

Jordanian student teachers' use of computers to develop primary stage pupils' literacy skills

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ABSTRACT

Primary stage teachers today face the challenge of using and integrating computers into their instruction in a way that develops children's teaching and learning. Thus, there is a need to examine student teachers' use of computers, as it provides the Teacher Education Program at Yarmouk University with feedback about its effectiveness in providing prospective teachers with the know-how to integrate computers into their instruction. Therefore, this study uses semi-structured interviews to investigate 33 Jordanian student teachers' use of computers to develop young children's literacy skills.

The data analysis shows that student teachers have a tendency to use the computer to develop young children's literacy skills. It further reveals that even though the time allotted to using computers for developing literacy skills is limited, a high degree of use is evident compared to its use with other skills stated in the school curriculum. The findings further reveal little diversity in the way computers are used to develop young children's literacy skills, with a few student teachers using computers as a resource for playing games, drill and practice, homework, and assessing children's literacy skills, whereas the majority use them for presenting instructional content and designing instructional media and worksheets. In light of these findings, the authors put forth a number of recommendations for the Teacher Training Program at Yarmouk University, the Jordanian Ministry of Education, student teachers and future researchers.

Key Words: *literacy development, computers, primary stage, teacher education, Jordan*

INTRODUCTION AND BACKGROUND

Over the last few decades, increasing attention has been given to the issue of computer use in education around the world. In Jordan, computer use in school education is becoming one of the most prominent features of the Jordanian educational system. The Ministry of Education (MoE) has spent heavily on enabling teachers to become qualified in the use of computers in the instructional process. For example, to encourage teachers' computer use, MoE has provided training and generous financial support for teachers who get the International Computer Driving License (ICDL). This attention may be largely attributed to a view of the computer as an instructional resource and a primary component of the teaching/learning process (Al-Sharhan, 2002).

Educational specialists see computer use in the instructional process as a revolution against traditional teaching approaches (Al-Ajlouni, 2003). As a result of this revolution, which has brought about drastic changes in the educational process, children's computer use has become an imperative requisite. O'Shea and Self (1988) attributed the need to encourage computer access in education to the children's need to be aware of the nature and uses of computers to be better able to cope with the present and future technology-driven society.

Literacy is traditionally defined as the ability to read and write (as well as to spell, listen, speak (Moats, 2000) and have basic numeracy skills (UNESCO, 2000). This definition has evolved to encompass a set of component skills that includes word recognition, fluency, vocabulary,

comprehension, spelling, writing, metalinguistic knowledge, and orthographic knowledge (National Reading Panel (NRP), 2000). Similarly, Yousif (2003) reports an operational definition of literacy formulated at an international expert meeting at UNESCO as "the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts".

Thus, literacy has evolved from the simple notion of the technical skills of reading, writing and calculating (traditionally referred to as the "three Rs") to encompass other competencies such as computer literacy, media literacy, health literacy, eco-literacy, and emotional literacy, probably because

the way literacy is defined influences the goals and strategies adopted and the programs designed by policy-makers as well as the teaching and learning methodologies, curricula and materials employed by practitioners. Its definition also determines how progress or achievements in overcoming illiteracy are monitored and assessed (UNESCO, 2004:12).

However, Arabic lacks for a word that translates literacy despite the fact that the Arabic language has terms for reading (viz., qirā'ah) and writing (viz., kitābah) and even one for illiteracy and eradication of illiteracy (viz., ummiyyah and maḥw-il-ummiyyah, respectively). Maamouri (1999) claims that this terminological void can only end with the coining and use of a new word which would link Arabic literacy to its etymological source.

The use of the computer as an instructional tool in young children's teaching and learning points to the unique value of technology which empowers these children to gain knowledge by concrete rather than symbolic media, especially as "computer representations are often more manageable, flexible, and extensible" (Clements, 1997:5). Along the same lines, the National Association for the Education of Young Children (NAEYC) (1996:2) points out that despite of claims of the positive impact of technology on children's learning and cognitive and social development, this impact is dependent on the appropriate use of technology which "can support and extend traditional materials in valuable ways".

Educational literature further paints a positive picture of the effectiveness of Computer-Assisted Instruction (CAI) in facilitating the mastery of various basic skills (Nicol and Anderson, 2000; Murray, 2001), which is most probably the result of the following:

1. CAI provides pupils with extended practice, which, in turn, can lead to atomization of basic skills (Nicol and Anderson, 2000).
2. CAI may readily provide feedback, for computers may be used to improve the timing, quality, and quantity of individual feedback (Nicol and Anderson, 2000) for pupils and teachers alike (Jones, 2002). Unlike traditional classrooms where the main source of feedback is the teacher, a good amount of feedback can derive from the technology itself.
3. CAI may foster pupils' motivation to learn. There is empirical evidence that stimulating pupils' motivation to engage in academic activities may readily be helped by computer learning activities (Willner and Willner, 2002; Nicol and Anderson, 2000). To achieve this, activities should be based on an intellectual challenge to motivate pupils to explore a solution to a problem, pique their curiosity, and give them an opportunity to gain a sense of individual control and mastery over an environment (Becker, 2000).

Roschelle, Pea, Hoadley, Gordin and Means (2001) reported that active group engagement and participation is considered a computer application that enhances the way children learn. More emphatically, Sandholtz, Ringstaff, and Dwyer (1997) reported increased engagement in academic work well beyond the requirements of assignments. Their respondents were found to explore new computer applications and develop application-related skills on their own initiative by

often coming in before school and staying after school to work on class computers. Significant teacher practices, which result in increased pupil engagement, include the following:

1. taking into consideration the use of computers as only one of a set of instructional tools rather than a central learning modality,
2. using computers in instructional settings to accomplish substantive curricular objectives,
3. using computer applications that allow pupils to experiment and explore knowledge, and
4. introducing individualized computer experiences which are responsive to individual pupil interest and ability.

Purpose of the Study

Since the early 1990s, as the internet began to be widely used in schools, there has been much interest in the impact of information and communication technology (ICT) on young children's learning, particularly in the U.S.A, U.K., and Australia. Jordan, on the other hand, started to integrate technology in its schools a few years later as the government began to invest heavily in the provision of computers to schools and in the training of teachers in the applications of ICT.

However, questions remain on what impact ICT has on schooling in general and on literacy learning in particular, which is the focus of the present study. There is no doubt that effective instructional practices are contingent upon the teacher him-/herself. By the same token, student teachers' use of computer technology would be both useful and effective in developing children's literacy skills.

To this effect, Willner and Willner (2002) claim that pupils' success is contingent upon the teacher's effective utilization of technology. Thus, teacher education programs around the world are facing the challenge of preparing teachers who can effectively use computers in their instruction (Byrum and Cashman, 1993; Wang, 1999).

Jordanian universities require undergraduate students to study two to four computer courses. At Yarmouk University, from which the present sample was drawn, students are required to study two computer courses offered by the Department of Computer Sciences (viz., CS100 and CS101) to fulfill the university and college requirements for graduation. These courses seem to aim at enabling the students to use the computer for personal purposes since their descriptions do not include any reference to using the computer for academic purposes. Similarly, the students do not study any courses on integrating computer technology into their learning nor do their professors integrate it into their own instruction.

Thus, exploring student teachers' computer use during practicum is probably among the most pressing issues in teacher education. Hunt (1995:37) regards investigating student teachers' views during teaching practice a significant matter because it helps them become

acquainted with the realities of life in elementary and secondary classrooms, looks for real-world connections to content presented in their university foundations and teaching methods classes, and develops their instructional and managerial skills.

This, coupled with the scarcity of local research in this area of teacher education, has prompted the authors to investigate primary education student teachers' use of computers during practicum. Therefore, the study aims to find out the extent and facets of the respondents' computer use for developing early primary stage pupils' literacy skills.

More specifically, the study attempts to find answers for the following questions:

1. Do student teachers prefer to use computer technology in developing young children's literacy skills, and to what extent do they use it in developing these skills in a typical week?
2. Do student teachers focus on using computer technology in developing children's literacy skills as compared with other skills included in the school curriculum?
3. How do student teachers use computers to develop young children literacy skills?

Significance of the Study

The literature suggests that the computer is an important instructional tool whose use may vary by context and teacher perceptions. Thus, this study attempts to explore Jordanian student teachers' use of computers during practicum. To the authors' best knowledge, there has not been any research on the Jordanian context that has attempted to ascertain the extent to which computers are used by student teachers to develop early primary stage pupils' literacy skills.

The literature suggests an increasing amount of research on the effect of CAI on pupils' achievement and attitudes in the Jordanian context. However, the review points to a dearth of studies of Jordanian student teachers' use of CAI during practicum to develop their pupils' literacy skills.

Thus, this study is hoped to add to the existing body of research in the field of teacher education. More specifically, since research on teacher education programs has recently been evolving in equipping future primary stage teachers with the essential knowledge and skills for effective computer use in instruction, this study is believed to provide the teacher education program at Yarmouk University (as well as other Jordanian state universities) with feedback concerning the professional development of student teachers with regard to the effective use of computers in the development of young children's literacy. In this respect, Jones (2002:3) emphasizes that professional development in the effective use of computers, as in most other fields of professional development, assumes that participants will be able to return to a classroom and use the skills, training, and knowledge that they have acquired.

Previous Research

The literature suggests a variety of uses of computers in the instructional process. Computer use for developing literacy skills is especially significant in early primary stage classes. In this context, Kim and Kamil (2002) point out a wide variety of successful uses of computer technology for enhancing and supporting reading comprehension. Moreover, the Education Development Centre (EDC) (2004) suggests that computer technology can support learning to read by presenting information and activities to learners, assessing their work and responding to it, and providing scaffolds, such as access to word pronunciation and definitions, which assist them to read effectively. NAEYC (1996:4) reports on research findings that children prefer working on the computer with one or more partners to working alone, which allows them to seek peer assistance (which they prefer to the teacher's) and, thus, engage in much oral communication and co-operation and initiate more frequent and varied interactions than in traditional activities such as puzzles and blocks.

Computers can also be used beyond the immediate classroom environment in the primary grades, as children are enabled to read and write through access to the Internet, which facilitates communication and promotes social interactions previously limited by the physical location of the participating pupils. Nicol and Anderson (2000) concluded that computer-assisted learning (CAL) helps children master numeracy skills by means of drill and practice. Along the same lines,

Murray (2001) reported that learners showed gains in the quantity and quality of their school learning in mathematics, science, and language skills using PowerPoint software.

The educational use of ICT has influenced a variety of classroom factors. Selwyn and Bullon (2000), who investigated primary school children's use of ICT in the UK, reported that the vast majority of children are positively oriented towards using ICT. Their ICT use outside school seems to vary even though positive attitudes towards computer use are in the literature.

Younger children tended to unconditionally express a preference for using the computer across all activities, usually for practical, process-focused reasons (Selwyn and Bullon, 2000:323).

In two related studies, Bataineh and Baniabdelrahman (2006) and Baniabdelrahman, Bataineh, and Bataineh (2007) investigated Jordanian EFL College students' perceptions of their computer literacy and Internet use for general and language learning purposes. The findings of the first study revealed that the majority of the students perceived themselves as fairly proficient to proficient in basic computer skills (e.g., installing a program on a hard disk) yet not or a little proficient in more complex computer skills (e.g., creating databases). In the second study, Baniabdelrahman, Bataineh, and Bataineh found that over one third of the sample use browsers to view documents, while slightly smaller percentages use the Internet for personal purposes, mailing lists and discussion groups, and e-mail. Furthermore, the majority of the respondents reported never, almost never, or rarely using the Internet for any EFL learning purposes, except for about one third who reported using it for developing speaking skills through chat and locating authentic texts. These findings may be closely related to those of the present study since the respondents bear an uncanny similarity to the present sample and, thus, these findings could readily shed light on some of their practices as both students and student teachers.

As for home technology use, Lewin (2004) reported that British children engage with networked technologies at home for various pursuits. Nevertheless, although their engagement for school-related work is limited, they value those uses, especially the opportunities to use superior technology and engage in activities for extended periods of time.

More related to the purpose of the present study, much research (see, for example, Becker, 1991; Byrum and Cashman, 1993) points out the necessity to address the role of technology in preservice teacher training. In attempting to ensure preservice teachers' mastery of relevant technology skills, educational experts suggest that skill mastery, albeit crucial, is not enough to ensure successful technology use in instruction. The attitudes, perceptions, and beliefs about technology preservice teachers acquire as part of their training were found equally important (Byrum and Cashman, 1993), which points to the crucial impact of the instructors at teacher training programs who, according to Becker (1991:8), are required to

modify their concepts of appropriate and inappropriate teaching behaviors, to reprioritize the value of different types of instructional content, and to change habits and assumptions that guide their classroom and school management strategies.

Byrum and Cashman (1993) reported that most student teachers from six American universities preferred using computers in the instructional process for drill and practice purposes. Similarly, Wang and Holthaus (1997) reported that drill and practice comprised the highest usage rate in educational software among preservice teachers at two American universities as opposed to a low usage rate for games, problem solving, tutorial, and simulation programs.

Much of the literature focuses on the impact of ICT on primary stage pupils in general and on literacy in particular. Andrews, Burn, Leach, Locke, Low, and Torgerson (2002:5) claim that

[a] computer-literate teaching profession will need to know about the impact of ICT on literacy learning in order to encourage the best use of resources in the raising of literacy standards.

The research highlights the positive effect of ICT use on young children's literacy. For instance, Allen and Thompson (1995) reported a positive effect for using email on American fifth grade pupils' writing. Similarly, Lankshear, Bigum, Green, Honan, Morgan, Murray, Snyder, and Wild (1997), who investigated the impact of technology on the nature, definition, and views of literacy, provided positive empirical evidence through snapshots of current practice and commentaries.

Hall, Hughes, and Filbert (2000) evaluated 17 American studies using CAI (drill and practice, strategy and simulation) in reading for pupils with learning difficulties. They found that using CAI increased the respondents' reading decoding and reading comprehension. They further revealed that regular classroom use of well designed CAI software has the potential to reinforce teacher instruction, allow for more practice time and lead to success in reading although mere access to hardware and software does not automatically result in reading success for pupils with learning difficulties.

Nicolson, Fawcett, and Nicolson (2000) examined British 6- and 8-year-old pupils identified as being most at risk of reading failure. The Reader's Interactive Teaching Assistant (RITA) system was used to tailor individual activities for the pupils, automatically storing and analyzing the results. Nicolson *et al* reported that the pupils using RITA showed higher levels of motivation than those taught with the traditional approach. Breese, Jackson, and Prince (1996) examined the effects of unlimited access to word processors on 22 British Year 7 pupils who were each given a laptop to use for all their writing lessons over a period of 20 months. The comparison of samples of their narrative writing with samples from a parallel class who only used hand writing methods showed significant improvement over those using pen and paper. Similarly, Scrase (1997) examined the effect of scanners and speech synthesizers on a group of British 7-year-old struggling readers. Average reading, spelling, and comprehension scores increased during the trial.

Moseley, Higgins, Bramald, Hardman, Miller, Mroz, Tse, and Stout (1999) reported that pupils' literacy and writing development was significantly accelerated by access to word processing, not to mention an increase in pupils' motivation to read using ICT texts. Similarly, Van Daal and Reitsma (2000) reported the findings of two small-scale pilot studies on the effects of an instructional multimedia system on Dutch children's spelling motivation and reading skill acquisition. Both studies reveal that pupils who participated in the computer-based reading and spelling practice significantly improved their spelling, word recognition and decoding skills and showed more positive behavior during practice with the computer than during classroom instruction. Along the same lines, Segers and Verhoeven (2002) reported that multimedia activities such as storybook reading, communicative writing and language games had a positive effect on pupils' oral and written language development.

Maamouri (n.d) points out the surprisingly little research on Arabic reading acquisition and literacy, especially in the Arab region itself. Most research on literacy is mainly official literacy statistics or statistical assessment of the performance of Arab learners' reading skills done mostly by UNESCO and affiliated education institutions.

The authors agree with previous claims (see, for example, Ayari, 1996; Maamouri, 1998) regarding the dearth of research on Arabic literacy, for locating local (or regional) research on the reading process has proved a difficult feat. The little available research seems to mainly address the linguistic duality of standard Arabic and other local varieties (e.g., Jordanian Arabic), which may account for the difficulties beginning native readers of Arabic encounter.

Among the most substantial research efforts is Wagner's (1993) longitudinal work on the acquisition of literacy and Arabic reading skills in Morocco. Orthographic features of Arabic are depicted as stumbling blocks for word comprehension among young learners of Arabic. Wagner (1993:240) reported that there is "substantial reason to believe" that learning to read in Arabic necessitates an even greater reliance on decoding skills than in other languages.

This dearth of research on Arabic literacy may add to the significance of the present study which constitutes an attempt to narrow the existing gap in the literature on the topic of computers and literacy.

METHOD, SAMPLING, INSTRUMENT, AND PROCEDURES

The sample of the study consisted of thirty-three student teachers who major in primary education (class teacher). This sample was randomly selected from a population of eighty-five students enrolled in the practicum courses at the college of Education at Yarmouk University (Irbid, Jordan) during the first semester of the academic year 2005/2006.

The authors used the qualitative approach to explore student teachers' use of computers as an instructional resource in developing young children's literacy skills. One or both authors conducted semi-structured in-depth interviews. Interviews are considered significant in collecting data from respondents, for they give the interviewer greater flexibility in the questioning process and allow the respondent greater depth of response, not to mention that they give the interviewer freedom to probe more deeply and to extend the responses of the sample (Robson, 1997; Cohen, Mannion, and Morrison, 2000).

The interview form, which consisted of ten questions, was designed by the authors and then checked by a jury of experts in methods of teaching, instructional technology, and teacher training from the departments of Elementary Education and Curriculum and Instruction at Yarmouk University. Based on the jury's recommendations, the interview schedule was modified to render a final draft of six questions (in the Appendix). The reliability of the interview form was checked using a sixteen-day interval test-retest of ten subjects who were excluded from the main sample of the study. Two analyses, one by the first researcher and another by a fellow professor from the same department, were conducted. The initial analysis indicated high reliability, which was further confirmed by high interrater reliability through the colleague's analysis.

To collect the data, the authors obtained the interviewees' consent to participate in the study and arranged the interview appointments. The respondents were informed about the study and the purpose of the interview and assured of the confidentiality of the information they provide in the interviews which were audio-taped and immediately transcribed. The transcripts were examined for reliability, as the authors returned them to the respondents to check if they are consistent with their responses. All participants reported that the transcripts matched their responses. Additionally, high interrater reliability of the analysis was obtained by asking a fellow professor in elementary education to analyze a number of interviews.

The interview transcripts were analyzed, categorized, and tabulated in terms of frequency and percentages. These categories were seen as the structure in which the findings related to the facets of computer use to develop pupils' literacy. The authors further computed frequencies and percentages to identify the frequency of computer use in the instructional process and the school subjects taught by using the computer. It is worth noting that, during the qualitative analysis of the data, some extracts were quoted to use in the presentation of the findings.

FINDINGS AND DISCUSSION

The findings of the study are presented in three parts, based on the research questions. Part One relates to student teachers' perceptions about the use of the computer to develop pupils' literacy skills. Part Two relates to student teachers' computer use to develop pupils' literacy skills as compared with other skills while Part Three relates to the facets of their computer use to develop pupils' literacy skills.

Part One: Perceptions of Computer Use to Develop Literacy

This section examines the respondents' perceptions of the use of the computer to develop their pupils' literacy skills. The respondents all reflected positively on computer use to develop their children's literacy, as shown in the following excerpts:

Yes, I like to use the computer in my classroom to foster children's creativity in learning to read and write.

I like to use the computer for its potential to develop young children's literacy skills and design good instructional activities.

I like to use computer software in most of my classes to encourage children to read and write.

If I could, I would do all my teaching using computer programs.

The computer is much better than other instructional media... It adds fun and enjoyment during the course of developing literacy skills.

The computer is very interesting for young children, and it helps me to consider individual differences to better develop their early reading and writing skills

Computer technology assists the young child to reinforce him-/herself independently and intrinsically.

I like to use the computer to develop children's ability to synthesize letters and new words.

I look forward to using computer in teaching literacy skills, especially for its potential to help me to develop children's writing skills by joining eye and hand.

The computer helps children to distinguish between the forms of letters, especially similar letters, and the way in which they can be written.

I prefer to use computer in my language class, because it encourages young children to learn individually and allows them an opportunity to employ self-assessment to identify their literacy level.

The computer could solve children's pronunciation difficulties through enabling them to listen (repeatedly) to correct pronunciation.

The above responses seem to provide evidence that student teachers are generally enthusiastic about developing children's literacy skills through the use of computer technology. This is consistent with previous findings (cf., for example, Wang and Holthaus, 1997; Bataineh and Baniabdelrahman, 2006) that respondents perceived computer use in education to be important.

It is worth noting that the respondents' obvious awareness of the use of the computer as a potential means to develop young children's literacy skills is often coupled with a justification of

their willingness to use it, which may be summarized in terms of these student teachers' quest for the following:

- improving their pupils' orthographic and pronunciation abilities,
- developing their pupils' reading and fostering their motivation to read,
- fostering their pupils' creativity,
- providing a fun, comfortable learning environment.
- fostering independent and learning-centered learning, and
- designing appropriate instructional activities.

These reasons, which reflect these student teachers' willingness to use computers in developing children's literacy skills, also point out the respondents' awareness of the value of computers in education. This awareness can be further attributed to the following:

- Student teachers' conviction of the necessity to use their computer-related skills to develop their pupils' literacy skills as one of the major goals of primary education in Jordan is to develop young children's reading and writing skills. To this end, an interviewee remarked:

I think that computer is helpful in accelerating the development of children's literacy skills, not to mention the other skills targeted in the school curriculum. I have to make an effort to help my pupils read and write before attempting to do anything else.

This is consistent with earlier findings (see, for example, Rathbun, West and Hausken (2003) who reported that computers are used most frequently to teach reading, writing, spelling and mathematics), and is compounded by Roschelle *et al's* (2001) argument that children make crucial gains through engagement with computer technology.

- Schoolteachers' conviction that children in the early grades should master writing, reading and numerical skills. This is further supported by Al-Barakat (2003) who reports a general view among teachers that a great deal of emphasis should be placed on the mastery of basic reading, writing and calculation. Thus, student teachers may be encouraged by their co-operating teachers to focus on using computers to develop literacy and numerical skills.
- Student teachers are seldom directed by their university supervisors to use computer technology in developing all children's skills. In this context, some of the student teachers commented that their supervisors have urged them to use computers in developing reading and writing skills rather than scientific, religion-related, social and civic, physical, artistic, and career-related skills.

Despite the respondents' self-reported perceptions of the value of the computer in developing literacy skills, the data analysis revealed that they do not use computers frequently in their instructional practices to develop literacy skills. This reveals variation in the respondents' use of the computer to develop pupils' literacy skills. While none reported using the computer in every lesson or once or twice daily, four (12.1%) reported using it twice a week. Similarly, 60% of the respondents reported using computers once a week as compared to 27.2% who reported rarely using them.

These results suggest that student teachers' perceptions of the value of computer use to develop children's literacy are not reflected in increased computer use. In other words, there seems to be a negative correlation between their perceptions of the value and their actual use of the computer

to develop children's literacy. This discrepancy between perceptions and reported actual use may be attributed to various reasons, the most important among which are:

- student teachers' low confidence in their ability to use the computer in their instruction, as shown in the following response:

I appreciate the role of computers in the educational process, but unfortunately I am not confident enough to use it in the classroom setting.

This may further suggest shortcomings in the ability of teacher preparation programs to equip student teachers with both the confidence and the know-how to use computers in the classroom;

- lack of computers in the classroom which may discourage student teachers from using them; and
- lack of instructional software specifically designed for children.

Part Two: Facets of Computer Use to Develop Children's Literacy

An initial analysis of the interview data showed that the use of computers by student teachers in the instructional process is divided into a set of categories, which are (1) drill and practice, (2) presenting instructional content, (3) homework, (4) games, (5) assessing literacy skills, and (6) designing instructional illustrations and worksheets, which are all discussed below.

Drill and Practice

Throughout the interviews, it was apparent that some student teachers used computers successfully. Four teachers (12.12%) allowed their pupils opportunities to use drill and practice software, as shown in the following responses:

I use computer-based drill and practice activities to support most reading lessons.

I use the computer to provide children with activities related to sound identification and segmentation of words into sounds.

I use some computer activities based on drill and practice to teach new lessons to account for individual differences among children.

I do my best to design some instructional drill and practice software drill and practice to meet individual differences amongst pupils.

For my first grade pupils, I designed drill and practice computer software to help them to learn letter, word, and sentence associations.

I use drill and practice programs as enrichment and remedial activities.

These excerpts demonstrate that computers are used as an instructional tool to achieve literacy-related objectives of the curriculum. Despite the fact that only few student teachers used computers for drill and practice, the above responses point out that these students design various end-of-chapter activities to remedy and foster their pupils' points of strength and weakness, which is not only commendable but also assuring in light of Pantiel and Petersen's (1984) claims of the significant role of the computer as a means of consolidation (reinforcement) for both high- and low- achieving pupils.

These findings are in line with previous findings asserting the effectiveness of CAI for skill mastery, the positive role of computers in child education, and the significant gains in phonological awareness by pupils who learned using computerized activities (cf., for example, Nicol and Anderson, 2000; Wang and Holthaus, 1997; Foster, Erickson, Forster, Brinkman and Torgesen, 1994; Torgesen, 2004).

Presenting Instructional Content

The data analysis revealed that 57% of the participants' responses pointed out student teachers' use of school computers to present instructional content. More specifically, the responses point out that the most common use of the computer in this area was to summarize the main ideas of lessons, as shown in the following responses:

I use the computer to present the main ideas in the reading lessons rather than write them on the board.

I use PowerPoint to present instructional content through the data show. This way, I can give a lot of attention to the ideas that should be taught in the reading lesson.

Along the same lines, a student teacher mentioned that the computer is good if it is available with a data show in the classroom to present the instructional content. She reported:

I sometimes use the computer lab to introduce some lessons to the children ... It facilitates my presentation of instructional content.

The above excerpts show that student teachers use computers as a resource to present the main ideas and knowledge contained in children's reading texts. Nevertheless, these responses suggest that this use may not be very effective because the student teachers' behavior during this practice concentrates on presenting the ideas as summarized by the student teachers themselves rather than raising questions for discussion. This result conflicts with current perspectives, such as constructivist learning, which assumes that for children to learn they should be given the chance to elicit, clarify and construct new knowledge through mental processes (Hodson, 1998). This negates the premise that the teacher solely possesses and imparts knowledge onto his/her pupils who, instead of passively absorbing knowledge from their teachers, must actively construct their own knowledge (Strommen and Lincoln, 1992).

It is worth noting that student teachers constitute role models for their cooperating teachers who, albeit older and more experienced, benefit from these student teachers' knowledge and practice of the most recent innovations in teaching and learning. Interdependence forms between the cooperating teacher's experience and the student teacher's knowledge, which goes a long way in improving various aspects of teaching and learning in- and outside the classroom.

Homework

Homework pertains to the ways young children use computers at home, independently of the teacher. The findings suggest that the integration of computers into young children's home lives is quite limited, for only five student teachers (15.15%) reported allowing their pupils opportunities to use home computers to do assignment, as shown in the following responses:

I give my children opportunities to use home computers for reading lessons and typing short paragraphs to enrich their learning in writing letters and words.

I give children a variety of home assignments which involve using their home computers.

Our school policy stipulates that teachers give children home activities related to literacy skills based on computer programs.

In reading lessons, I often give literacy-related questions to be answered at home using the Internet.

To help my pupils understand abstract reading passages, I sometimes give them relevant digital video films to watch at home. For instance, this week, I have given my class a DVD that relates to environmental pollution in cities.

These responses point out the way in which the computer is integrated into developing children's literacy skills at home. However, despite the small number of student teachers who engage their children in computerized home assignments, it reflects student teachers' ability to use computers effectively for purposes of enriching and developing children's learning. This use by student teachers is crucial, for it certainly reinforces other learning as doing more homework assists children in achieving high academic standards (Becker, 2000), which is further supported by Lewin's (2004) claims that although pupils' home use of ICT is limited, it focuses on providing pupils with opportunities to engage in activities for extended periods of time.

The data analysis further shows the key role of school policy plays in computer use for homework. The findings suggest that some student teachers do not give children computer-based homework, because school principals and co-operating teachers discourage them from doing so, as suggested by the following responses:

I prefer to give children who have personal computers some homework to do on them, but my co-operating teacher does not encourage me. She says there is no point in doing so.

I would like to give computerized homework, but the school principal says we have to give children textbook-based paper homework and attaches little importance to computer-based homework.

These excerpts suggest that despite some student teachers' willingness to give children computer-based homework, they were neither directed nor encouraged to do so by school principals and co-operating teachers, who are their role models during practicum. However, this could be further attributed to the following reasons:

- School principals believe that student teachers may not have the ability to design computer-assisted homework activities, as reported by a student teacher in the following excerpt:

My school principal tells me that I have to give children homework from textbooks. He says that I may not have the ability to design computer-based homework myself.

This school principal's view may be all wrong, for the authors themselves have come across some student teachers who designed excellent activities despite their lack of experience with and/or training to do so.

- Some co-operating teachers believe that children are not used to computer-assisted homework, as shown in the following response:

My co-operating teacher does not give attention to using computers for homework; she told me that children are not used to doing homework by computer.

However, this view does not constitute a legitimate excuse, because children may need time to become used to doing homework with a computer, particularly as they are still unaccustomed to working independently with home computers.

Instructional Games

Despite research reports that playing games is the predominant activity in using computers (cf., for example, Fromme, 2003), the data analysis showed that only seven (21.2%) student teachers used computers as a resource for playing games, as exemplified in the following excerpts:

I have bought some computer games to develop my pupils' phonological skills.

I designed various computer games to explain the meaning of the vocabulary in my pupils' reading lessons.

I am unable to design game software, but I have borrowed some computerized games to teach literacy skills from the Learning Center in Irbid Directorate of Education.

It is surprising to note that fewer than 25% of the respondents designed and/or used computerized games to enhance pupils' literacy skills in an appealing and stimulating way. This sheds light on a potential shortcoming in computer use in reading instruction, as knowledge of vocabulary lies at the heart of the reading process, for its role in comprehension. Thus, using computers to foster learning vocabulary has a great potential for offering children frequent, engaging practice with word meaning (Aist, 2002:2).

Student teachers' use of computerized instructional games may help pupils to develop psychologically, socially, and intellectually (Al-Abbadi, 2005), not to mention that it increases their activity and stimulates their enjoyment and motivation (Abu Rayya and Hamdi, 2001). More importantly, the use of computerized games is of crucial significance to young children because these games can help them

learn facts and skills, integral as well as peripheral to the game. The players learn what they need to know in order to play the game and this, if the game is well designed, can include educationally valuable information. Through the fiction of the game, students are likely to retain that knowledge longer than they might by other means (Snyder and Palmer, 1986:119).

Thus, it is worth pointing out that the non-use of computerized games in the instructional process may have an adverse effect on children's learning and experience of school education. In this context, Somekh, Lewin, Mavers, Fisher, Harrison, Haw, Lunzer, McFarlane, and Scrimshaw (2002:3) note that

pupils' perceptions of what learning is are shaped by their experience in school settings. They associate 'learning' with school-related use and typically describe all ICT use at home as 'games'. When the meaning of 'games' is probed, it is clear that much learning is taking place through their use of ICT for leisure pursuits, including learning of factual knowledge and conceptual understanding.

Designing Literacy-Related Activities

The majority of the respondents (72.7%) reported that one of the main uses of the computer is developing literacy skills during the course of language instruction, as shown in the following responses:

This week I have given my pupils software that requires them to respond to different tasks and then provides feedback about their responses.

I assess my pupils' learning of literacy skills by providing them with opportunities to type some short dictation passages using a word-processing program.

I design computerized exercises to assess my pupils' ability to distinguish between similarly shaped letters.

During dictation lessons, I give my pupils group activities in which they are required to type some difficult words for training purposes.

Along the same lines, some student teachers (18.2%) reported using the computer to teach pronunciation and letter writing, as shown in the following excerpts:

I use CDs available in the school to help pupils master the learning of the alphabet by presenting the letter supported with pictures and words in addition to auditory phonological pairing.

I require my pupils to use the computer to trace letters to enable them to correctly identify letter shapes and letter-symbol associations.

These excerpts point to the respondents' use of computers to assess pupils' learning of literacy skills, which shows that language-related software has a great potential for helping to develop children's literacy skills. These types of software are effective probably because they give pupils an opportunity to see text on the computer screen, which enables them to model their writing and spend time exploring techniques for revising it.

In this vein, Pantiel and Petersen (1984) reported that primary stage pupils achieve better all-round writing results and can correct their errors more easily using a text editor. Similarly, Murray (2001:36) claims that

the use of a word processing program gives the students power to produce printed work that is free of errors and/or erasure marks possibly for the first time in their lives.

In sum, not only have the respondents reported a tendency to use the computer to develop children's literacy skills but have also used it to improve their pupils' pronunciation using CD programs. These reports are consistent with previous findings such as those of Murray (2001) who claimed that using PowerPoint presentations in teaching reading is an effective approach, for it promotes the alphabetic principle by fading in graphic representations of letters combined with auditory phonological matching.

Designing Instructional Illustrations and Worksheets

Seven respondents (21.2%) reported using the computer to produce instructional media and worksheets, as shown in the following responses:

Children prefer to use instructional illustrations that are done by computer to those made by hand. For instance, I design picture-word/sentence association worksheets for my pupils to do based on the reading text.

I produce various pictures to give children an opportunity to link them to each other so that they can form a short story as a kind of practice of the reading lesson.

I use the computer to create transparencies to use with the overhead projector. I have made many transparencies during this semester to help children acquire a variety of

concepts benefiting from the computer capabilities to add details, such as those related to the water cycle.

I make computer drawings to clarify various vocabulary items in the reading lessons.

I use the scanner to copy pictures to produce good illustrations to facilitate my pupils' learning of new vocabulary.

I sometimes design good caricatures to reflect the pupils' social environment and foster the societal values in the reading lessons.

The above excerpts show that the effectiveness of computer use in young children's learning is multi-faceted. The first two excerpts point out the use of the computer to produce worksheets, a reportedly highly regarded instructional behavior as these worksheets serve as a resource for carrying out classroom activities. These responses also highlight the value of the computer in helping teachers produce pictures to develop their pupils' ability to write short passages, which is considered a major form of communication (Thompson, Bakken, Fulk and Peterson-Karlan, 2004). Moreover, the third excerpt depicts the computer as a tool for designing instructional transparencies that develop young children's literacy skills, which is consistent with Haugland's (2000) conclusion that early childhood teachers often use computer technology for directed activities that match their learning objectives (e.g., fostering pupils' language skills through writing letters to a friend or relative using computerized templates).

Along the same lines, using the computer to produce caricatures to instill societal values in young children confirms the authors' earlier claims regarding the commendable level of awareness among the respondents, especially in light of previous findings which point out the role of instructional illustrations in promoting children's understanding and thinking (Mayer and Gallini, 1990).

To recap, the above excerpts show that the respondents are aware not only of the computer role in developing literacy skills but also of its potential for producing instructional illustrations that help develop these skills. This awareness is commendable since it points out the respondents' awareness of the fact that young children are not apt in abstract learning but do so rather well through the concrete experiences that can be made available by the computer. This is consistent with Papert's (1998) claim that computers have affect children through providing them not only with concrete experiences but also with free access and control of their learning.

CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

The Jordanian MoE has given increasing attention to integrating CAI in all its schools. More specifically, it has designed computerized curricula that are rapidly becoming an important component of the educational process. Therefore, during their preparation, it is essential to equip prospective teachers with a set of computer-related competencies to enable them to integrate computer technologies into their instruction. As a preemptive measure, this study has attempted to investigate student teachers' (viz., tomorrow's teachers' and change agents') computer use to develop young children literacy during practicum.

The findings reveal that, even though the respondents are generally aware of the value of the computer in the instructional process, the majority do not regularly integrate it into their instruction, which could be readily explained in terms of authority and time constraints. The findings further reveal that the computer was used mainly to develop children's literacy and numerical skills rather than their scientific, religion-related, social and civic, physical, artistic, and career-related skills.

This may be attributed to the traditional view that children in the early grades should be taught language and numerical skills, although this goes against more recent approaches that emphasize the need to address all school subjects as the core of the instructional process, especially that each subject is included in the curriculum to achieve certain objectives, which together are intended to develop different areas of the child's personality.

In terms of promoting children's teaching and learning, the authors conclude that a good number of the respondents tend to use computers as a resource for presenting instructional content and designing instructional media and worksheets. On the other hand, fewer than 25% of the respondents reported using the computer for drill and practice, homework, games, and assessing children's literacy skills.

Traditional learning by presenting information and knowledge was also among the computer uses reported by the respondents. Having the teacher as the active agent in the instructional process, with the child as the passive recipient of information from PowerPoint presentations, may be attributed to the student teachers' misconception of the role of technology in the classroom which has been pointed out by Reeves (1996:74) who claimed that the ineffective use of computers is due to teachers' misunderstanding of its appropriate role. He wrote

a primary reason for the failure of technology to become an integral component of educational practice has been the misunderstanding of appropriate roles for technology.

The fact that only few of the respondents reported using the computer is in line with previous reports which suggest not only that student teachers tend to make limited use of computers in their school-based practicum experiences (Robinson, 1995; Sunal, Smith, Sunay, and Britt, 1998; Gibson, 2002) but also that preservice teachers are not well prepared to use technology in instruction (Willis and Mehlinger, 1996; Becker and Anderson, 1998; Becker, 1999; Moursund, 1999). Willis and Mehlinger (1996:978), for example, summarized much of the literature in the following sentence:

Most preservice teachers know very little about effective use of technology in education and leaders believe there is a pressing need to increase substantially the amount and quality of instruction teachers receive about technology.

Willis and Mehlinger further reported that the literature they reviewed suggest that although a large number of pre-service teachers study coursework in technology, the instruction in these courses is, more often than not, unrelated to the curriculum, teaching methods, field experience, or practice teaching.

The present findings suggest a limited, albeit divergent, use of computers, which may be attributed to a host of factors, most important amongst which are the following:

1. The computer courses required of the students in the teacher preparation program at Yarmouk University (viz., CS 100 and CS 101) focus more on computer skills than instructional computer use to develop young children's literacy skills. Many student teachers supported this view, as in the following response:

We have been taught a couple of computer courses, but they have not shown us how to use the computer for instructional purposes.

This response is consistent with Lewin's (2004:152) claim that

there should be less focus on teaching ICT skills in discrete lessons and more emphasis on embedding the teaching of skills across the curriculum within the context of authentic and purposeful tasks.

The response is also consistent with Wang and Holthaus (1997:2) who concluded that computer literacy courses in teacher education programs are

a poor 'tell and show' model of practice which offered isolated and discrete computer skills, but provided little opportunity for pre-service teachers to explore the computer use in real classroom settings Pre-service teachers are receiving little exposure to the computers' role in education outside of technology courses.

2. Co-operating teachers and school principals, who are student teachers' role models, may not be aware of the potential benefits of CAI in developing young children's literacy skills. They are reported to hardly encourage student teachers to integrate computers into their instruction, which should be the case as "administrators need to continually support teachers in their quest to discover how technology can best enhance children's learning" (Haugland, 2000:2).
3. Teacher training programs may not provide teacher trainers/supervisors with the know-how to integrate computers into the school curriculum, which could also reflect negatively on their trainees.
4. The unavailability of computers in classrooms and lack of teaching/learning-related software are reportedly obstacles that limit computer use for instructional purposes.

In light of the above conclusions, the following recommendations are put forth:

1. The Jordanian MoE and the teacher training program at Yarmouk University should strive to provide teacher trainers, school principals, co-operating teachers, and student teachers with workshops and printed matter (e.g., newsletters) on the benefits of computers for learning and teaching pursuits for all school subjects.
2. All courses, including computer-related ones, should give student teachers opportunities to acquire a broad level of computer applications and to develop the proper ways in which computers can be integrated into the instructional process.
3. The teacher training program at Yarmouk University should train student teachers, through micro-teaching, on the instructional skills related to appropriate computer use for developing children's teaching and learning.
4. School administrations should provide student teachers with the software needed for instructional purposes and equip every classroom with one or more computers.
5. In the course of the practicum, teacher trainers/supervisors and co-operating teachers should spare no effort to train teachers to use and integrate computers into their instruction.

It is of paramount importance that instructional computer use be informed by empirical research. Thus, further research is recommended in the following areas:

1. the effectiveness of instructional computer courses in preparing student teachers to be effective in using and integrating computers into their instruction,
2. school principals' and teachers' perceptions of the role of computers in developing teaching in the early grades,

3. teacher trainers'/supervisors' contribution to developing student teachers' competencies to use and integrate computers into their instruction,
4. co-operating teachers' contribution to developing student teachers' competencies to use and integrate computers into their instruction, and
5. the major obstacles in instructional computer use by teachers of the first three primary grades from a teacher's perspective.

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Appendix

Interview Form

1. Do you believe that the computer has a role to play in children's literacy learning in the early primary grades? If so, what role does it play?
2. Some people claim that using the computer to develop young children's literacy is a waste of time? What do you think of these claims?
3. Do you prefer to use the computer in developing young children's literacy skills? If so, how often do you use it in a typical week?
4. What makes you believe that the computer does assist in developing young children's literacy skills?
5. What are the facets in which the computer can be used to support developing young children's literacy- be it in the classroom and independently?

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