Early Childhood Educators' Attitudes towards Use of Digital Technology in Young Children's Learning

Leigh Disney, *Monash University, Melbourne*
Gretchen Geng, *Teaching and Researching Australian English and Culture, Melbourne*

Introduction

Within the scope of digital technology is the concept of educational technology, which 'is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources' (Orey, McClendon & Branch, 2009, p. vi). In earlier years (late 1930s-1960s), the common form of technology was the media of films and television, which was only used in higher education environments. The impact of these technologies on university education is the simple fact that they could be used within an educational setting (Hedberg & McNamara, 2002). Since the 1970s, digital technology started to be used in primary and middle school environments in Australia; and some individual teachers began to explore the relationships between technology and learning, although most teachers did not embrace the ideas of implementation of digital technology into classrooms. Nevertheless, the understanding of the tools of mass media and the entertainment industry were seen as providing an awareness to different students so that the students would be provided with practice and understanding of the skills and would be more appropriately kept in pace with the technology advancement (e.g. Ausburn & Hedberg, 1981; Maggs & Ray, 1985). Moving forward, digital technology appeared as instructional technology or computer based learning (Hedberg & McNamara, 2002). Moreover, digital technology is concerned with a wide range of media, including software and hardware development (McDougall & Boyle, 2001), exploration of new and different approaches to teaching and learning with digital technology (Romeo & Walker, 2001); multimedia, teleteaching and web-based teaching and learning (Allan & Ainley, 2000; Herrington & Knibb, 1999; Winter, 2001). Further more academic researchers (e.g. Franklin & Peat, 2001; Hedberg & McNamara, 2002) have conducted different studies to consider the strengths of diversity of various digital technology in teaching and learning.

The above indicates that digital technology has been co-opted into teaching and learning for a long period of time, and many studies have been conducted of using them effectively in educational environments so that their negative potential is averted and their positive potential is boosted within school or university learning environments. However, most research were focused only in the school or university education system, and very limited study has been undertaken about the use of digital technology within early childhood education environment, such as home, childcare or kindergarten. Part of the reason that there are limited studies done on the use of digital technology in early childhood settings is that it is not recommended that children under the age of three use computers. In that children younger than three learn through their bodies: their eyes, ears, mouths, hands, and legs and that the developmental skills of these children are learning to master are crawling, walking, talking, and making friends (Haugland, 2000).

In realistic terms, it is the educators of young children who will determine if children are exposed to digital technology within the early childhood learning environment. Therefore, the attitudes early childhood educators have towards use of technology and their corresponding ability to teach with digital technology will determine which technology children will be exposed too. Attitudes have been addressed as linking affective domains to reactions; hence attitudes influence behavior (Lee, 2005; Venkatesh, Morris, Gordon & Davis, 2003; Venkatesh, Thong & Xu, 2012). Educators' attitudes towards teaching with technologies are strongly associated (Lee, 2005).

Moreover, due to the relative lack of confidence of many early childhood educators and parents of early childhood aged children in their knowledge of the use of digital technology; there often is a resultant pedagogical practice of 'teaching the way you were taught', hence diminishing opportunities for new

pedagogical opportunities (Perry et al., 2008). This includes the concern that children will not get exposure to new technological tools that may assist learning.

The use of digital technology within early childhood settings is a controversial topic and one that creates debate amongst those with stakes in early childhood education (policy makers, early childhood directors and educators, as well as parents). As stakeholders they will act as a filter to children's access to digital technology, determining the exposure that children will have and scaffolding the way it is used.

Methods

Participants
Researchers contacted several child care centres with ethics clearance, and twenty early childhood educators in three child care centres in Australia participated in this research. Out of the twenty early childhood educators, 3 (15%) were male, and 17 (85%) were female. Seventeen participants provided their ages, ranging from 18 to 59 years old. The majority of the educators had been working from 2 months to 60 months (5 years).

Instruments
A survey was developed and administered to the participants. There are four sections in this questionnaire.

In the first section, the participants were asked to tick the media devices owned by the child care centre. The devices television, cable television (Foxtel/Austar), DVD player/Blue Ray player, a laptop or desktop computer, video game console like an Xbox, PlayStation, or Wii, handheld video game player like a GameBoy, PSP, or Nintendo DS, Smartboard, Smartphone, video iPod or similar device, Kindle, Nook or similar e-Reader, iPad or similar tablet device, and Internet were listed. The listed devices were based upon the study from Funk et al. (2009). The participants were also given an opportunity to list any other devices.

The participants were also asked to respond to the questions by placing a √ in the appropriate box/es or typing/writing numbers in identifying the media devices they used in the child care centre and the number of times the devices were used by their children attending the centre. The participating educators were asked to choose the number of times the media device from the following categories: Has never been used, yearly, at least once a semester, monthly, weekly, and daily. The categories were based upon the study of Funk et al. (2009).

In the second part of this section, educators were asked to placing a √ in the appropriate box/es about the 5 statements regarding the use of digital technology. The statements were developed based upon Chen and Chang (2006), Fogarty et al. (2002), and Li (2006). The participants were asked to rate their agreement using the following scale: Strongly disagree, disagree, unsure, agree, and strongly agree. The statements were (a) in terms of educational value, do you believe that the implementation of digital technology into early childhood is an urgent priority? (b) are you enthusiastic regarding the integration of digital technology into your service? (c) do you agree that the potential use of digital technology enhances the educator's ability to teach? (d) do you agree that funding is sufficient to incorporate digital technology into your child care centre? and (e) do you agree that in the next five years your child care centre will have integrated more digital technology devices than you already posses? The 5 point scale was followed: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree.

The participating educators were also asked to identify the most important reasons for integrating digital technology into child care centres. Four possible reasons based upon the studies of Chen and Chang (2006), Fogarty et al. (2002), and Li (2006) were provided: (a) familiarising children with the world of new technologies, (b) the curricular benefits, (c) the recreational value to the child, and (d) parental expectations. Some participants might be aware of other reasons besides these identified four reasons; therefore, an opportunity to provide other reasons was provided for the participants.

The participants were then asked about whether in-service training for early childhood educators in the use of digital technology from four categories: mandatory and done annually, mandatory and done when new

digital technology is introduced, optional for staff, and not necessary. In the following part of this section, educators were asked to provide their attitudes towards the use of digital technology in teaching literacy, numeracy, science and physical education to 3-4 year old children. The 5-point scale was used: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. Educators were also asked to provide their attitudes towards the use of digital technology to promote 3-4 year old children's development in the domains of cognitive development, gross motor skills development, fine motor skills development, language development, and social development. The 5 point scale was used: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree.

Procedure

Consent was obtained successfully for the site directors with ethics approval. The questionnaire survey was administrated with the assistance from the child care centres. The site survey was undertaken from August to September. Survey instruments, in hard copy, were handed out to the participants and collected from the participants later with the assistance from the directors of the child care centres.

Results
Access the media devices in centres

The present study was conducted in three child care centres, two centres (Centre A and Centre B) from South Australia (SA) and one centre (Centre C) from Northern Territory (NT). Table 1 presents the number and percentage of the children who had been given access to the media devices in different care centres.

Table 1: Access the digital devices within child care centres/classrooms (percentage)

	Centre A (*n* = 6)	Centre B (*n* = 8)	Centre C (*n* =6)
• **Television**	0	87.5	0
• **DVD player/Blue ray player**	0	75	0
• **Computer (laptop or desktop)**	100	87.5	0
• **Internet**	100	62.5	0
• **Smartphone**	0	0	0
• **Video games (e.g., Xbox, Playstation, or Wii)**	0	0	0
• **Video iPod or similar device**	0	0	0
• **Handheld video game player (e.g., GameBoy, PSP or Nintendo DS)**	0	0	0
• **iPad or similar tablet device**	0	0	0
• **Cable television (Foxtel/Austar)**	0	0	0
• **Kindle, Nook or similar e-Reader**	0	0	0
• **Smartboard**	100	0	0

Note. N = 20

For the five devices (television, DVD player, computer, Internet and Smartboard), the participating directors and educators in SA were asked to choose from a 6 point scale (1 = have never been used, 2 = at least once a year, 3 = at least once every six months, 4 = at least once a month, 5 = at least once a week, and 6 = at last once a day) in the number of times the media devices were used by the participating children in the child care centres in Centres A and B. It was found that the five devices were used at least once every six months in the child care centres/classrooms in Centres A and B (see Table 2).

Table 2: Access the digital devices within SA child care centres/classrooms (means)

	Mean	SD	n
• Television	3.29	1.64	14
• DVD player/Blue ray player	3.15	1.75	14
• Computer (laptop or desktop)	3.79	2.22	14
• Internet	3.57	2.07	14
• Smartboard	3.14	2.57	14

Note: N = 20

Attitudes about use of digital technology (e.g., Internet, educational software, television programs, educational apps etc.) within early childhood settings

This section reports the participants' educators' opinions about the use of digital technology in early childhood education from the following areas: (a) educators' view towards digital technology is an urgent priority, (b) educators' view towards digital technology's integration in child care centre, (c) educators' view towards digital technology's enhancement of educators' abilities to teach, (d) educators ' view towards funding to incorporate digital technology into child care centres, and (e) educators' view towards future use of digital technology.

Table 3 shows that the educators and directors agreed that (a) digital technology was an urgent priority; (b) digital technology should be integrated in child care centre; (c) educators' abilities to teach should be enhanced; and (d) digital technology should be used in the future. It was also noted that educators believed that there is not enough funding to incorporate digital technology into child care centres.

Table 3: Educators' view towards digital technology (means)

	Mean	SD	N
• Educators and directors' view towards digital technology is an urgent priority	3.35	1.18	20
• Educators and directors' view towards digital technology's integration in child care centre	3.65	1.14	20
• Educators and directors' view towards digital technology's enhancement of educators' abilities to teach	3.85	0.75	20
• Educators and directors' view towards funding to incorporate digital technology into child care centres	2.65	1.04	20
• Educators and directors' view towards future use of digital technology	3.65	0.75	20

Note: The means were presented using a 5 point scale anchored (1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree).

The participating educators were also asked to provide the reasons for integrating digital technology into child care centres. Four set reasons were provided for the educators to choose and they were also allowed to add any other reasons.

The four provided reasons were (a) familiarising children with the world of new technologies, (b) the curricular and educational benefits, (c) the recreational value to the child, and (d) parental expectations.

Table 4 presents the percentages of the 4 reasons. It was found that educators agreed that "familiarising children with the world of new technologies", "the curricular and educational benefits" were the main

reasons for integrating digital technology into child care centres, and they also agreed that "the recreational value to the child" and "parents expectations" were not the reason for the integration.

Table 4: Reasons for integrating digital technology into child care centres (percentages)

	Yes	No
• Familiarising children with the world of new technologies	85	15
• The curricular and educational benefits	85	15
• The recreational value to the child	30	70
• Parental expectations	10	90

Note: N = 20

Attitudes towards training for educators in the use of digital technology

It was found that directors and educators in all the centres agreed that it was important for educators to be trained in the use of digital technology, *p = ns*.

Attitudes towards the use of digital technology for teaching literacy, numeracy, science, art and physical education

Table 5 shows that the most educators thought that use of digital technology could be used to teach literacy, numeracy, science, and art, and physical education in early childhood education.

Table 5: Educators opinions about the use of digital technology teaching literacy, numeracy, science, art and physical education (Means)

	Mean	SD	N
• Numeracy/mathematics	4.30	.73	20
• Literacy/language	4.30	.73	20
• Science	4.20	.77	20
• Art	4.10	.91	20
• Physical education	3.40	1.14	20

Note: (a) The means were presented in order, from highest to lowest, using a 5 point scale anchored (1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). (b) A repeated measures ANOVA on the above means revealed a significant effect, $F_{(4, 76)} = 13.45$, $p < .01$.

Table 6 presents the percentages of educators' opinions attitudes towards the use of digital technology for teaching literacy, numeracy, science, art and physical education.

Table 6: Educators' opinions about the use of digital technology teaching literacy, numeracy, science, art and physical education (percentages)

	1	2	3	4	5
• Numeracy/mathematics	0	5	0	55	40
• Literacy/language	0	5	0	55	40
• Science	0	5	5	55	35
• Art	0	10	5	50	35
• Physical education	0	30	20	30	20

Note: (a) All above figures represents percentages within each item.
(b) 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree

Attitudes towards the use of digital technology for children's development in the domains of cognitive development, gross motor skills development, fine motor skills development, language development, and social development

Table 7 shows that the most educators thought that use of digital technology could be used for children's cognitive development, fine motor skill development and language development, social development, and gross motor skills development.

Table 7: Educator's opinions about the use of digital technology for children's development in the domains of cognitive development, gross motor skills development, fine motor skills development, language development, and social development (Means)

	Mean	SD	N
• Cognitive development	4.40	0.75	20
• Language development	4.10	1.02	20
• Fine motor skills development	3.95	1.15	20
• Social development	3.65	1.14	20
• Gross motor skills development	3.25	1.25	20

Note: (a) The means were presented in order, from highest to lowest using a 5 point scale anchored (1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). (b) A repeated measures ANOVA on the above means revealed a significant effect, $F(4, 76) = 9.14$, $p < .01$.

Table 8 presents the percentages of educators' attitudes towards the use of digital technology for children's development in the domains of cognitive development, gross motor skills development, fine motor skills development, language development, and social development.

Table 8: Educators' opinions about the use of digital technology for children's development in the domains of cognitive development, gross motor skills development, fine motor skills development, language development, and social development (percentages)

	1	2	3	4	5
• Cognitive development	0	5	0	45	50
• Language development	5	30	20	25	20
• Fine motor skills development	5	10	5	45	35
• Social development	5	5	0	55	35
• Gross motor skills development	5	15	10	50	20

Note: (a) All above figures represents percentages within each item.
(b) 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree

Discussion and Conclusion

The present study reported the early childhood educators' survey findings from the participating child care centres in SA and NT in Australia. Twenty educators participated in the survey. The majority of the educators had been working from 2 months to 60 months (5 years).

In regards to children's access to digital technology in child care centres, it was found the children were provided access to some media devices such as television, DVD player, computer, Internet and Smartboard. This finding is consistent with the existing literature such as Perry et al (2008) that early childhood educators do not use a lot of available digital technology in their classrooms. Partially it was because of the funding provided by the child care centres; however, it was noted in this study that educators needed training to use and teach with these technologies.

Educators were asked to provide attitudes about use of digital technology within early childhood. It was found that educators agree that digital technology was an urgent priority, digital technology should be integrated in child care centres, educators' abilities to teach should be enhanced, and digital technology

should be used in the future. This result agrees with the statement that digital technology can be used as instructional technology in educational settings (Hedberg & McNamara, 2002).

Educators agreed that "familiarising children with the world of new technologies", "curricular and educational benefits" were the main reasons for integrating digital technology into child care centres, and they also agreed that "parents expectations" were not the reason for the integration. Educators agreed it was important for educators to be trained in the use of digital technology. The present study is consistent with Orey et al (2009)'s conclusions that educators need practice to facilitate learning and improving their performance of using digital technology.

In addition to the above findings, this study also found some other findings in relation to the use of digital technology in different curriculum areas as well as young children's development. For example, educators' attitudes towards the use of digital technology for teaching literacy, numeracy, science, art and physical education were reported. Most educators agreed the use of digital technology could be used to teach literacy, numeracy, science, art and physical education.

Moreover, this research also studied the educators' attitudes towards the use of digital technology for children's development in the domains of cognitive development, gross motor skills development, fine motor skills development, language development, and social development. Most educators thought the use of digital technology could be used for children's five domains developments. This findings is consistent with the statement that digital technology can help with children achieving effective outcomes and improve the process of human learning (Australian, society for Educational Technology, 1975).

There are some limitations of this research. This study was conducted only in three child care centres in two states in Australia. Only twenty educators participated in this research. Therefore, further study has been developed already to conduct an online questionnaire survey to more early childhood educators in all states and territories in Australia to find more information about the educators' attitudes towards use of digital technology in child care centres and how to target professional development programs to train the early childhood educators.

References

Allan, A. & Ainley, M. (2000). *Issues of Engagement: The Learner's Experience of Computers in the Classroom.* Paper presented to the Learning Technologies, Teaching and the Future of Schools Conference. 2000 Australian Computers in Education Conference. 6-9 July, Melbourne.

Ausburn, L. J., & Hedberg, J. G. (1981). Evaluation Basis for Instructional Materials and Methods, *Australian Society of Educational Technology*, Hawthorn, Victoria.

Australian Society for Educational Technology (1975). Retrieved January 5, 2009 from http://cleo.murdoch.edu.au/gen/aset/aset_memb.html

Cheng, J-Q & Chang, C. (2006). Using computers in early childhood classrooms, *Journal of Early Childhood Research , 4*(2), 169-188.

Forgarty, G., Cretchley, P., Harman, C., Ellerton, N. & Konki, N. (2001). Validation of a questionnaire to measure mathematics confidence, computer confidence, and attitudes towards the use of technology for learning mathematics, *Mathematics Education Research Journal, 13*(2), 154-160.

Franklin, S. & Peat, M. (2001) Managing Change: The Use of Mixed Delivery Modes to Increase Learning Opportunities. *Australian Journal of Education Technology*, *17*(1), 37-49.

Funk, J.B., Brouwer, J., Crutiss, K. & McBroom, E. (2009). Parents of preschoolers: expert media recommendations and ratings knowledge, media-effects beliefs, and monitoring practices, *Pediatrics, 123*(3), 981-988.

Haugland, S., W. (2000). Computers and young children. *Clearinghouse on Elementary and Early Childhood Education*.

Hedberg, J. G., & McNamara, S. (2002). Innovation and Re-Invention: A Brief Review Of Educational Technology in Australia, *Digital technology International*, 1469-5790, *39*(2), 111-121.

Herrington, J. & Knibb, K. (1999). Multimedia and Student Activity: An Interpretive Study Using Videosearch, *Australian Journal of Educational Technology*, *15*(2), 47-57.

Lee, J. (2005). Correlations between kindergarten teachers' attitudes toward mathematics and teaching practice. *Journal of Early Childhood Teacher Education, 25*(2), 173-184.

Li, H. (2006). Integrating information and communication technologies into the early childhood curriculum: Chinese principals' views of the challenges and opportunities, *Early Education and development, 17*(3), 467-487.

Maggs, A. & Ray, E. (1985). Microcomputers and education, *Australian Journal of Educational Technology*, *1*(1), 2-11.

McDougall, A. & Boyle, M. (2001). *Scaffolding or Skeleton: Supporting Software for Student Multimedia Development Activities*. Paper presented at the World Conference on Computers in Education , 29 July-3August, Copenhagen.

Orey, M., McClendon, V. J., & Branch, R. M. (Eds.). (2009). *Digital technology and Technology Yearbook*. New York: Springer US.

Perry, B., Young-Loveridge, J., Dockett, S., & Doig, B. (2008). The development of young children's mathematical understanding. In H. Forgasz, A. Barkatsas, A. Bishop, B. Clarke, S. Keast, W. T. Seah & P. Sullivan (Eds.), *Research in mathematics education in Australasia 2004-2007*. Rotterdam, The Netherlands: Sense Publishers.

Romeo, G. & Walker, I. (2001). *So We Have Got Our New Computers What More Do Want? Using Activity Theory to Examine the Implementation of ICTE in a Primary School.* Paper presented at the World Conference on Computers in Education , 29 July-3August, Copenhagen.

Venkatesh, V., Morris, M. G., Gordon, B. D., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly, 27*(3), 425-478. doi: 10.2307/30036540

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *Management Information System Quarterly, 36*(1), 157-178.

Winter, R. (2001). *Flexible Learning: Some Issues for Support Staff.* Paper presented at the World Conference on Computers in Education, 29 July-3August, Copenhagen.