Wong, L.-H. et al. (Eds.) (2013). Proceedings of the 21st International Conference on Computers in Education. Indonesia: Asia-Pacific Society for Computers in Education

How to use information technology (IT) wisely for early childhood language education?

Wen-Si YANG [a*], Pei-Wen TZUO[b]
[a]*National Institute of Education, Nanyang Technological University, Singapore*
[b]*National Institute of Education, Nanyang Technological University, Singapore*
*wenwen308728@hotmail.com

Abstract: To examine the uses of information technology (IT) in early childhood language education, this paper reviews 34 studies to synthesize the current literature. Considerable insights are provided by these conceptual and empirical studies. A synthesis is given of with regards to the different pertinent IT features and how young children's language development is influenced by these features. These pertinent IT features include digital picture, video, audio clips, website, game, Microsoft office, electronic file, blog and diagram. The findings are then based on literature to underpin how to use IT wisely for the language development of young children. The synthesis would like to highlight that, the nine pertinent IT features are somehow related to young children's language developmental domains, and ways to use these features. This seems probable to shed lights on future IT research, design, and implications in young children's language development.

Keywords: Information Technology (IT), Early Childhood Education (ECE), young children, language development

1. Introduction

Nowadays, IT is more accessible for young children, caregivers and ECE settings. Young children are competent in a wide range of up-to-date IT products. These IT products are smart phone, smart TV, tablet computer, interactive whiteboard and video game console. Meanwhile, the other IT products such as digital cameras, desktop, laptop and television still play an important part in young children's lives. Despite the popularity of IT, the ECE literature lacks a first hand, up-to-date review to explain how to use IT for young children's language development in recent four years. This synthesis paper addresses this timely issue by identifying the key features of IT and presenting alternative ways to implement the useful features of IT.

At the pragmatic level, since IT is attractive to both young children and their caregivers for decades, knowing how to utilize IT wisely is an important issue. Either accessed by young children or operated and controlled by caregivers, IT has the potential to support early language development in diverse ways. At the policy level, most developed countries' ECE policies and curriculum guides require caregivers to use IT to support young children's language development. At the research level, there is a lack of consensus concerning IT and young children with regards to identify the useful features of both traditional IT and up-to-date information technological. Based on the three levels, this synthesis paper would like to synthesize both conceptual and empirical studies in ECE to address the use of IT for young children's language development before six years old.

2. Review of the Literature

2.1 The Up-to-date IT: Define the key Features

Up-to-date and old IT products are usually blended with each other. IT enhanced life has been a catalyst to facilitate children's development(Cohen & Uhry, 2011). The development can be strongly affected by the various IT products they accessed and the duration of each individual manipulation.

Wolfe and Flewitt (2010) suggested clarifying the role of IT in the processes of young children's IT use at home was crucial to ensure that all children had equal access to developmental opportunities. And Yelland(2011) declared that how to use IT was fundamental to social and personal futures for all citizens in the twenty-first century. Young children have known how to manipulate IT products(Plowman, Stevenson, McPake, Stephen, & Adey, 2011). They have been constantly aware of the functions beside these IT products. For example, Young children know how to switch IT products off and on, fast-forward and rewind. They also understand the IT is a way of communicating with others.

Both up-to-date and old IT products have facing fast-paced transformation(Flewitt, 2011). By watching television (TV) program on computer, computer has the functions of electronic media. By integrating the Internet and Web 2.0 features into smart TV, TV has the functions of computer. These IT products are tablet computers, smart phones, and smart TV. The old video game console is substituted by Nintendo Will, Microsoft Xbox, and Sony Play Station. Under this circumstance, the boundaries have been blurred. It is difficult to define whether the merger is a TV, computer, game console or a hand phone. Furthermore, additional studies stressed that the impacts of IT on young children should be studied across developmental domains(Lim, 2012)..

2.2 The Purpose

As yet, there have limited studies regarding how these key pertinent features embedded in the merger of IT influences young children's language development. A research synthesis has recently been started by the authors, with the goal of exploring IT use in ECE and to address the following research question: How to use IT products with respect to its key pertinent features in young children's language development? In this study, the pertinent features include digital picture, video, audio clip, website game, Microsoft office, electronic file, blog, and diagram.

3. Methods

3.1 Research Design: Systematic Narrative Synthesis

According to research designs of 34 selected studies, qualitative design was adopted by 19 studies, quantitative design was adopted by 9 studies, mix-method design was adopted by 1 study only, and 5 studies were conceptual works. As qualitative research designs and conceptual works have more threats to validity than experimental designs, statistical methods (meta-analysis) cannot be used to analyze and summarize the results of the included studies. Thus, this paper adopts systematic narrative research design.

3.2 Search Procedures and Selection Criteria

Three search approaches are adopted: hand search 10 journals related in ECE, ancestry approach and descendancy approach. The selection criteria were: (a) reported from January 2009 to August 2012; (b) published in English; (c) published journal articles with primary data; (d) involving young children below 6-year-old and the use of IT for language development with the following keywords: "information technology (IT)," "information communicate technology (ICT)", "computer," "website," "software," "media", "television," "video games," "digital camera," "smart phone," "tablets," "interactive whiteboard" and "language development".

4. Key Pertinent Features and Language Development

Overall, 34 studies drew attention to the variety of features offered in different IT hardware, software and different settings. Usually, an IT product may comprise more than one feature such as digital picture, video and audio clips. These reviewed studies provide a framework to highlighting the

language development domain that be supported by pertinent features of IT. Each study was analyzed on how to use IT wisely to extend the language development of young children. The following discussion draws on figure1, which summarized our framework as it related IT and young children's development.

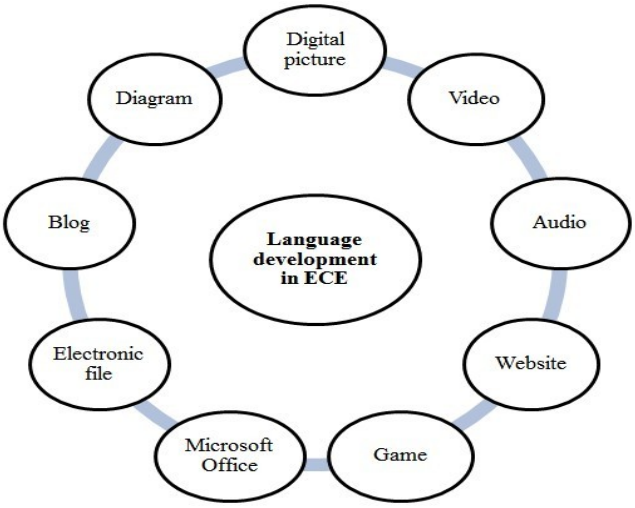

Figure 1. Overall Framework

This framework revealed the dimensions of IT in which for the purpose of informing an argument on how to use IT for young children's language development. These dimensions were therefore used to structure the following sections, which provide highly condensed accounts of the main findings arising from the ECE literature. We therefore moved on form the in-depth descriptions of the framework.

4.1 In-depth Analysis How to Use the IT Products Wisely for Young Children's Language Development?

Digital picture feature was the catalyst to extending the opportunities for language development (Hill, 2010; Yelland, 2011). It also was a kind of literacy recourse for young children(Flewitt, 2011). Digital picture feature was used commonly in storytelling and immersion learning. During a storytelling section, young children used digital pictures skillfully to narrative by dragging different background pictures and main character pictures on the screens(Lisenbee, 2009). The published E-books were additional resources for young children to build their reading fluency(Korat & Blau, 2010). This kind of E-book's included the frequency words by highlighting and repeating them (A. Karemaker, Pitchford, & Malley, 2010; A. M. Karemaker, Pitchford, & O'Malley, 2010; Korat & Blau, 2010; Lacina & Mathews, 2012). Another use of digital pictures is immersion learning. For example, digital pictures were used as the labels for activities plan and incorporated into young children's storytelling and group work (Lin, 2012; Yelland, 2011). Young children used digital pictures to make stories and podcasts. They integrated digital pictures to created narratives of their real life experience (Yelland, 2011). Young children were the knowledge co-constructers when they made their own electronic books with digital pictures (Hourcade, Parette.Jr, Boeckmann, & Blum, 2010; Shifflet, Toledo, & Mattoon, 2012).

Video feature was used to expand young children's vocabulary, print awareness and reading comprehension skills(Lisenbee, 2009). As An and Seplocha(2010) mentioned if a child watch a video about train, s/he saw and heard words which related to directions and parts of the train. And video of an excursion was used to get young children engaged in sharing their stories(Yelland, 2011). When integrated into language training programs, videos have positive effects on developmental language delay(Balkom, Verhoeven, Weerdenburg, & Stoep, 2010). Although, a research conducted with 12 young children indicated that they thought the certain video had same fun regardless the type of IT products(Levy, 2009). Hourcade, et al(2010) indicated young children learned better from large

screens. And Mendelsohn et al(2010) indicated that the verbal interactions with young children mitigated the flaws of video exposure. Similarly, the more teaching focus interactions the higher degree of engagement in learning was found during video exposure (Fender, Richert, Robb, & Wartella, 2010; Penuel et al., 2009). To choose a video, a content analysis of 58 videos for young children below three-years-old was conducted. It indicated that videos with explicit language claims had significantly higher percentage of scenes with language content and language-promoting strategies than those without such claims (Vaala et al., 2010). Moreover, with the careful selected by the ECE educators, the online videos for young children were cost-effective, match young children's language development, and useful resources(Pretti-Frontczak, Jung, & Pfeiffer-Fiala, 2010).

Audio feature reinforced the connection between writing and speaking (McPherson, 2009; Parette, Hourcade, Dinelli, & Boeckmann, 2009). For example, it embedded in E-book as read out when each word lighted up (A. Karemaker, et al., 2010; A. M. Karemaker, et al., 2010; Korat & Blau, 2010). Young children language awareness was developed by touching the words or letters to hear the audio on the interactive IT products(M. R. Davidson, Fields, & Yang, 2009). Furthermore, audio recording enhanced the engagement and interest of early literacy activities (Fesakis, Sofroniou, & Mavroudi, 2011; Hourcade, et al., 2010).

Website feature promoted language development in conversational aspects (C. Davidson, 2012; Fesakis, et al., 2011).Video-sharing website related to pattern language development(An & Seplocha, 2010). Interactive website offered short interactive books which focused on sounds, words and letters(Lisenbee, 2009). Young children demonstrated their funds of knowledge through these exponentially growing video-sharing and interactive websites(Fantozzi, 2012). And Websites feature was commonly designed to work together with certain products to promote early literacy. Young children accessed websites from software, package of electronic toys and other commercial products(Nixon, 2011). For example, LeapFrog spaces focused on phonics, reading and early writing. And it instructed parents the ways to encourage valued language development activities(Nixon, 2011).

Game feature improved language development by repeating and reinforcement as a supplement ECE curriculum (McPherson, 2009; Penuel et al., 2012; Penuel, et al., 2009). Game which embedded in educational IT products was designed in different reading levels(Lacina & Mathews, 2012). The wide range of visual and auditory cues offered various options. For example, Humpty Dumpty game invited young children to create a nursery rhyme-type story by making selections from the various auditory, symbols, print and visual cues (Levy, 2009). And the matching games which required young children memorized the position of words expanded their language skills (Shifflet, et al., 2012; Wolfe & Flewitt, 2010). Beside these cues of the game feature, verbal interactions moderated the adverse impacts of young children game exposure(Mendelsohn, et al., 2010).

Microsoft office feature provided many opportunities for young children to become competent early writers. It scaffold young children's left to right concept and word composition(Hourcade, et al., 2010). By composing words on Microsoft office, young children managed to participate in emergent literacy programs successfully(Lim, 2012). Microsoft office was commonly used in daily ECE practice. For example, educators facilitated both mainstream and at risk young children to develop their own projects and reinforced learning through Microsoft office (PowerPoint) presentation(Parette.Jr, Hourcade, & Blum, 2011). And the Microsoft office feature in a talking book could integrate both educator and young children's voice, animation and activities(Parette, Quesenberry, & Blum, 2010). It facilitated young children to acquire phonemic awareness at fast rate(Parette, et al., 2010). Furthermore, educator facilitated young children at risk's word recognition by using instruction-supported Microsoft office (PowerPoint) slides (Parette, Blum, Boeckmann, & Watts, 2009; Parette, et al., 2010).

Electronic files feature facilitated a series of activities to situate in one story which helped young children to engage in a long lasting and multiple learning processes(Fesakis, et al., 2011). It was also a good method to document young children's learning experience(Parnel & Bartlett, 2012).

Blog feature provided relevant information of ECE language education in order to ensure appropriate and meaningful language learning experiences(An & Seplocha, 2010).

Diagram feature was labels for activity plans which incorporated into young children's storytelling and group work(Yelland, 2011). For example, block-building was one of the most popular activities in young children's play. Block-building plan could be made by IT products' diagram feature.

5. Discussion and Conclusion

By drawing on research literature that related young children‘s language developmental domain to the use of IT features, this synthesis put forward the use of IT in ECE. Digital pictures feature promoted young children’s language by means of storytelling and immersion learning. Video feature strengthened young children’s print awareness and reading comprehension. Audio feature reinforced the connection between writing and speaking and as strategies of scaffolding and guiding. Website feature promoted early literacy in communication and pattern language development. Game feature which integrated with the educational functions served as ECE curriculum supplement. Microsoft office feature nurtured left to right concept, word recognition and word composition. Electronic file feature engaged and documented young children’s long lasting and multiple learning processes. Blog feature provided an online community where ECE educators got useful information to ensure appropriate language learning experience. Diagram feature facilitated educators to make daily activity plans.

And when selecting IT products for young children, we must consider about the embedded pertinent features. To harness pertinent IT features will bridge the different streams of IT and in order to establish a smooth transition of different IT products. Beyond consider the pertinent IT features, careful consideration must go into how to use IT. The reason is when young children engage in certain IT products or programs, the using of strategies may influence development.

The 21st century ECE educators need to integrate the rapid advancement of technology into their daily practice. It is important for them to adapt and use IT wisely to cater the 21st digital native young learners. By examining how to use these nine pertinent IT features, this paper open the possibilities of rematch these features in different IT products. This may strengthen the usefulness of IT product more clearly and practically and highlight the new research directions. We suggest that by valuing the influence of IT in ECE, future research can see the IT features as the bridge between IT products and young children’s language learning. So, a shift in interests towards IT features will begin. For example, there is an evident interest in supporting fully integrated IT in ECE. The ECE educators take into consider the different approaches embedded in their IT integrated curriculum. Similar to IT features which also embedded in the curriculum, educators and researchers can use and uptake these features for the future of young children’s language development.

To sum up, this body of work not only reflected the particular pertinent features to promote young children’s language development, but also ways to use these features.

References

An, H., & Seplocha, H. (2010). Video-sharing websites: Tools for developing pattern languages in children. *Young Children, 65*(5), 20-25.

Balkom, H. v., Verhoeven, L., Weerdenburg, M. v., & Stoep, J. (2010). Effects of parent-based video home training in children with developmental language delay. *Child Language Teaching and Therapy, 26*(3), 221-237.

Cohen, L., & Uhry, J. (2011). Naming block structures: a multimodal approach. *Early Childhood Education Journal, 39*(1), 79-87

Davidson, C. (2012). Seeking the green basilisk lizard: Acquiring digital literacy practices in the home. *Journal of Early Childhood Literacy, 12*(1), 24-45.

Davidson, M. R., Fields, M. K., & Yang, J. (2009). A randomized trial study of a preschool literacy curriculum: The importance of implementation. *Journal of Research on Educational Effectiveness, 2*(3), 177-208.

Fantozzi, V. B. (2012). Exploring elephant seals in New Jersey. *Young Children, 67*(3), 42-49.

Fender, J. G., Richert, R. A., Robb, M. B., & Wartella, E. (2010). Parent teaching focus and toddlers' learning from an infant DVD. *Infant and Child Development, 19*(6), 613–627.

Fesakis, G., Sofroniou, C., & Mavroudi, E. (2011). Using the internet for communicative learning activities in kindergarten: The case of the "Shapes Planet". *Early Childhood Education Journal, 38*(5), 385-392

Flewitt, R. (2011). Bringing ethnography to a multimodal investigation of early literacy in a digital age. *Qualitative Research, 11*(3), 293-310.

Hill, S. (2010). The millennium generation: Teacher-researchers exploring new forms of literacy. *Journal of Early Childhood Literacy, 10*(3), 314-340

Hourcade, J. J., Parette.Jr, H. P., Boeckmann, N., & Blum, C. (2010). Handy manny and the emergent literacy technology toolkit. *Early Childhood Education Journal, 37*(6), 483-491.

Karemaker, A., Pitchford, N. J., & Malley, C. O. (2010). Enhanced recognition of writtenwords and enjoyment of reading in struggling beginner readers through whole-word multi media software. *Computers & Education, 54*(1), 199–208.

Karemaker, A. M., Pitchford, N. J., & O'Malley, C. (2010). Does whole-word multimedia software support literacy acquisition? *Reading and Writing, 23*(1), 31-51.

Korat, O., & Blau, H. (2010). Repeated reading of CD-ROM storybook as a support for emergent literacy: A developmental perspective in two SES groups. *Journal of Educational Computing Research, 43*(4), 445-466

Lacina, J., & Mathews, S. (2012). Using online storybooks to build comprehension. *Childhood Education, 88*(3), 155-161.

Levy, R. (2009). 'You have to understand words...but not read them': young children becoming readers in a digital age. *Journal of Research in Reading, 32*(1), 75-91.

Lim, E. M. (2012). Patterns of kindergarten children's social interaction with peers in the computer area. *International Journal of Computer-Supported Collaborative Learning, 7*(3), 399 - 421.

Lin, C.-H. (2012). Application of a model for the integration of technology in kindergarten: An empirical investigation in Taiwan. *Early Childhood Education Journal, 40*(1), 5-17.

Lisenbee, P. (2009). Whiteboards and websites digital tools for the early childhood curriculum. *Young Children, 64*(6), 92-95

McPherson, S. (2009). A dance with the butterflies: A metamorphosis of teaching and learning through technology. *Early Childhood Education Journal, 37*(3), 229-236.

Mendelsohn, A. L., Brockmeyer, C. A., Dreyer, B. P., Fierman, A. H., Berkule-Silberman, S. B., & Tomopoulos, S. (2010). Do verbal interactions with infants during electronic media exposure mitigate adverse impacts on their language development as toddlers? *Infant and Child Development, 19*(6), 577-593.

Nixon, H. (2011). From bricks to clicks': Hybrid commercial spaces in the landscape of early literacy and learning. *Journal of Early Childhood Literacy, 11*(2), 114-140.

Parette, H. P., Blum, C., Boeckmann, N. M., & Watts, E. H. (2009). Teaching word recognition to young children who are at risk using Microsoft® PowerPoint™ coupled with direct instruction. *Early Childhood Education Journal, 36*(5), 393-401.

Parette, H. P., Hourcade, J. J., Dinelli, J. M., & Boeckmann, N. M. (2009). Using Clicker 5 to enhance emergent literacy in young learners. *Early Childhood Education Journal, 36*(4), 355-363.

Parette, H. P., Quesenberry, A. C., & Blum, C. (2010). Missing the boat with technology usage in early childhood settings: a 21st century view of developmentally appropriate practice. *Early Childhood Education Journal, 37*(5), 335-343.

Parette.Jr, H. P., Hourcade, J., & Blum, C. (2011). Using animation in Microsoft Power Point to enhance engagement and learning in young learners with developmental delay *Teaching Exceptional Children, 43*(4), 58-67.

Parnel, W., & Bartlett, J. (2012). iDocument: How smartphones and tablets are changing documentation in preschool and primary classrooms. *Young Children, 67*(3), 50-58.

Penuel, W. R., Bates, L., Gallagher, L. P., Pasnik, S., Llorente, C., Townsend, E., . . . VanderBorght, M. (2012). Supplementing literacy instruction with amedia-richintervention: Results of a randomized controlled trial *Early Childhood Research Quarterly, 27*(1), 115-127.

Penuel, W. R., Pasnik, S., Bates, L., Townsend, E., Gallagher, L. P., Llorente, C., & Hupert, N. (2009). Summative evaluation of the ready to learn initiative *Preschool teachers can use a media rich curriculum to prepare low income children for school success: results of a randomized controlled trial* (pp. 1-23): New York and Menlo Park, CA: Education Development Center, Inc., and SRI International.

Plowman, L., Stevenson, O., McPake, J., Stephen, C., & Adey, C. (2011). Parents, preschool children's learning with technology at home:some implications for policy. *Journal of Computer Assisted Learning, 27*(4), 361-371.

Pretti-Frontczak, K., Jung, L. A., & Pfeiffer-Fiala, C. (2010). Introduction to the special issue on web-based technologies. *Topics in Early Childhood Special Education, 29*(4), 197-200.

Shifflet, R., Toledo, C., & Mattoon, C. (2012). Touch tablet surprises: A preschool teacher's story. *Young Children, 67*(3), 36-41.

Vaala, S. E., Linebarger, D. L., Fenstermacher, S. K., Tedone, A., Brey, E., Barr, R., . . . Calvert, S. L. (2010). Content analysis of language-promoting teaching strategies used in infant-directed media. *Infant and Child Development, 19*(6), 628–648.

Wolfe, S., & Flewitt, R. (2010). New technologies, new multimodal literacy practices and young children's metacognitive development. *Cambridge Journal of Education, 40*(4), 387-399.
Yelland, N. (2011). Reconceptualising play and learning in the lives of young children. *Australasian Journal of Early Childhood, 36*(2), 4-12.