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The Use of Technology in Early Childhood Classrooms: An Investigation of Teachers' Attitudes
Okul Öncesinde Sınıflarda Teknoloji Kullanımı: Öğretmen Tutumlarının İncelenmesi

Kevser Koç*

Abstract

Exploring early childhood teachers' attitudes towards technology use is critical to define the characteristics of their teaching practices. Negative attitudes may hinder their use, while positive attitudes increase the effectiveness of their use of technology. The purpose of this study is to investigate early childhood teachers' attitudes related to technology use in Turkey. This study employed a survey research design where the aim was to reach a large group of participants to examine early teachers' attitudes toward using technology in teaching young children. The participants were 217 early childhood teachers working in public schools in a southeastern city. They were given a questionnaire containing items exploring their attitudes related to technology use in early childhood education. Factor and frequency analyses and other descriptive statistics techniques were utilized to analyze the data. Findings indicated that the participants in general hold positive attitudes toward using technology in teaching young children.

Keywords: Early Childhood Education, Technology Integration, Teacher' Attitudes.

Özet

Okul öncesi öğretmenlerinin teknoloji kullanımına ilişkin tutumlarının incelenmesi, onların verdikleri eğitimin niteliğini belirlemek bakımından kritik önem taşır. Olumsuz tutumlar onların teknoloji kullanımını engellerken, pozitif tutumlar öğretmenlerin teknolojiyi daha etkili kullanmalarına neden olur. Bu araştırmanın amacı Türkiye'de eğitimde teknoloji kullanımına ilişkin okul öncesi öğretmenlerinin tutumlarını araştırmaktır. Araştırmanın amacı çok sayıda okul öncesi öğretmenine ulaşarak onların küçük çocukların eğitiminde teknoloji kullanımına ilişkin tutumlarını araştırmak olduğu için yöntem olarak survey araştırması kullanılmıştır. Katılımcılar Güneydoğu Anadolu Bölgesi'nde bir şehirde çalışan 217 okul öncesi öğretmenidir. Katılımcı öğretmenler okul öncesi eğitiminde teknoloji kullanımına ilişkin tutumlarını araştıran bir anketi doldurmuşlardır. Verilerin analizinde factor analizi ve frekans tablolarıyla diğer betimleyici istatistik yöntemler kullanılmıştır. Bulgular, katılımcıların önemli bir bölümünün küçük çocukların eğitiminde teknoloji kullanımına ilişkin olumlu tutumlara sahip olduklarını göstermiştir.

Anahtar Kelimeler: Okul öncesi eğitimi, Teknoloji kullanımı, Öğretmen tutumu

* Yrd. Doç. Dr., Gaziantep Üniversitesi Eğitim Fakültesi İlköğretim Bölümü, e-mail: kevserkoc@gantep.edu.tr

Introduction

The use of technology in early childhood education (ECE), especially computer use, is a controversial issue (Lynch &Warner, 2004). There are advantages and disadvantages of the use of computers in preschools. While some educators believe that computers and other technological tools, such as cameras and projectors, are not developmentally appropriate for children under the age of three (Elkind, 1998; Haugland, 1999), even very young children can benefit from technological tools if they are used intentionally and in developmentally appropriate ways(Parikhi, 2012). Scoter, Ellis,and Railsback(2001) noted that children have already been exposed to technological materials in their daily lives. Cellular phones, computers, cameras, video games, televisions and other technological devices are available to many people, and children are familiar with them. Contemporary life so heavily relies on technology that it is unnatural to isolate children from technology. Children should be equipped with all necessary knowledge and experiences to become active members of our digital age. They should be aware of the potential benefits of technology as well as the risks that can emerge from the technology (Funnell, 2011). Therefore, instead of discussing whether technological tools *should* be integrated into young children's school life or not, educators should think about *how* to integrate them, and they should take advantage of and avoid the problems related to technological tools (Scoter et al., 2001).

Technology has potential to improve the quality of education when it is used adequately. Educational research supports the use of technology in classrooms and reports encouraging results about children's learning experiences assisted by technological devices (Glaubke, 2007; McCarrick & Li, 2007).Children who are familiar with technological devices at early ages in quality educational programs may have the advantages of technology-improved life. Hence, educators are searching for innovative ways to use technological materials in early childhood education (Barron et al., 2011).

Contemporary educational approaches provide a theoretical and practical basis for the use of computers and other technological tools in early childhood education. In a recent book, *Blocks to Robots: Learning with Technology in the Early Childhood Classroom*, Bers (2008) explains how robotic manipulatives can be incorporated into early childhood classrooms to promote developmentally appropriate and a high quality technological experience for children. Bers explains that technological tools extend children's experiences by providing opportunities for learning in different contexts and letting them design and program their own projects via using computers. Like Bers, there are many other early childhood professionals who have successfully integrated technological tools in early childhood settings. For instance, Linder (2012) explains how interactive whiteboards can enhance children's understanding of mathematics concepts and he also provides suggestions for early childhood teachers for successful applications of these tools. In another study, Shifflet, Toledo, and Mattoon (2012) present a pre-school teacher's experience with touchtone tablets and show how technology can enhance children's social and cognitive development when it is used appropriately. The literature review

renders similar results with technology applications in ECE classrooms and confirms the belief that intentional and developmentally appropriate use of technological tools can enhance young children's different skills and make them active members of our digital age (Yelland, 2005).

Appropriate use of technology requires that teachers to be in close contact and interact with children, guide them about how to use the technology, and ask them to interact with other children so that they can learn from each other (McManis & Gunnewig, 2012). Technology use should also be sensitive to the characteristics of age groups, the social and cultural milieu that hosts children, and individual needs and interests of children (McManis & Gunnewig, 2012). Glaubke (2007) indicates that instructional technologies provide flexible tools that allow teachers to easily design instructional activities for students at different levels. He also says, "This makes it possible to design programs that are not only appropriate to a particular age group, but also to different developmental levels within that age group" (Glaubke, 2007, p.23).

Teachers' Attitudes Towards Technology

It is essential to explore and understand teachers' beliefs and attitudes about the use of technology in classrooms because beliefs and attitudes have the potential to impact various decisions in life (Ajzen & Fishbein, 2005). Additionally, learning about these beliefs provides insight into the educational experiences in our schools as well as the direction to improve the quality of children's school life and learning. As it is important for teaching, understanding about attitudes towards technology integration has been the subject of many studies (Albion & Ertmer, 2002; Bai & Ertmer, 2008; Jakopovic, 2010; Loyd & Gressard, 1986; Park & Ertmer, 2007). There is research evidence showing that people with positive attitudes towards technology are more likely to have positive experiences with technology (Loyd & Gressard, 1986). On the other hand, negative attitudes and beliefs are often listed as one of the main resources of resistance towards technology use (Hew & Brush, 2007). Additionally, Lumpe and Chambers (2001) found that teachers' perceptions about the technological opportunities in their school affect their decisions about integrating computers into their curriculum. Furthermore, teachers' core beliefs and their teaching styles are responsible for teachers' resistance to using computers in their instruction (Albion & Ertmer, 2002). Albion and Ertmer explained that computers have only partial impact on instructional techniques in schools despite the fact that they are more accessible than before. Therefore, teachers' positive attitudes towards technology have long been recognized as an essential characteristic for their career.

In Turkey, the research on technology use in early childhood education is rare. One of the few studies related to early childhood teachers' attitudes toward technology use was conducted in Ankara, the capital city of Turkey with 215 pre-service early childhood teachers from two state universities (Yılmaz & Alıcı, 2011). The topic was pre-service early childhood teachers' attitudes towards computer use in science education in early years, and the results showed that pre-service teachers were mainly positive about computer use in science education. Kol (2012) conducted a qualitative research study involving

33 participants from Sakarya, a small city in northwest Turkey. The results indicated that participant teachers were favorable of computer use in early childhood education and listed some benefits such as visual-audial abundance and increased hand-eye coordination. Lastly, Bayhan, Olgun, and Yelland (2002) conducted a study in Ankara with 111 early childhood education teachers working in 22 institutions. The purpose of the study was to investigate teachers' opinions about using computer-assisted instruction in early childhood education settings. Based on survey results, it was found out that although early childhood teachers acknowledged the benefits of using computers, they were also reluctant to use computers with young children. Also, some of the teachers believed that computers interfere with children's social development. There were also participants who indicated that computers foster children's cognitive development, including their problem solving skills.

The review of the literature indicates that early childhood teachers' attitudes toward technology use have not been investigated in southeast Turkey where student achievement on national standardized tests is under the national average for years (Cetingul & Dulger, 2006). Such students may benefit from technological resources if they are exposed to successful technology applications in education.

As part of current educational reforms, Turkey's national education authorities have placed special emphasis on improving technological facilities in schools. It is believed that improved technological resources may help teachers improve the quality of education for children living in lower social and economic conditions (Du, Havard, Yu, & Adams, 2004). Considering these conditions, learning about the early childhood teachers' attitudes towards technology becomes essential to shaping future directions in the use of technology in educating young children.

Purpose

The purpose of this study is to examine early childhood teachers' attitudes toward using technology in early childhood classrooms in a southern eastern city in Turkey. The specific research questions that guided the study are, "What level attitude do early childhood teachers hold about using technology in teaching young children?" and "Are there significant differences among the early childhood teachers with different levels of teaching experience with respect to their attitudes toward using technology in teaching young children?"

Method

Research Design

This study employs a survey research design where the aim was to reach a large group of participants to examine early teachers' attitudes toward using technology in teaching young children.

Participants

Two hundred and seventeen early childhood teachers teaching in 19 different public institutions in a large southeastern city of Turkey participated in this study. The participants were selected from several different kindergartens; while some of the schools were from neighborhoods where families with moderate income lived, the other three were from relatively higher affluent neighborhoods. The schools were very similar regarding their physical and technological capabilities. The participants' years of teaching experiences indicate that both experienced and inexperienced teachers participated into the study. To be more specific, 51% of the participants (110 teachers) had 1-5 years of teaching experience and another 28% of them (61 teachers) have been teaching between 6 and 10 years. The rest of the participants (19% or 41 teachers) were experienced teachers with teaching experiences of at least 11 years. Five teachers did not share the amount of their teaching experience.

Procedures

Data collection was conducted in two phases. In the first phase, a list of the contact information for kindergartens operated by public authorities was obtained on the website of the city education department. Then, from the top of the list, the kindergartens were called. The researcher reached building administrators by phone to inform them about the purpose of the project and invite their school to participate in the research. The schools that granted the permission to conduct the study were visited at the beginning of the 2012 fall semester. In each school, the teachers were informed about the project and asked if they would be willing to take the survey. The teachers who volunteered to be part of the study completed the instrument at their convenience. The blank surveys were left at the schools and the completed surveys were collected a few days later. Based on the researcher's observation survey completion time was found to be about 10 minutes. The return rate was about 90% in all schools; so, the data represents 97 out of about 110 teachers working in those schools.

In the second phase of data collection, a teacher educator who has personal connections with local education authorities sent the data collection instrument to a number of kindergarten administrators around the city so that the administrators could invite their teachers to participate into the study. It is possible that some of the administrators who participated into the second phase did not respond in the first phase. From that attempt, an additional 120 early childhood teachers teaching in schools in various neighborhoods in the city responded. Since the administrators of schools participated into the first phase were already informed about the study and the teachers working in those schools were not given the survey again, it was ensured that no more than one survey was submitted by a single teacher. In total, 217 completed surveys were received from early childhood teachers working in several schools in the city. The exact number of schools could not be determined, as the researcher could not go to each school personally. There was only a small amount of missing data. More specifically, 13 participants did not answer one or two items and only one participant did not respond to four items. The missing cells were coded as

undecided because there was no evidence to know about the participants' opinions on those items.

The sample is a suitable representative of early childhood teachers in south eastern Turkey because the teachers were not selected on purpose. In Turkey, early childhood teachers are hired and placed in kindergartens based on their performance on a nationwide standardized test, which was nothing to do with the teachers' knowledge, experience and attitude regarding the use technology in early childhood classrooms. Also, the study was conducted in a large city with a population of about one and a half million; so, the participants and the schools they were working in represent diverse characteristics of a typical south-eastern city. Participants' and schools' names were not collected so the participants' privacy concerns were taken seriously. The data was collected anonymously and it was not possible to track the participants based on their responses.

Data Collection Instrument

A survey developed by Kol (2012) was used in this study to investigate early childhood teachers' attitudes toward using technology in teaching young children. The instrument was composed of 20 items with a five-point Likert scale. While 14 of the items indicate positive attitudes (for example, "The use of technology positively contributes to young children's development"), four items indicate negative attitudes (for example, "The use of technology in early childhood education is not necessary").The categories were "strongly disagree," "disagree," "undecided," "agree," and "strongly agree."Positive items were scored as follows: strongly agree = 5; agree = 4; undecided = 3; disagree = 2 and strongly disagree = 1; but, negative items were scored in the reverse order (strongly disagree = 5 and strongly agree = 1).

To investigate construct validity for this instrument, factor analysis was conducted and it was found that the instrument measured a single factor, attitude toward using technology in early childhood education (Kol, 2012). In addition, the survey was submitted for expert review and found to be valid. To investigate the reliability of the instrument, the Cronbach alpha reliability coefficient was calculated and found to be .92 (Kol), a considerably high value for quantitative studies (Fraenkel & Wallen, 2006). In the present study, the reliability analysis yielded the very same reliability coefficient of .92. Finally, factor and frequency analyses and other descriptive statistics techniques were utilized to analyze the data.

Results

The analysis of the data indicates that the participants generally have positive attitudes toward using technology in early childhood classrooms (Table 1). The average overall rating for the 20 items was 4.20 with a standard deviation of 0.49. This figure falls into somewhere between *strongly agree* and *agree*, but closer to *agree*. This means that the participants had considerably positive attitudes toward using technology in early childhood classrooms. Average figures for each item are given in Table 1.For more detailed data, the

numbers of participants at each response level of the items are provided in the Appendix.

Table 1.*Item Averages and Standard Deviations for Early Childhood Teachers' Attitudes toward Technology Use*

Items*	Average*	Standard Deviation
1. Technological tools are essential for me.	4.18	.80
2. Use of technology supports early childhood education.	4.56	.54
3. Use of technology in instructional activities is a waste of time.	4.37	.71
4. Technological tools make early childhood teachers' work easy.	4.32	.65
5. Use of technological tools increases the quality of early childhood education.	4.40	.69
6. Technological tools undermine the teacher's role.	3.99	.87
7. Technological tools highly motivate young children.	4.03	.78
8. Technological tools make early childhood instructional activities more enjoyable.	4.32	.70
9. Technological tools distract young children's attentions.	4.18	.67
10. My technical skills are adequate enough to use the technological tools.	3.79	.83
11. The use of technology in early childhood education is not necessary.	4.49	.67
12. Technological tools are suitable for instructional methods used in early childhood education.	3.89	.73
13. Experienced teachers do not need technological tools to deliver quality instruction.	4.12	.79
14. Technological tools are essential for visualization in early childhood education activities.	4.41	.64
15. Technological tools make early childhood teachers more effective.	4.15	.72
16. Technological tools decrease teacher-student interaction.	3.98	.95
17. Technological tools help the learner retain new knowledge longer.	4.20	.72
18. The instructional activities containing technological tools help improve young children's developmental levels.	4.16	.64
19. The use of technology positively contributes to young children's development.	4.26	.60
20. Technological tools are influential in making abstract concepts concrete.	4.32	.76

*The bold items indicate negative attitudes and they were scored in the reverse order (strongly disagree = 5 & strongly agree = 1).

An examination of Table 1 indicates that the participants in general hold highly positive attitudes toward using technology in early childhood education. A quick review of the table shows that the averages of all but four items were above 4.00, which is somewhere between *agree* and *strongly agree* categories. Most of them responded that use of technology supports early childhood education (Item 2) with an average of 4.56 out of 5.00. Only one participant did not think that technology supports young children's education and four of them were undecided; yet, all others were either agree (91 participants) or strongly agree (121 participants) on the idea. Many of them also thought that technological tools increase the quality of early childhood education (Item 5;

average=4.40). More specifically, 98 participants agreed and 105 strongly agreed that technological tools increase the quality of early childhood education.

Table 1 shows that the participants positively reacted to the items that concern effects of using technological tools on young children's learning and development. For example, most of them thought that technological tools are essential for visualization in early childhood education activities (Item 14; average=4.41) and influential in making abstract concepts concrete (Item 20; average=4.32), and they help the learner retain new knowledge longer (Item 17; average=4.20). Only about 10 out of 217 participants disagreed that technological tools could promote early childhood education (Items 14, 17 & 20). Regarding the effects of using technology on children's development, the participants mostly agreed that use of technology positively contributes to young children's development (Item 19; average 4.26). On the same item (#19), almost all participants (201 of them) agreed or strongly agreed on the positive contribution of the use of technology on children's development. Additionally, about 200 participants agreed or strongly agreed that technology helps improve young children's developmental levels (Item 18; average=4.16). Additionally, most of the participants did not think that technological tools decrease teacher-student interaction (Item 16; average=3.98); but, the average was relatively low on Item 16.

As seen in table 1, many participants noted that technological tools highly motivate children (Item 7), make instructional activities more enjoyable (Item 8) and do not distract young children's attention (Item 9). [Item 9 is a negatively worded statement where only 10 participants agreed that technology distracts children's attention; most participants responded that technology does not distract children's attention.] Also the participants believed that the use of technology in instruction was not a waste of time (Item 3); but, it was necessary in early childhood education (Item 11). To be more specific, only less than ten participants noted that the use of technology was a waste of time and it was not necessary.

The attitude scale includes some items referring to the teacher's role and needs in using technology (e.g. Item 1 and Item 4). The analysis of these items indicates that many teachers noted that technological tools are essential for them (Item 1; average=4.18) and technological tools make early childhood teachers' work easy (Item 4; average=4.32) and make the teachers more effective (Item 15; average=4.15). Also only a few participants provided negative responses to such statements. While the participants showed considerably high positive attitudes regarding teachers' role in using technology in early childhood classrooms, the averages of two items about teachers' use of technology were relatively low. To be more specific, the average of Item 10, "My technical skills are adequate enough to use the technological tools" was 3.79, and the average of Item12, "Technological tools are suitable for instructional methods used in early childhood education," was 3.89. About one fourth of the participants were quite confident in their technical skills to use technology in their teaching and almost the same amount of participants felt that

technological tools are not suitable for instructional methods used in early childhood classrooms.

Overall, the findings indicate that data most of the participants hold positive attitudes toward using technology in early childhood classrooms; yet, not as many participants declared that their technical skills and instructional methods were adequate for using technology.

Effect of teaching experience on teacher attitudes

In order to investigate whether teacher attitudes change by their level of teaching experience, a one-way ANOVA was used to test for attitude differences among teachers by their level of teaching experience. The teachers were first formed into three groups by their teaching experience: 1-5 years of teaching experience, 6-10 years of teaching experience and more than 10 years of teaching experience. The ANOVA results indicated that there was not difference among the teachers by their level of teaching experience ($F(2, 209) = 1.809$, $P = .116$). Thus, there was no significant difference among the teachers by their level of teaching experience with respect to their attitudes toward using technology in early childhood classrooms.

Discussion

The analysis of the data collected from 217 early childhood teachers shows that the participants in general hold positive attitudes toward using technology in teaching young children. This main finding, which is similar to the findings of earlier studies conducted in western part of the Turkey (Kol, 2012; Yılmaz & Alıcı, 2011), implies promising news for using new technologies in early childhood education. At least, it is seen that the teachers tend to benefit more from technology in their teaching. Considering innovations in education, teachers' acceptance of the new changes increases the likelihood of successful implementation of the incoming ideas and practices. In Turkey, education policy makers have recently decided to use tablet PCs, smart boards and Internet resources in school settings to increase the quality of teaching at all levels from first grade through 12^{th} grade. Introducing new technologies does not always guarantee positive outcomes in student learning or teacher effectiveness (Jakopovic, 2010); hence, unless the teacher welcomes the technology, we could never know whether technology use will yield intended outcomes. As a result, having found positive teacher attitudes toward technology use in early childhood education indicates that teachers are ready for new technologies.

Though responses were overall highly positive towards technology in ECE, there are limitations to interpreting the findings. First of all, there are still some teachers who do not agree with a number of statements in the data collection instrument. For example, several teachers were undecided or disagreed whether "Technological tools does not undermine teacher's role" or not. Probably, those teachers were thinking that the technology could negatively affect the teachers' role by taking over some of their authority. As a matter of fact, the use of technology in teaching does have an impact on the teacher's role (Kynigos & Argyris, 2004; Wang, 2002). Teachers need to assume new responsibilities and challenges by integrating technology; yet, they should be

supported through technology adaptation. Their knowledge and skills regarding technology use should be improved since teachers' levels of knowledge and skills affect their attitudes and behaviors related to technology (Christensen, 2002).

The present study indicates that many early childhood teachers do not feel that their technical skills are adequate to effectively use technology in instruction. Considering that technology integration is a relatively recent concept in early childhood education (McManis & Gunnewig, 2012), it is not surprising to find that teachers felt that they might not have enough technical skills. Neither pre-service nor in-service teacher education programs adequately place enough emphasis on technology integration in early childhood education (Koch, 2009). As a result, it is essential to help teachers gain the necessary knowledge and technical skills necessary for using technology in teaching young children. Then, teachers will feel more confident and integrate appropriate technology in ECE settings with ease (Barron et. al, 2011). For this purpose, pre-service teacher education curricula and in-service teacher training programs should increase their focus on technology integration.

The present study shows that technical skills are not the only area of concern for the early childhood teachers. Additionally, several of them were not sure whether technological tools were suitable for instructional methods used in early childhood education. This finding is consistent with the one reported by Bayhan, Olgun, and Yelland (2002), where early childhood teachers believed that technological tools were not appropriate for young children. As a recent idea in early childhood classrooms, teachers need to modify their current traditional ways of teaching to embed technology in teaching. Technology should be used to support current view of developmentally appropriateness criteria and related practices, not to replace them (Parikh, 2012). The current traditions in early childhood education can be enhanced with the technology integration. Yet, it is also important that teachers should be given enough opportunities to understand and implement how technology use can be aligned with current teaching methods.

This study shows that early childhood teachers welcome the use of technology in teaching young children; yet, they have a few hesitations about technology use. Some teachers' lack of technical and pedagogical knowledge and skills were found to be key factors negatively impacting on their attitudes toward technology use. It is suggested that appropriate training programs should be developed and implemented to increase the likelihood of successful technology integration. Training programs should be designed to provide teachers with necessary knowledge and experience which allow them to identify the specific technology and teaching techniques for specific learning goals. Also, teachers should be able to decide if traditional materials or technological tools are better in certain learning conditions (Parikh, 2012). Parikh explains, "Professional development should include in-depth, hands-on technology experiences, ongoing support, and access to the latest technology and interactive media. Educators need opportunities to play and create using these tools" (p.11).

Although the present study provided useful results, it has a few limitations. The data was collected using a survey tool, which helped to reach a large number of participants and analyze the data objectively; yet, individual teachers' voices could not be heard to understand their attitudes and concerns in depth. Perhaps, future studies could integrate qualitative techniques to collect and analyze data from individual teachers to portray teachers' attitudes from a different perspective. Additionally, the present study only focused on teachers' attitudes, but teachers' actual practices in using technology in early childhood classrooms should also be studied. In fact, their attitudes and practices should be investigated together for a better understanding of technology integration in early childhood classrooms.

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Appendix

ITEMS	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. Technological tools are essential for me	3	14	9	107	84
2. Use of technology supports early childhood education.	-	1	4	91	121
3. Use of technology in instructional activities is a waste of time	109	90	11	4	3
4. Technological tools make early childhood teachers' work easy	-	8	12	106	91
5. Use of technological tools increases the quality of early childhood education	-	4	10	98	105
6. Technological tools undermine teacher's role	66	106	27	13	5
7. Technological tools highly motivates young children	2	10	29	115	61
8. Technological tools make early childhood instructional activities more enjoyable	-	8	6	111	92
9. Technological tools distract young children's attention	78	113	16	8	2
10. My technical skills are adequate enough to use the technological tools	6	19	34	113	45
11. The use of technology in early childhood education is not necessary	123	84	5	3	2
12. Technological tools are suitable for instructional methods used in early childhood education	1	14	41	112	49
13. Experienced teachers do not need technological tools to deliver quality instruction	88	97	7	19	6
14. Technological tools are essential for visualization in early childhood education activities	3	2	5	100	107
15. Technological tools make the early childhood teachers more effective	3	10	19	104	81
16. Technological tools decrease teacher-student interaction	67	103	26	17	4
17. Technological tools help the learner retain new knowledge longer	1	13	10	111	82
18. The instructional activities containing technological tools help improve young children's developmental levels	1	3	22	126	65
19. The use of technology positively contributes to young children's development	-	5	11	124	77
20. Technological tools are influential in making abstract concepts concrete	1	7	13	96	100