prior to joining college while very few had computer qualification. Most of the students with CPK possessed basic computer hardware and software skills and a few others, higher order computer skills. The computer CSE of students without CPK compared badly with that of students with CPK. Both the groups of students experienced difficulties in learning advanced computer skills. Students with CPK displayed better performance in computers than students without it in a statistically significant manner. Hence results of this study confirm the importance of computer prior knowledge. This has implications on policy for running computer courses with respect to grouping students, effecting differentiated instruction and strategies for dealing with students' learning difficulties in the higher learning institution.

Keywords: Computer prior knowledge, Computer self efficacy, Cognitive outputs, Affective outputs, Computer skills

1. Introduction

House's (1988) prediction of the twenty-first century ultimately being characterized by exponential growth and rapid changes essentially based on information communication technology (ICT) has been fulfilled throughout most countries (including Zimbabwe) incorporating computer studies into their educational programmes with all students in Zimbabwe's teachers' colleges compulsorily learning computers. In line with the notion of computer

technology as a tool for improving the delivery of educational services and for making education an instrument of social change and development (Chitanana, 2009; Nziramasanga, 1999), University of Zimbabwe's Department of Teacher Education (DTE, 2006) committed itself to uplifting the standards and demands of teachers' college computer studies curriculum. It mandated that like all college curricula, computer studies be offered at first year degree level and all students must pass it with a minimum of 50%. Thus the curriculum demands students' mastery of computer skills at a high level. Despite their background in computers students are expected to learn the same curriculum at more or less the same pace and within the same study time frame.

Research evidence shows that students' general exposure to computers influences the degree of their success in mastery of skills to use the gadgets for various purposes at different levels of sophistication (Koc and Bakir, 2010). Some authors have also cited access to computers from an early age and continued exposure to computer technology in the home, school or work place as conditions that enhance students' ability to use computers with proficiency and confidence as they are pursuing formal academic computer learning programmes (Roth and Karsten, 1998, Koc and Bakir, 2010). These authors' observations conflict with findings of Isman and Celikli's (2009) survey which revealed that although some students had advance computer knowledge and possessed computers in the home, they still resisted computer usage and faced difficulties to improve and transfer their knowledge to the next levels in formal courses.

While students must learn the same curriculum at the same pace, within the same study period albeit their diverse computer background, research evidence highlight higher learning students' psychological estrangement and inertia emanating from the technological novelty in ICT, an innovation alien to most Third World populations' indigenous body of knowledge (Stean, 1988; Reinen and Plomp, 1997). Technophobia and consequent negative experiences with general usage of ICT, coupled with increased cognitive load imposed on students introduced to ICT at adulthood pose as a challenge to be dealt with in Zimbabwe's tertiary institutions (Chikasha, Tarugarira and Petegen, 2006). Policy's silence on selection criteria of students into computer courses in colleges manifests a disjunction between students entry characteristics or behaviours expected of the learner prior to the curriculum and the expectations demanded by the curriculum itself (Leithwood, 1981). It is for this reason and the foregoing problem that the significance of students' pre-knowledge of computers may be queried. Thus the question that arises is: "How do self-efficacy perceptions and academic performances of students with CPK and those without it compare in the learning of computers by students in a teacher training college?"

2. A Theoretical Framework

2.1 Ausubel's Cognitive Theory of Pre-existing Knowledge/Experience

In this study, the suggested theoretical framework for exploring the value of prior knowledge in the learning of computers in academic settings is informed by Ausubel's cognitive learning theory which posits that learning is a purposeful, meaningful activity (Frazer and Hugo, 1996; Ausubel, 2000; Woolflolk, Winnie, Perry and Shapka, 2010). The learner is a self-determining agent who actively learns and constructs new knowledge on the basis of what is already known to him or her (Frazer and Hugo, 1996)**.** For Woolfolk et al. (2010) Ausubel's theory incorporates learners' use of expository advance organizers to understand the upcoming information or unfamiliar learning materials. In practical learning situations, the computer student is an active learner who assimilates new information from data that are selected and interpreted according to his or her existing conceptual framework or cognitive structure. The learner also engages in accommodation, the act of modifying and reconstructing the schemata anchored on the already established cognitive structure to cumulatively form new concepts and skills.

Requisite to the learner's ability to form heuristic relationships between his or her prior learning experiences and new knowledge entailed in Ausubel's theory is meta-cognition, the knowledge and control a learner has over his or her thinking and learning (Frazer and Hugo, 1996; Topcu and Ubuz, 2008). Based on information processing and general intelligence theories (Pintrich, Wolters and Baxter, 2000) meta-cognition includes meta-cognitive judgments and monitoring and self-regulation and control of cognition. Mpofu (1996) argues that meta-cognitive strategies enable the learner to process information effectively, ultimately building up a serviceable knowledge base upon which higher order meta components are developed and consolidated. It is through meta-cognitive strategies that the learner develops "knowledge about knowledge" thereby regulating and controlling his/her dynamic learning processes (Mpofu, 1996). In practical terms this implies that the computer learner knows that, for example, simulation is better than memorisation and that when learning certain computer programmes the amount of time and effort spent on certain computer tasks must differ according to their complexity.

The influence of meta-cognition on students' learning of computers has been empirically investigated. A study by Topcu and Ubuz (2008) revealed that those students who had developed sound meta-cognitive strategies such as elaboration, rehearsal, organisation and mnemonics learned successfully the use of asynchronous communication

and displayed confidence in their computer studies, whether or not they had had prior computer knowledge before embarking on the course.

2.2 Self-efficacy and Computer Self-efficacy

The construct of self-efficacy (CSE) has increasingly continued to gain importance in explaining the extent to which individuals judge their ability to engage in a given task. Based on Bandura's social cognitive theory, self-efficacy is the belief one has capability to perform a task (Bandura, 1997). Being one's perceived self-confidence in the ability to carry out a certain task; self-efficacy plays a role in motivating someone to engage in sustained performance of the task, to have a positive attitude towards doing it and to do it well because one judges oneself as being capable (Selaledi, 2000).

Derived from the general concept of self-efficacy, computer self-efficacy (CSE) therefore refers to an individual's perceptions about his or her ability to use a computer to perform a computing task successfully (Compaen and Higgins, 1995 in Hasan, 2003). Thus being one's self-approval of one's ability to use a computer (Roth and Karsten, 1998, Chikasha, et al. 2006) computer self- efficacy also affects one's intentions toward future use of computers.

2.3 Previous Studies on Students' Cognitive and Affective Outputs in Computer Learning

Among a wide array of variables examined as antecedent factors to CSE beliefs, computer pre-existing knowledge has been reported to have a positive relationship with computer self-efficacy (Hasan, 2003, Koc and Bakir, 2010). Similar investigations on the relationship of CPK to CSE concluded that individuals with prior computer knowledge were more likely to evidence higher levels of CSE than individuals without such experience in the acquisition of additional computer skills in future courses (Harrison and Ravier, 1992, Hill, Smith and Mann, 1987 in Roth and Karsten, 1998). Research confirmed the positive relationship between specific computer prior knowledge and students' performance in computer training (Hasan, 2003; Chikasha, et al. 2006).

Research also identified learner variables such as well developed meta-cognition and intelligence (Topcu and Ubuz, 2008), students' conceptions of learning, learning strategies of students, students' perceptions of the computer learning environment and epistemological beliefs about the nature of knowledge (Chang, 2009) as critical. Chang (2009) further cites teacher variables such as teaching methods and the ability to motivate students as pivotal. The nature of a technological curriculum innovation in terms of its design, its content and instructional methods and the extent to which it celebrates social interaction and collaboration among students influence students' cognitive outputs when learning (Ferdig, 2006). Underscoring the role played by the nature and dynamics of a given social environment in which students are learning a new technology, Ferdig (2006) states that humans enter into a fundamentally social and natural relationship with computer technology to the extent that some individuals get angry with computers and act spitefully towards them (Ferdig, 2000 in Ferdig, 2006).

While the above findings on students' learning of computers were obtained in the developed world, it should be noted that there are no studies conducted to explore the influence of CPK on students' cognitive and affective outputs in an African teacher training college. We are cognizant of the ambiguity in the definition of the construct computer prior knowledge noted in previous studies (Hasan, 2003) and the meanings attached to it by different researchers in different countries. In this study we conceptualised and operationalised computer prior knowledge to denote (a) computer experience, that is, the period of time students had used a computer before joining college and qualifications earned before college, (b) three broad categories of skills/knowledge students possessed before joining college viz: hardware and software, application skills and internet skills, each of which contains specific, discrete items.

3. Goals of the Study

The general research question previously stated leads to the following research questions and null hypotheses:

3.1 Research Questions

1) What computer prior knowledge did the students possess before enrolling with college?

2) Is there any difference in students' perceptions of their computer self-efficacy between students with CPK and those without it?

3) Which aspects do students with CPK and those without it find most difficult in their computer studies?

3.2 Hypothesis

Ho_1: There is no significant difference between students' average performance in computer studies for the students with prior knowledge of computers and students without it.

4. Methodology

4.1 Participants and Setting

The participants in the study were a sample of 168 students from a teachers' college in Zimbabwe (males= 63, females= 105, mean age = 31, SD= 6.74). This was a convenience sample of second year teacher education students in the Early Childhood Development (ECD) section. ECD students typically undergo a computer studies course in the first 3 terms of their teacher education course during which they cover their computer studies curriculum.

4.2 Data Collection Tools

A structured questionnaire which contained sections on (i) respondents demographic information, (ii) computer prior knowledge and (iii) knowledge and skills assessing their self-efficacy was used. The section on CSE had 21 items to which students responded, rating themselves on a five point Likert scale calibrated as, "5= strongly confident; 4=confident; 3= fairly confident; 2= not confident and 1= strongly not confident. A pilot study was conducted with 50 similar respondents. The questionnaire was also analyzed by experts in computer studies for validity. In the present study the internal consistency reliability of the instrument for items on self-efficacy (28 to 48) was 0.90. Through document analysis we extracted the sampled students' marks from a mark profile to analyze their performance in three assignments.

4.3 Procedure

Approval to conduct this research was obtained from the management of the higher education institution. Data were collected from participants who returned the questionnaires by hand post after completing them during their own time. Through document analysis the marks for the three assignments of the chosen participants were collected. The students individually consented to participate. Confidentiality and anonymity were stressed to the participants.

4.4 Data Analysis Procedure

Using the SPSS.Version 18 package, Descriptive statistics, t- tests and reliability co-efficient were employed. Statistical analysis was conducted

5. Results

5.1 Computer Prior Knowledge (CPK) Possessed by Students

Tables 1, 2, 3 and 4 below show results of the constituent components of students' computer prior knowledge (CPK) conceptualised and operationalised in this study, while Tables 5 and 6 show data on CSE and difference in performance between students with CPK and those without it respectively.

Insert Table 1

Table 1 shows that 50.6% of the respondents indicated that they had some prior-knowledge of computers before joining college while 49,4% said they did not have any knowledge or skills on how to use a computer.

Insert Table 2

Table 2 above shows that of the 85 students who claimed to possess some computer prior-knowledge, the majority of them (57.6%) had little experience in using computers in the home, school or workplace (2-4 years), while 38,8% had used computers for 5-9 years. Very few students (2.4%) had used computers for more than 10 years before joining college.

Insert Table 3

A sizeable number (41.2%) of the students with CPK had no formal qualification in computers, while 35.3% indicated that they had a computer literacy certificate. A few students had tertiary qualifications in computers, that is, national certificate, national diploma and higher national diploma, while one had a degree in Computer Science.

Insert Table 4

Table 4 presents results on the knowledge or skills students who claimed to possess some computer prior-knowledge had before joining college. Data on the skills and knowledge are categorised as items 7- 12 (hardware and software skills), items 13-20 (application skills) and items 21-27 (internet skills).

Regarding the kind of computer knowledge or skills students possessed before joining college, the data in Table 4 shows that the majority of them (ranging from 80% to 95%) possessed basic skills of hardware and software viz: knowledge of computer hardware and software, switching on the computer, shutting down the computer;

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keyboarding and playing recreational and educational games. A good majority of the students with CPK (80%) had gained the application skill of word processing experience while a considerable majority (more than 50%) in each case possessed the higher order application skills of spreadsheet experience, database experience, using email and using search tools. It is notably evident from the results on Table 4 that of the 85 students with CPK, an insignificant number of them had mastered the higher order skills namely; web page construction (28.2 %), using newsgroups (29,4%), graphics experience (31,8%), multimedia applications (40%) and file management using an operating system (41,2%).

5.2 Computer Self-Efficacy

The results that appear in Table 5 show the confidence ratings of students with computer prior knowledge and students without any computer prior knowledge before joining college. The results show that students without CPK experience lack of confidence in almost all areas of using computers. However, the students showed some degree of confidence in a few basic computer skills such as working on a personal computer (microcomputer), Switching the computer on (mean 3.98), shutting down the computer (mean 3.75) and working with the keyboard (mean 3.54). Students without CPK indicated that they had huge challenges in almost all advanced computer skills (mean <3).

Insert Table 5

Consistent with previous research findings students with CPK expressed higher levels of confidence in the basic lower order computer knowledge or skills of switching on the computer, shutting down the computer and working with the keyboard shown by means 4.56; 4.53; 4.12 respectively, than their counterparts whose means on the same knowledge/skills areas were 3.98; 3.75 and 3.54 respectively. The students without CPK thus expressed confidence in the same basic lower order computer knowledge/skills areas as those students with it. A close scrutiny of Table 5 also shows that generally the mean values for both the groups of students are declining as the computer skills become more and more complex and that those students without CPK expressed lack of confidence in the basic skills of working with Microsoft Windows operating system (mean 2.93). While students with CPK expressed confidence in using search tools (mean 3.14) students without CPK were not confident in the skill (mean 2.35). Generally differences occurred in the confidence levels of learning some basic computer skills as well as advanced skills between students with CPK and those without it, with the latter's self-efficacy comparing badly in advanced skills. However both the groups of students expressed lack of confidence in the higher order skills. (See Table 5).

5.3 Students' Areas of Difficulty

Results in Table 5 indicate students' areas of difficulty gleaned from their confidence levels in using the computer for various purposes. Students without CPK experienced difficulties in almost all areas of using the computer. The areas of difficulty for these students range from working with computer software, playing recreational and educational games, through working with database packages to using the internet for identifying learning opportunities. Students without CPK thus faced huge challenges in almost all advanced computer skills (mean <3). Students with CPK found the learning of advanced computer skills difficult. The most difficult ones included working with computer graphics applications (mean, 1.98); working with multimedia applications (mean, 2.06); using newsgroups (mean, 2.11); accessing information via CD ROM and constructing a web page (mean, 2.14).

5.4 Students' Performance in Computer Studies

An average score of three tests in computer studies written during the first two terms when students were in college was used to compare the two groups of students' performance in the area. Table 6 shows the computed t-test results to determine whether there was any significant difference in performance between the two groups.

Insert Table 6

A t-test was run to determine whether a significant difference in computer studies existed between students with CPK and those without. At 0.05 significance level and using a two tailed test, for the group of students the obtained t value (5,038) was greater than the tabulated t which is 1.993. Thus the null hypothesis (HO_1): There is no significant difference between students' average performance for the students with prior knowledge of computers and those without it, is rejected. This means that students with CPK performed better than those without it in a statistically significant manner.

6. Discussion

Results of this study revealed that a majority of students who were currently pursuing the computer studies curriculum at a teacher training college had not had any prior exposure to computers. Yet, exposure to the

relatively new technology which is alien to most Third World populations' indigenous body of knowledge (Stean, 1988; Reinen & Plomp, 1997) serves as a cognitive structure on which heuristic relationships are formed between what students already know or are familiar with and incoming information (Frazer & Hugo, 1996; Topcu & Ubuz, 2009). It sounds quite tricky for students to start learning a new technology requiring advanced cognitive skills for the first time in their adulthood. This scenario has been linked with the phenomena of technophobia and negative experiences with general computer usage (Chikasha, Tarugarira & Petegem, 2006). Getting introduced to computer literacy at adulthood has implications on how one student will master a computer curriculum at the same pace with a student with CPK and meet its academic demands comparably well. Conversely in this study students with CPK showed a comparably higher level of confidence, hence had a greater level of readiness and were thus expected to learn about computers faster than their counterparts. This is consistent with Harrison and Ranier's study (1992) and a study by Hill, Smith and Mann (1987) in Roth & Karsten (1998) which concluded that individuals with CPK were likely to experience higher computer self-efficacy than those without it in the acquisition of additional skills in future courses.

Findings of this study also revealed that most of those students with CPK had little experience in computer usage and generally no meaningful computer qualifications. A question arises as to the extent of the usefulness of the rudimentary skills towards the mastery of a higher level curriculum. The quality of exposure to computers of students with CPK in terms of the regularity and amount of practice at home, school or workplace prior to and during their current studies is yet a different thing altogether. This may explain the complexity of underlining the comparability of the cognitive and affective outputs for the two groups of students. The fact that students with CPK also experienced difficulties with advanced computer skills in more or less the same way as their counterparts (see Table 5), seems to point to this observation. However, the fact that statistically significant differences in academic performance occurred between students with CPK and those without it further underlines the value of CPK, and so the current findings concur with previous studies in reaffirming its significance (Roth and Karsten, 1998). The fact that both the groups of students faced difficulties in higher skills despite their CPK seems to suggest that other antecedent variables identified in previous studies could also play a significant role in the students' learning of computers. For example, the nature of the curriculum, the amount of social interaction and collaboration among learners (Ferdig, 2000), students' general intelligence (Pintrich, Wolters and Baxter, 2000), meta-cognition (Mpofu, 1996; Topcu and Ubuz, 2008; Frazer & Hugo, 1996), play a crucial role in successful learning of computers.

When computer students employ meta-cognitive strategies such as rehearsal, orgainisation elaboration and mnemonics, they demonstrate the ability to learning how to learn and self-consciously examine their mental processes, displaying the agility to make correct inferences relevant to unique, situational computer skills. Students can only evolve to meta-cognitive levels of discovering new insights of computer usage through access to computers in the home and at college for ample rehearsal time, engaging in constant practice to improve their short-term memory. It is through practice that computer students ultimately develop automaticity in various computer skills. Ample access to computers can engage students in constant self-exploration and reflection, where they can employ elaboration-expanding and embellishing on already mastered computer information to solve emerging computer problems (Topcu and Ubuz, 2008). The expanded or elaborated information can be related to other concepts already anchored in the pre-existing knowledge structures. This taps into the meta-cognitive strategy of organisation. According to Frazer and Hugo (1996) this meta-cognitive strategy entails students organising or ordering subject matter, determining their own learning styles and methods (of certain computer skills) and forming meaningful associations between new information and pre-existing information to construct a serviceable knowledge base (Mpofu, 1996). Ultimately the students develop their own mnemonic devices to recall computer operations, thereby aiding both the acquisition and retrieval of learned computer skills for use as and when needed. Over and above, as much as it is contingent upon tertiary institutions offering computer courses to develop in their students the combination of meta-cognitive strategies, so is it incumbent upon students themselves to learn how to learn or think how to think. This way they will be able to apply their strategic knowledge to particular situations in their computer courses.

The other issue that emerges is the presumptions curriculum developers make when crafting the college computer curriculum vis-à-vis students' prior knowledge. On this note Leithwood (1981) emphasises the value of students' entry characteristics in the learning of a new curriculum. In addition to pedagogical skills which teachers who shall teach students how to use computers should possess are basic computer literacy skills to be included in the curriculum. It sounds inconceivable to expect students to make effective use of computers in their own learning and for teaching purposes when they are unable and not confident to use for example the internet.

The findings of this study, while useful, are limited by a number of aspects most importantly in terms of the construct validity of the construct computer prior knowledge and the sample size. Although we operationalised

CPK as a multidimensional concept containing several components, we were by virtue of the brevity of this study not able to analyze the sub-variables such as the varied computer experiences and qualifications earned before joining college for comparing them among students with CPK themselves. The sample was confined to only one teacher training college and therefore the findings cannot be generalised to all higher institution colleges, though they may be analogous to similar settings.

7. Conclusions and Recommendations

Findings of this study revealed that almost half of the sampled students lacked computer prior knowledge while those who claimed to possess it had little experience and low qualifications in using computers before embarking on the college computer curriculum. The fact that those students with computer prior knowledge expressed greater self-efficacy and performed better than those without it in a statistically significant manner underlines the importance of computer prior knowledge. Since almost half of the sampled students lacked CPK they entered college computer illiterate. This suggests the reason why their performance compared badly with that of their counterparts in a statistically significant manor. It can thus be concluded that together with much lower performance levels, their lower self-efficacy levels in low order computer skills logically links with their computer illiteracy. Although the importance of CPK is reaffirmed in this study, what also seems to essentially account for how well students with CPK compare in performance and self efficacy with their counterparts could be the quality of CPK possessed by the later. If the CPK is of the barest minimum quality it may stand to reason why both the groups of students experienced difficulties in higher order skills in more or less same way. However other antecedent variables could also play a crucial role in the learning of computers. Both students with computer prior knowledge and those without it experienced learning difficulties in higher order computer skills, with programming using computer language being a conspicuous skill where no significant differences occurred.

The forgoing conclusions have implications for a number of recommendations. The importance of CPK evidenced by the statistically significant difference in performance and lower computer self-efficacy between the two groups of students necessitates the for the college to group students according to their different levels of CPK as a way of managing differentiate teaching. The college could consider offering an orientation training that bridges the gap between students with CPK and those without it before they study the college computer curriculum. Though potentially useful for this higher education institutions findings may lead to further research in all colleges with a view to uncovering additional variables that may influence students' learning of computers.

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Table 1. Data on students' possession of CPK (n=168)

Status of CPK	**Frequency**	**Percentage (%)**
Had CPK	85	50.6
Had no CPK	83	49. 4
Total	168	100

Table 1 shows that 50.6% of the respondents indicated that they had some prior-knowledge of computers before joining college while 49.4% said they did not have any knowledge or skills on how to use a computer.

Table 2. Data on computer experience (n=85)

Length of time using computers before joining college	**Frequency**	**Percentage (%)**
Less than a year	1	1.2
2-4 years	49	57.6
5- 9 years	33	38.8
More than 10 years	2	2.4
Total	**85**	**100**

Table 2 above shows that of the 85 students who claimed to possess some computer prior-knowledge, the majority of them (57.6%) had little experience in using computers in the home, school or workplace (2-4 years), while 38.8% had used computers for 5-9 years. Very few students (2.4%) had used computers for more than 10 years before joining college.

Table 3. Data on computer qualifications (n=85)

Qualification	**Frequency**	**Percentage (%)**
No Certificate	35	41.2
Computer Literacy Certificate	30	35.3
National Certificate	11	12.9
National Diploma	7	8.2
Higher National Diploma	1	1.2
Any other Qualification	1	1.2
Total	**85**	**100**

A sizeable number (41.2%) of the students with CPK had no formal qualification in computers, while 35.3% indicated that they had a computer literacy certificate. A few students had tertiary qualifications in computers, that is, national certificate, national diploma and higher national diploma, while one had a degree in Computer Science.

Table 4. Data on computer knowledge/skills students possessed before college (n= 85)

	Item	**Frequency**	**Percentage**
7	Knowledge of computer hardware	78	91.8
8	Knowledge of computer software	75	88.2
9	Switching on the computer	81	95.3
10	Shutting down the computer	81	95.3
11	Keyboarding	77	90.6
12	Playing recreational and educational games	71	83,5
13	Word processing experience	68	80.0
14	Spreadsheet experience	50	58.8
15	Database experience	49	57.6
16	File management using an operating system	35	41.2
17	Graphics experience	27	31.8
18	Multimedia applications	34	40.0
19	Information access via CD-ROM	41	48.2
20	Programming experience	38	44.7
21	Using email/mailing lists	47	55.3
22	Using the World Wide Web	43	50.6
23	Using search tools	47	55.3
24	Using newsgroups	25	29.4
25	Obtaining and using files	41	48.2
26	Web-page construction	24	28.2
27	Identifying learning opportunities using internet	40	47.1

Table 4 presents results on the knowledge or skills students who claimed to possess some computer prior-knowledge had before joining college. Data on the skills and knowledge are categorised as items 7- 12 (hardware and software skills), items 13-20 (application skills) and items 21-27 (internet skills).

Table 5. Data on Computer Self- Efficacy

Category		Students with CPK		Students without CPK	
No.	**Item**	**Mean**	**SD**	**Mean**	**SD**
28	Working on a personal computer (microcomputer).	3.78	0.89	3.02	1.05
29	Working with computer Software, e.g. Microsoft windows	3.69	0.94	2.93	1.02
30	Switching the computer on	4.56	0.59	3.98	0.95
31	Shutting down the computer	4.53	0.70	3.75	1.15
32	Working with the keyboard	4.12	0.80	3.54	1.10
33	Playing recreational & educational games on a computer	3.35	1.31	2.51	1.17
34	Typing a letter using a word processor	3.95	1.05	2.83	1.17
35	Working on a spreadsheet	3.25	1.29	2.47	1.18
36	Working with Database packages such as MS Access	3.13	2.44	2.22	1.07
37	Using an Operating system to management files	3.79	1.25	2.16	1.05
38	Working with computer graphics applications	2.47	1.32	1.98	0.96
39	Working with multimedia applications	2.58	1.22	2.06	1.00
40	Accessing information via CD-ROMs	2.75	1.30	2.14	1.07
41	Programming using a computer language	2.59	1.27	2.25	1.39
42	Using Email/Mailing Lists	2.81	1.30	2.30	1.17
43	Using World Wide Web	2.99	1.27	2.31	1.05
44	Using Search Tools	3.14	1.12	2.35	1.12
45	Using Newsgroups	2.62	1.10	2.11	1.42
46	Obtaining and Using Files	2.96	1.16	2.31	1.18
47	Constructing a webpage	2.68	1.26	2.14	1.23
48	Identifying learning opportunities using the Internet	3.33	1.20	2.63	1.25

The results that appear in Table 5 show the confidence ratings of students with computer prior knowledge and students without any computer prior knowledge before joining college.

Table 6. Data on differences between students with CPK and students without CPK with regard to performance in computer studies (n=168)

Category	**Group of students**	**N**	**X**	**t**	**p**
Performance in Computer Studies	Students with CPK	85	67.6	5,038	0.00
	Students without CPK	83	62.3		

$P < 0.05$

A t-test was run to determine whether a significant difference in computer studies existed between students with CPK and those without.