透過資訊通訊技術（ICT）提升學齡前孩童之讀寫萌發：以公共圖書館為情境

Supporting young children's emergent literacy through information and communications technology (ICT) in the public library setting

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【摘要】

本文針對資訊科學及幼兒教育兩方面進行文獻回顧，以闡述一項介入性研究之原理，本研究旨在探索目前臺灣地區，公共圖書館服務如何整合遊戲方式與資訊通訊技術 (ICT) 的運用，以提升學齡前孩童之讀寫萌發。研究顯示，不論在家或幼稚園的幼兒教育，對於個人及社會的重要性。研究亦發現成人與幼兒互動及共同持續思考，對幼兒發展與學習的重要性。此外，大量研究證實，有效地將 ICT 融入於幼兒日常生活學習環境中之益處。

然而，目前並沒有針對成人與幼兒共同使用 ICT 的互動，或是圖書館支持此角色的潛能之相關研究，為了彌補這方面的文獻缺口，本研究將以國立公共資訊圖書館為研究場域，進行介入性研究，使用社群媒體、參與觀察法及訪談法，以

記錄成人與幼兒的行為、並描述他們的參與過程及觀點。研究對象包含：兒童圖書館員、兒童照護者及學齡前兒童。將針對這項介入性研究的每一個階段進行詳盡地評估，其過程並以行動研究法進行調整。介入性研究首先前測問卷預試，作為研究基準，並在介入性研究結束時再進行一次後測問卷調查，以了解研究的變化與否。預期這項研究結果對未來相關領域之決策者、兒童照護者、教育專家學者及兒童圖書館員具有參考價值。

【Abstract】

This paper, drawing upon literature from both information science and early childhood education, provides the rationale for an intervention study aiming to explore how a public library service can support emergent literacy through the playful use of ICT in Taiwan. Research has shown the important benefits of early childhood education, delivered in the home and in preschools, to individuals and society. Research has also identified the importance of adult-child interactions and 'substantial shared thinking' in child development and learning. Furthermore, substantial research has evidenced the benefits of integrating ICT into young children's daily learning environment when used effectively.

However, no research has been conducted on adult-child interactions when using ICT or on the potential of library services to promote this. In order to fill the gap, an intervention has been designed in collaboration with the National Library of Public Information in Taiwan. Social networking, participant observations and interviews will be used to record the actual behaviours of adults and children and to describe the process and perspectives of the study participants, including the children's librarians, caregivers and the young children themselves. Every stage of the intervention will be closely evaluated and the progress moderated in action research. Pre-questionnaires will be administered at the start of the intervention to provide a baseline, and post-questionnaires will be administered at the end of the intervention to see if changes have occurred. It is to be hoped that the findings of this study will be of value to policy makers, caregivers, professional educators and the children's librarians in the future.

關鍵字：讀寫萌發、公共圖書館、學齡前孩童、共同持續思考、資訊通訊技術
Keywords: Emergent literacy, Public libraries, Young children, Sustained shared thinking, ICT

Introduction

Research has shown that family interventions and high quality educational provisions in the nursery or playgroup can go a long way towards compensating for early disadvantage (Schweinhart et al., 2005; Siraj-Blatchford & Siraj-Blatchford, 2006; Sylva et al., 2010). James Heckman (2006), a Nobel prize-winner in economics, has also shown that investments in early childhood programmes are justified by the returns provided to society as a whole. In other words, investments in the foundation stage of early childhood education have been shown to provide a higher rate of economic return than investments later in life.

Evidencing the importance of early childhood education, and in response to a call of the Organisation for Economic Co-operation and Development (OECD, 2012) for both quantitative and qualitative research in the area, this paper begins with identifying priorities and challenges for developing early childhood education. Three areas are of particular interest to this study, including: integration of ICT, adult-child interactions, and the parental and community engagement potential of library services. Drawing upon literature from both information science and early childhood education, this paper provides the rationale for an intervention study aiming to explore how a public library service can support emergent literacy through the playful use of ICT in Taiwan. Based on the Early Childhood Education and Care Act (Ministry of Education, 2011) in Taiwan, young children are defined as two to six years old in this study.

Priorities for early childhood education research

Integration of ICT

In the following discussion, ‘curricula’ pertain to the educational content, and

'pedagogies' relate to teaching methods. Different countries have set different curricula and pedagogies for the development of early childhood education, which are usually tightly related to their culture. For example, some countries emphasise literacy and numeracy in their learning framework; some value the importance of play; and some integrate ICT into children's learning (OECD, 2012).

In Taiwan, the Grade 1-9 Curriculum policy since 1990 has focused on the integration of ICT into the elementary and junior high school curriculum, and there has also been evidence of increased use of ICT with young children in the home and in preschools (Lin, 2013). Lee (2009) attributed this phenomenon to a general belief among Taiwanese parents that they shouldn't "let your children lose out at the starting point", and desperate efforts to develop children's basic literacy as well as ICT skills in order to get ready for school. A similar emphasis on literacy and ICT has also been found in the USA, in particular through the No Child Left Behind Act (Learning Point Associates, 2007).

With the prevalent usage of ICT with young children worldwide, a growing body of research has discussed various issues, both positive and negative, from the perspectives of the curriculum, pedagogy, paradigm, philosophy and practice. Bowman et al. (2001), citing an early proponent Papert (1980), suggested that "Computers help even young children think about thinking." In one study, pre-schoolers who use computers score higher on measures of metacognition (Flatcher-Flin & Suddendorf, 1996; Bowman et al., 2001). In 2012, the National Association for the Education of Young Children (NAEYC) and Fred Rogers Center put forward a joint statement, arguing that when used intentionally and appropriately, technology and interactive media are effective tools to support children's learning and development.

Adult-child interactions

In order to lay the strong foundation for lifelong learning, a number of authorities including Siraj-Blatchford and Siraj-Blatchford (2006), the NAEYC and Fred Rogers Center (2012), and Siraj-Blatchford and Smith (2012) argued that play and adult-

child interactions are more important than study and instruction in the early childhood programmes. In Taiwan, this may require some rethinking of the key objectives of early learning: from obtaining literacy skills (i.e. to read and write) towards the development of thinking (especially critical thinking). Consistent with this, OCED (2012, 11) considered: "the way in which staff involve children, stimulate interactions with and between children and use diverse scaffolding strategies", to be critical for creating a high-quality pedagogic environment in preschools. In this regard, the adults' perceptions, knowledge and skills for child development and learning would appear to be essential at home and in the preschool.

Additionally, Crook (1994) and Siraj-Blatchford and Siraj-Blatchford (2006) have suggested that ICT provides a good context for promoting child development and learning through playful dialogue. Tablet technologies in particular, and appropriate accompanying software applications (Apps) have been shown to provide contexts for playful exploration and educational value for young children (Cohen, 2011; Yelland & Gilbert, 2012). However, no research has been conducted on adult-child interactions when using tablet and handheld technologies. OECD (2012) has called for more quantitative and qualitative research to advance knowledge and inform policy and practice in early childhood education and care.

Parental and community engagement

The Early Childhood Education and Care Act (Ministry of Education, 2011) shows the need to support young children's learning and development in the home, in preschools and in the community in Taiwan. Substantial research has also highlighted the importance of enhancing home learning environments for promoting family learning. As Feinstein et al. (2004) explained, there are important benefits of early childhood education to individuals and society in what education enables parents to pass on to their children. Indeed, the importance of family involvement and intergenerational learning has recently been emphasised in research, policies and practices. In addition to the home, children's learning also occurs in preschools and in the community (e.g. libraries,

museums and sports centres).

According to OCED (2012, 12), community agencies can act as a "connector" between the home and preschools; a "social network" to support parents (especially for disadvantaged families); an "environment" to promote social cohesion and public order; and a "source of resources". The public library, as a community anchor, fits the aforementioned roles very well. As identified in the research of Sung et al. (2012), the objectives of community engagement for public libraries include: tackling social exclusion; promoting democracy; and contributing to social/human/cultural capital. It is this latter priority that we are most concerned with here. Sylva et al.'s (2010) influential research conducted at the early years of this century specifically highlighted the importance of parents reading to children and taking them to the public library. The role of ICT was not investigated at that time. ICT now plays a much more significant role in providing digital story books and games.

Emergent literacy

Literacy studies have been intensively studied in education and information science. When applied in early childhood education research, the term literacy is frequently qualified with an array of prefixes, such as pre, early, emergent and new. The term emergent literacy was defined by Whitehurst and Lonigan (1998, 848) as "the skills, knowledge, and attitudes that are presumed to be developmental precursors to conventional forms of reading and writing" and "the environments that support these developments". From this perspective, young children's skills, knowledge and attitudes are therefore considered the developmental precursors, rather than determinants, to reading and writing (Siraj-Blatchford & Parmer, 2011). Emergent literacy also highlights the importance of not only young children's skills, knowledge and attitudes, but also the external environments for early childhood learning and development.

Emphasising the importance of conventional literacy, the National Institute of Child Health and Human Development (2000, 2) focused on "phonemic awareness"

and “letter knowledge”. Going beyond writing and reading, a relatively new term new literacy has also emerged from the literature, which can be understood as the ability to use digital technologies to “identify questions, locate information, evaluate information, synthesize information to answer questions, and communicate the answers to others” (Leu et al., 2004, 1572).

As noted by Dresang et al. (2011), these terms, such as emergent literacy and early literacy, are often used interchangeably in the literature. Considering that early learning involves emergent conceptual development (Siraj-Blatchford & Parmer, 2011) and in order to simplify the language used, the concept of emergent literacy has been adopted throughout this study.

A review of the early childhood education literature has identified the importance of communication, collaboration and creativity (three Cs) for enhancing emergent literacy. These conclusions were also supported by research findings from the Researching Effective Pedagogy in the Early Years (REPEY) study in the UK, and in Siraj-Blatchford (2007), where the three Cs were identified as providing support across a continuum of children’s development of their lifelong learning capabilities. Creativity is closely linked with imagination and abstract thinking, which is an essential element for children’s learning not only for art but all other aspects of social cognitive development and subjects such as learning, science and technology (Vygotsky, 1933). Communication and collaboration characterise the interactions and experiences of children when they engage with adults and their peers in ‘sustained shared thinking’, as showed in the REPEY study.

Sustained shared thinking is considered critical to the development of young children and was defined by Siraj-Blatchford (2007, 18) as “an effective pedagogic interaction, where two or more individuals ‘work together’ in an intellectual way to solve a problem, clarify a concept, evaluate activities, or extend a narrative”. These shared activities or interactions could occur between children with peers, parents, caregivers or other adults.

Play is central to the concept of sustained shared thinking in early childhood, and it is recognised as the leading context of children's early learning and development. It is essentially through play that children develop intellectually, creatively, physically, socially and emotionally. In the words of Vygotsky (1933, 1), "The child moves forward essentially through play activity. Only in this sense can play be termed a leading activity that determines the child's development." It is through play that children learn to work collaboratively, think critically, solve problems, and apply their capacities and creativity.

Use of ICT for promoting young children's emergent literacy

Substantial evidence has shown the value of ICT in supporting young children's emergent literacy, communication, collaboration, creativity, sustained shared thinking and play, which are seen as building blocks for their lifelong learning. In the USA, the value of parents and children reading books together at home has been well established and research associated with Head Start has provided direct evidence of the effectiveness of applying ICT at home (McCarrick et al., 2007). This is also seen in projects in the UK, where the Supporting Playful Learning with Information and Communications Technology in the Early Years (SPLICT) (Siraj-Blatchford et al., 2013), has provided robust evidence through a randomised control trial to show that ICT can be used to enrich early childhood practices in the home and in preschools.

As the NAEYC and Fred Rogers Center (2012, 1) made it very clear, "There has never been a more important time to apply principles of development and learning when considering the use of cutting-edge technologies and new media." ICT developments in early childhood can be justified through three evidence-based principles. According to Siraj-Blatchford and Smith (2012):

1. the enrichment of home learning environment (Sylva et al., 2008b);
2. the enhancement of interaction, dialogue and sustained shared thinking (Sylva et al., 2010); and
3. the enrichment of language environments (Snow, 2004).

Undeniably, there exist claims and concerns with regard to the inappropriateness of ICT in the early years. But discussion has shifted from "whether children should have access to ICT" to "how ICT can be effectively integrated into children's learning" (Rosen & Jaruszewicz, 2009; Wang et al., 2010).

Solitary play vs. social play

A number of researchers have been critical of much of the software currently available for the early years as it has been designed to support solitary play, and neglects the important interactions between adults and children or between children (Eagle et al., 2008; Siraj-Blatchford & Smith, 2012). Systematic empirical research has evidenced the value of adult-child interactions during shared activities for developing emergent literacy (Snow et al., 1991; Hall & Robinson, 1995; Siraj-Blatchford et al., 2001; McCarrick et al., 2007).

Formal Education vs. play

When it comes to the use of ICT with young children, many parents have been concerned whether or not it has the educational value. This notion can be interpreted from the perspectives of both pedagogic and curriculum perspectives. Pedagogical practice is clearly heavily influenced by cultural needs and preferences. As Siraj-Blatchford and Smith (2012) noted, variations in preschool ICT practice can range from extremely didactic teaching (focusing on formal academic achievements) to extremely child-centred approaches (focusing on playful interactions) during free play. An appropriate approach would seem to be to take something between these two extremes – promoting emergent literacy and playful learning. Some software claims also seem to embed the educational content in games. In particular, concerns are expressed regarding children's focusing on completing predefined tasks or playing games, where there is little opportunity or potential for problem solving or creativity. In the application of any such software it will be important to emphasise the educational pedagogy, not just the ICT tools or curricula, and this will require adults' facilitation and supervision. As clearly suggested in the 2012 position statement of the NAEYC and Fred Rogers Center,

"without guidance, usage [of ICT] can be inappropriate and/or interfere with learning and development."

On vs. off screen learning

There is also a fear among some parents and authorities that the use of ICT could distort or replace 'traditional' activities, such as outdoor experiences, pretend play, real-life exploration, physical activities or real books. However, as Yelland and Gilbert (2012) observed, the claim is not supported by any systematic evidence-based research. In fact, the importance of stimulating and motivating for young children to engage with activities away from the screen has been highlighted for designing/evaluating computer software for children's learning and development, for example "be play-based and support 'hands on' activities away from the screen" (Siraj-Blatchford & Clarke, 2000) and "integration with other aspects of curriculum away from the computer" (International Business Machines, 2003).

Passive vs. active learning

In response to a call for eliminating screen time for infants/toddlers or limiting screen time for pre-schoolers in the USA, the NAEYC and Fred Rogers Center (2012, 3) report argued that "all screens are not created equal." Embedded in this notion is that the design of the digital technology varies from those encouraging, linear, non-interactive to interactive usage, which could influence how young children interact with technology. According to the NAEYC and Fred Rogers Center (2012, 4) report, "Passive use of technology and any type of screen media is an inappropriate replacement for active play, engagement with other children, and interactions with adults." To this end, appropriate guidance and support from adults to help children select and use ICT are considered valuable for children's learning and development.

It is clear that the integration of ICT into the early years is potentially valuable for their learning outcomes. Building upon the robust evidence showing the value of integrating ICT into the early years, the proposed research will focus on computers (e.g. desktops and laptops), handheld devices (e.g. smart phone, tablets), and their

accompanying digital Apps and software. Some exploratory studies to date have shown positive findings supporting young children's use of iPad and Apps (Cohen, 2011; Yelland & Gilbert, 2012). Such findings include: young children enjoy playing with iPads; iPads provide a natural way for young children to explore and learn; some Apps allow for more open ended and individual responses; and iPads have the potential for encouraging more reflective, creative and investigative learning (op cit).

In developing the intervention study, the researchers have been particularly concerned to identify Apps and software that afford social play, playful interactions, educational value, motivation for extended activities away from the screen, and active learning.

Supporting emergent literacy through ICT in public libraries

A great deal of systematic research has evidenced the fundamental importance of supporting early learning in preschools (e.g. Siraj-Blatchford & Siraj-Blatchford, 2006), in the home (e.g. Sammons et al., 2007; Sylva et al., 2008a; Sylva et al., 2010), and in the community (e.g. Ball, 1994). Compared with the literature focusing on the school and home context, there are relatively fewer studies looking into the community context. For example, current studies into emergent literacy programmes in public libraries are scarce and fragmented. Although it could be argued that public libraries have a long history of providing in-library services for young children, Sung and Siraj-Blatchford (2013) noted that not all children's services equal emergent literacy programmes. In the proposed study it is intended that all three contexts for learning are included.

Internationally, two major emergent literacy programmes in public libraries, involving both young children and parents, attract a good deal of interests in the literature. One is Bookstart in the UK, initiated by the Booktrust Foundation; the other is Every Child Ready to Read @ your library in the USA, initiated by the Association for Library Service to Children (ALSC) and the Public Library Association (PLA) in consultation with the National Institute of Child Health and Human Development

(NICHD). Learning from the UK practice, the Bookstart programme has been officially implemented in Taiwan since 2005, which encourages book shared reading between young children from birth to three and their parents.

In addition to promoting print literacy, public libraries have already begun providing children with access to ICT for enhancing playful learning. In the National Library of Public Information in Taiwan, for example, they regularly invite parents and children to attend related library sessions, e.g. digital storytelling. Public libraries, in accordance with its universal mission, open for all, are encouraged to take leadership in providing democratic access to ICT, in order to help bridge the digital divide. However, it must be recognised that passively providing access to ICT itself is not enough. As discussed in the previous section, the effectiveness of integrating ICT into the early years depends upon its intentional, careful, responsible and effective usage, which could only be achieved through adults' guidance and facilitation. Therefore, the children's librarians have a role to proactively play a part in facilitating the interactions between adults and children with ICT. Public libraries can also optimise the use of ICT to provide interactive activities that encourage family involvement, and dialogue in order to improve children's literacy competencies. Furthermore, public libraries can support a community of practice through online channels.

However, a few practical issues emerge when it comes to the children's librarians facilitating young children's interactions with ICT. For example, with the budget cuts imposed on library services both nationally and internationally, are there enough staff resources for such services? Do the children's librarians have the knowledge about appropriate principles of child development and learning? Are the children's librarians equipped with the professional skills to select and use ICT that promote learning in the early years? Taking these questions into consideration, there is a need to give the children's librarians the support that they need to support children and caregivers together. It has been for this reason that an intervention study has been adopted. It is worth noting at this point that the role of the public library is not to replace but support

emergent literacy in the home and in preschools.

An intervention study into promoting emergent literacy through ICT

This study, drawing upon studies and methods from information science and early childhood education, aims to explore how a public library service can support emergent literacy through the playful use of ICT in Taiwan. Since no systematic research has looked into this area, developing an intervention study is considered appropriate for exploring how using computers (e.g. desktops and laptops) and handheld devices (e.g. smart phone, tablets) with young children is understood, perceived and performed by caregivers, children and children's librarians. The findings are intended to advance the knowledge of young children's interactions with adults as they engage with computers and handheld devices in the public library, and should be of value to policy makers, caregivers, professional educators and children's librarians in this area.

Symbolic interactionism

Given the exploratory nature of this study, symbolic interactionism is considered to provide an appropriate epistemological and methodological framework, because it "addresses the nature of society and the human being, the relationship between the two, and the nature of human action and interaction" (Stryker & Statham, 1985, 314). In essence, symbolic interactionists emphasise the importance of identifying the meanings of the interactions between individuals in relation to the environment (Sung, 2012). As a prominent advocate of symbolic interactionism, Blumer (1969, 66), explained, symbolic interactionism involves interpretation of the actions or remarks of another person and how one is to act. The potential for onscreen symbol manipulation using computers in the early years has long been established. For instance, Siraj-Blatchford (2008) in a major review of the early childhood education literature argued that the role played by symbols and signs manipulated in children's early play are crucial in early child development. The symbolic interactions will therefore provide a consistent framework for considering the interactivity at both the human and technological levels.

This study underpinned by the philosophical perspective of symbolic interactionism affords an opportunity to explore how the use of computers and handheld devices with young children is understood and perceived by caregivers, children and children's librarians. It will also provide an instrument to explore how the individuals build up their meanings of using computers and handheld devices, and how these meanings are influenced by their interactions with others and in relation to the environment. It will further allow an exploration of how these individual meanings influence their behaviours of using computers and handheld devices, and its potential impact on child development and learning.

Sampling

The value of using ICT to support emergent literacy in the early years has been shown in substantial evidence-based research. In order to explore how a public library service can support the effort of promoting emergent literacy through computers and handheld devices, this study, in collaboration with the National Library of Public Information in Taiwan, provides the context for investigation. The National Library of Public Information aims to promote lifelong learning and reading, including through digital resources, thus helping to bridge the digital divide. In practical terms, the Library already provides for lending digital mobile devices (e.g. one mini computer and three e-book readers) and offers weekly interactive stories for young children with motion-sensing technology.

A preliminary meeting with one children's librarian and two observations at a sample Library took place in June 2013. The following priorities for supporting early childhood education were identified:

1. Limited interactions between young children and adults (including caregivers and children's librarians) were observed to occur during children's use with the technology.
2. The children's librarians offered limited professional (educational) facilitation and guidance for supporting children's learning and development.

3. The children's librarians equated play simply with games and did not appreciate the importance of interactive play for children's learning.
4. Children tended to focus on playing games/completing tasks, without really understanding the educational intentions embedded in the games/tasks.

On a positive note, young children's emotional and physical engagement with the games and activities provided an indication for their interest in and excitement about the new technology. The selected Library also featured its promotion for digital learning. However, there appears a serious lack of adults' educational facilitation and guidance during young children's use with the technology. An intervention was therefore been developed and will now be carried out from October 2013 to January 2014.

Data collection strategy

The research will focus upon young children aged two to six years, their caregivers and the children's librarians at the National Library of Public Information in Taiwan. A half-day introductory workshop on the overall project rationale and implementation will initially be carried out. During the workshop, information regarding the usage of computers, handheld devices, appropriate Apps and software will be presented to potential study participants. The selection of these Apps and software has been informed by the IBM's KidSmart project review (Siraj-Blatchford & Smith, 2012; Yelland & Gilbert, 2012).

A pre-questionnaire that identifies the family's technology ownership and the frequency and type of involvement that caregivers have with their children, both novice and experienced, while using computers and handheld devices will be administered at the start of the intervention to provide a baseline. A post-questionnaire will be administered at the end of the intervention in order to see if changes have occurred. During the intervention, qualitative data will also be collected to record the actual behaviours of adults and young children, and to describe the process and perspectives of the study participants. In order to observe and interact with the young children, caregivers and the children's librarians while using computers and handheld devices,

the study will initially adopt a participant observation approach, where the researcher conducts observations as a participant (Creswell, 2009). Interviews will then be conducted to ask for study participants' reflections on the experience at the end of the session each week. Data will also be gathered through social networking website (e.g. Facebook).

The focus of the current study is on giving the library staff the support that they need to support caregivers and children together. It is assumed that if they do that, the home learning environment would change. Findings of the current study will be disseminated in August 2014. It is intended that a further study will look at the extent to which that actually brings about change.

A concluding summary

This paper has identified three priorities of early childhood education research, that is, integration of ICT, adult-child interactions, and parental and community engagement. The passive provision of young children with access to ICT is not enough; applying evidenced-based principles of child development and learning (i.e. emergent literacy, communication, collaboration, creativity, sustained shared thinking and play) is considered essential for effectively using ICT with young children. For example, computers (e.g. desktops and laptops) and handheld devices (e.g. smart phone, tablets) that afford social play, playful interactions, educational value, motivation for extended activities away from the screen, and active learning are regarded as providing a good context for children's learning and development. It is also worth noting that the intention of applying such software is to emphasise the educational and child development value. It is primarily not to master the ICT tools. The proposed approach requires adult facilitation and guidance.

The study aims to explore how a public library service can support emergent literacy through the playful use of ICT in Taiwan. Underpinned by the epistemological and methodological framework of symbolic interactionism, an intervention study has

been designed in collaboration with the National Library of Public Information. Data will be gathered using qualitative methods, including social networking, participant observations and interviews. A pre-questionnaire will be administered at the start of the intervention to provide a baseline, and a post-questionnaire will be again administered at the end of the intervention to see if changes have occurred. It is to be hoped that the findings of this study will of value to policy makers, caregivers, professional educators and children's librarians in this future. The findings of this study will be reported in August 2014.

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References

1. Ball, C. (1994). *Start Right: The Importance of Early Learning.* London: Royal Society for the Encouragement of Arts, Manufactures and Commerce.
2. Blumer, H. (1969). *Symbolic Interactionism*. Englewood Cliffs, NJ: Prentice-Hall.
3. Bowman, B., Donovan, S., & Burns, S. (Eds.) (2001). *Eager to Learn: Educating our Preschoolers, Committee on Early Childhood Pedagogy.* Washington: National Academic Press.
4. Cohen, M., Hadley, M., & Frank, M. (2011). *Young Children, Apps and iPad*. New York: Michael Cohen Group LLC.
5. Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* (3rd ed.). Thousand Oaks: Sage.
6. Crook, C. (1994). *Computers and the Collaborative Experience of Learning.* London: Routledge.

7. Dresang, E. T., Burnett, K., Capps, J., & Feldman, E. N. (2011). *The Early Literacy Landscape for Public Libraries and Their Partners.* Unpublished whitepaper supported by Project VIEWS: Value Initiatives in Early Learning that Work Successfully. A National Leadership Collaborative Planning Grant, Institute for Museum and Library Services.
8. Eagle, S., Manches, A., O' Malley, C., Plowman, L., & Sutherland, R. (2008). *From Research to Design: Perspectives on Early Years and Digital Technologies*. Futurelab PhD Studentship Network.
9. Feinstein, L., Duckworth, K., & Sabates, S. (2004). *A Model of the Inter-generational Transmission of Educational Success.* <http://eprints.ioe.ac.uk/5973/1/Feinstein2004Amodel.pdf>, [accessed 03.07.2013].
10. Flatcher-Flin, C., & Suddendorf, T. (1996). Do computers affect the mind? *Journal of Educational Computing Research, 15*(2), 97-112.
11. Hall, N., & Robinson, A. (1995). *Exploring Writing and Play in the Early Years*. London: David Fulton.
12. Heckman, J. J. (2006). Skill formation and the economics of investing in disadvantaged children. *Science, 312*(5782), 1900-1902.
13. International Business Machines (IBM) (2003). *Early Learning in the Knowledge Society: Report on a European Conference*, 22-23rd May, Brussels.
14. Learning Point Associates (2007). *Understanding the No Child Left Behind Act: Technology Integration.* <http://www.learningpt.org/pdfs/qkey3.pdf>, [accessed 03.07.2013].
15. Lee, Y. (2009). Computer technology in Taiwan kindergartens. In: Blake, S., & Izumi-Taylor, S. (Eds.). *Technology for Early Childhood Education and Socialization: Developmental Applications and Methodologies*. Hershey: Information Science Reference. 2009.

16.Leu, D. J., Kinzer, C. K., Coiro, J. L., & Cammack, D. W. (2004). Toward a theory of new literacies emerging from the Internet and other information and communication technologies. In: Ruddell, R. B., & Unrau, N. J. (Eds.). *Theoretical Models and Processes of Reading*. (5th ed.). Newark, DE: International Reading Association.

17.Lin, S. (2013). When humanity meets technology: Rethinking technology in preschool. *Journal of Early Childhood Education and Care, 10*, 39-68 [In Chinese].

18.McCarrick, K., Fish, A. M., Holtrop, T., Bhavnagri, N. P., Stanton, B., Brumitt, G. A., Butler, S., Partridge, T., & Li, X. (2007). Parental involvement in young children’ s computer use and cognitive development. *NHSA Dialog, 10*(2), 67-82.

20.Ministry of Education (2011). *Early Childhood Education and Care Act.* Taipei: Ministry of Education [In Chinese].

21.National Association for the Education of Young Children (NAEYC) & Fred Rogers Center for Early Learning and Children’ s Media (2012). *Technology and Interactive Media as Tools in Early Childhood Programs Serving Children from Birth through Age 8*. <http://www.naeyc.org/files/naeyc/file/positions/PS_technology_WEB2.pdf>, [accessed 03.07.2013].

22.National Institute of Child Health and Human Development (2000). Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction. Washington, D.C.

23.The Organisation for Economic Co-operation and Development (OECD) (2012). *Starting Strong III: A Quality Toolbox for Early Childhood Education and Care*. <http://dx.doi.org/10.1787/9789264123564-en>, [accessed 02.07.2013].

24.Papert, S. (1980). *Mindstorms: Children, Computers and Powerful Ideas.* New York: Basic Books.

25.Rosen, D., & Jaruszewicz, C. (2009). Developmentally appropriate technology use and early childhood teacher education. *Journal of Early Childhood Teacher Education, 30*(2), 162-171.

26.Sammons, P., Sylva, K., Melhuish, M., Siraj-Blatchford, I., & Taggart, B. (2007). *Effective Pre-school and Primary Education 3-11 (EPPE 3-11) Project: Summary Report: Influences on Children's Attainment and Progress in Key Stage 2: Cognitive Outcomes in Year 5*. Nottingham: DfES Publications.

27.Schweinhart, L. J., Montie, J., Xiang, Z., Barnett, W. S., Belfield, C. R., & Nores, M. (2005). *Lifetime Effects: The High/Scope Perry Preschool Study through Age 40*. Ypsilanti, MI: High/Scope Press.

28.Siraj-Blatchford, I. (2007). Creativity, communication and collaboration: The identification of pedagogic progression in sustained shared thinking. *Asia-Pacific Journal of Research in Early Childhood Education, 1*(2), 3-23.

29.Siraj-Blatchford, I. (2008). Understanding the relationship between curriculum, pedagogy and progression in learning in early childhood. *Hong Kong Journal of Early Childhood Education, 7*(2), 6-13.

30.Siraj-Blatchford, I., & Clarke, P. (2000). *Supporting Identity, Diversity and Language in the Early Years*. Buckingham: Open University Press.

31.Siraj-Blatchford, I., & Siraj-Blatchford, J. (2006). Postscript: Towards a future early years ICT curriculum. In: Hayes, M. & Whitebread, D. (Eds.). *ICT in the Early Years.* Buckingham: Open University Press. 2006.

32.Siraj-Blatchford, I., Sylva, K., Muttock, S., & Gilden, R. (2001). *Researching Effective Pedagogy in the Early Years: A Report to the DfES*. London: University of London Institute of Education.

33.Siraj-Blatchford, J., Morgan, A., & Kyriacou, M. (2013). *Supporting Playful Learning with ICT: A randomised control trial*. University of Swansea.

34. Siraj-Blatchford, J., & Parmer, N. (2011). Knowledge, learning processes, and ICT in early childhood education. *He Kupu: The World, 2*(5), 45-60.

35.Siraj-Blatchford, J., & Smith, I. S. (2012). *IBM KidSmart International Software Review.* London: IBM Paper.

36.Snow, C. E. (2004). What counts as literacy in early education? In: McCartney, K., & Phillips, D. (Eds.). *Handbook of Early Child Development*. Oxford: Blackwell. 2004.

37.Snow, C. E., Barnes, W. S., Chandler, J., Hemphill, L., & Goodman, I. F. (1991). *Unfulfilled Expectations: Home and School Influences on Literacy.* Cambridge: Harvard University Press.

38.Stryker, S., & Statham, A. (1985). Symbolic interactionism and role theory. In: Lindzey, G., & Aronson, E. (Eds.). *The Handbook of Social Psychology*. New York: Random House. 1985.

39.Sung, H. (2012). *An Exploration of the Essential Elements of Community Engagement in Public Libraries*. Unpublished doctoral thesis, Loughborough University, U.K.

40.Sung, H., Hepworth, M., & Ragdsell, G. (2012). Investigating essential elements of community engagement in public libraries: An exploratory qualitative study. *Journal of Librarianship and Information Science.* DOI: 10.1177/0961000612448205.

41.Sung, H., & Siraj-Blatchford, J. (2013). Exploring the role of public libraries in supporting intergenerational literacies through ICTs. *IFLA World Library and Information Congress: 79th IFLA General Conference and Assembly.* Singapore.

42.Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2010). *Early Childhood Matters: Evidence from the Effective Pre-school and Primary Education Project.* London: Routledge.

43.Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., & Taggart, B. (2008a). *Effective Pre-school and primary education 3-11 (EPPE 3-11) project: Final report from the primary phase: Pre-school. School and Family Influences on children's development during key stage 2 (age 7-11)*. Nottingham: DfES Publications.

44.Sylva, K., Scott, S., Totsika, V., Ereky-Stevens, K., & Crook, C. (2008b). Training parents to help their children read: A randomized control trial. *British Journal of Educational Psychology, 78*(3), 435-455.

45.Vygotsky, L. (1933). Play and its role in the mental development of the child. In: Bruner, J., Jolly, A., & Sylva, K. (Eds.). *Play: It's Role in Development and Evolution.* New York: Penguin Books. 1976.

46.Wang, F., Kinzie, M. B., McGuire, P., & Pan, E. (2010). Applying technology to inquiry-based learning in early childhood education. *Early Childhood Education Journal, 37*(5), 381-389.

47.Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development, 69*(3), 848-872.

48.Yelland, N., & Gilbert, C. (2012). *iPlay, iLearn, iGrow*. Victoria: IBM Paper.