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Computer literacy in childhood and basic education

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Abstract
During the last three years all Victorian state primary schools in Australia have been equipped with computers and Internet access for their students, following similar developments in the USA and England. Between 1989 and 1992, U.S. schools acquired 1.1 million computers; in 1995 the total reached around 5.8 million, about one computer for every nine students. This development has now reached the early childhood sector, kindergartens and preschools, as well as the childcare industry. Advertising a "fully computerized center" has become a means of attracting enrolments.
The paper begins by exploring the different assumptions about the role of digital texts that underpin the studies considered, identifying three loose categories of studies which position technology as: deliverer of literacy; site for interaction around texts; and medium for meaning-making. Following this, actor-network theory (Latour, 2005) is used to consider other ways that technology and children may be acting upon literacy in educational settings through recontextualizing meanings from other domains. The paper concludes by arguing that there is a need for more extensive exploratory research in this field, which considers how digital practices within educational settings relate to other dimensions of children's literacy learning, in order to better understand how new technologies are and could be contributing to children's literacy within educational settings. New ways.

Keywords: Literacy, technology, digital literacy, new technologies, young children

Introduction
In the USA, a group of 75 educators, child-development and health authorities, technology experts, and researchers has recently turned to the public to express their concern about the current "experiment of computerizing childhood." They have pointed to the lack of research regarding the impact on child development and learning and call for a moratorium on more computers for children. Fourteen experts from seven universities in the USA. Have contributed to a comprehensive report on research in the area of educational technology over the last 30 years. In this report, Fool's Gold: A Critical Look at Computers in Childhood, The issue of potential harm to children in the recent development of technology in education is investigated as well as the issue of benefits. Research so far does not support the current and proposed expenditure of billions of dollars on technology in primary schools. (The proposed expenditure by the US government amounts to 8 billion dollars per year.) Larry Cuban of Stanford University, former president of the American Educational Research Association, finds that: "Drill-and-practice programs appear to improve scores modestly-though not as much or as economically as one-on-one tutoring-on some standardized tests in narrow skill areas. Other than that, there is no clear, commanding body of evidence that students' sustained use of multimedia machines, the Internet, word processing, spreadsheets, and other popular applications has any impact on academic achievement." The March 1997 report of the President's Committee of Advisers on Science and Technology to Strengthen K-12 Education in the United States, concludes that. The quality of research to date on the impact of computers on academic achievement has been low, relying partly on anecdotes. No one has established how to use technology in ways that actually improve education. Not only is there no consensus on how to use technology to support the best pedagogy, but there is also no agreement on which pedagogical approaches are best for children. Schools will have to make significant cuts in other programs to fund the billions needed for technology. There is a relative dearth of high quality software and digital content designed for K-12 schools, and an absence of a demonstrably effective base of educational software. Research is able to advice on conditions that promote early development and learning. Strong emotional rapport of children with responsible, caring adults is important for later academic achievement and

the development of literacy. As one researcher puts it: "It has been shown in study after study that warm, close interactions with loving adults promote language and literacy skills in the most powerful and natural way." Computer programs designed to help children learn to write have not been particularly effective. Words and images on-screen invite constant change or substitution. Speed and control are emphasized at the expense of thoughtfulness and understanding. Movement is important as the natural kinesthetic mode of learning in early childhood. Real world experience and exploration on a sensory and emotional level promote intellectual development and mathematical comprehension. Creative play supports the foundation of later lateral thinking and a creative approach to scientific and cultural concepts. Artistic activities (Music, drama, dance, painting) assist in establishing a positive attitude toward learning and improve students' achievements in academic subjects. Hands-on activities help to establish trust in one's own abilities. The authors of the U.S. Department of Education publication Doing Science with Your Children (1994) advice: "To give your children a firm foundation in science, they should be encouraged to think about and interact with the world around them. Concrete experiences that require the use of children's senses, such as planting and watching a seed germinate, provide a strong framework for abstract thinking later in life. Rich sensory experiences can help children become more observant and curious. Science begins for children when they discover that they can learn about the world through their own actions." Paul Nitze, global operations director at Allied Signal, an aircraft and automotive company, says about his own elementary education: "If you've had the experience of binding a book, knitting a sock, playing recorder, then you feel that you can build a rocket ship-or learn a software program you've never touched. It's not a bravado, just a quiet confidence. There is nothing you can't do. In contrast, children trained from the earliest ages to expect that they will need computers for even the most elementary lessons may experience learning as a manipulation of random facts stored in an electronic box outside themselves, behind a seemingly all-knowing screen. Such children receive a debilitating message: that they - unlike generations of children before them - are incapable of learning the basic skills of arithmetic, reading, and writing without expensive and sophisticated machines." Further possible effects are that: "computing and cyberspace may blur children's ability to separate the living from the inanimate, contribute to escapism and emotional detachment, stunt the development of a sense of personal security, and create a hyper-fluid sense of identity." The deepening of the understanding of key concepts seems to be more important for the development of science literacy than large amounts of information, yet the internet's infinite trail of links discourages concentration on key concepts and is likely to distract students from staying focused. · Community support and a strong personal bond between teacher and student have a positive effect on the school performance of at risk children.

Literacy, technology and education for young children: perspectives from policy and research into the practices surrounding digital texts has supported calls to re-conceive the nature and significance of literacy provision. Lankshear and Knobel note how, whilst some textual practices involving new technologies replicate those associated with print texts or old literacies "others are associated with what they call new literacies" patterned by distributed relationships, multiple identities, multimodality and global participation (Lankshear and Knobel, 2006) [23]. Movements from old to new literacies are evident in shifting practices on the Internet, as characterised by movements from Web 1.0 to 2.0 to 3.0 with their respective emphases on widening access to 2 knowledge, enabling social participation, and providing ever more personalised and co-ordinated access to information and networks (Davis and Merchant, 2009) [24]. It has been argued therefore that educational contexts should provide children with opportunities to explore digital environments, and develop their critical evaluation of digital texts and critical participation in digital worlds (Media Literacy Task Force, 2004 [25]; Snyder, 2001) [26]. In considering the significance of this for the early years, it is worth noting that studies of children's interactions with digital texts in informal settings have highlighted the playfulness, agency and creativity with which very young children may engage with digital texts. Marshs study of 2 ½ - 4 year-olds at home draws on interviews and observational data to describe the active meaning-making in which young children engage as they encounter a range of new technologies including computer games and mobile phones (Marsh, 2004) [27]. Studies of individual children provide specific examples of children's experimentation and sense-making around digital texts. Smith (2005) [17], explores how her 2 ½ -3 ½ year-old daughter developed and articulated her understanding of hypertext through role play about computer games. Pahl, reporting a longitudinal ethnographic study of children's communicative practices, describes how three 6-7 year-olds drew on narratives and characters encountered in console games as cultural resources which they used and recontextualised in their play and their drawings (Pahl, 2005 [28], Mavers 2007) [28], analysing an email exchange between a 6 year-old and her uncle, highlights design choices the child made in order to enhance the impact of her messages. These studies remind us that children can participate in meaningful exchanges that are relevant to their current lives: engaging with digital texts then is about „being rather than becoming literate (Mavers, 2007) [29]. Such explorations of young children's digital practices are useful in highlighting the funds of knowledge.

(Moll, Amanti Neff and Gonzalez, 1992) [30] that young children bring to educational settings. Despite increased recognition that new technologies should be effectively integrated within early year's curricula (Plowman and Stephen, 2005) [31], state-sponsored guidelines relating to literacy and technology could be seen as inconsistent. In England, for example, the government has published case studies exemplifying use of new technologies in early year's settings (DCFS, 2009a) [32]. However, the early learning goals for communication, language and literacy", which establish expectations for what most children will achieve by the age of five (DCSF, 2008) [33], contain no reference to children's engagement with digital texts. From age five onwards, the government currently recommends that children's literacy learning is structured by the Primary National Strategy Framework for Literacy (PNS, 2006) [34]. Whilst this requires teachers to plan to use on-screen multimodal texts, assessment criteria still reflect the skills and knowledge associated with print-based alphabetic literacy. Gomez, Johnson and Gisladottir (2007) [35], describing a similar context for early literacy education in

the United States, note how this emphasis on acquiring skills for use in later life, described by Freire (1972) [36] as a banking approach, can focus teachers attention away from the task of developing their students as engaged and flexible literacy users and ignore the literacy experiences children bring with them to school. Given the social and participatory dimension of new literacies described above, such provision would seem to reflect a limited and outdated vision of literacy education.

Meaning of Computer?

The introduction of computer into education has dramatically reshaped our contemporary teaching and learning (Pulkkinen, 2007; Wood, 1995) [37]. This inclusion of computer in education has brought about increase in the quality of teaching and learning that guarantee successful pedagogy at international and national level. According to Maule (1991) [38], "a computer is an electronic machine that reads information, processes it, and reports the output" Similarly, Dwivedi and Dwivedi (2013) [39] defines computer as "a fast and accurate data manipulating system that is designed to automatically accept and store input data. Process them and produce output results under the directions of a stored program". Computer is also defined as "an electronic machine that can store, organize and find information, do calculation and control other machines" (Gambo, 2017, p. 12) [40]. Computer can be regarded as an electronic machine capable of accepting data from an input device, processes the data with sets of instructions within it to produce a meaningful result through an output unit. The computer described in the above definitions can be represented diagrammatically as shown in Figure 1.

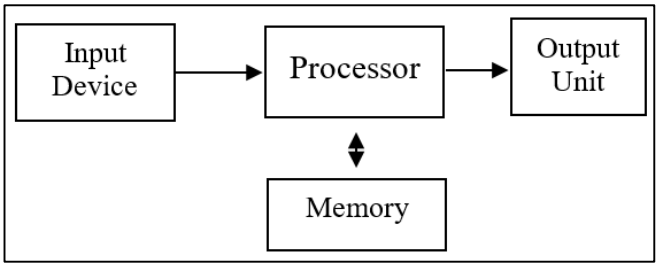

Fig 1: Simple computer system

Definitions of Computer Education

Computer science education involves teaching student to "solve problems, design systems, provoke creativity, and explore their own interest by using basic concepts of computer science" (Chang, Chin, & Chang, 2016, p. 640) [41]. According to Rößling *et al*. (2008) [42] computer science education is associated with the use of software for teaching, learning, and management of progression. Likewise, computer education is defined as the acquisition of knowledge, skills, and abilities to manipulate and interpret the language of computer (FRN, 2004) [43]. NGWU (2011) [44] defines computer education as the training of individual in the acquisition of computer principles, practices and utilize the principles effectively for the benefit of the livelihood. More so, computer education is defined as a process of teaching students on the basic rudiment of computer uses and solving everyday life issues with computer (Suberu, 2014) [45]. On the premise of these definitions, it can be argued that computer education is the art of developing in students the understanding of problem solving with the use of computer and to mediate teaching of other subjects with the use of ICT.

ICT in Education

The term "ICT is refers to forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means" (Meleisea, 2007) [46]. On the other hand, ICT in education is defined as "use of all devices, tools, content, resources, forums, and services for realizing the educational goals" (Basargekar & Singhavi, 2015) [47]. ICT is an acronym that stands for "information and communication technologies". According to Gill (2017) [48] ICTs are the "umbrella term that includes all technologies for the manipulation and communication of information". Likewise ICT is defined "as an umbrella term that includes any communication device or encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems as well as the various services and applications associated with them, such as videoconferencing and distance learning" (Charoensukmongkol & Moqbel, 2014) [49]. Similarly, Shrivastava and Bhattacherjee (2014) [50] concluded that ICT is "an umbrella term for information technology (IT) services and infrastructure" (p.7). It can be inferred from these definitions that ICT combines components of computer and telecommunication in order to function. It is also apparent that the concept 'computer' is a sub-set component of ICT. This indicates that ICT covers all discussions relating to the use of computer.

Likewise, ICT in education can generally be regarded as discipline in itself (Abdullahi, 2014) [1]. According to Nair and (Hindle 2016) [51] ICT in education can be classified into: ICT as a subject (computer studies); ICT as a tool to support traditional subjects (computer-based learning, presentation, research); ICT as administrative tool (education management information system/EMIS) and ICT as a medium of knowledge exchange. Likewise, Kim (2009) [52] explains that ICT in education implies taking ICT as a subject like computer studies; using ICT as innovative tool for teaching-learning activities (example: digital content, multimedia, teaching-learning methods, learning environment).

What is computer literacy?

Researchers have different views when it comes to defining computer literacy. In most literature, definitions of computer literacy are coined out of the field of the researcher. Take for example; Son, Robb, and Charismiadji (2011) [53] define computer literacy in language teaching perspective as the "ability to use computers at an adequate level for creation, communication and collaboration in a literate society". In Chrystal (2009) [54] computer literacy is defined as "the ability to transmit, investigate, share, and create knowledge, and critically reason with a computer". Also, Oluwatayo (2012) [6] defines computer literacy in terms of knowledge and skills an individual acquires to do a given sets of task by applying computer. Whereas in (Bada, Oyewusi, Ojedokun, & Adewole, 2010) [13] computer literacy is to tell the computer what you want it to do (input data) and understand what the computer says (interpret the associated output). It can be deduced from all the definitions that computer literacy is the adequate skills required to utilised ICT for computation, instruction, design and to facilitate teaching and learning in kindergarten classroom.

Computer literacy is a vital component of teachers' pedagogy Dashtestani (2014) [55] before the teachers can effectively prepare the pupils to face the 21st century challenges. The ICT literacy must be considered as an integral part of teachers' development because of the roles ICT skills play in curriculum delivery (Apawu, 2011; Bisht, 2013) [56]. In today pedagogy, ICT is no longer a tool teacher or teachers' trainers can do away with. This is because of the immense roles ICT is playing in child training. Despite the roles ICT literacy contributes to training, teacher trainers still lack adequate computer knowledge to prepare pre-service teachers for teaching (Bisht, 2013; Dashtestani, 2014) [57].

Finally, it may be that references to use of technology or use of ICT are unhelpful. Conflating wide-ranging activities into technology use may underplay the diverse ways that new technologies may contribute to young children's literacy education and the different ideologies that underpin such uses. In order to support educationalists in brokering the findings of research from contrasting perspectives, there would seem to be a need to refine our shared vocabulary around literacy and technology. It is argued here that differentiating between the use of technology as deliverer of literacy, site for interaction, and medium for meaning-making is helpful in beginning to differentiate in this way. However, given the continuing predominance of studies of technology use to support print literacy, there would seem to be a need to go further in challenging existing paradigms of research and practice in early year's literacy education. Actor-network theory may prove useful in informing a possible agenda for future research and theorisation.

Conclusion

This review echoes the findings of previous reviews in suggesting that the predominance of small scale studies reflecting a psychological-cognitive model of literacy has continued and far more extensive research is needed into young children's engagement with digital texts. Current educational practices are becoming increasingly anachronistic within a world in which knowledge, learning and relationships are being re-defined in digital environments. As studies of children's home lives indicate, many young children engage in digital practices in the home and such experience needs to be recognised as a resource for their current and future meaning-making. This review would suggest that the predominance of small-scale studies reflecting a psychological cognitive model of literacy has continued and that far more extensive research is needed into young children's engagement with digital texts. New ways of thinking about the relationship between literacy, technology and learning in the early years are needed. There would seem to be a particular need for more qualitative research which, by adopting a broader gaze, investigates children's sustained engagement with digital texts in educational settings by investigating the meaning-making processes associated with these and their relationship with digital identities and practices forged in more informal contexts.

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