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The Role of Computer Technology in Teaching Reading and Writing: Preschool Teachers’ Beliefs and Practices

Fathi Ihmeideh

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This study investigated preschool teachers’ beliefs and practices regarding the use of computer technology in teaching reading and writing in Jordan. The researcher developed a questionnaire consisting of two scales—Teachers’ Beliefs Scale (TB Scale) and Teachers’ Practices Scale (TP Scale)—to examine the role of computer technology in teaching reading and writing to preschoolers. A random sample of 154 preschool teachers participated in the study by completing the questionnaire; 12 teachers were later interviewed. Results indicated that the preschool teachers’ beliefs about the use of computer technology were aligned with their perceptions of their teaching practices, although teachers’ beliefs and their perceptions of their practices were fairly moderate. The results also revealed significant differences between kindergartens in favor of public kindergartens, and the training programs in favor of trained teachers, whereas there was no difference due to area of certification. Directions for further research and recommendations for policy and practice are discussed.

Keywords: computer technology, reading and writing, preschool teacher

The education system in Jordan consists of a 2-year cycle of preschool education, 10 years of compulsory basic education, and 2 years of secondary academic (Ministry of Education [MoE], 2004). In the preschool stage, children between the ages of 4 and 6 learn the “three Rs”: reading, writing, and arithmetic. In addition to these primary subjects, they learn other fundamental subjects, such as religious education, the Arabic language, science, social studies, mathematics, music, arts, handicrafts, physical education, and English. However, it should be made clear that kindergartens in Jordan differ from one area to another with regard to the socioeconomic background of the kindergartners’ families. Unlike the other two educational stages, which are compulsory, preschool education in Jordan is still noncompulsory and is mainly run by the private sector, charities, and voluntary societies (United Nations Educational, Scientific, Cultural Organization [UNESCO], 2007). The Ministry of Education (MoE) runs a very limited number of public kindergarten classes linked with elementary schools in some remote regions. Although kindergartens are run mainly by the private sector, they are exclusively administered by the MoE.

Jordan, a small Arab country with limited natural resources, has been striving to redevelop its education system. In 1987, the MoE held its First National Conference on Educational Development...
to identify ways to enhance and enrich all aspects of education. One of these aspects was integration of technology into school curricula. The Jordanian education system enhanced the use of educational technology, such as educational television programs, tape recorders, overhead projectors, videotapes, laboratories, workshops, libraries, and computer technology (MoE, 1989). Despite the fact that the MoE has paid much attention to technology, and computer technology has been employed in the primary and secondary stages, technology is still not used in most preschool grades.

INTRODUCTION AND THEORETICAL FRAMEWORK

It is a good time to consider the power of current technological advances. Increasingly, communication and information technologies have become part of our everyday lives. The use of computers is increasing day by day, because they are used in many fields to make our lives easier (Bayhan, Olgun, & Yelland, 2002). Computers can present crucial information and offer effective tutorial instruction (Cammarata, 2006). Computers also connect us with other people, store vast amounts of data, and provide us with access and entertainment (Yelland, 2002).

In the technology literature, learning theories have offered different views regarding the use of computer technology. For instance, behaviorism proposed that learning from technologies means using computers for drill and practice, because learning, according to this view, is a matter of imitation and practice. Thus, the behavioral view strongly advocated that the role of adults in learning is important, as they provide a model by which children learn through imitation; the adults also encourage children to continue using computer technology by providing them with positive reinforcement (Gruender, 1996). In contrast to behaviorism, the socioconstructivist theory suggests that if the child learns with computer technology, the role of the computer is to foster, scaffold, and enhance learning in meaningful ways. When learning with technology, children should be given many opportunities to create, test, and reverse their hypotheses (Gruender, 1996). Therefore, preschool teachers have a responsibility to provide children with these experiences to promote their development. The use of computers in preschool settings often requires competent teachers who are skilled in using computers in such settings (Bayhan et al., 2002). The socioconstructivist view has been considered to be the more contemporary perspective of learning and teaching process; thus, today’s early childhood classrooms often reflect this view of using computer technology for children.

Computer technology has important transformative effects on society (Logan, 1995). It provides concrete experiences, helps children control the learning experience (Papert, 1998), and supports children’s development in all domains, as they use computers to investigate questions, solve problems, explore, and manipulate objects on a screen (Dodge, Colker, & Heroman, 2003). For example, children can use computers to investigate questions by using a program that teaches number concepts. Such a program might allow children to create “monsters,” for example, by adding the right number of body parts. Also, children can explore with computers, using software programs that label vocabulary with pictures, written words, and spoken words. Such software programs often verbally identify an object when the child clicks on it. Some software programs allow children to match pictures of images to their beginning letters (Dodge et al., 2003).

In recent years, using computers in early childhood classrooms has become commonplace. Research has shown that preschool children who use computers with supporting activities have
significantly better developmental growth, compared to children without computer experiences, in terms of intelligence, structural knowledge, long-term memory, manual dexterity, communication skills, and problem solving (Haugland, 1992). Other researchers (e.g., Clements & Sarama, 2003; Dodge et al., 2003; Labbo & Ash, 1998; Morrow, Gambrell, & Pressley, 2003; Tancock & Segedy, 2004) have found a positive relationship between the use of computer technology and children’s literacy progress. Hutinger, Bell, Johnson, and McGruder (2002) indicated that children’s literacy skills increase as they work together at the computer. Voogt and McKenney (2008) carried out a study to examine how technology can support the development of emergent reading and writing skills in 4- to 5-year-old children. The results revealed that computer technology benefited children’s literacy and communication skills. An empirical study carried out by Judge (2005) investigated the effect of computer technology on African American children’s literacy achievement. The results indicated that the children’s access to computer technology—at home and in the classroom—improved their academic achievement remarkably. The results also indicated that the preschoolers’ frequent use of literacy software later enhanced their academic achievement in kindergarten.

Almost all early childhood educators share the aim of providing young children with early literacy instruction that leads to successful reading and writing achievement (Fisher, 2000). Research studies have emphasized the importance of children’s early literacy achievements vital later academic success (Justice, 2007; Nutbrown, Hannon, & Morgan, 2005). Teaching reading and writing should be an exciting and meaningful experience that captures children’s interests and enriches their experiences. Fisher (2000) stated that because early literacy is so important, early childhood educators should discover the best ways to help children achieve a high level of literacy. Although experts agree that there is no single way for promoting children’s literacy development, the knowledge base that has emerged from research studies has provided valuable information on instructional practices that are associated with growth in early literacy development. These practices include creating a print-rich classroom environment through the use of genuine children’s literature, establishing literacy centers, increasing opportunities for social collaboration among children, and providing extensive professional development for teachers (Morrow et al., 2003). In addition, researchers have emphasized that technology, particularly computer-related technology, plays a fundamental role in improving teachers’ instructional practices and, therefore, developing children’s literacy skills (Labbo & Ash, 1998; Lankshear & Knobel, 2003).

For example, Dodge et al. (2003) indicated that computer technology has a number of valuable advantages in terms of supporting literacy development for young children: (1) expanding children’s vocabulary and language development by introducing them to software that associates vocabulary with pictures, written words, and spoken words; (2) helping children develop phonological awareness with interactive software that plays with language; (3) increasing children’s understanding of books by exposing them to electronic books; (4) enhancing children’s knowledge of print by recording their responses on a word processing/reading program; (5) offering children practice in learning about letters and words with a program that matches pictures to their beginning letters; and (6) developing children’s enjoyment of literacy by letting them explore electronic storybooks.

Computers enhance and develop young children’s emergent reading and writing skills (Voogt & McKenney, 2008). This can be achieved when children are actively engaged in a range of electronic symbol-making activities containing conceptual processes, knowledge, and
literacy strategies while using classroom computers that are equipped with multimedia word-processing software (Labbo & Ash, 1998).

As children begin to understand how to use computers, such as clicking on an icon, moving the cursor, or opening a file, they unconsciously learn a large amount of technical vocabulary. Also, the child will begin to recognize the letters of the alphabet on the keyboard and in programs. While the child is using software that reads and highlights a spoken text, he or she makes connections between speech and print (Dodge et al., 2003). Furthermore, it is worth mentioning that computer technology provides preschoolers with storybook reading opportunities. According to the National Center to Improve Practice (NCIP; 1998), providing children with these computerized storybook reading opportunities—particularly those incorporating recently improved technologies in voice, sound graphics, and memory capacity—plays a crucial role in developing their reading skills.

The attention given to research into the role of technology in literacy education was not restricted to finding out the relationship between computers and children’s reading progress but also addressed the impact of computers on developing children’s writing skills. Computer technology contributes to developing children’s early writing through improving their ability to use a word processor, organize their thoughts, and make several drafts of their writing (Bruce, Michaels, & Watson-Gegeo, 1985). Baker, Rozendal, and Whitenack (2000) carried out a study to investigate children’s audience awareness as they composed their writing in a classroom in which each child had a personal computer on his or her desk. The authors found that computers benefited children’s writing.

Against this background, a number of researchers have taken a more critical perspective on computer technology in the classrooms. For instance, Cordes and Miller (2000) consider computer technology to be inappropriate for children, citing a number of risks to children’s physical health, emotional-social development, moral development, and intellectual development. Cordes and Miller (2000) stated that early use of computers stunts children’s imaginations and impoverishes their language and literacy skills. Other researchers (e.g., Barnes & Hill, 1983; Cuffaro, 1984) viewed the computer as a developmentally inappropriate tool for young children, due to its abstract nature.

The incidence of children “surfing” the Internet has increased rapidly, and children of preschool age seem to benefit much from the abundant sources of information available on the Internet. For instance, the teacher can develop children’s literacy enjoyment by providing them with a link to an appropriate Website and letting them explore electronic storybooks. Moreover, in the area of science, the Internet can help children learn about Earth and the environment as they check weather Websites under teachers’ supervision. And children can use Websites to learn about plants and animals, as well as other life science topics. For example, some zoos and aquariums have live web cams that allow children to view animals in real time (Dodge et al., 2003). In fact, the Internet has changed the way that teachers, parents, and children perceive education. As preschool children should have access to the Internet in the classroom, teachers have the responsibility of selecting appropriate Websites, and previewing any site that they want their children to use, because preschoolers should not be using the Internet without supervision (Dodge et al., 2003).

The preschool teacher plays a pivotal role in the development of technology-based literacy skills. Most early childhood educators see the computer center as an important activity center for learning (Haugland, 2000). In the computer center, children can have many opportunities to
integrate learning across content areas (Morrow et al., 2003). To support children’s learning in the computer center, teachers should take the time to observe each child and provide them with many opportunities for independent explorations on the computer.

Hsiac (2003) stated that the most important aspect of a good early childhood program is its teachers, as classroom practices are influenced by teachers’ beliefs. In other words, if teachers appreciate the role of computer technology in developing children’s learning, they will be more likely to integrate technology into their early childhood programs, and vice versa. In the view of Foote, Smith, and Ellis (2004), “What teachers do is likely to be an outcome of their beliefs and knowledge about what is appropriate literacy for children in an early context” (p. 136). Researchers (e.g., Hsiac, 2003) have revealed that teachers’ beliefs and practices are influenced by their years of teaching experiences, area of certification, and knowledge about teaching and learning. Therefore, the purpose of the current study is to examine teachers’ beliefs and practices regarding the role of computer technology in teaching reading and writing and its relation to some variables, and to know whether or not teachers put their beliefs into practice in this realm within the Jordanian education system.

Statement of the Problem

The impact of the computer in early childhood educational settings is well established, especially with respect to enhancing children’s literacy development, as stated earlier. Consequently, the powerful responsibility of this tool in Jordanian society cannot be denied. Despite all the advantages of computers in facilitating learning, computer technology is still not utilized effectively in most Jordanian preschool settings. This could be due to a number of reasons: (1) most Jordanian kindergartens do not have the required funds to buy computers for all children and to buy hardware or software, (2) a technological infrastructure is lacking, and (3) kindergarten teachers who are computer literate are scarce (United Nations International Children’s Emergency Fund [UNICEF], 2000).

During his visits to kindergartens, the researcher has noticed that computers, although available, are not widely employed in kindergarten classrooms. For instance, some preschool teachers use computers only for games and leisure time activities, others did not know the benefits of computer technology in developing children’s literacy skills, and those who are computer literate still lack the training in using developmentally appropriate literacy software programs. It should be mentioned that developmentally appropriate ways to use computers with preschoolers are different from the ways we use computers in the primary grades (Haugland, 2000).

It is unclear whether preschool teachers do not use computers in teaching literacy because they do not believe that computers have a significant effect on children’s literacy development, or because they are not aware of the importance of this tool. Therefore, it is important to investigate teachers’ beliefs about the role of computer technology, and to find out whether their beliefs reflect their perceptions of their classroom practices. Fang (1996) stated that teachers’ beliefs about teaching and learning play a crucial role in defining their behaviors and found a strong relationship between teachers’ beliefs and their practices. The significance of this kind of investigation is that it provides a better understanding of how and why the process of teaching looks and works the way it does (Clark & Peterson, 1986). Fang (1996) revealed that teachers’ beliefs about teaching reading and writing not only influence their classroom practices, but also form children’s perceptions of the nature of literacy.
In view of the scarcity of research studies on the role of computer technology in Jordanian preschool education, the current study aims to investigate the role of computer technology and how the beliefs and practices of Jordanian preschool teachers affect it. Also, this study aspires to provide the MoE, curricula designers, preschool teachers, and kindergartners’ parents with valuable information about how preschoolers learn to read and write with computers and assist them in supporting children’s literacy skills by employing computer-related technology. Moreover, it could encourage other researchers to conduct further studies in this field in Jordan and other countries in the world.

Research Questions

The current study addresses the following research questions:

1. What are preschool teachers’ self-reported beliefs and their perceptions of their practices about computer technology in teaching reading and writing?
2. Is there a connection between teachers’ beliefs about the role of computer technology in teaching reading and writing and their perceptions of their instructional practices?
3. How do preschool teachers’ self-reported beliefs and their perceptions of their practices vary in terms of type of kindergarten, area of certification, and training programs?

Limitations of the Study

The current study is restricted by some limitations that hinder the generalization of its results. First, the study utilized two research methods—namely, a survey questionnaire and a semistructured interview. However, no attempt was made to gather information using other research methods, such as observation. Second, the selection of the sample was limited to two governorates in Jordan (Amman and Zarqa), whereas other governorates of the country have not been investigated. Data collected from other governorates could possibly produce different results.

RESEARCH METHODS AND PROCEDURES

Population and Sample

The target population for the current study was all preschool teachers from all kindergartens in two governorates in Jordan—namely, Amman and Zarqa. The population of teachers is chosen from all teachers who teach 5-year-old children. A list of kindergartens was obtained from the MoE to determine the population frame for the study. According to the list, the target population consisted of 857 kindergartens. A simple random sample of 128 kindergartens (80 private kindergartens and 45 public kindergartens), representing 15% of the kindergarten population, was drawn from the established population frame. Two preschool teachers from each private kindergarten (N = 160) and one preschool teacher from each public kindergarten (45) answered the questionnaire items. Twelve preschool teachers were interviewed later, to obtain a greater in-depth understanding of their beliefs and practices. Follow-up interviews were conducted with a subsample of the selected teachers who responded to the questionnaire.
A total of 154 usable questionnaires were returned, with a response rate of 75.1%. The sample distribution was all female preschool teachers. Table 1 illustrates the distribution of the sample by the study variables.

### Availability of Computers in the Sample Classrooms

With regard to the availability of the computers in the sample classrooms, Table 2 shows the number of private and public preschool teachers surveyed that had computers in their classrooms. Table 2 reveals that 36 public preschool teachers out of 42 (86%) have computers in their classrooms. Regarding private preschool settings, it could be seen that almost one half of private preschool teachers (55) reported that they have computers in their classrooms, whereas 57 do not.

### Instrumentation

The researcher developed the instrument used in the current study after a thorough review of the literature worldwide, especially research related to computer technology and literacy development. The survey questionnaire consists of two sections. A demographic section gives a description of the sample used in the study, such as type of kindergarten, area of certification, and training programs that teachers received. The second section includes preschool teachers’ beliefs and practices concerning the role of computer technology in teaching literacy. Section two addresses the two scales employed: the Teachers’ Belief (TB) Scale, which consists of 19 items using a 5-point Likert-type scale of responses, with 5 indicating strongly agree and

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency and Percentage of Total (154)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of kindergarten</td>
<td>42 public (27.3%), 112 private (72.7%)</td>
</tr>
<tr>
<td>Area of certification</td>
<td>60 ECE-related certification (39.0%), 94 ECE-unrelated certification (61.0%)</td>
</tr>
<tr>
<td>Training programs</td>
<td>28 trained teachers (18.2%), 126 untrained teachers (81.8%)</td>
</tr>
</tbody>
</table>

ECE = early childhood education.

<table>
<thead>
<tr>
<th>Private Preschool Teachers</th>
<th>Public Preschool Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unavailable</strong></td>
<td><strong>Available</strong></td>
</tr>
<tr>
<td><strong>Private</strong></td>
<td><strong>Public</strong></td>
</tr>
<tr>
<td><strong>F</strong></td>
<td><strong>F</strong></td>
</tr>
<tr>
<td><strong>P</strong></td>
<td><strong>P</strong></td>
</tr>
<tr>
<td>51</td>
<td>57</td>
</tr>
<tr>
<td>49</td>
<td>55</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>86</td>
<td>36</td>
</tr>
</tbody>
</table>

F = frequency; P = percentage.
indicating *strongly disagree*; and the Teachers’ Practice (TP) Scale, which consists of 19 items used in the TB Scale employing a 5-point Likert-type scale of responses, but this time asking how frequently the teachers practice the behaviors described in the 19 items, with 5 indicating *always* and 1 indicating *never*. An example of one item within the two scales is provided in Table 3 below.

The face and content validity of the instrument was evaluated by a 10-expert panel consisting of university teacher educators with specialization in early literacy development and instructional technology. The instrument was field tested, with 30 preschool teachers representing all disciplines under scrupulous study. Changes indicated by the validation panel and field test were incorporated into the instrument development. For instance, the panel suggested that the TB scale and the TP scale need to be listed together on one page for the same items, instead of being separated into two pages. Also, they suggested adding one or two items examining teachers’ beliefs about using electronic storybooks or electronic nursery rhymes, and they recommended a number of items be shortened. The field testing also showed that preschool teachers did not understand some of the technical terms used in the first draft of the questionnaire (such as “developmental software” and “big books”); thus, the field testing was helpful in giving the researcher an opportunity to make refinements. Finally, the field-testing instruments gave the researcher a good opportunity to test the time needed to complete the instrument. It took most teachers around 10–15 minutes.

To estimate the reliability of the questionnaire, an internal consistency coefficient for the instrument was calculated using Cronbach’s alpha method for each scale. Consequently, the internal consistency coefficient was (0.84) for the TB Scale and (0.89) for the TP Scale. These results mean that the reliability coefficients were satisfactory for the purpose of the study.

Follow-up Interviews

A semistructured interview was adopted in this study to clarify issues identified in the questionnaires and provide help in exploring the situation in more depth. This kind of interview has many advantages, because it is a more flexible technique than the other interview techniques, and it allows the interviewer get detailed information, gauge opinion, and exchange ideas (Drever, 1995). The interview questions were prepared after analyzing the questionnaire. The purpose was to explore, in-depth, the preschool teachers’ beliefs about their use of computer technology in their instructional practice.

### TABLE 3
Sample Item From the TB and the TP Questionnaires

<table>
<thead>
<tr>
<th>Items</th>
<th>TB Scale</th>
<th>TP Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>preschool classrooms should contain computer centers</td>
<td>SA A U D SD</td>
<td>A O S R N</td>
</tr>
</tbody>
</table>

*TB = Teachers’ Beliefs; TP = Teachers’ Practices. TB Scale (SA: Strongly Agree; A: Agree; U: Undecided; D: Disagree; SD: Strongly Disagree); TP Scale (A: Always; O: Often; S: Sometimes; R: Rarely; N: Never).*
Data Collection

The researcher conducted personal visits to kindergartens and met the preschool teachers. Teachers were acquainted with the aim of the study. The researcher hand-delivered the questionnaire to the classrooms during the first semester of the 2008–2009 academic year. Teachers were encouraged to read the items carefully before selecting the appropriate choice, although none of survey questions was discussed. Additionally, the participants were ensured confidentiality and anonymity. It should be mentioned that the preschool teachers completed the TB and the TP questionnaires simultaneously. After delivering the questionnaires to the teachers, the researcher made an appointment to collect them after one week.

With regard to the interviews, data from the follow-up interviews were collected during the second semester of the 2008–2009 academic year. The interviews were conducted in the Arabic language, as the interviewees were native speakers of Arabic and most of them did not have adequate knowledge of English. The interviews were conducted in the teachers’ room and took about 15 minutes.

Data Analysis

The current study utilized quantitative data analysis techniques, using correlation coefficient analysis and $t$ test to examine responses to a survey questionnaire used for the purpose of conducting the current study. The alpha level was set at 0.05 a priori. The analysis techniques are discussed by research questions as follows:

- **Question 1** examines preschool teachers’ beliefs about the role of computer technology in teaching reading and writing and their related practices. Descriptive statistics, including means and standard deviations for each of the 19 items and the average of all items, were utilized to answer this question.
- **Question 2** investigates whether there is a connection between teachers’ beliefs about the role of computer technology in early literacy and their own instructional practices. Pearson correlation coefficient analysis was performed to examine the relationship between the overall score of teachers’ beliefs and practices. This has been achieved by using the Pearson rank correlation analysis.
- **To answer research Question 3**, the $t$ test for the independent sample was used to compare if differences exist in preschool teachers’ beliefs and practices, based on the study variables.

The interviews were recorded using a tape recorder. After the transcriptions stage, a list of all topic areas covered by the data was constructed after reading the data, line by line, to separate and categorize the data related to the aims. The final step was translating the interviews into English.

**RESULTS**

The data collected from the sample were coded, entered to the Statistical Package for Social Sciences (SPSS) spreadsheets, and analyzed using the SPSS software package (ed. 14). Descriptive
statistics for all variables in the current study were examined using SPSS frequencies. Missing subjects were not detected, either. Results of the study are addressed by each research question as follows.

Results Pertaining to Research Question 1

Research Question 1 examines teachers' beliefs and their perceptions about their practices regarding the role of computer technology in teaching reading and writing. Descriptive statistics, including means and standard deviations, were used to analyze the answer this question. As shown in Table 4, the mean values of the TB Scale were almost higher than the TP Scale, as the overall mean score for the TB Scale was 3.43, indicating moderate beliefs toward the role of computer technology, whereas the overall mean score for the TP Scale was also moderate (3.27). Furthermore, the validity of the scores (as represented by their standard deviations) was almost equal for the two scales.

Regarding the TB Scale about the role of computer technology in teaching reading and writing, Table 4 shows that items 17, 6, 10, and 16 had the highest mean values (4.75, 4.57, 4.52, and 4.27, respectively), as teachers strongly agreed that computers should be used as a part of the print-rich classroom environment. They also agreed that preschool classrooms should contain computer centers that provide children with developmentally appropriate literacy software, and give them literacy activities to be done at home, using a computer. However, items 5, 3, 13, and 18 had the lowest mean values (1.88, 2.45, 2.64, and 2.75, respectively), as teachers disagreed that teachers should allow children to read and write through computer use every day. They also disagreed that children should have access to the Internet, should frequently write using the word processor, and gain phonological awareness through computers. The mean values for the rest of the items ranged from high to fairly moderate, ranging from 4.17 to 3.05. It is notable that 12 of the 19 items had mean values above 3.50, indicating moderate beliefs regarding using the computer in literacy instruction.

As with regard to the TP Scale of the role of computer technology in teaching reading and writing, teachers were asked to respond to the same previous items mentioned in the TB scale, but the question asked teachers to state how frequently they translate what they believe into their actual practices. Table 2 reveals that items 8, 16, 17, and 6 received the highest mean values (4.65, 4.50, 4.45, and 4.37, respectively), because preschool teachers often expose children to language games through computers, give children literacy activities to be done at home using a computer, use computers as a part of the print-rich classroom environment, and employ computer centers in their classroom. On the contrary, items 5, 13, 3, and 11 received the lowest mean values (1.76, 1.42, 2.28, and 2.51, respectively), because preschool teachers rarely allow children to read and write through computers every day, frequently allow children to write using the word processor, give children access to the Internet, and give children the opportunity to select their own computer literacy software programs. The mean values for the rest of the items ranged from moderate to fairly low, ranging from 4.36 to 3.45. It should be mentioned that 11 of the 19 items had mean values above 3.50, indicating also moderate perception of their practice regarding use of computers in literacy instruction.

Interview results confirmed the questionnaire’s results. The majority of the preschool teachers interviewed believed that computers should be used as a part of the teaching and learning process. Ten out of 12 teachers indicated that the computer center is considered
important in the kindergarten classrooms and should contain appropriate literacy software programs. One teacher said:

There is no doubt that the computer makes children’s literacy development better. I believe that the computer center can play a significant role in this matter. However, this corner could not play its role without providing it with appropriate literacy software.

### TABLE 4
Means, Standard Deviation, and Rank for Teachers’ Beliefs and Their Perceptions of Their Practices Regarding Using Computer Technology in Teaching Reading and Writing

<table>
<thead>
<tr>
<th>No</th>
<th>Statements</th>
<th>Teachers’ Beliefs</th>
<th>Teachers’ Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>1</td>
<td>Computers should be used to assess children’s progress in literacy.</td>
<td>4.16</td>
<td>1.06</td>
</tr>
<tr>
<td>2</td>
<td>Preschool teachers should allow children to draw pictures using drawing-related software programs.</td>
<td>3.73</td>
<td>1.30</td>
</tr>
<tr>
<td>3</td>
<td>Preschool children should have access to the Internet.</td>
<td>2.45</td>
<td>1.22</td>
</tr>
<tr>
<td>4</td>
<td>Computers should be used in kindergarten classrooms as teaching aids.</td>
<td>4.04</td>
<td>1.25</td>
</tr>
<tr>
<td>5</td>
<td>Preschool teachers should allow children to read and write on the computer every day.</td>
<td>1.88</td>
<td>1.56</td>
</tr>
<tr>
<td>6</td>
<td>Preschool classrooms should contain computer centers.</td>
<td>4.57</td>
<td>0.91</td>
</tr>
<tr>
<td>7</td>
<td>Preschool teachers should read aloud to children from e-books installed on the computer.</td>
<td>3.51</td>
<td>1.28</td>
</tr>
<tr>
<td>8</td>
<td>Preschool children should be exposed to language games through computers.</td>
<td>4.17</td>
<td>1.00</td>
</tr>
<tr>
<td>9</td>
<td>Preschool children should not use computers because most of them have limited fine-motor skills.</td>
<td>3.55</td>
<td>1.49</td>
</tr>
<tr>
<td>10</td>
<td>Preschool children should be provided with a wide variety of developmentally appropriate literacy software.</td>
<td>4.52</td>
<td>1.00</td>
</tr>
<tr>
<td>11</td>
<td>Preschool children should select their own computer literacy software programs.</td>
<td>3.45</td>
<td>1.44</td>
</tr>
<tr>
<td>12</td>
<td>Nursery rhymes, songs, and poems should be presented through computers.</td>
<td>3.90</td>
<td>1.21</td>
</tr>
<tr>
<td>13</td>
<td>Preschool children should frequently write, using the word processor.</td>
<td>2.64</td>
<td>1.42</td>
</tr>
<tr>
<td>14</td>
<td>It is important for preschool children to hear stories using computer earphones.</td>
<td>3.09</td>
<td>1.55</td>
</tr>
<tr>
<td>15</td>
<td>Preschool children should be encouraged to work in groups while doing computer literacy activities.</td>
<td>3.05</td>
<td>1.18</td>
</tr>
<tr>
<td>16</td>
<td>Preschool children should be given literacy activities to be done at home on the computer with their parents.</td>
<td>4.27</td>
<td>1.08</td>
</tr>
<tr>
<td>17</td>
<td>Computers should be used as a part of the print-rich classroom environment.</td>
<td>4.75</td>
<td>0.71</td>
</tr>
<tr>
<td>18</td>
<td>Phonological awareness is best learned through a computer.</td>
<td>2.75</td>
<td>1.48</td>
</tr>
<tr>
<td>19</td>
<td>Preschool computers should be utilized to develop children’s emergent literacy skills.</td>
<td>3.60</td>
<td>1.28</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3.43</td>
<td>0.45</td>
</tr>
</tbody>
</table>
Most of the teachers interviewed (9 out of 12) do not agree that children should spend a lot of time using computers. They argued that computers cannot help children develop their social, emotional, and physical skills. As one teacher explained:

Although the computer is vital in children’s learning, relying wholly on this tool is considered to be the "miseducation" of young children since children, at this critical stage, are in need of developing other important skills, like talking, walking, and making friends.

From the interview results, it is of interest to note that the vast majority of teachers (11 out of 12) believed that the Internet should not be employed in early childhood classrooms, confirming the findings obtained from the questionnaire. One teacher’s response on this matter is summarized here:

It is very dangerous to introduce the World Wide Web to young children. We cannot trust the commercial websites. Many of these sites, however, may give our young children dangerous values like violence, sex, and so on. These sites are more concerned with money than our children’s future.

Another teacher made the following statement:

Actually, I feel it is too early for the preschoolers to learn from the Internet. I think there is a time for learning from the Internet, and this is best suited when children have moved up into primary school, but not at the “critical stage.”

Regarding teachers’ perceptions of their practice, interview results revealed that eight teachers were found to be in agreement with regard to using computers in teaching reading and writing through electronic nursery rhymes and language games, whereas seven (out of 12) indicated that they often allow children to type their names, the letters, syllables, and some familiar words by using a word processor. One of them said:

I sometimes let children play language games. Honestly, they like this practice. Additionally, they enjoy listening nursery rhymes through the computer. I am really happy when I see my children looking at the screen and repeating what the nursery rhymes say.

Against this background, the majority of the teachers in the interviewed sample (10 out of 12) reported minimal use of computer technology in teaching literacy. They mentioned that they never use the Internet in their instructional practice. Their reasoning may be summarized in the words of one teacher, who said:

There are many reasons why I do not use computers in my teaching practice. Although we do have computers in our kindergartens, I do not actually find time to prepare activities for children to be used on the computer. You know I have to do things which are unrelated to my profession.

Another teacher added the following:

The large numbers of children in my class obstruct the use of computers and the Internet, as the use of technology in the classroom, as we all aware, needs a small number of children per class.

Finally, more than one half of the teachers interviewed (8 out 12) mentioned that they do not know how to guide the young children to learn with computers, as they do not have the knowledge of how to make computers valuable tools for young children. One of them added:
Many teachers, including myself, lack the technology skills to use a computer. I think the problem is not whether computers are available in children’s classrooms or not. We, as teachers, need training programs to know how to use computers to teach young children. However, such training programs are costly and that is why our kindergarten administration does not want us to attend and participate in these programs.

Results Pertaining to Research Question 2

Research Question 2 examines the relationship between teachers’ beliefs and their perceptions of their instructional practices. To determine whether teachers’ beliefs about the role of computer technology in teaching reading and writing correlate with their perceptions of their actual classroom teaching practices, the overall mean score of the two scales (TB Scale and TP Scale) were summed up separately, and then the correlation analysis was used. As shown in Table 5, results revealed that there is a statistically significant correlation between teachers’ beliefs and their perceptions of their practices, as teachers’ practices correlated with their beliefs regarding the TB Scale and TP Scale. A moderate positive correlation of 0.55 at the level 0.01 was found between both scales. This result reflects the fact that preschool teachers are more likely to put their own beliefs into practice about the use of computers in teaching reading and writing.

Results Pertaining to Research Question 3

Research Question 3 is concerned with the significant differences between the two scales and the following individual demographics of preschool teachers in Jordan: (1) type of kindergarten, (2) area of certification, and (3) training programs. The t test for the independent samples was used to answer this research question.

Type of kindergarten

Type of kindergarten was used as an independent variable to determine whether teachers’ beliefs and practices about the role of computer technology in teaching literacy differ based on whether they work in public kindergartens (n = 42) or private kindergartens (n = 12). As shown in Table 6, results of the t test showed that there was a difference between the two scales pertaining to public kindergarten teachers and private kindergarten teachers in favor of those working in the public kindergartens.

<table>
<thead>
<tr>
<th>Scale</th>
<th>TB</th>
<th>TP</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>TP</td>
<td>0.55*</td>
<td>—</td>
</tr>
</tbody>
</table>

N = 154. TB = Teachers’ Beliefs; TP = Teachers’ Practices.
*p < 0.01.
Area of certification

The data about areas of certification were further analyzed to determine whether teachers’ beliefs and practices about the role of computer-related technology in teaching literacy differ according to the teachers’ qualifications. Sixty teachers hold early childhood certification, whereas the others (n = 94) do not. Utilizing the t test, as can be seen in Table 7, shows that there was no statistically significant difference across the teachers’ certification.

Early childhood education training programs

Data about early childhood education (ECE) technology training programs that preschool teachers attended are also grouped. The t test for the independent sample was used to determine whether teachers’ beliefs and practices about the role of computer technology in teaching literacy differ for ECE technology-trained teachers (n = 28) versus untrained teachers (n = 126). As shown in Table 8, results showed that there was a difference in the TB Scale between ECE technology-trained teachers and -untrained teachers in favor of those who have attended or are still attending such programs. With the TP Scale, results revealed no statistically significant difference between ECE technology trained and untrained teachers.

DISCUSSION

There is no doubt that computer technology plays a vital role in developing children’s literacy skills. Therefore, assessing the beliefs and practices of Jordanian preschool teachers about the
The role of computer technology in teaching literacy was the major aim of the present study. One hundred fifty-four preschool teachers completed the TB and TP questionnaires, in which they were asked to respond to two scales (TB Scale and TP Scale), including 19 statements in each scale pertaining to the role of computer technology in teaching literacy. After analyzing the questionnaires, 12 teachers were later interviewed.

### Teachers' Beliefs and Their Perceptions of Their Practice

Results indicated that teachers' beliefs and their perceptions of their practices about the role of computer technology in teaching literacy were fairly moderate, although the mean scores of the TB Scale were nearly higher than those of the TP Scale. This result is consistent with the work of Labbo and Ash (1998), who indicated that many early literacy instructional practices are employed without the use of computer activities. In spite of the fact that we live in the 21st century, which has been described as the computer age, Jordanian preschool teachers still do not hold strong beliefs about the role of computers in teaching literacy, nor do they always employ this technology in their actual instructional practices. This result could be due, as the interview findings indicated, to the lack of teachers’ knowledge about the important role that computer technology plays in developing children’s literacy skills, or it may be attributed to the nonavailability of the computers, as 63 out of 154 preschool teachers (41%) do not have computers in their classrooms.

As with regard to teachers’ beliefs about the role of computer technology in teaching reading and writing, results showed that teachers hold a high agreement toward using computers as a part of the print-rich classroom environment, providing the classroom with a computer center, providing children with developmentally appropriate literacy software, and giving children literacy activities to be done at home on a computer. The reason why teachers hold strong beliefs about the first three instructional practices is perhaps due to the fact that print-rich classroom environments, the computer center, and literacy software might not be available in the kindergartens where the teachers in the sample work, because the availability of computers among private preschool teachers, who represent the vast majority of the teachers in the sample, is quite limited, as indicated in Table 2. Thus, teachers believe that providing children with these facilities would help them develop their literacy skills because of the importance of these ECE technologies in preschool settings.

Giving children literacy activities to be done at home on a computer was the fourth instructional practice upon which the teachers agreed. This may be due to the fact that the majority of

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**Table 8**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Training Programs</th>
<th>No.</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB Scale</td>
<td>ECE technology-trained teachers</td>
<td>28</td>
<td>3.84</td>
<td>0.26</td>
<td>5.74</td>
<td>0.00*</td>
</tr>
<tr>
<td></td>
<td>ECE technology-untrained teachers</td>
<td>126</td>
<td>3.34</td>
<td>0.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP Scale</td>
<td>ECE technology-trained teachers</td>
<td>28</td>
<td>3.23</td>
<td>0.45</td>
<td>−0.49</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>ECE technology-untrained teachers</td>
<td>126</td>
<td>3.27</td>
<td>0.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ECE = early childhood education; TB = Teachers’ Beliefs; TP = Teachers’ Practices.

*The mean difference is significant at the $p < .05$ level.
the teachers in the sample do not have computers in their classrooms. Thus, teachers may think that children could have an opportunity to use a computer at home more than in their classrooms. This explanation is supported by one preschool teacher interviewed, who said:

As far as I know, almost every house now has a computer. This is the truth. We have a responsibility for supporting and encouraging parents to become aware of the role of computers in developing their children. We should also help parents to play their role in a successful way, as children spend most of their time at home with their parents, as you know.

Against this background, the results revealed that teachers did not have strong beliefs about allowing children to read and write through computer use every day, giving them access to the Internet, allowing them to write frequently using the word processor, and teaching them phonological awareness through computers. This result disagrees with the work of Cammarata (2006), who acknowledged the role of ECE computer technology in developing children’s phonological awareness. This result could be due to the fact that teachers still underestimate children’s ability, as most preschool teachers do not consider children as developmentally ready to use computers or the Internet (Barnes & Hill, 1983). One preschool teacher interviewed said:

Sometimes, I allow children to experience computers. For example, I let them press the Enter key to see how the screen changes, put CDs in the right way, and click the mouse. I do not think asking children to write through computers is an appropriate practice, as children are not mature enough.

Even without using computers, children’s writing, in most Jordanian preschool grades, is not encouraged until children become mature and master other language skills—namely, reading and speaking.

Regarding teachers’ practices in using computer technology in teaching literacy, the results revealed that preschool teachers often employ the following instructional practices: exposing children to language games through computers, giving children literacy activities to be done at home using computers, using computers as part of the print-rich classroom environment, and employing computer centers in their classrooms. It is worth noting in this regard that the same items found in the TB Scale were found in the TP Scale, except for a few differences in the order of their mean scores in favor of the TB Scale. However, exposing children to language games through computers was found to be the most widely employed instructional practice. This result is not surprising for teachers in Jordan, as the researcher has noticed from his supervisory visits to the kindergarten classrooms that some preschool teachers use computers only for games and leisure-time activities. This result is consistent with Labbo and Ash (1998), who found that computers are often reserved for games after assigned deskwork has been completed.

By contrast, the results emerging from the analysis of the TP Scale indicated that preschool teachers did not employ the following instructional practices in their actual classroom environments—namely, allowing children to read and write through computers every day, allowing children to frequently write using the word processor, allowing children to have access to the Internet, and giving children the choice to select their own computer literacy software programs. Similar to the findings of the TB Scale, these instructional practices did not hold a strong agreement among preschool teachers. This could be due to the fact that the preschool settings are not equipped for the appropriate use of educational technology (including computers) because of insufficient funding. In addition, preschool teachers, particularly veterans who began their jobs in a period mainly free of computer technology, may lack adequate knowledge of the different
electronic and digital tools available to them and lack the training in how to use these tools effectively. In the view of Hope (1998), the lack of experience with computers as educational aids is considered to be one of the difficulties teachers face when using technology in the classroom environment.

The Relationship Between the TB Scale and the TP Scale

The results concerning the relationship between teachers’ beliefs and their perceptions of their practices about the role of computer technology in teaching reading and writing revealed a moderate positive relationship between the two scales. This means that the preschool teachers perceive that they practice what they believe regarding the use of computers in teaching reading and writing, as there is an obvious correspondence between the teachers’ beliefs and their perceptions of their actual practices. This congruence between teachers’ beliefs and practices is similar to the results of studies conducted by Stipek and Byler (1997), who found that teachers’ beliefs were aligned with their actual practices in the field of childhood education. This result may be attributed to the fact that preschool teachers feel pressure to ensure that their children are learning, although some of their beliefs and practices about the use of a computer in teaching literacy are still quite far away from what the MoE and the National Curriculum expect.

Demographic Variables and Group Differences

The last research question investigates whether any statistically significant difference exists between the means of teachers’ beliefs and their perceptions of their practices about the role of computer technology in teaching literacy, based on differences in type of kindergartens, area of certification, and training programs. As with regard to the type of kindergarten, the results indicated that significant differences exist at the (0.05) alpha level in favor of the public kindergartens. This result might be justified in light of the recent interest in the field of ECE in Jordan, as the MoE recently established its own public kindergartens in some parts of the country to provide remote and poor areas with preschool services, which are not provided by the private sectors. Only public kindergartens receive funding from the MoE’s budget; therefore, these kindergartens are provided with computers and their preschool teachers receive ECE computer training funded by the MoE. Private kindergartens, on the other hand, do not receive any financial support from the MoE and therefore may not have the financial capability to purchase computers and train their teachers to use them. Consequently, teachers in public kindergartens are more likely to hold strong beliefs about the use of computers in teaching literacy and practice accordingly.

Moreover, the results indicated that there were, statistically, no significant differences at the 0.05 alpha level with regard to teachers’ certification. This result is contrary to most previous research findings conducted throughout the world in the field of ECE, which have revealed that teachers who have qualification in ECE are more likely to have more effective instructional practices than their counterparts with certification unrelated to ECE (National Association for the Education of Young Children, 2009). This may be attributed to the fact that teachers who hold certification in ECE may have not been exposed, during their studies at the college or university, to courses that helped them acquire knowledge about the use of technology in general, so a statistically significant difference was not found between teachers who are certified in ECE and those who are not.
Regarding ECE computer training programs, the results revealed that there were statistically significant differences in the TB Scale in favor of trained teachers, whereas there were no statistically significant differences in the TP Scale between computer-trained and untrained preschool teachers. ECE computer training that preschool teachers receive helps them develop their awareness and beliefs about the role of technology in early literacy development. This result is similar to that in Morni’s (2001) study, which identified that trained preschool teachers are more likely to develop appropriate beliefs about the teaching and learning process in preschool settings. In the view of Haugland (2000), “Training opportunities enable teachers to build skills and confidence and learn strategies to integrate computers into their curriculum” (p. 4).

Although the results revealed that there were statistically significant differences in the TB Scale with regard to the training in favor of trained teachers, statistically significant differences in the TP Scale were not found between the groups. This could be due to the fact that the ECE computer technology training course that preschool teachers usually attend exposes teachers to theoretical issues in the use of technology without training them on the practical applications of the technology in kindergartens. Thus, the ECE computer technology training programs offered by the MoE to develop preschool teachers’ technological practices in teaching literacy may be still unproductive.

**CONCLUSION AND RECOMMENDATIONS**

In light of the above discussion, it can be concluded that the preschool teacher plays a major role in providing children with computer experience—or in excluding this tool from their classroom environment. Teachers are more likely to put their beliefs into actual instructional practice, because the current study has confirmed the congruence between the teachers’ beliefs and their perceptions of their instructional practices in teaching reading and writing. In addition, teachers working in public kindergartens were found to hold stronger beliefs and practices regarding the use of computer technology and are more likely to practice accordingly than their colleagues working in private kindergartens.

Moreover, statistically significant differences were not found between teachers holding ECE-related certification and those who do not. Finally, ECE computer technology-trained teachers share the same positive perceptions of the use of computer technology in teaching literacy, although statistically significant differences were not found between preschool ECE computer technology-trained and untrained teachers. Based on these conclusions, several practical and theoretical recommendations are provided. From a practical standpoint, it is recommended that the MoE should play a crucial role in expanding the use of computers in kindergartens. The MoE should provide preschool teachers with extensive training on the appropriate use of ECE computer technology, increase the number of computers in kindergartens, provide kindergartens with developmentally appropriate literacy software, and, most important, provide preschool teachers working in private and public kindergartens with in-service training programs to change their attitudes toward technology and increase their knowledge and awareness, about the use of computers in teaching literacy, and enhance their practice in this area. These programs, however, should concentrate on the practical applications of ECE computer technology, rather than on the theoretical ones.

The MoE needs to pay more attention to private kindergartens by providing them with adequate funding and appropriate supervision, because the private sector still bears the overall responsibility
for running the vast majority of kindergartens in the country, without receiving any financial support from the ministry. It is also recommended that the ECE study plans at community colleges and universities be reviewed, to make sure that these programs include courses and training related to the use of computer technology in teaching literacy to preschoolers.

From a theoretical standpoint, qualitative studies should be done to get a complete picture of the role of computer technology in teaching reading and writing, as perceived by teachers, principals, and parents. Conducting further studies to investigate the effectiveness of computer technology in developing Jordanian children’s literacy skills also is recommended. It is important to increase Jordanian educators’ awareness of the importance of the appropriate use of computer technology in the preschool stage. Further studies should be conducted to compare the instructional practices in the field of computer technology used in Jordanian preschool education programs with leading international programs, to benefit from their instructional practices and their effective use of computer technology in preschool grades. Finally, it is hoped that the current study might provide valuable insights for decision makers in the MoE about the use of computer technology in teaching reading and writing, which may lead to its continuous improvement and development.

REFERENCES


ROLE OF COMPUTER IN TEACHING READING AND WRITING


