

Student-teachers' ICT Skills and their Use during Placement Related to Pre-Service Teacher Education Program at Yarmouk University in Jordan

Tariq Jawarneh and Ayed El-Hersh *

Received Date: Dec. 1, 2004

Accepted Date: Jun. 1, 2005

Abstract: Identifying Pre-service teachers' Information and Communication Technology (ICT) skills and the degree to which they apply these skills in their teaching is a vital issue both to inform future planning and to implement new ICT in educational systems in Jordan and worldwide. This study investigates ICT skills of student-teachers at Yarmouk University in Jordan and their degree of ICT use in practice schools during the first semester of 2003/2004 academic year. Data were obtained via questionnaires with a random sample of the (90) student-teachers and interviews with a random sample of (40) student-teachers. In addition, interviews with all teacher trainers (22) at Yarmouk University were conducted to further triangulate findings from student-teachers' questionnaires and interviews. Regarding ICT skills the results showed that student-teachers possessed low to moderate ICT skill levels. With regard to the degree of ICT use at practice schools, results from the questionnaires showed congruency between student-teachers' ICT skills level and the degree to which they apply these skills. However, results from the interviews indicated lack of ICT skills used by student-teachers during their teaching practice. Lack of adequate training at the university, lack of access to ICT resources, teacher-trainers' inability to model the use of ICT in their teaching and inability to incorporate ICT in teaching were among the factors that affected student-teachers' ICT use at practice schools. **(Keywords:** Information and Communications Technolog Skills, Teacher Education).

Introduction:

The use of ICT has caused substantial changes for teaching and learning. It is bringing about opportunities for educators as it can provide powerful support for educational innovations. Nonetheless, getting to grips with ICT skills and its related applications in real teaching-learning situations creates formidable challenges for teachers and teacher educators. They need not only to learn the skills of using ICT, but also to learn how to design innovative instruction through an integration of ICT with curriculum and teaching experiences at schools. Reasonably, for undergraduate students who are prospective school teachers, they should be well prepared to use ICT in education.

مدى امتلاك طلبة التربية العملية في جامعة اليرموك لمهارات تكنولوجيا المعلومات والاتصالات ودرجة ممارستهم لها خلال فترة التطبيق العملي الخاصة ببرنامج إعدادهم معلمين قبل الخدمة
طارق جوارنة وعاید الهرش، كلية التربية، جامعة اليرموك.

ملخص: إن الكشف عن مدى امتلاك طلبة التربية العملية لمهارات تكنولوجيا المعلومات والاتصالات ودرجة ممارستهم لها في المدارس المتعاونة قبل الخدمة أمر ضروري من أجل التخطيط المدروس لعمليات إدخال تكنولوجيا المعلومات والاتصالات إلى النظم التربوية في الأردن وعلى المستوى العالمي. لذلك هدفت هذه الدراسة إلى الكشف عن مدى امتلاك طلبة التربية العملية في جامعة اليرموك لمهارات تكنولوجيا المعلومات والاتصالات ودرجة ممارستهم لها في أثناء التطبيق العملي في المدارس المتعاونة وذلك خلال الفصل الأول من العام الدراسي 2004/2003. تم جمع البيانات بوساطة استبانة بناها الباحثان وتم تطبيقها على عينة عشوائية من طلبة التربية العملية تكونت من (90) طالباً وطالبة. كما تم إجراء مقابلات مع عينة عشوائية أخرى تكونت من 40 طالباً وطالبة. وأجريت مقابلات مع كل مشرفي التربية العملية في جامعة اليرموك والبالغ عددهم 22 مشرفاً. أظهرت نتائج الدراسة المنبثقة عن الاستبانة أن مدى امتلاك طلبة التربية العملية لمهارات تكنولوجيا المعلومات والاتصالات تراوح بين ضعيف ومتوسط، وفيما يتعلق بمدى استخدامهم لهذه المهارات في التطبيق فقد دلت النتائج على أن هناك انسجاماً بين مدى امتلاكهم لهذه المهارات وبين درجة استخدامهم لها في مدارس التطبيق. ودلت النتائج التي تم الحصول عليها من خلال المقابلات أن هناك قصوراً كبيراً فيما يتعلق بمدى استخدامهم لمهارات تكنولوجيا المعلومات والاتصالات في أثناء فترة التطبيق العملي. وكان نقص التدريب المناسب في الجامعة، وصعوبة الوصول إلى مصادر تكنولوجيا المعلومات والاتصالات، وعدم استخدام مشرفي التربية العملية لهذه المهارات في التدريس وعدم قدرة طلبة التربية العملية أنفسهم على دمج هذه المهارات أثناء التطبيق، من أبرز العوامل التي أثرت في درجة استخدامهم لهذه المهارات (الكلمات المفتاحية: اعداد المعلمين، مهارات تكنولوجيا والاتصالات).

Studies conducted in the field of pre-service teacher education unveiled numerous weaknesses on the part of teachers graduating from teacher education programs at universities with regard to the knowledge of the ways of ICT use in their professional practice (Gibson, 2002; Cuckle et al, 2000; Murphy and Greenwood, 1998). Student-teachers who are being prepared to enter the teaching profession, upon fulfilling the requirements of the teacher preparation program at Yarmouk University, are required to possess basic computer skills as well as how to apply these skills in various teaching-learning situations. They need to see the importance of planning, designing and implementing computer-based instructions in their classroom when they finally become teachers. The Jordanian Ministry of Education (MOE) stipulates teachers are required to have considerable knowledge and teaching ability in a full range of ICT skills within their specialist subjects; they

* Faculty of Education, Yarmouk University, Irbid, Jordan.
© 2005 by Yarmouk University, Irbid, Jordan.

should be able to demonstrate understanding and classroom use of ICT and need to experience its use in school (MOE, 1988; MOE, 2003). These MOE stipulations have been recently accentuated in all the documents presented to Jordan-UK ICT in education conference (MOE, 2004).

In considering these requirements, it was decided to assess student-teachers' ICT skills and the degree to which student-teachers use these skills in their teaching practice at school. In addition, this study will attempt to identify factors that inhibit the use of ICT at schools and the university. To the best of the researchers' knowledge, there is no prior study that investigated student-teachers' ICT skills and the degree to which they apply these skills in their teaching in Jordan. Therefore, this research will contribute to the body of the literature in Jordan and other countries with regard to the use of ICT in education. It will also assist MOE and the teacher education institutions to make informed decisions regarding the use of ICT in education. More effective use and improved outcomes are dependent on an increased understanding of the training needs that contribute to student-teachers' development. It is timely, therefore, to examine student-teachers' current stage of development and the needs which they themselves express in relation to moving forward with ICT.

Objectives of the Study: The researchers attempted to accomplish the following objectives:

- 1- Assess student-teachers' ICT level of competence.
- 2- Assess student-teachers' degree of ICT use during their teaching practise at school.
- 3- Identify factors that student-teachers and their trainers believe to be the greatest barriers to implementing ICT in the Jordanian schools.

Related Literature: Information and Communications Technologies (ICT) has great potential to aid teachers to adapt to their new role as the facilitators of the learning process (Al-Far, 2003; Altawalbeh, 2003; Dede, 1997). For instance, teachers' inquiry can be facilitated with the help of computers as it provides access to vast amounts of information. Through the use of E-mail, user groups, and other online forms student-teachers will have the opportunity to communicate and share their experiences with a much wider range of colleagues and experts in their fields of specialisms. The World Wide Web can facilitate teachers' access to digital libraries and vast amounts of information in printed, visual and video form. Video conferencing offer the teachers the opportunity to observe other teachers in different countries as they implement similar curriculum areas and learn from their expertise (Gibson, 2002). Nonetheless, the use of ICT cannot be fully effective unless teachers receive adequate training and support (Al-Far, 2002; Salameh & AbuRaya, 2002; Altawalbeh, 2003; Resta, et al, 2002). Their skills and competencies should be continuously updated to keep current with the most recent innovations in this area so they can transfer these competencies to students (Resta, et al, 2002 ; Reid, 2000). To enable teachers to make full use of ICT,

pre-and in-service teacher training institutions should undertake a more active role with regard to teacher education and training that goes beyond the development of basic ICT literacy skills to educationally oriented training on ICT. This entails that teacher educators and trainers should model the appropriate use of ICT in the delivery of the curriculum of teacher education and training programmes inasmuch as teachers are required to incorporate ICT into their own teaching at schools. Matthew et al (2002) examined the benefits of one-on-one coaching for teacher educators by technology coaches as they worked together to learn to use technology. Results from the study indicated that coaches as well as teacher educators benefited from the relationship and both groups increased their technology competency.

The identification of teachers' information technology skills is a prerequisite for developing the existing pre-service teacher education program and designing future professional development training for in-service teachers.

Studies conducted in the field of pre-service teacher education unveiled numerous weaknesses on the part of teachers graduating from teacher education programs at universities with regard to the knowledge of the ways of ICT use in their professional practice (Gibson, 2002; Cuckle et al, 2000; Murphy and Greenwood, 1998). Watson (1997) investigated pre-service teachers' views on their information technology education. The results indicated that many student-teachers were inadequately prepared for teaching ICT in schools and had low self-ratings of competency and negative feelings about it. Cuckle et al (2000) surveyed the years' cohort of 427 student-teachers in 63 partnership secondary schools in the UK by means of two self-rating checklist questionnaires. The results showed that much of the student-teachers' ICT experience had been gained during their undergraduate studies or at home. They also had considerable enthusiasm for learning more ICT skills and using them in their future careers as teachers. The researchers also found that students were not always able to transfer their ICT skills to use in the classroom.

Collaboration between schools and universities is a crucial factor for successful implementation of pre-service teacher education programmes (Resta et al, 2002). Such collaboration provides an opportunity to pre-service teachers to interconnect theory with practice. Asan (2002) examined benefits of a collaborative work between the Faculty of Education at Karadeniz Technical University and basic education schools in Turkey. Pre-service teachers were assigned to complete a computer project, which was intended for use to support classroom lessons. As a result of this collaborative work, pre-service teachers and classroom teachers practiced the development of instructional materials and the integrating of technology in subject content areas. In addition, they became more comfortable with the technology and developed greater

proficiency in their computer use. In line with this argument, McDougall and Squires (1997) suggested that teachers learning alongside students might provide a fruitful means of teachers' professional development, within a framework of curricular changes and integration of IT into and across existing curricula.

Student-teachers who are being prepared to become teachers should realise the efficacy and see benefits of ICT with regard to the enhancement of teaching/learning situations. Russell et al (2000) reviewed results from an Australian study, which was conducted to establish baseline information about teachers' experience and skills in information technology. Results from the study revealed that although there is a general agreement among teachers regarding the importance of ICT for their students and for their own professional development, significant areas of deficit were identified. Teachers saw themselves as competent with basic computer skills, but were less confident with activities requiring advanced use of computers. In addition, teachers reported low levels of confidence in their knowledge of information technology developments.

Computer literacy is an important key factor that can assist student-teachers to utilise the course activities successfully during pre-service teacher education programmes. In line with this argument, Resta et al (2002) contend that for education to reap the full benefits of ICTs in learning, it is essential that pre-service and in-service teachers have basic ICT skills and competencies. Baki (2000) analysed an undergraduate course related to a teacher education programme. The researcher gathered data through questionnaires and students' writings about the course activities. Findings indicated that students who felt prepared, made the link between computer-based mathematical activities and school mathematics, and had more experience of using instructional software during the course than others. Similarly, a low level of competence among pre-service teachers in Canada was identified in a study conducted to assess prospective student-teachers' performance regarding the use of the Internet in teaching (Hewitt et al, 2002). The results indicated that pre-service teachers had little previous experience facilitating student-led investigations, and often attempted to direct student research. Prospective English teachers held optimistic views regarding ICT use in education. However, they expressed frustration due to the lack of opportunity to make full use of it (Goodwyn, et al, 1997).

Lack of ICT related facilities and opportunities that allow student-teachers to make full use of ICT can have serious negative consequences on their competencies. Murphy and Greenwood (1998) identified three main obstacles that limited the successful implementation of pre-service teacher education programmes – student access to computers, the ICT policy adopted by initial teacher training providers and the lack of encouragement for students to use ICT in teaching practice.

The learning environment in which ICT is used requires certain facilities and resources that should be made available for effective delivery of teacher education programmes. Facilities include basic infrastructure such as electrical wiring, Internet access, lighting, air-conditioning, and space, in addition to various types of technological devices from computers with peripherals, video equipment, and specialised tools like digital microscopes. Further resources including various types of software as well as traditional tools like books, videotapes, and audiotapes, should be made available for student-teachers (Resta et al, 2002; Gibson, 2002).

ICT is an ever changing area that requires continuous updating of related equipment and tools in addition to continuous updating of teachers' ICT-related skills.

Methodology: This study utilised two types of data collection instruments, questionnaires and interviews.

Questionnaires: In this study the researchers surveyed the semester cohort of 237 students participating in the practicum teaching programme at Yarmouk University. A random sample of 90 (38%) student-teachers was given a self-rating questionnaire containing two checklists towards the end of their teaching experience in schools during the academic year 2003-2004. All subject specialties (i.e Maths, Science, English, Arabic, Islamic Education, Social Studies and class teachers (covering all subject areas) were covered. Student-teachers were asked about the following :-

1. Gender
2. Subject specialty.
3. Type of school (i.e. private or public).
4. Self- assessment of overall competence and in a range of ICT applications (e.g. word processing, databases, spreadsheets, CD-ROMs, the Internet, etc).
5. The degree of use of ICT during their teaching practice at schools.

Two open-ended questions were placed at the end of the questionnaire requiring student-teachers to indicate any ICT related skill/skills they possessed that was/were not included in the checklist and to provide their personal opinion regarding motivation and enthusiasm to use ICT related skills in teaching.

The questionnaire used in this study was developed by the researchers based on their experience in the field of ICT in education. A panel of experts was used to establish content validity for the instrument. Members of the panel were selected because of their experience in ICT in education, expertise in instrument development, expertise in the use of statistics, and expertise in translating the English language into the Arabic language and vice versa. The panel examined all statements for appropriate language and word usage and made suggestions about item terminology to enhance clarity and brevity. To ensure the internal consistency for the questionnaire, the Cronbach's Alpha coefficient formula was used, and the coefficient was found to be 0.90. To analyse the data gathered from student-teachers, mean scores and standard deviations were

computed for responses to each item on the questionnaire. The survey took the form of a self-rating questionnaire with tick boxes requiring a response on a scale from 1-3 for both the level of competence and the degree of ICT use in schools. Such a self-rating scale is widely used in evaluative studies throughout the social sciences.

Interviews:-

The data gathered through the survey questionnaire were complemented by means of follow-up semi-structured interviews with student-teachers. A random sample of 40 student-teachers was drawn from across the various subject specialisms.

Following student interviews, all teacher trainers were interviewed to further explore issues highlighted by students and to triangulate the findings of the questionnaire and student-teachers' interviews.

Data Analysis

The responses which required a tick response were coded numerically and entered on an SPSS database.

The t-test was used to determine statistically significant differences attributed to 'gender', 'speciality' and 'type of school' variables on the responses of the participants. For qualitative data analysis there was no single ideal approach to analysing qualitative data, (McMillan and Schaumacher, 1997) so the researchers contrived to find a suitable pattern for the analysis within the general framework of approaches suggested in the research books and guided by the research objectives of the present study. With regard to the semi-structured interviews they were first tape recorded and then transcribed for analysis. The reliability of transcripts was examined by the interviewees themselves who ascertained that they were consistent with their views. None of the interviewees reported inconsistency between his views and the content of the transcript. The initial analysis of the interview data suggested several categories which were used as basis for the interpretation of the data. In addition, it was possible to provide frequencies and percentages for many of the issues in the identified categories (Patton, 2002 and Cohen et al, 2000).

Results

With regard to student-teachers' level of competence in ICT, the group of respondents was segmented into three categories: low, moderate and high. Student-teachers who possessed a low level of competence in ICT were those whose average mean of responses on ICT skills is less than 1.5. When the average mean of responses of the participants fell between 1.5 and 2.5, student-teachers were considered as having moderate ability with regard to ICT skills. Student-teachers were considered as having a high level of competence where those whose average mean of their responses was more than 2.5.

The results indicated that the average mean of responses did not fall in the high level of competence category for all the ICT skills in the questionnaire. Table (1) lists the ICT skills where student-teachers felt they possessed

moderate ability in terms of the means and standard deviations.

Table 1: Means and standard deviations of the ICT skills which student-teachers felt they moderately possessed ranked in a descending order

No.	Item (ICT Skills)	Ability Level	
		M	SD
1	Use of various computer software programs	2.00	0.64
2	Loading software programs into computers	1.64	0.68
3	Proper use of ICT related terminology in teaching subject specialty	1.68	0.67
5	Knowledge of ICT use in the development of the local society	1.76	0.64
6	Knowledge of computers and their peripheral devices (printer, scanner, ...)	1.92	0.74
11	Use of word processing software	2.00	0.70
12	Use of computers to create data bases	1.79	0.71
14	Use of E-Mail	1.96	0.86
15	Use of the Internet as a teaching learning resource	2.07	0.70
16	Use of computers to create electronic slides	2.01	0.79
17	Use of computers to promote professional productivity	1.76	0.71
18	Use of the Internet to promote professional productivity	2.09	0.76
19	Utilization of audio and video conferencing to promote professional productivity	1.56	0.66
20	Use of computers to enhance teaching-learning process	1.90	0.70
21	Use of computer peripheral devices (scanners, printers, data shows, etc.) to enhance teaching learning process	2.07	0.78
22	Utilization of electronic audio and video conferencing to enhance teaching learning process	1.71	0.62
23	Proper use of ICT related devices and programs in various teaching learning situations	1.91	0.65
24	Adherence to the legal standards pertaining to the use of ICT (especially the Internet) in teaching	1.80	0.72
25	Use of ICT to promote the idea of life long learning	2.14	0.74
26	Evaluation of instructional software programs	1.66	0.69
27	Implementing instructional activities derived from research and studies found on the Internet	1.71	0.69
28	Use of ICT related resources to reinforce instructional activities delivered to large groups	1.96	0.72

No.	Item (ICT Skills)	Ability Level	
		M	SD
29	Use of ICT related resources to reinforce instructional activities delivered to small groups	1.79	0.69
30	Use of ICT related resources to assess students' academic achievement	1.81	0.73
31	Prior planning for ICT use in various teaching learning situations	2.07	0.73

Student-teachers possessed a low level of ability in the ICT competences shown in (Table 2).

Table 2: Means and standard deviations of the ICT skills which student-teachers felt they possessed to a low degree ranked in a descending order.

No	item	Ability level	
		Mean	S.D.
4	Knowledge of the use of ICT for teaching practical activities	1.49	0.60
7	Making simple connections and installing computers and their peripheral devices	1.47	0.66
8	Use of scanners to make presentations	1.39	0.53
9	Use of digital cameras to make presentations	1.20	0.43
10	Use of ICT to assess student academic achievement	1.43	0.56
13	Use of computers to make spread sheets	1.49	0.66
17	Use of computers to promote professional productivity	1.46	0.60

To determine if the independent variables affected the participants' responses, the t-test was conducted at the 0.05 level of significance to identify if any statistically significant differences existed between male and female respondents. The results showed no effect that could be attributed to the independent variables of gender, specialty and school type, as shown in Table (3) below.

Table (3): table description table description table description table description table description table description table description.

		N	Mean	SD	t	df	Sig. (2-tailed)
GENDER	Male	20	1.69	0.38	-1.332	88	0.186
	Female	70	1.81	0.34			
SPECIALTY	Class teacher	31	1.75	0.38	-0.577	88	0.566
	Field teacher	59	1.80	0.3426			
SCHOOL TYPE	Public	78	1.76	0.33	-1.294	88	0.199
	Private	12	1.90	0.45			

With regard to student-teachers' ICT use during placement the participants' responses were categorized into three categories: high degree, moderate degree, and low degree of use. This categorization was based on the average mean of responses on each ICT competency in the questionnaire. Where the average of responses fell below 1.5, student-teachers were considered low users of ICT skills, whereas with the average mean of responses between 1.5 and 2.5, the student-teachers were considered moderate users of ICT competency in their practice. Where the average mean of responses is greater than 2.5, student-teachers were considered high users of ICT skills in their teaching practice. The results

indicated that student-teachers did not integrate any of the ICT skills listed to a high degree. However, they moderately used the ICT competencies shown in (Table 4) below.

Table 4: Means and standard deviations of the ICT skills which student-teachers moderately used during their teaching practice ranked in a descending order.

No	Item (ICT Skills)	Degree of use	
		M	SD
1	Use of various computer software programs	1.82	0.68
2	Loading software programs into computers	1.57	0.65
3	Proper use of ICT related terminology in teaching subject specialty	1.52	0.64
5	Knowledge of ICT use in the development of the local society	1.62	0.59
6	Knowledge of computers and their peripheral devices (printer, scanner, ...)	1.77	0.74
11	Use of word processing software	1.79	0.68
12	Use of computers to create data bases	1.58	0.70
14	Use of E-Mail	1.78	0.83
15	Use of the Internet as a teaching learning resource	1.96	0.75
16	Use of computers to create electronic slides	1.71	0.75
18	Use of the Internet to promote professional productivity	1.88	0.78
20	Use of computers to enhance teaching-learning process	1.58	0.64
21	Use of computer peripheral devices (scanners, printers, data shows, etc.) to enhance teaching learning process	1.90	0.77
22	Utilization of electronic audio and video conferencing to enhance teaching learning process	1.54	0.64
23	Proper use of ICT related devices and programs in various teaching learning situations	1.56	0.60
24	Adherence to the legal standards pertaining to the use of ICT (especially the Internet) in teaching	1.68	0.75
25	Use of ICT to promote the idea of life long learning	1.87	0.72
26	Evaluation of instructional software programs	1.57	0.65
28	Use of ICT related resources to reinforce instructional activities delivered to large groups	1.59	0.69
29	Use of ICT related resources to reinforce instructional activities delivered to small groups	1.59	0.63
30	Use of ICT related resources to assess students' academic achievement	1.59	0.65
31	Prior planning for ICT use in various teaching learning situations	1.80	0.75

Means of responses also indicated that student-teachers applied the ICT competencies shown in Table (5) during their teaching practice to a low degree.

Table 5: Means and standard deviation of the ICT skills which student-teachers use to a low degree during their teaching practice ranked in a descending order.

No	item	Degree of use	
		M	SD
4	Knowledge of the use of ICT for teaching practical activities	1.39	0.53
7	Making simple connections and installing computers and their peripheral devices	1.33	0.56
8	Use of scanners to make presentations	1.29	0.50
9	Use of digital cameras to make presentations	1.14	0.38
10	Use of ICT to assess student academic achievement	1.37	0.55
13	Use of computers to make spread sheets	1.37	0.61
19	Utilization of audio and video conferencing to promote professional productivity	1.40	0.58
27	Implementing instructional activities derived from research and studies found on the Internet	1.49	0.66

The t-test was performed to identify any significant statistical differences which can be attributed to the variables of gender, specialism and type of school.

Results from the analysis (Table 6) showed that student-teachers' specialism and school type affected their responses regarding the degree of the use of ICT skills during teaching practice in favour of private schools and field teachers, respectively.

Table 6: Results of the t-test relating to the effect of the independent variables in the study regarding student-teachers' ICT use in practice schools

		N	Mean	SD	t	df	Sig. (2-tailed)
GENDER	Male	20	1.47	0.38	-1.959	88	0.053
	Female	70	1.63	0.32			
SPECIALTY	Class teacher	31	1.48	0.35	-2.343	88	0.021
	Field teacher	59	1.66	0.32			
SCHOOL TYPE	Public	78	1.56	0.31	-2.477	88	0.015
	Private	12	1.81	0.42			

Interviews Results

Student-teachers were asked whether they owned a personal computer (PC) at home. The majority of student-teachers reported that they did not own one. Word processing was the predominant use made of ICT by student-teachers who reported owning a PC. All of the interviews indicated positive attitudes towards computers and were ardently in support of their inclusion in education provided that they are properly used in various teaching/learning situations. They also expressed their enjoyment and excitement when using computers. Some of the views expressed by the interviewees were that the computer is:

- 1- very useful (95%);
- 2- beneficial and interesting (95%);
- 3- very useful if we knew how to use it (87.5%);
- 4- a teaching/learning tool which is very useful (77.5%);
- 5- an indispensable tool which is necessary in contemporary life (62.5%); and
- 6- a very useful tool for social interaction and exchange of information among human beings (52.5%).

In line with their views and positive attitudes towards computers, student-teachers indicated that they had gained at least one benefit from using computers. The

most common benefits reported by student-teachers are shown in Table (7) in terms of frequency and percentage.

Table 7: Student-teachers' perceived personal ICT benefits

Rank	Benefit	Frequency	percentage
1	Storing information	29	73
2	Searching for information using various search engines	26	65
3	Use of email	24	60

All student-teachers indicated that they had undertaken at least one module related to ICT during their pre-service preparation. However, 11 students (just over a quarter of the interviewees) believed that the module/modules they had undertaken incorporated activities related to real and authentic applications of ICT in instruction. In other words, most interviewees believed that the ICT-related modules they had studied at the university were not conducive as for equipping them with how to harness ICT in teaching and learning in schools. Student-teacher trainers conduct weekly training workshops and seminars covering main aspects of the teaching/learning situation at the university twice a week. Student-teacher trainers in these training workshops and seminars should model good practice so that student-teachers are able to experience the ways in which ICT can be effectively incorporated into teaching and learning. However, results from the interviews showed a different picture from the results revealed in the questionnaire. Only 6 student-teachers reported that their teacher-trainers had incorporated ICT related applications in the training workshops and seminars. The main applications used as reported by the interviewees are shown in Table (8) ranked according to frequency and percentage.

Table 8: The main ICT skills used during workshops and seminars related to teaching practicum

Rank	ICT related applications	frequency	percentage
1	Word processing	6	100
2	Presentation software (Power Point)	5	83
3	Search engines (Yahoo, Google, etc.)	2	33

The majority of the interviewees who reported lack of ICT use during workshops and seminars conducted by teacher trainers indicated the factors that precluded the use of ICT, as shown in Table (9) according to frequency and percentage.

Table 9: Factors which inhibited ICT use during workshops and seminars related to teaching practicum

Rank	Reason	Frequency	Percentage
1	Ineffective ICT related module undertaken at the university	28	70
2	Unavailability of virtual learning environments to practice use of ICT related skills in teaching.	21	53
3	Teacher educator did not model the use of ICT in workshops and seminars.	13	33

Surprisingly, the interviewees neither undertook any training session related to the use of ICT in education

inside or outside the university during the four-year period of teacher preparation, nor did they use any ICT related applications during their teaching practice in schools. The interviewees were asked to provide reasons for not being able to implement ICT-related applications in their teaching in schools. Table (10) shows the main factors which inhibited the use of ICT in schools, as perceived by student-teachers.

Table 10: Factors that inhibited student-teachers ICT use at practice schools

Rank	Factors inhibiting ICT use	Frequency	Percentage
1	Inability to incorporate ICT into teaching and learning	40	100
2	Inadequate training at the university	40	100
3	Lack of computer availability at schools	36	90
4	Lack of help and support from ICT specialist teachers at schools	30	75

All interviewees felt that they needed to develop their ICT skills and competencies. The kinds of knowledge training sessions and expertise which they considered important and likely to promote long-term development in their teaching and learning in the future are shown in Table (11).

Table 11: Knowledge, training sessions and expertise needed to develop student-teachers' ICT competencies

Knowledge, training sessions and expertise needed	Frequency	Percentage
International computer driving licence (ICDL)	38	95
Training sessions in keyboarding	35	88
Relating ICT-related modules taught at the university to ICT subject speciality.	29	73
Teacher educators should model the use of ICT in implementing workshops and training session.	24	60
Methods for designing instructional software programmes to use in teaching	20	50
How to utilize internet in teaching and learning	27	66

Results from Teacher Trainers' Interviews

The majority of the teacher trainers (n=16) reported that they have PCs at home. Amongst those teacher trainers who did use computers at home, the predominant applications were using the Internet search engines (Yahoo, Google, Altavista, etc), searching for information for purposes of scientific research, using E-mail for information exchange, using word-processing for typing examination questions, spreadsheets and statistical packages (SPSS and SAS).

Teacher trainers were asked about their opinions and attitudes towards computers, which was an attempt to ascertain their general attitudes towards computers. Similar to the results obtained from student-teachers, all teacher trainers were found to have a favourable view of computers. Some of their comments which ascertain these positive views are computers are:

- 1- a very advanced technology that is very useful;
- 2- an efficient teaching-learning tools; and
- 3- illiteracy does not mean the inability of a person to read and write but rather the person's inability to deal with computers.

In line with their positive views and attitudes towards computers, teacher trainers indicated that they have gained at least one benefit from using computers.

The most common benefits reported by teacher trainers are shown in Table (12).

Table 12: student-teachers' trainers perceived personal ICT benefits

Rank	Benefit	Frequency	Percentage
1	Information gathering (using the internet search engines)	15	68
2	Use of E-mail.	16	72
3	Word processing	22	100
4	Use of CD-ROMs	5	23

Almost half of the teacher trainers (n=10) undertook a training session related to computer use inside or outside the university. The training sessions focused on areas like Windows, Microsoft Office applications (Excel, Word Processing, Access, and Power Point), the Internet, and E-mail. Such responses suggest that the trainers had not been trained on the utilization of ICT skills in education. The teacher trainers' responses allowed a judgement to be made of the level of their competence in ICT and allowed comparison with how much they used ICT in the delivery of workshops and seminars for student-teachers at the university. The low level of competence in ICT among teacher trainers was reflected on their delivery of student teachers' training workshops and seminars. It was evident from their responses that the majority of the teacher trainers did not model the use of ICT during the weekly seminars and workshops which were conducted to support the student-teachers' ability to use ICT in instruction. Among the 22 teacher trainers interviewed only 4 (18.18%) utilized ICT-related applications. The ICT areas applied during training seminars and workshops for student-teachers by those who reported using them included the use of presentation software (PowerPoint), the Internet search engines (Google, Yahoo, etc.) for gathering information, CD-ROMs, and word processing. The teacher trainers were asked to provide the factors which precluded their use of ICT in training seminars and workshops for student-teachers. Table (13) shows the inhibiting factors for the use of ICT by teacher trainers during training sessions at the university in terms of frequency and percentage.

Table 13: Factors inhibiting ICT use during workshops and seminars as perceived by teacher trainers

Rank	Factors inhibiting ICT use	Frequency	Percentage
1	Inability to incorporate ICT into teaching and learning	19	86
2	Large number of students in each group to accommodate them in the computer lab	17	77
3	Inability to design instructional software programmes	17	77
4	Inadequate computers with regard to hardware and software	15	68
5	Lack of computers availability at university.	13	59
7	Inavailability of virtual learning environment labs at the university to allow student-teachers to integrate ICT into various teaching learning situations.	7	34

Although all the interviewees strongly supported the introduction of ICT in education, they were cautious about this issue. They reported that the Jordanian MOE and Yarmouk University should have trained teachers and teacher trainers prior to the introduction of the instructional media into schools.

The kinds of knowledge, training sessions and expertise which the teacher trainers considered important and likely to enable them to model the appropriate use of ICT in the delivery of training sessions and seminars for student-teachers are shown in Table (14).

Table 14: Knowledge, training sessions and expertise needed to develop teacher trainers competency in ICT use.

Knowledge, training sessions and expertise	Frequency	Percentage
International computer driving licence (ICDL)	20	91
Methods for designing instructional software programmes to use in teaching	17	77
How to utilize the Internet in teaching and learning.	14	64

Discussion

The results of the study showed that student-teachers possessed varying ICT related ability levels ranging from low to moderate ability. Results from the interviews showed that many of the ICT-related skills some student-teachers' possessed had been gained at home. According to the results from the questionnaire, the level of student-teachers' competence in ICT ranged between low and medium. Despite possessing some basic ICT skills, none of them used these skills for coursework and preparing classroom materials in schools. Nonetheless, during workshops and seminars at the university, few students reported using some ICT related activities such as word processing, power point for designing instructional software programs and internet use for gathering information. Mellar and Jackson (1994) and Cuckle et al (2000) reported similar results. They found that there was little use of IT amongst Post Graduate Certificate in Education PGCE students except in word processing, databases, desktop publishing, spreadsheets and graphics. There was not much difference in computer use in both home and school settings by student-teachers who possessed a PC at home with almost complete lack of ICT use in schools by all of them. The ICT related modules at the university as well as the workshops and seminars related to the practical teaching experience provided student-teachers with low to moderate ability level to use ICT, but did not provide them with the ongoing support needed to adapt the skills learned to their classroom teaching. Additionally, both workshops and taught modules may have focused on teaching the technical skills, but did not show student-teachers how to integrate ICT into their specific subject area. In order for ICT to reach its full potential, ICT taught modules and workshops should focus on the practical use of these skills in classroom teaching. Teacher educators and cooperating teachers should model good practice so that student-teachers are able to experience the ways in which ICT can be effectively incorporated into teaching. However, the results from the present study showed that

the situation was problematic because schools and the university did not have the adequate infrastructure to support good practice and thus cooperating teachers at schools and teacher trainers at the university were severely limited by what they could do. If they are to assist student-teachers, cooperating teachers and teacher trainers need to be professionally developed to raise their level of competence in ICT skills and its proper applications in teaching.

Examining individual students' questionnaires did not reveal a different picture with regard to student-teachers' level of competence in ICT and the degree to which they utilized ICT in their teaching at school. It was disappointing to see that many student-teachers from all subject specialties neither gained a considerable ICT skill nor properly practiced using ICT for teaching their subject matter at schools. Although there were students who possessed basic ICT skills and were enthusiastic, they did not use ICT in the classroom as much as they might have done (for instance, those who possessed basic ICT skills in word processing, power point, data base and used them for their own study could have used these applications in their teaching at school). Obviously, those student-teachers were unable to relate the basic ICT skills they possessed to their teaching tasks. Few teacher trainers modelled the use of ICT in the delivery of training workshops and seminars in addition to the separation in the delivery of the taught modules related to basic ICT skills and those modules relating these skills to teaching practice. These factors greatly influenced student-teachers' ability to relate theory to practice and reflected on their performance at schools. It was satisfying, though, to see that student-teachers were enthusiastic and willing to increase their knowledge and use of ICT with students. They also possessed positive attitudes towards the introduction of computers into schools.

Results from both the students' questionnaires and interviews showed that subject specialty did not affect student-teachers' level of competence. Student-teachers from across the subject specialties were exposed to the same ICT experience during their preparation as teachers. They also practice their teaching under similar school settings, which had probably led to the lack of differences in student-teachers' ICT skills. Different results were obtained by Simmons (1994) and Cuckle et al (2000) who found that the most influential factor affecting whether student-teachers used ICT in classroom teaching was their subject specialty. In Jordan, computer use in schools is subject area specific. The results from this study indicated that the practical teaching experience did not provide student-teachers with specific models for instructional use in those subject areas (Wetzel and Chisholm, 1996; Matthew et al, 2002).

The most influential factors which inhibited ICT uptake by student-teachers were their inability to incorporate ICT into teaching and learning; inadequate training at the university; inavailability of computers at schools;

and lack of help and support from ICT specialists at schools. Rosen and Weil (1995), Winnans and Brown (1992), Williams et al (2000), and Hadley and Sheingold (1993) had similar results. They identified a number of factors affecting teachers' use of ICT including lack of teaching experience with ICT, on-site support for teachers using technology, and ICT specialists to teach students computer skills. Regarding teacher educators' reluctance to incorporate ICT into their teaching, Matthew et al (2002) identified a variety of reasons including lack of access to appropriate hardware and software, limited technology skills; lack of knowledge of how to integrate it into their teaching; and lack of teaching support. The results from teacher trainers' interviews were much in sync with these factors.

Student-teachers' gender, specialty, and school type seem to play no role in their level of competence in ICT. Similar to this result, several studies suggested that there was no gender-related impact regarding ICT (Murphy and Greenwood, 1998; Koustourakis et al, 2000). In contrast, several studies indicated that there were differences regarding ICT ascribed to pre-service teachers' gender. Summers (1990), Marshall (1997) and, Watson (1997) found that male pre-service teachers believed that they knew more about ICT, showed more positive attitudes, and had greater confidence in their abilities than their female counterparts. However, in the present study, the independent variables of specialty and school type affected the participants' responses regarding the degree of ICT use at schools. The student-teachers who were being prepared to teach one school-subject (*viz.*, field teachers) appeared to have used ICT skills during their teaching practice more than student-teachers who were being prepared to be class teachers. In addition, student-teachers who practiced teaching at private schools incorporated more ICT into their teaching than student-teachers who practiced their teaching at public schools. A possible explanation for this result could be that privately-run schools are better equipped with ICT related facilities which encourage more student-teachers to incorporate ICT into their teaching.

Results from the interviews showed a somewhat different picture from that obtained through the questionnaire with regard to student-teachers' ICT use at schools and the effect of the variables of gender, school type, and specialty. None of the respondents indicated any sort of ICT use at schools. Moreover, these variables mentioned affected neither the student-teachers' ability level nor their degree of ICT use at practice schools. From the participants' responses to the interview, inadequate training at the university, lack of access to ICT resources, and inability to incorporate ICT in teaching were among the most influential factors which inhibited ICT uptake by student-teachers. These factors affected student-teachers' performance regardless of their gender, specialty, or the type of practice schools. These results are consistent with those

obtained by Murphy and Greenwood, 1998 and Simson et al, 1999.

The presence of such inhibiting factors resulted in the majority of student-teachers' becoming less confident when they entered into school on practice. When they finally become teachers, they may not make use of their skills, their enthusiasm and positive attitudes may fade away, and the situation may continue with the next generation of pupils and student-teachers. It is doubtful that such cycle will be broken if this situation persists since student-teachers will be able to qualify as teachers in Jordan without having to demonstrate their level of ICT use upon entry into the teaching profession after graduating from the university. Schools and training institutions in partnership need to take a proactive role in promoting ICT in order for ICT training during initial teacher training to be really effective. Resta et al (2002, p. 13) argued that

teacher education institutions may either assume a leadership role in the transformation of education or be left behind in the swirl of rapid technological change. Teacher education institutions and programmes must provide the leadership for pre-service and in-service teachers and model the new pedagogies and tools for learning. They must also provide leadership in determining how the new technologies can best be used in the context of the culture, needs, and economic conditions within their country.

Conclusion and Recommendations

Most student-teachers possess limited knowledge of the ways ICT can be used in their teaching practice at schools. Few student-teachers have any instruction in the proper use of ICT in the classroom indicating that transferring these skills from teacher preparation to classroom practice has been limited. Little use of ICT at schools and the university settings seems to be related to the inability to incorporate ICT into teaching and learning, inadequate training at the university, inavailability of computers (both at schools and the university), and lack of help and support from ICT specialists at schools.

Teacher educators at the university are not prepared to integrate ICT into their courses and, consequently, are not able to model the appropriate use of ICT in the delivery of workshops and seminars they conduct for student-teachers. The inhibitors resulting in this inability on the part of teacher educators appear to be similar to those encountered by student-teachers, which both need to be tackled in partnerships between schools and the university.

Teacher educators as well as school teachers should be prepared through intensive professional development training sessions so that they are able to model the appropriate use of ICT in their teaching and assist their student-teachers to imitate them.

Although this study has unveiled many weaknesses on the part of student-teachers and teacher trainers, better insights into the reluctance to use ICT and deeper understanding of their training needs are urgently

needed. ICT specialists and serving school teachers appear to be unable to assist student-teachers to incorporate ICT into their teaching. It is necessary to identify their training needs to provide them with suitable professional development activities so that they are able to aid student-teachers.

The separation in the delivery of ICT-related courses from the real world context proved to be ineffective in preparing student-teachers to use computers in their teaching. Thus, for those courses to be effective, student-teachers need to learn how to integrate their knowledge of ICT into their courses in all subject areas and be able to apply them in a real world context. A possible approach to relate ICT courses to real world situations is through designing a virtual school-based experience and including it as a component in the pre-service teacher education programme. Gibson (2002) designed a virtual field trip to schools through the use of WebCT software and interactive multimedia combinations of video, text, sound, and computer graphics to allow her students to experience teachers demonstrating their practice in a social studies course. This approach may help student-teachers to observe real classes and learn from others through electronic means prior to their entry into teaching practice.

References

- Al-Far, I. (2002). *Using Computer in Instruction*. First Edition, Dar Alfikr for Printing, Publication and Distribution, Amman, Jordan.
- Altwalbeh, M. (2003). "The Computer is the best Companion". *Teacher's Message* 3, 4 (29).
- Asan, A. (2002). "Pre-service Teachers' Use of Technology to Create Instructional Materials: A School-College Partnership". *Journal of Information Technology for Teacher Education*, 11 (2): 217-232.
- Baki, A. (2000). "Preparing Student Teachers to Use Computers in Mathematics Classrooms through a Long-term Pre-service Course in Turkey". *Journal of Information Technology for Teacher Education*, 9 (3): 343-362.
- Cohen, L. Manion, L. and Morrison, K. (2000). *Research Methods in Education*. Routledge, London, England.
- Cuckle, P. Clarke, S. & Jenkins, I. (2000). "Students' Information and Communications Technology Skills and Their Use during Teacher Training." *Journal of Information Technology for Teacher Education*, 9 (1): 9-22.
- Dede, C. (1997). "Distributed learning: How new technologies promise a richer educational experience". *Connection: New England's Journal of Higher Education and Economic Development*, 12(2): 12-16.
- Gibson, S. (2002). "Incorporating Computer-Based Learning Into Preservice Education Courses". *Contemporary Issues in Technology and Teacher education [Online serial]*. Retrieved March. 12, 2003 from the World Wide Web: <http://www.citejournal.org/vol2/iss1/currentpractice/article2.cfm>
- Goodwyn, A. Clarke, S. & Adams, A. (1997). "The Future Curriculum in English and Information Technology: How Teachers and Student-Teachers View the Relationship", *Journal of Information Technology for Teacher Education*, 6: 227-239.
- Hadley, M. & Sheingold, K. (1993). "Commonalities and Distinctive Patterns in Teachers' Integration of Computers". *American Journal of Education*. 101: 261-315.
- Hewitt, J. Reeve, R. Abeygunawardena, H., & Vailancourt, D. (2002). "Pre-service Teachers as Telementors: exploring the links between theory and practice". *Journal of Information Technology for Teacher Education*. 11 (1): 45-62.
- Koustourakis, G., Panagiotakopoulos, H. and Katsilis, G. (2000). "Social Approach of Teachers. Self-Evaluation Stress Cause of New Technologies Introduction in Educational Process: The Case of Stress for Computers", *Sichroni Ekpedefsi*, 110: 122-131.
- Matthew, K., Callaway, R., Letendre, C., Kimbell-Lopez, K., & Stephens, E. (2002). "Adoption of Information Communication Technology by Teacher Educators: One-on-One Coaching". *Journal of Information Technology for Teacher Education*. 11 (1): 45-62.
- Marshall, G. (1997). "Time for Change: Critical Issues in Teacher Education". In D. Passey and B. Samways (ed.) *Information Technology: Supporting Change Through Teacher Education*. Chapman and Hall, London.
- McDougall, A. & Squires, D. (1997). "A Framework for Reviewing Teacher Professional Development Programmes in Information Technology". *Journal of information Technology for Teacher Education*. 6: 115-126.
- Mellar, H. & Jackson, A. (1994). "The Changing Picture of IT Experience in Postgraduate Teacher Training". *Journal of Computer Assisted Learning*. 10: 14-23.
- MOE (1988). "The First National Conference of Educational Development". *Teacher's Journal*. 3-4 (29).
- MOE (2003). "Incorporating Information and Communication Technology (ICT) in Teaching-Learning Process". *Teacher's Journal*. 42 (1), MOE-Jordan.
- MOE (2004). "Education Reform for Knowledge Economy (ERfKE) Overview". *Documents Presented to the Jordan-UK ICT in Education conference*, Amman, March.
- Murphy, C. & Greenwood, L. (1998). "Effective Integration of Information and Communications Technology in Teacher Education". *Journal of*

- Information Technology for Teacher Education*, 7 (3): 413-429.
- Patton, M. (2002). *Qualitative Evaluation and Research Methods* (third edition). Sage Publications, London.
- Reid, M. (2000). "Towards Effective Technology Education in New Zealand". *Journal of Technology Educatio*. 11 (2): 33-47.
- Resta, P. Allen, N. Anderson, J. Davis, N. Muranov, A. Thomas, L. & Uvarov, A. (2002). *Information and Communication Technologies in Teacher Education: a Planning Guide*. UNESCO Publications.
- Rosen, L. D. & Weil, M. M. (1995). "Computer Availability, Computer Experience, and Technophobia Among Public School Teachers". *Computers in Human Behavior*. 11: 9-31.
- Russel, G., Finger, G., & Russell, N. (2000). "Information Technology Skills of Australian Teachers: Implications for Teacher Education". *Journal of Information Technology for Teacher Education*. 9 (2):149-166.
- Salameh, A. & AbuRaya, M. (2002) *Computer in Instruction*. First Edition, Al-Ahliyah Publishers, Amman, Jordan.
- Simmons, C. (1994). "New Forms of Student Teacher Learning through Information Technology: the First Four Years". *Research in Education*. 52: 51-64.
- Simson, M., Payne, F., Munro, R. & Huges, S. (1999). "Using Information and Communications Technology as a Pedagogical Tool: Who Educates the Educators?" *Journal of Education for Teaching*. 25(3): 247-262.
- Summers, M. (1990). "Starting Teacher Training - New PGCE Students and Courses". *British Educational Research Journal*, 6 (1): 79-87.
- Vagle, R. (1995). "Technology in Teaching Methods Courses: Is it happening?" *Technology and Teacher Education Annual* (pp. 238-243). Charlottesville, VA: Association for the Advancement of Computing in Education.
- Watson, G. (1997). "Pre-service Teachers' Views on Their Information Technology Education". *Journal of Information Technology for Teacher Education*,6: 255-269.
- Wetzel, K. & Chisholm, I. (1996). "An Evaluation of Technology Integration in Methods Courses". *Technology and Teacher Education Annual*. Charlottesville, VA: Association for the Advancement of Computing in Education.[Online]. Retrieved July. 29, 2003 from the World Wide Web:
http://www.coe.uh.edu/insite/elec_pub/HTML%201996
- Williams, D. Coles, L. Richardson, A. Wilson, K. & Tuson, J. (2000). "Integrating Information and Communications Technology in Professional Practice: An Analysis of Teachers' Needs Based on a Survey of Primary and Secondary Teachers in Scottish Schools". *Journal of Information Technology for Teacher Education*, 9 (2): 167-182.
- Winnans, C. & Brown, D. (1992). "Some Factors Affecting Elementary Teachers' Use of the Computer". *Computers in Education*, 18: 301-309.