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Early Childhood Teachers and Computers: Beliefs and Self-Reported Practices [*]

Ramazan Sak[**] **Feyza Tantekin Erden**[***]
İkbal Tuba Şahin Sak[****] **Hadi Esmeray**[*****]

Abstract

There are disadvantages as well as advantages to the use of computers, and early childhood teachers have an important role to play in the appropriate incorporation of computer technology into learning. To fulfill this role, they not only need to have the skills and knowledge to implement this relatively new way of learning, but also to have a positive attitude towards and belief in the validity of the use of computer technology in the classroom. Thus, it is important to analyze early childhood teachers' beliefs about computer use, since these are keys to understanding their practices in the classroom. The current study aims to determine early childhood teachers' beliefs and self-reported practices relating to computer use in the context of Turkey. The participants in this study were selected purposefully and consisted of 16 early childhood teachers. Data was obtained via a semi-structured interview protocol and analyzed through the word-repetition technique. Following data analysis, five themes were determined: (1) the availability and use of computers and the Internet, (2) the aims of computer use, (3) the advantages and disadvantages of computer use, (4) the teacher's role in computer use and (5) teachers' suggestions for effective computer use in early childhood classrooms. The teachers who participated in this study recognized the benefits of computer technology. However; they also expressed a need for more access to technology and more training. It is hoped that, with the help of technology-development projects, the early education of children will be enhanced.

Keywords: computer use, early childhood teachers, teachers' beliefs, teachers' practices

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[**] Assist. Prof. Dr., Yüzüncü Yıl University, Early Childhood Education, Van, Turkey. E-mail: ramazansak@yyu.edu.tr
[***] Assoc. Prof. Dr., Middle East Technical University, Early Childhood Education, Ankara, Turkey. E-mail: tfeyza@metu.edu.tr
[****] Assist. Prof. Dr., Yüzüncü Yıl University, Early Childhood Education, Van, Turkey. E-mail: ikbalsak@yyu.edu.tr
[*****] Lecturer, Gaziosmanpaşa University, Computer Programming, Tokat, Turkey. E-mail: hadi.esmeray@gop.edu.tr

Okul Öncesi Öğretmenleri ve Bilgisayarlar: İnançları ve Kendi Söylemlerine Dayanan Uygulamaları

Öz

Bilgisayar kullanımının avantajları olduğu kadar dezavantajları da bulunmaktadır ve okul öncesi öğretmenleri bilgisayar teknolojisinin öğrenme sürecine uygun şekilde adapte edilmesinde önemli bir rol oynamaktadırlar. Bu görevi yerine getirmek için öğretmenlerin kısmen daha yeni sayılan bu öğrenme yolunu yalnızca bilmeleri veya bununla ilgili birtakım becerilere sahip olmaları yeterli değildir. Bunlara ilaveten sınıfta bilgisayar teknolojisini kullanmanın doğruluğu ile ilgili inançları ve olumlu tutumları da oldukça önemlidir. Bu nedenle, özellikle öğretmenlerin sınıf içi uygulamalarını da anlamak açısından okul öncesi öğretmenlerinin bilgisayar kullanımı ile ilgili inançlarını analiz etmek gerekmektedir. Bu çalışmanın amacı, Türkiye bağlamında okul öncesi öğretmenlerinin bilgisayar kullanımı ile ilgili inanç ve kendi söylemlerine dayanan uygulamalarını belirlemektir. Çalışmanın katılımcılarını amaçlı olarak seçilmiş 16 okul öncesi öğretmeni oluşturmaktadır. Çalışmanın verisi yarı yapılandırılmış bir görüşme formu ile toplanmış ve kelime tekrarı tekniği ile analiz edilmiştir. Veri analizi sonucunda, beş tema belirlenmiştir: (1) bilgisayar ve İnternet ulaşılabilirliği ve kullanımı, (2) bilgisayar kullanımının amaçları, (3) bilgisayar kullanımının avantaj ve dezavantajları, (4) bilgisayar kullanımında öğretmenin rolü ve (5) okul öncesi sınıflarında etkili bilgisayar kullanımı için öğretmen önerileri. Çalışmaya katılan öğretmenlerin, bilgisayar teknolojisinin faydalarının farkında olduklarını söylemek mümkündür. Bununla birlikte öğretmenler, hem teknolojiyle ilgili daha fazla eğitime ihtiyaç duyduklarını, hem de teknolojiye daha fazla erişim imkânlarının olması gerektiğini ifade etmişlerdir. Bu sonuçlar ışığında, teknoloji-gelişim projelerinin de yardımıyla okul öncesi eğitimin geliştirilmesi beklenmektedir.

Anahtar Sözcükler: bilgisayar kullanımı, okul öncesi öğretmenleri, öğretmen inançları, öğretmen uygulamaları

Introduction

Computer technology has become one of the essential elements in human knowledge-acquisition and communication. Computers are increasingly used in education because they add value to learning environments and provide various opportunities for effective thinking, problem-solving and learning at all grade levels (Haugland & Wright, 1997; Martin et al., 2011; McKenney & Voogt, 2012; Parette & Blum, 2013). However, in early childhood education, computer use is a controversial topic (McKenney & Voogt, 2009), especially due to concerns regarding the developmental appropriateness of this technology (Barnes & Hill, 1983; Cordes & Miller, 2000). Despite these concerns, the recent literature suggests that the positive effect of computers on the education of young children outweighs their possible negative aspects. Several studies have found that computers had positive effects across all the developmental domains of children (Clements & Sarama, 2003; Kol, 2006; Wang & Ching, 2003), while many early childhood programs have been shown to benefit from computer technology as a facilitator of teaching and learning (Chen & Chang, 2006).

The literature usually compares computer-assisted instruction (CAI) against traditional teaching methods (Ayvacı & Devecioğlu, 2010; Toki & Pange, 2010). For instance, it was found that CAI was more successful than traditional methods when teaching the concept of contrasts to preschool children (Ayvacı & Devecioğlu, 2010). When preschoolers used computers for e-learning speech-articulation activities, their performance was better than the performance of preschoolers not using computers (Toki & Pange, 2010). Moreover, it was found that the measured intelligence level of 3 and 4 year olds was higher after they experienced CAI; and the same children also exhibited better structural knowledge, long-term memory, manual dexterity, verbal and non-verbal skills, problem-solving ability, and conceptual skills than children who had no computer learning experience (Haugland, 1992). CAI was also more successful than traditional education in terms of children acquiring the concepts of numbers and shapes (Kaçar & Doğan, 2007), and increased children's motivation to learn (Can, Yorulmaz & Kahya, 2012). Furthermore, children's access to computers both at home and in the classroom was found to improve their levels of academic achievement (Judge, 2005).

It has also been stressed that CAI promotes positive pro-social interaction between children (Shahrimin & Butterworth, 2002). Vernadakis, Avgerinos, Tsitskari and Zachopoulou (2005) claimed that teaching with computers is an interactive process, and that children could learn faster in such a learning environment than in a traditional one. The same study also found that, in comparison with traditional teaching, CAI gave each child more opportunity to learn at his or her individual pace (Vernadakis, Avgerinos, Tsitskari & Zachopoulou, 2005).

In short, there is considerable awareness of the benefits of using computers in children's education. However, for various reasons, many early childhood teachers are not able to integrate CAI into their classrooms (Chen & Chang, 2006). One of the prerequisites of computer use in early childhood institutions is the presence of

teachers' competent in the use of the computers (Bayhan, Olgun & Yelland, 2002). Such competence involve not only knowing how to use computer technology, but also how to integrate it into the learning process. At the core of improving early childhood teachers' skills in this area are the existing attitudes and practices of the teachers, and there is an abundance of research in this area. The specific topics covered include in-service early childhood teachers' thoughts on CAI (Bayhan et al., 2002); their attitudes, knowledge, skills, habits and methods of computer use (Önkol, Zembat & Balat, 2011); their thoughts and practices concerning the use of computers (Yurt & Cevher-Kalburan, 2011); their attitudes, skills and practices in the classroom (Chen & Chang, 2006); their thoughts and practices concerning the use of interactive CD-ROMs in education programs (Cevher-Kalburan, Yurt & Ömeroğlu, 2011); their beliefs and practices related to computer technology for teaching reading and writing (Ihmeideh, 2009); and their actual classroom use of computer technology (Işıkoğlu, 2003). Pre-service early childhood teachers likewise participated in computer-use studies, which covered their attitudes about computers and CAI (Akış, 2008; Oğuz, Ellez, Özyılmaz-Akamca, Kesercioğlu & Girgin, 2011) and their experiences related to embedding computers into practice (Lindahl & Folkesson, 2012). Additionally, some researchers conducted comparative studies of in-service and pre-service early childhood teachers' views, attitudes and intentions vis-a-vis computer-assisted instruction (Ayaz, 2005; Gialamas & Nikolopoulou, 2010).

Kagan's meta-study of 40 studies also found that teachers' beliefs about teaching influenced their behaviours in the classroom (Kagan, 1992a) and that these beliefs were at the heart of teaching (Kagan, 1992b). Despite the large amount of research concerned with the intersection of teaching and computer technology, there have been very few studies of teachers' beliefs relating to computer use in early childhood classrooms, especially in the Turkish context. Computer technology is now ubiquitous, and Turkey like most other nations has experienced a rapid increase in the use of this technology in the past 30 years; as such, it is essential that future generations be able to use and understand computers. The foundation of a child's attitude to learning is formed in the early stages of education, and this is no less relevant to learning with/about computer technology. However, there are disadvantages as well as advantages to the use of computers, and early childhood teachers have an important role to play in the appropriate incorporation of computer technology into learning. To fulfil this role, they not only need to have the skills and knowledge to implement this relatively new way of learning, but also to have a positive attitude towards and belief in the validity of the use of computer technology in the classroom. Thus, it is important to analyse early childhood teachers' beliefs about computer use, since these are keys to understanding their practices in the classroom (Bandura, 1986). Accordingly, the current study aims to contribute to the literature on early childhood teachers' beliefs and self-reported practices relating to computer use in the context of Turkey.

Method

Research Model

Merriam (2009) states that the aim of basic qualitative research is to understand the meaning of a phenomenon for its participants, through data collected using interviews, observations, and document reviews. Thus, this method was chosen because the aim of the present study is to comprehend and describe early childhood teachers' beliefs and self-reported practices related to computer use through semi-structured interviews.

Participants

The participants in this study were selected purposefully and consisted of 16 early childhood teachers working in public (n=12, 75%) and private (n=4, 25%) schools. While most (n=13, 81.25%) had a bachelor's degree in the field of Early Childhood Education (ECE), three teachers (18.75%) graduated from vocational high schools with diplomas in Child Development and Education. In addition, one of the teachers with a bachelor's degree in ECE also had a master's degree in Educational Sciences (See Table 1).

Table 1

Teachers' Highest Level of Education

Level of education	**n**	**%**
Vocational high school	3	18.75
Bachelor's degree	12	75
Mster's degree	1	6.25
Total	**16**	**100**

The current study uses the terms novice (teaching for three years or less), mid-career (4-15 years) and veteran (more than 15 years' experience) to refer to the participants' levels of teaching experience (McMullen et al. 2006). As shown in Table 2, most of the teachers (n=13, 81.25%) were in the middle of their careers, and three (18.75%) were novices. The average teaching experience across all 16 teachers was 6.8 years.

Table 2

Teaching Experience of Participants

Experience level	**n**	**%**
Novice	3	18.75
Mid-career	13	81.25
Veteran	-	-
Total	**16**	**100**

The teachers taught different groups of children ranging from age 3 to age 6, as shown in Table 3. Nearly half the teachers taught age 4, while more than a quarter of the teachers worked with 5 year olds.

Table 3

Age Groups Taught by Teachers

Age(s)	n	%
5-6	2	12.50
5	5	31.25
4-5	1	6.25
4	7	43.75
3	1	6.25
Total	**16**	**100**

Most of the teachers in this study (n=13, 81.25%) had taken at least one course about the use of computers in the early childhood classrooms and the duration of these courses varied from 40 to 180 hours. All but one of the teachers (93.75%) had a personal computer or laptop at home.

Data Collection Process

A semi-structured interview protocol was developed by the researchers to obtain data on the participant teachers' beliefs and self-reported practices related to the use of computer technology in their classrooms. The initial draft of the protocol, based on the relevant literature, contained 18 questions. Then, the content validity and face validity of the protocol were verified by two experts in ECE and qualitative research. After it received their approval, the interview protocol was piloted with three early childhood teachers who were different from participants of the study and some of the questions were modified. The same experts' opinions were then requested again, and after implementation of their second round of responses, the final interview protocol consisted of six demographic questions and 10 questions related to the teachers' beliefs and practices.

Early childhood teachers from schools in Tokat, in the Black Sea region of Turkey (n=25), were contacted about the study via e-mail. In all, 16 teachers volunteered to join the study and signed consent forms. The researchers conducted interviews in one-to-one settings within the teachers' respective schools. Each interview lasted between 20 and 60 minutes, and was audio-recorded with the subjects' permission.

Data Analysis Process

One of the four members of current research team prepared transcripts of the audio recordings, which were then separately coded by two of the other researchers. For purposes of qualitative data analysis, a word-repetition technique was used (Ryan & Bernard, 2003), and the coders also identified the unique words in the data.

Discussions yielded 91% agreement regarding the organization of codes. Then, with respect to the remaining 9%, two coders investigated the relevant literature and were able to reach a consensus on 97% of the codes. The 3% of the total data on which they could reach no agreement is not included in this paper. Finally, the following five main themes related to computer use in early childhood classrooms were identified:

1) The availability and use of computers and the Internet in the classroom,
2) The aims of computer use,
3) The advantages and disadvantages of computer use,
4) The teacher's role in computer use,
5) Teachers' suggestions for effective computer use.

Findings

Availability and Use of Computers and the Internet in Early Childhood Classrooms

The teachers were asked if there were any computers in their classrooms and if so, how they utilized them.

Availability

In terms of beliefs related to the presence of computers in early childhood classrooms, one teacher did not respond to the question. Of the remaining teachers, just over half (n=8) agreed that there should be computers in the classroom. Most prominent among their arguments in favour of this were that computers could provide children with activities that held their attention (n=4); that the technology was suitable for improving different senses such as seeing and hearing (n=3); and that it provided access to rich visual materials (n=3). Three teachers stated that in this technological age, educational activities could not be carried out without computers. However, four teachers said that there should be no computers in early childhood classrooms: this was because they impaired children's social development (n=2), or reduced time for other activities (n=1), or that starting to use computers at such an early age was "not meaningful", especially since computers were used very extensively at higher grade levels (n=1).

Almost half the teachers (n=7) said that there were no computers in their classrooms. Another seven stated that there were some computers in their classrooms, but not enough for the children's individual use. Teachers from this group explained that their children used computers taking turns (n=4) or in pairs (n=1). One teacher revealed that, because there were not enough computers in her classroom, she used a projector that displayed to the whole class what she was doing on her computer. Four teachers said that, since there were no computers (n=2) or not enough computers (n=2) in their classrooms, they brought their personal laptops to school to use in various activities with the children.

When the respondents were asked if there were Internet connections in their classrooms, five said that there was no access. Another five stated that there was access in their classrooms, and other teachers (n=4) said that they could use the Internet in other rooms in their schools. The remaining two teachers did not respond to this question.

Use of Computers and the Internet in Early Childhood Classrooms

Three teachers believed that children should use computers in the early years, but only under certain conditions, i.e., if monitored by the teacher (n=2), or if the computers were located outside the classroom setting (n=1). Another teacher said:

> *"In my opinion, there is no need for young children to use computers individually because they spend enough time using computers at home. However, teachers should have computers and use projectors to show activities to the children in their class."*

The frequency of the use of computers by the teachers who had them in their classrooms varied considerably. Four said that they used computers whenever necessary. Two revealed that they rarely used them, and other one used them just four or five times a year. However, one teacher who stated that she used a computer every day explained:

> *"There is only one computer in my classroom and children use it in turn. However, I bring educational CDs every day and children can use them individually."*

Six teachers said that their children were allowed to use the Internet, while two stated that their children were not allowed to use it. Various respondents reported using the Internet for activities (n=2), for games (n=1), and for guiding children's individual browsing sessions on a one-to-one basis (n=2). One teacher commented:

> *"Since there is no computer or Internet in our classroom, we do not have the opportunity to use technology frequently. However, we sometimes undertake various activities in the computer lab."*

Another teacher responded:

> *"We use the Internet in the computer labs. The children usually play games and use painting websites. For example, the boys usually prefer war games and girls put clothes on babies."*

Aims of Computer Use

When the teachers in sample of this study were asked to define the aim of computer use in early childhood classrooms, they stressed their own beliefs and practices. Ten of them said that computer technology should be used to support the goals and objectives of the classroom activities. Other teachers stated that computers

should be used to undertake searches for information (n=2), to learn how to use a computer (n=1), and to play games (n=1).

In all, 10 teachers stated that they used computers in their classrooms to enhance their educational activities. One of them commented:

> *"I use computers to support my educational activities in the classroom. For example, I choose matching games, songs or paintings that include my goals and objectives. Thus, activities are more enjoyable and the visual appeal increases. Thus, permanent learning takes place."*

Teachers stated that computers were used in their classrooms to support the teaching of certain concepts such as big/small or tall/short (n=3), inspiring creativity and imagination (n=2), and building fine motor skills (n=1). Two teachers also mentioned that they used computers to search for information.

Advantages and Disadvantages of Computer Use

When the early childhood teachers in sample of current study were asked for their beliefs and observations about the advantages of computer use for young children, the responses included the following: that it supported permanent learning (n=4), increased self-confidence (n=2), and supported memory development (n=2), imagination (n=2) and hand-eye coordination (n=2). One of them said:

> *"When age-appropriate games and materials are chosen, children can achieve various goals and computers are useful to the development of children's self-confidence."*

With regard to observations they had made in their classrooms, some teachers stated that computers were useful in providing attractive visual materials (n=3) and drawing children's attention (n=2). Moreover, two teachers stressed that computers increased the attention spans of children in their classrooms. One said:

> *"My classroom is crowded, and interacting with children individually is not possible. Therefore, computers are very useful in drawing children's attention and maintaining it over a longer period of time. Furthermore, the computer and projector are interesting for children and they can easily focus on what I do."*

When teachers were asked for their beliefs and observations about the disadvantages of computer use in early childhood classrooms, almost half (n=7) stated that they did not believe this phenomenon had any disadvantages for young children at all. For example, one teacher commented:

> *"When computers are used for educational aims under the teachers' control and the duration of computer use is well-determined, I don't believe that it will harm young children or will have any negative effects."*

Some of the teachers said that computers could create problems related to children's social skills (n=3) and physical development (n=1). However, only two of these four said that they had personally observed negative effects of computers on children's socialization and interaction with their peers.

The Teacher's Role in Computer Use

The interviewees were asked about their beliefs and practices related to the teachers role in classroom computer use. In terms of their beliefs, five said that teachers should monitor children during computer use and ensure Internet safety. Some also commented that teachers should: be role models and guides in the children's computer use (n=2); consider children's developmental levels while planning an activity (n=2); answer children's questions related to computers (n=1); and have the children work in small groups to maintain control (n=1).

In terms of their practices, the respondents mentioned that they considered children's ages and developmental levels while choosing activities and materials (n=4); made use of computers by taking turns (n=3); offered brief, clear instructions related to computer use (n=3); tried to be a good role model for them (n=2); and tried to understand and answer questions appropriately (n=1). One teacher said:

> *"I choose appropriate materials for the children's developmental levels and parallel software with classroom activities. Therefore, computer is a part of our activity. For instance, I explain the topic to the children and we undertake a language activity or art activity. Then, I switch on the computer and we watch some CDs or create artwork related to our topic."*

Teachers' Suggestions for Effective Computer Use

The responses falling within this theme included recommendations for both individual teachers and for schools. For individual teachers, the interviewees suggested monitoring of children's computer use (n=6), using computers for educational purposes (n=5), informing children about computers and how to use them (n=3), and choosing appropriate programs and websites for children's developmental levels and classroom activities (n=2). One teacher commented:

> *"On the Internet, there are many materials and documents which are attractive, interesting and parallel to classroom activities. Also, there are many educational materials and CDs so the teacher needs choose the appropriate material based on an informed choice."*

Suggestions directed at schools included: that the number of computers in classrooms should be increased (n=5); that teachers should be informed about computers and CAI (n=4); and that there should be specialized computing-skills teachers in schools (n=3).

Discussion

The findings of the current study reveal that there were no computers, insufficient numbers of computers, and/or no Internet connection in most of the schools where the participant teachers worked. In parallel with these findings, Yurt and Cevher-Kalburan's (2011) study of 100 early childhood teachers in Turkey found that 64.2% only had one computer in their classrooms and the remaining 35.8% had no computer. The same study reported that 67.4% of teachers did not have Internet access in their classrooms.

In the current study, teachers commented that they could sometimes use computers and access the Internet in computer rooms within their schools. However, the National Association for the Education of Young Children (NAEYC) has recommended that technology should be integrated into the daily routine of the early childhood classroom, i.e., physically located in the classroom rather than in a separate computer room (NAEYC, 1996). It appears that this recommendation has generally not been followed in the region covered by the present research, suggesting that young children in Turkey may not be receiving the full benefit of the use of computers in their education. Change may be on the way, however: the FATIH project, which has been developed by the Turkish Ministry of National Education (MoNE), is intended to implement "Smart Class" information-technology projects in all 42,000 schools and 570,000 classrooms in Turkey, with the aim of contributing to the effective use of computers in education (MoNE, 2012).

The findings of the current study also demonstrate that early childhood teachers' beliefs and practices related to the aims of computer use in their classrooms were consistent. Most of the teachers respondents believed that computers should be used for educational activities, and in practice, used them for this purpose. This supports the results of previous research by Cevher-Kalburan, Yurt and Ömeroğlu (2011) and Önkol, Zembat and Balat (2011), who found that computers were generally used by teachers for planned classroom activities, with particular software in the case of early childhood classrooms.

The current study found that early childhood teachers believed computer-technology use had advantages for children's cognitive, social and physical development, despite having only observed the advantages related to children's attention spans in their own classrooms. Nevertheless, the accuracy of these beliefs appears to be supported by the findings of some prior studies. For example, Haugland (1992) stressed that computers enhanced the memory, communication and problem-solving abilities of young children, and Hyun (2005) reported that a computer-based, technology-rich classroom environment improved children's self-confidence and reflective self-assessment. More specifically, the findings of Ayvacı and Devecioğlu (2010) and Celements and Sarama (2003) indicate that CAI can hold the attention of children for a longer time than standard instruction, due to its use of sound and visual effects.

Findings of this study also revealed a widespread lack of belief that computer use had any disadvantages, provided only that the teacher maintained proper oversight and control. However, a minority of the participants of this study felt that computer use did have a negative impact on the social and physical development of children. In keeping with the teachers' beliefs reported in the current study, Klein, Nir-Gal and Darom (2000) emphasized the importance of adult interaction with children during computer use, and reported that effective teacher-child interaction in this context had positive effects on children's performance. In terms of the disadvantages of computers, Ayvacı and Devecioğlu (2010), Heft and Swaminathan (2002), Hohmann (1990), Hyun (2005), and Yurt and Cevher-Kalburan (2011) disagreed with the views of those teachers in the current study who were concerned about the negative effects of computers on children's social development. Rather, these prior studies emphasized that computer use supported children's development of self-confidence, self-esteem and cooperative learning. However, Cordes and Miller (2000) found that computer use posed some risks to children's physical health and to the development of their social-emotional, moral and cognitive skills.

The participant teachers' beliefs and practices related to their own roles in computer use were generally consistent with one another. They also paralleled the findings of Fisher (1996), Klein and Nir-Gal (1992), Salomon (1996) and Samaras (1996), who all stressed that the teacher should be an organizer, guide and helper in the process of computer use.

Lastly, the respondents of this study urged that teachers should be better informed about computers and CAI. This finding is in line with Uçar's study (1999, as cited in Önkol et al., 2011), which found that most teachers do not receive sufficient education or skills training concerning instructional technology. Likewise, NAEYC's (2012) in position statement on computer technology and interactive media as tools in early childhood programs stressed that early childhood educators should be given greater opportunities for professional development of their technological knowledge, skills, and experience, to better needed to meet the expectations of young children.

The teachers who participated in this study recognized the benefits of computer technology. However; they also expressed a need for more access to technology and more training. It is hoped that, with the help of technology-development projects such as FATIH and increased computer-skills training in pre- and in-service teacher-training programs, the early education of children will be enhanced. Further studies of teachers' views and beliefs in different contexts should be carried out, to compare the situation before and after the implementation of in-service computer-technology training; to assess changes to early education classroom environments that may result following the installation of more computers; and to examine the differences between the beliefs of teachers in public and private schools.

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