

Original Research Article

A STUDY OF THE EFFECTIVENESS OF AN INTRODUCTORY COMPUTER COURSE ON STUDENTS' PERFORMANCE AND ATTITUDE

ABSTRACT

The objective of this paper is to determine whether the introductory computer course in Preparatory Year Program (PYP) influences students' performance and attitude towards computer studies in Qassim University, Saudi Arabia. The instrument employed for examining the attitude towards computer studies is Computer attitude scale (CAS) by Loyd and Gressard. A questionnaire is prepared for investigating students' perceived computer skills. This paper is an analysis of the computer attitudes and skills of all students enrolled in PYP. Measures were taken at two points during the course: at the beginning of the course and at the end of the course. A paired sample t-test is applied using SPSS, version 21 to find the significant difference in the attitude and skills. This study concluded that in computer knowledge, and in promoting positive attitudes towards computer skills, the PYP program achieves significant increases in these areas. The course proved to effectively improve students' attitude and skills.

Keywords: Preparatory Year Program, Computer attitude Scale, Questionnaire, Paired Sample t-test, SPSS.

1. INTRODUCTION

At many Universities in Saudi Arabia, it is compulsory for the students to do a one-year program called Preparatory Year Program (PYP) after they finish high school. The Preparatory Year Program (PYP) acts as a bridge between the students' high school education and university study. The main goal is to enhance the students' English language skills to the level required in freshman courses conducted in English. The English program is sharply focused on what the students will need to achieve for their success in freshman studies and beyond. It is not a general English program but also focuses on English for Academic Purposes (EAP). Based on PYP merits, students can opt for differing specialties like computer science, Pharmacy, or limited medical specialties, or course available to female students at Qassim University.

There are some specific reasons, which lead to decline in enrollment of female students in Computer Science College. For investigating those reasons, computer attitude and skills are examined at the beginning and at the end of the introductory computer course in PYP. According to the Bureau of Labor statistics [4], computer and information technology are two of the fastest growing occupations globally for both gender. However, still many institutions are experiencing declines in enrollment in computer science programs [6, 14 and 15]. Thus, the present study was initiated to determine the attitude and skills of female students towards computers during the introductory course in PYP. The aim was to study the effect of this introductory course on female students' attitude and performance.

2. LITERATURE SURVEY

Computer technology is increasing at a very high pace. In fact, it has revolutionized both teaching and learning process and computer science studies/technology has received increasing attention by many educators in recent years. Commitment is required from both students and teachers to integrate computers in the teaching and learning process. Students' attitude towards computer study should be positive to enhance learning computer skills. Hong, Ridzuan and Kuek [16] found that students with better basic computer skills generally have more positive attitudes towards the use of computer for learning purposes. Shaft et al. [27] explained the Reliability assessment of the attitude towards computers instrument (ATCI). The computer is a very important learning tool for the growth and development of a student's career. Students must have an optimistic attitude towards computer study and should be aware of the rapid changes in technology. Divine and Wilson [9] explained that developing a positive attitude among students is more important than increasing computer skills because a positive attitude will automatically lead to the improvement of computer skills.

Many researches [8, 19, 24 and 26] showed the importance of attitudes for learning when using new technologies. Aiken [2] defined attitude as a "learned predisposition to respond positively to certain objects,

situations, institutions, concepts or persons”. Loyd and Gressard [19] divided computer attitude into four subscales: 1) computer anxiety 2) computer confidence 3) computer liking and 4) computer usefulness. Dusick [10] also defined attitude as “an evaluative disposition based upon cognition, effective reactions, behavior intentions, and past behaviors which can influence future cognitions, effective responses, intentions, and behaviors”.

Dalton and Goodrum [7] found that those who studied programming had improved problem skills and attitudes towards computers over a control group with no programming offered. Koohang [18] investigated the effect of experience in programming and spreadsheets on attitudes towards computer studies. Farkas [11] proved that there is a statistically significant decrease in positive attitudes towards computer studies as a result of learning programming. This paper describes a study conducted at Qassim University, Saudi Arabia that was done as an experimental attempt to assess the effectiveness of the introductory course on the attitude and performance of female students.

Research Objectives of our study are:

- To find the effectiveness of the introductory course on the attitude towards computer study of the female students in Saudi Arabia.
- To find the effectiveness of the introductory course on the general performance of the female students in Saudi Arabia.
- To investigate reasons which led to a decline in enrollment of female students in Computer Science College after PYP.

3. THE INTRODUCTORY COURSE

The students study two main Computer Science Courses at Qassim University. The First Course is “CSC105” that students study in the first semester of their preparatory year program. The CSC105 course includes all the basic subjects of Computer Science, i.e. PC Basics, Windows and Microsoft Office Suite (MS Word, MS PowerPoint, MS Excel and MS Access). The objective of the course is to prepare students for freshman science courses taught in English by emphasizing knowledge of the essential concepts of IT. Students should be able to use a personal computer and common computer applications at a recognized level of competence. In the 2nd Semester of their preparatory year, students study CSC111 course, i.e. Programming in Java language. Programming language is one of the most important tools used to communicate with a computer. In addition, among all the programming languages, Java is most widely used. Billions of devices are using Java applications. The objective of this course is to provide an introduction and fundamental concepts of programming, algorithmic thinking, and computational problem solving. The programming language Java is used to introduce basic programming techniques. Students will gain some proficiency with the programming techniques, and the skills and tools necessary for computing practices. (Appendix 1 & 2)

4. METHODOLOGY

4.1 Sampling Procedure and Sample

The participants of the study were 172 female students enrolled in PYP of Qassim University, Saudi Arabia. Data collection was done by distributing and collecting the survey before and after the course. The present survey study was done with the help of Likert type questionnaire, comprising mainly of three sections. The first section was related to general information; the second section was comprised of Loyd Gressard Computer Attitude Scale (Appendix 3); and finally, Perceived Computer Skills were assessed in the third section. (Appendix 4)

In order to investigate the effect of the introductory computer course (CSC105 & CSC111), measures were taken at two points during the course: at the beginning and at the end. The questionnaire was given to students in six groups of the computer literacy course with three different instructors. Participants in six groups were examined by CAS and computer skill assessment at each time point.

4.2 Instrumentation

Demographic information of participants were taken in the first section of the questionnaire. The second section, Computer Attitude Scale (CAS) was used to measure attitudes towards computers acquired by Loyd and Gressard (1984) [19]. CAS is an instrument measuring four aspects, each of which depicts one subscale of the CAS: (i) Computer Anxiety subscale, (ii) Computer Confidence subscale, (iii) Computer Liking subscale and (iv) Computer Usefulness. Score value of each subscale consists of 10 questions with choices measured on a 5 point Likert Scale (strongly agree, agree, neutral, disagree and strongly disagree). Thus, subscore values can range from a low of 10 to a high of 50. Similarly, total score of attitude can range from a low of 50 to a high of 200. The higher the score indicates a more positive attitude towards computer studies. Loyd and Gressard [19] reported high reliability (Cronbach's alpha) on the total score (.90). High reliability (.95) and stable factorial validity was reported by Christensen and Knezek [5]. Nash & Moroz [23] also yielded similar high internal consistency scores.

The third section is Perceived Computer Skills scale (PCSS) which was adopted from the study carried out by Abdul Malek (1999) [1] and Tengku Ariffin (2005) [3]. Perceived computer skills can be defined as students' beliefs or perceptions about to what extent they can use a computer skillfully. Participants have to assess themselves with respect to general computer literacies like writing documents, scanning documents, sending messages, printing documents etc. PCSS is a five point Likert scale ('Not well at all' to 'very well') consisting of 13 items. Score value in PCSS can range from a low of 13 to a high of 65.

4.3 Statistical analysis

Subscore value of each subscale of CAS and total score were analyzed at the beginning and end of the course. To measure the overall effect of the course on students' attitudes and skills, Paired sample t-test was used to compare the subscale score and total score at the beginning and end of the class. Results were formulated using the Statistical Packages (SPSS IBM, version 21). The level of significance (alpha level) was set at .05.

5. RESULTS AND FINDINGS

5.1 Effect of the introductory course on attitude towards Computers

Attitudes towards computers were compared with respect to four aspects of CAS from the beginning to the end of the course. Comparing the total score of CAS, we see an overall significant increase ($t(171) = -27.797, P = .000$) [see Table 2].

Table 1 & 2 reveal that there was a significant increase in computer anxiety and confidence with maximum mean difference from the beginning to the end of the course. However, there was a significant increase in computer usefulness but with less mean difference. Students realized the importance and usefulness of computer study before the course also, but students became more confident and optimistic towards computers by the end of the course.

Table 1: Paired Sample Statistics

Subscale	Course point	Mean	S.D
Computer anxiety	Beginning	29.12	5.44
	End	39.26	4.21
Computer confidence	Beginning	28.47	4.38
	End	39.35	4.02
Computer liking	Beginning	34.16	4.20
	End	41.65	4.28
Computer usefulness	Beginning	36.31	4.70
	End	42.28	4.82
CAS total Score	Beginning	128.05	12.07
	End	162.53	12.81

Table 2: Significant increase- t-test comparing attitude from the beginning to the end of the course

Subscale	Compares course effect	t	df	Sig. (2 tailed)	Mean difference
Computer anxiety	Beginning-End	-26.697	171	.000	-10.13
Computer confidence	Beginning-End	-23.025	171	.000	-10.88
Computer liking	Beginning-End	-20.208	171	.000	-7.49
Computer usefulness	Beginning-End	-17.653	171	.000	-5.97
Total Score	Beginning-End	-27.797	171	.000	-34.48

5.2 Effect of the introductory course on Performance

Performance was compared with the help of PCSS at the beginning and end of the course. A paired sample t-test was conducted to evaluate whether a statistically significant difference existed between the PCSS scores before and after the course. Assumption testing indicated no gross violation of assumptions. The results of the paired sample t-test were significant, $t(171) = -28.358$, $P = .000$ [see Table 4], indicating that there is a significant increase in PCSS scores from the beginning (Mean = 55.67, S.D = 6.07) to the end (Mean = 55.67, S.D = 5.04) [see Table 3].

Table 3: Paired Sample Statistics

PCSS	Course point	Mean	S.D
Score	Beginning	44.44	6.07
	End	55.67	5.04

Table 4: Paired Sample t-test

PCSS score	t	df	Sig. (2 tailed)	Mean difference
Beginning-End	-28.358	171	.000	-11.24

6. DISCUSSION AND CONCLUSION

In order to prepare the students to face the challenges of the modern world, Qassim University introduced the computer course in PYP (Preparatory year program). PYP is a yearly program where the students study all basic subjects including Computer Science. The course includes Computer Basics, MS Office Windows' and Java programing. The objective of the introductory computer course in PYP is to introduce students to the basic computer concepts and programming skills so as to provide a base for further learning and taking computer as a major subject at college. In other words, students are introduced to a new subject which will encourage them to enhance their academic progress. An additional objective is to investigate into the effectiveness of the course on the attitudes and skills of the students towards computer course.

The course seems to be successful in creating a positive attitude towards computer study and also in developing computer skills in our students. Thus, students' positive attitude increased throughout the study and revealed that the course is very effective. Generally, the results showed that students exhibited positive responses in all the four aspects of computer attitudes, which are: anxiety, confidence, liking, and computer usefulness. The students had a moderate level of confidence but a high level of perception toward computer usefulness and liking at

the beginning of the course. This revealed that students have positive awareness of the importance of computer studies and this awareness continued to increase more so by the end of the course.

Rozell & Gardner, (1999) [25] showed that experience and familiarity might improve people's perceptions about their computer skills and consequently improve their attitudes towards computer. Similarly, results have been shown by previous studies by Garland & Noyes (2004) [13], Gao (2005) [12], Teo (2006) [28] that experience and perceived usefulness have a strong correlation with attitude. Also, Abdul Malek (1999) [1] revealed in his study that computer knowledge, interest in computer technologies, and attitudes toward computers are some of the variables that are related to computer skills. Accordingly, results of the present study proved that familiarity with the course improved the computer skills and attitudes of the female students at Qassim University, Saudi Arabia. However, female students do not often take computer science as a major subject after they complete PYP. In addition to providing computer literacy, this one-year computer course is also used for recruiting students into the CS major after PYP.

One of the major reasons for not showing an enthusiastic attitude towards computer may be the lack of career opportunities for Saudi women in Saudi Arabia or due to the cultural restrictions. However, the Saudi Government has made a considerable effort to promote the gender inequality and to ensure women's equal access to education. Even then, the fields of education, training and jobs for women are limited as the specializations available to them do not match with the needs of the labor market. Another reason of the decline in enrollment in CS major may be the portion of syllabus of the Java programming part of the course which students study in the 2nd semester at PYP. Also, students find programming too hard and uninteresting. Generally, students use computers just for recreational-type of activities like gaming and chatting on the Internet. Instead, purposeful searching of the education websites should be encouraged and activities which lead to the learning of computer skills like spreadsheet and programming must be emphasized.

The third reason tends to be the lack of female role models in the computer field in Saudi Arabia. McGrath & Thurston (1992) [22] showed that one of the factors contributing to the gender gaps in computer skills is the lack of female role models in the computer world. Parents should play an important role in encouraging female children to gain experience in using computers and take CS as major.

Finally, it is concluded that learning computer concepts in an introductory course contribute significantly to students' attitude toward computers. Hence, a continuous effort has to be taken to develop the confidence of the students in the use and potential of computers.

7. FUTURE WORK

Future studies could focus on the attitudes of male students towards computers at Qassim University, Saudi Arabia. Another possibility is to study at the programming skills of the students and investigate strategies after maintaining or increasing them. Results of previous studies have not been consistent with regard to the relationship of gender and attitudes towards computers and computer skills. In view of gender segregation in the education system in Saudi Arabia, future research can be done on gender differences in computer attitudes and skills.

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252 **Appendix 1: CSC105 Syllabus**

253 **CSC105 Syllabus breakdown**

254 *Textbook ICDL 5.0 Course, Cheltenham Courseware Pty. Ltd. 2010.*

255	Week#	Section	Topic
256	Week 01	1.1	Hardware
257		1.2	Software
258		1.3	Computer Performance
259	Week 02	1.4 & 1.5	Memory &Data Storage
260		1.6	Input and Output Devices
261		1.7 & 1.8	Networks & Data Transfer Terminology
262	Week 03	1.9	The Internet
263		2.1 & 2.2	A first look at Windows 7 & The Windows 7 Desktop
264		2.3 & 2.4	Applications & Windows Explorer
265	Week 04	2.5 & 2.6	Manipulating folders & Manipulating files
266	Week 05	2.7 & 2.8	Compressing files & Printing Issues
267		3.1 & 3.2	The Microsoft word 2010 screen &
268			Starting to use Microsoft Word 2010
269	Week.06	3.10 & 3.11	Tables and using Graphics within Microsoft Word
270		3.12	Printing Word Document
271		4.1 & 4.2	Using Excel & Selection techniques
272	Week 07	4.3	Manipulating Rows and Columns
273		4.4 & 4.5	AutoFill & Worksheets
274		4.6 & 4.7	Alignment Formatting & Number Formatting
275	Week 08	4.8 & 4.9	Freezing row and column title & Formulas
276		4.10	Functions
277		4.11	Charts
278	Week 09	4.12	Printing Issues
279		5.1 & 5.2	Using PowerPoint & Creating a Presentation
280		5.3, 5.4 & 5.5	Manipulating Slides, Themes, Text Boxes
281	Week 10	5.6 & 5.7	Graphics &Manipulating Graphics
282		5.8	Organization Charts
283		5.9 & 5.10	Slides Shows & Printing
284	Week 11	6.1	Database Concepts
285		6.2	Tables, Fields and Field Types
286		6.3	Field Properties
287	Week 12	6.4 & 6.5	Manipulating Tables and Records & Primary Keys
288		6.6 & 6.7	Filtering &Sorting
289		6.8	Relationships
290	Week 13	6.9	Forms
291		6.10	Queries
292		6.11	Reports

293 **Appendix 2: CSC111 Syllabus**

294 **CSC111 Syllabus breakdown**

295 *Textbook: Rogers Cadenhead, Sams Teach Yourself Java in 24 Hours, Sams Publishing (6th edition), 2012.*

296	Week#	Chapter	Topic
297			(including Q & A, Workshops and Activities)
298	Week 01	1	Becoming a Programmer
299	2	Writing	Your First Program
300	Week 02	3	Understanding How Java Programs Work
301	Week 03	4	Storing and Changing Information in a Program (I)
302	Week 04	4	Storing and Changing Information in a Program (II)
303	Week 05	4	Storing and Changing Information in a Program (III)
304	Week 06	5	Accepting Input from User
305	Week 07	6	Using Strings to Communicate (I)
306	Week 08	6	Using Strings to Communicate (II)
307	Week 09	7	Using Conditional Tests to Make Decisions (I)
308	Week 10	7	Using Conditional Tests to Make Decisions (II)
309	Week 11	8	Repeating an Action with Loops (I)
310	Week 12	8	Repeating an Action with Loops (II)
311	Week 13	9	Storing Information with Arrays (I)
312	Week 14	9	Storing Information with Arrays (II)

313

314 **Appendix 3: Loyd & Gressard Computer Attitude Scale (CAS)**

315 Below are a series of statements. There are no correct answers to these statements. They are designed to permit you
 316 to indicate the extent to which you agree or disagree with the ideas expressed. Circle the best describes how you feel
 317 about that statement

318 1=Strongly Disagree (SD)

319 2=Disagree (D)

320 3=Undecided (U)

321 4=Agree (A)

322 5=Strongly Agree (SA)

323			SD	D	U	A	SA
324	1.	Computers do not scare me at all.	1	2	3	4	5
325	2.	I am no good with computers.	1	2	3	4	5
326	3.	I would like working with computers.	1	2	3	4	5
327							
328							
329							

330							
331	4.	I will use computers many ways in my life.	1	2	3	4	5
332							
333	5.	Working with a computer would make me	1	2	3	4	5
334		nervous.					very
335							
336	6.	Generally, I would feel OK about trying a		1	2	3	4
337		new problem on computer.					5
338							
339	7.	The challenge of solving problems with computers	1	2	3	4	5
340		not appeal to me.					does
341							
342	8.	Learning about computers is a waste of time.	1	2	3	4	5
343							
344	9.	I do not feel threatened when others talk		1	2	3	4
345		about computers.					5
346							
347	10.	I do not think I would do advanced computer work.	1	2	3	4	5
348							
349	11.	I think working with computers would be enjoyable	1	2	3	4	5
350		stimulating.					and
351							
352	12.	Learning about computers is worthwhile.		1	2	3	4
353							5
354	13.	I feel aggressive and hostile toward computers.		1	2	3	4
355							5
356	14.	I am sure I could do work with computers.	1	2	3	4	5
357							
358	15.	Figuring out computer problems does not appeal		1	2	3	4
359		to me.					5
360							
361	16.	I will need a firm mastery of computers for my future	1	2	3	4	5
362							work.
363	17.	It would not bother me at all to take computer	.	1	2	3	4
364		Courses.					5
365							
366	18.	I am not the type to do well with computers.	1	2	3	4	5
367							
368	19.	When there is a problem with a computer run		1	2	3	4
369		that I can't immediately solve, I would stick with					5
370		it until I have the answer					
371							
372	20.	I expect to have little use for computers in my		1	2	3	4
373		daily life.					5
374							
375	21.	Computers make me feel uncomfortable.	1	2	3	4	5
376							
377	22.	I am sure I could learn a computer language.	1	2	3	4	5
378							
379	23.	I do not understand how some people can spend	1	2	3	4	5
380		so much time working with computers and seem					
381		to enjoy it.					

382	24. I cannot think of any way that I will use computers in	1	2	3	4	5
383	my career.					
384						
385	25. I would feel at ease in a computer class.	1	2	3	4	5
386						
387	26. I think using a computer would be very hard	1	2	3	4	5
388	for me.					
389						
390	27. Once I start to work with the computer,	1	2	3	4	5
391	I would find it hard to stop.					
392						
393	28. Knowing how to work with computers will	1	2	3	4	5
394	increase my job possibilities.					
395						
396	29. I get a sinking feeling when I think of trying	1	2	3	4	5
397	to use a computer.					
398	30. I could get good grades in computer courses.	1	2	3	4	5
399						
400	31. I will do as little work with computers as possible.	1	2	3	4	5
401						
402	32. Anything that a computer can be used for, I can	1	2	3	4	5
403	do just as well some other way.					
404						
405	33. I would feel comfortable working with a	1	2	3	4	5
406	computer.					
407						
408	34. I do not think I could handle a computer course.	1	2	3	4	5
409						
410	35. If a problem is left unsolved in a computer	1	2	3	4	5
411	class, I would continue to think about it					
412	afterward.					
413						
414	36. It is important to me to do well in computer	1	2	3	4	5
415	classes.					
416						
417	37. Computers make me feel uneasy and confused.	1	2	3	4	5
418						
419	38. I have a lot of self-confidence when it comes to	1	2	3	4	5
420	working with computers.					
421						
422	39. I do not enjoy talking with others about	1	2	3	4	5
423	computers.					
424	40. Working with computers will not be important	1	2	3	4	5
425	to me in my life's work.					

426 Appendix 4: Computer Skills Scale

427	1=Not Well At All (NWAA)
428	2=Not Very Well (NVW)
429	3=Slightly Well (SW)
430	4=Well (W)
431	5=Very Well (VW)

432	Computer Skills Scale		NWAA	NVW	SW	W	VW
433	1. Write documents	1	2	3	4	5	
434	(Reports,articles,letters,etc)						
435							
436	2. Prepare spreadsheets(grades,budget,etc)	1	2	3	4	5	
437							
438	3. Scan documents or images	1	2	3	4	5	
439							
440	4. Edited images		1	2	3	4	5
441							
442	5. Prepare slides for presentation		1	2	3	4	5
443							
444	6. Send messages via electronic mail	1	2	3	4	5	
445							
446	7. Create web pages	1	2	3	4	5	
447							
448	8. Upload documents on the World Wide Web	1	2	3	4	5	
449							
450	9. Search for the information on the web		1	2	3	4	5
451							
452	10. Use software for computer assisted learning	1	2	3	4	5	
453							
454	11. Print document		1	2	3	4	5
455							
456	12. Create database	1	2	3	4	5	
457							
458	13. Write computer programs	1	2	3	4	5	