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**The Effects of Early Use of
Computer on Cognitive
Development and school Readiness
of Preschool Children**

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The Effects of Early Use of Computer on Cognitive Development and school Readiness of Preschool Children

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ملخص:

دراسة حول تأثير الاستخدام المبكر للكمبيوتر على النمو المعرفي والاستعداد للمدرسة بين أطفال ما قبل المدرسة.

تهدف هذه الدراسة إلى معرفة تأثير الاستخدام المبكر للكمبيوتر على النمو المعرفي والاستعداد للمدرسة بين أطفال ما قبل المدرسة. وقد تم اختيار عينة البحث من الأطفال المتقدمين للالتحاق بالمركز التربوي لكلية رياض الأطفال، جامعة الإسكندرية وتكونت العينة من ٦١ طفلة و٣٦ طفل وقد تم إجراء الأتي لكل الأطفال:

- ١- استبيان حول استخدام الأطفال للكمبيوتر بالمنزل بواسطة الأهل.
 - ٢- اختبار الاستعداد للمدرسة للأطفال.
 - ٣- اختبار النمو المعرفي للأطفال.
- وقد أثبتت الدراسة التأثير الإيجابي للاستخدام المبكر للكمبيوتر على الاستعداد للمدرسة والنمو المعرفي لأطفال العينة.

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Abstract:

The aim of the present work is to investigate the effects of early use of computer on cognitive development and school readiness of children. The study was done during the interview of children attended the educational centre of the Kinder Garten College. The sample of the study was 97 children (61 ♀ and 36 ♂). All children were subjected to the following;

- a- Questionnaire filled by parents of children about the use of home computer by their children.
- b- Test for school readiness.
- c- Cognitive test.

The study revealed that the early use of computer has significant impact on school readiness and cognitive development of preschool children.

Introduction:

The preschool years are a critical time in every child's life. Nearly everything they do, every moment of every day, can have some effect on their cognitive, socio-emotional or physical development. Parents and other caregivers provide an invaluable foundation and critical guidance for their children during these early years. For some children, this development is also supported amid the nurturing environment of blocks, books, crayons, paper, pencils, water, dough, sand, toys and devoted teachers that can be found in most preschool classrooms-places that are supposed to foster children's growth in these areas and prepare them for success in kindergarten and beyond.⁽²⁾

Over the past couple of decades, a debate has grown over the appropriateness of adding computers and other interactive media such as interactive books and toys, video games, and the Internet to the list of learning tools in preschool classrooms. While some experts believe that technology has the capacity to positively influence even young children's cognitive and socio-emotional development in significant ways, other believe that technology can rob children of many of the essential childhood experiences they need for healthy development or even worse, can cause irreparable harm.⁽⁷⁾

Despite the debate about the appropriateness of young children using technology, many preschoolers already are using it. According to the Kaiser Family Foundation, 70% of four-to Six-year-olds have used a computer, 27% use one in a typical day and one out of ten preschoolers use a computer every day.⁽¹⁰⁾

The children access use a computer in a number of ways: free playing, typing, playing games or learning software on the computer; playing or striking computer input devices (eg, keyboard, mouse, joystick); watching pictures, colourful images, or motion displays on the screen; or observing or imitating parents/adults using a computer. A recent national survey found that young public school children with access to home computers used them 3 to 4 days a week the purposes of use varying by children's gender, ethnicity, and family size.⁽⁴⁾

There is a relatively small but growing body of research on the effects of interactive media on preschooler's learning and development. Most of this research is focused on the use of educational computer software, though there are a few studies that investigate the effects of home computer.⁽¹⁶⁾

It is apparent that the majority of the conflicting results or debates on the issue involved the use of a computer in formal teaching and learning activities in a school environment or involved older children (eg, school-aged children), among whom the use of a home computer was heavily confounded by the use of children at schools, few empirical data are available to date about the effect of early childhood computer experience at home before formal schooling on the physical and well-being of young children.(6,8) Therefore, the current study was designed to explore the association between early computer experience (both accessibility and frequency of use) and cognitive and school readiness among school children.

The aim of the present work:

The aim of the present work is to investigate the impact of early use of computer on cognitive development and school readiness of pre school children.

Material and Methods:

The study was conducted between June 2007 and August 2007. The study was done during the interview of new children entering the education centre of kinder garter college. The total sample of the study was 97 child (61 ♀ and 36 ♂). The age of the sample range from 4-5 years.

The study was done on the following steps:

- I- All parents of the children were subjected to questionnaire(8) to evaluate the use of their children to computer containing the main following items.
 - 1- If they have a computer in house (yes/no).
 - 2- If their children use the computer (yes/no).
 - 3- If there are other computer games.
 - 4- The frequency of computer use (every day/ every week/ sometimes).
- II- all children of the sample were subjected to:
 - a- School readiness test containing the following items:(9)
 - 1- Knowledge of colour (red- blue- yellow).
 - 2- knowledge of number through 10.
 - 3- knowledge of shapes.
 - 4- Understand similarities.
 - 5- Understand difference.
 - 6- Understand opposites.
 - b- Cognitive test

III- The children are divided according to the questionnaire into three group:

- 1- Group A 18 child (No use of computer)
- 2- Group B 53 (Infrequent use of computer once per week).
- 3- Group C 26 (frequent use of computer once per day).

IV- Statistical analysis were done using chi square.

Results:

Table one shows the main demographic features of the sample, table two shows the impact of early use of computer on school readiness. Table three shows the impact of early use of computer on cognitive development.

Table (1)
shows the main demographic features of the sample

Variable	
Sex	
♀	61
♂	36
Socioeconomic status	
Middle	68
High	29
Order of the child in the family	
First	28
Second	59
Third	10

Table (2)
Shows the effects of early use of computer
on school readiness

Group \ Test	Normal		Delayed	
	No	%	No	%
Group A	9	50.0	9	50.0
Group B	31	58.5	22	41.5
Group C	25	96.2	1	3.8
χ^2 (p)	14.086* (0.001)			

Table (3)
Shows the effect of early use of computer
on cognitive development

Group \ Test	Normal		Delayed	
	No.	%	No.	%
Group A	10	55.6	8	44.4
Group B	33	62.3	20	37.7
Group C	25	96.2	1	3.8
χ^2 (p)	11.790* (0.003)			

Discussion:

The data in the current study suggest a strong impact of computer use on school readiness and cognitive development. Children with computer access at home are scored significantly higher than those children with no or less computer access.

The data in the current study support Vygotsky's theory of socially mediated cognitive development, which considers computers with developmentally appropriate software as physical and cultural tools that expand mental tools among young children.

The current study also provides empirical evidence supporting Clements's interpretation of Piaget's theory of development regarding the appropriateness of computer use among young children (Clements et al; 1993).⁽¹²⁾

Li and Atkins (2004) examined the association of home computer use with children's school readiness and psychomotor development and found a significant association between computer access and children's performance on cognitive and psychomotor tests, controlling for children's development stage and family socioeconomic status.

Children who had access to a computer in the home environment (e.g, home and other nonschool settings) performed significantly better in preschool concepts and cognitive skills (both verbal) tasks and performance tasks) than children who had less or no access to a computer.⁽¹¹⁾

On the basis of their review of limited research on the effects of home computer use on children use on

children's physical, cognitive, and social development, Subrahmanyam et al(13,14) indicated that playing computer games could be an important building block to computer literacy.

They believe that home computer use enhances children's visual intelligence skill, such as the ability to read and visualize images in 3-dimensional space and trace multiple images simultaneously. However, in a quasiexperiment home/ school computer project among 289 fourth and fifth graders, Miller and McInerney suggested no relationship between home computer use and academic achievement in reading, language, and mathematics.

In their study, the treatment group (n = 142) received a computer, printer, and telecommunications equipment for learning activities in their homes.

Follow-up data over 2 years indicated that participation in the project was not associated with improvement in academic achievement. The present study revealed significant impact of frequent use of computer on cognitive development and school readiness of pre school children.

One of the critical issues associated with computer use among young children is the amount of time children spend on the computer. Limited data are available to address this issue. Li and Atkins (2004) found that frequency of computer use (I.e, "dose") at home among preschool children, based on parents report, did not correlate with scores on school readiness and psychomotor measures.

However, the authors were cautious about these findings because the measure of frequency of use was based solely on parental reports in very general terms, which might be subject to errors in estimation and recall.⁽¹¹⁾

Finally, some studies have concluded that simply having access to computers is enough to support learning gains. Hess and MCGsrvey (1987)⁽¹⁵⁾ gave computers and reading and math software to three kindergarten classes.

One class received home computers as well. At the end of the study they found that the computer-use students had greater gains in reading readiness and keyboard knowledge than non-computer-use students. Those students who were given computers for home-use had even greater learning gains than the school-use-group.⁽⁵⁾

Similarly, a program that introduced computers to UK preschool classrooms found that children gained a better understanding of how to use, access, control and gather information once they had access to computer.

The teachers in these classrooms also felt that students knowledge of colors and shapes, as well as their literary skills, were enhanced due to computer use (Siraj-Blatchford and Siraj-Blatford, 2001). It should be noted that it is possible that the content of the programs used for each study may have been a factor influencing students' learning, however, neither study performed analyses of the content.⁽¹²⁾

Conclusion:

Children 3 and 4 years of age are developmentally ready to explore computers, and most early childhood educators see the computer center as a valuable activity center for learning. Timing is crucial. Children need plenty of time to experiment and explore.

Young children are comfortable clicking various options to see what is going to happen next. Computer has positive effects on cognitive development and school readiness.

References:

- Boehm AE (2001). **Boehm Test of Basic Concepts**. 3rd ed. Preschool. San Antonio, TX: The Psychological Corporation; 31-5
- Calvert,SL. (2006). **Medical and Early Development**. In K. McCartney & DA Phillips (Eds). **Blackwell Handbook of Early Childhood Development**. Boston, MA: Blackwell. PP. 843-879.
- Clawson A. (1999). **The Bender Visual Motor Gestalt Test for Children**. Los Angeles, CA: Western Psychological Services. 71-7.
- Clements D.H J Nastasi, B.K. and Swaminathan S. (1993). **Young Children and Computers: Crossroads and Directions From Pro Search**. *Young Children*. 48 (2). 56-64.
- Hess, R.D. & McGarvey, L.J. (1987). **School-Relevant Effects of Educational Use of Microcomputers in Kindergarten Classrooms and Homes**. *Journal of Educational Computing Research*. 269.
- Kafai YB, Sutton S. (1999). **Elementary School Students' Computer and Internet Use at Home: Current Trend and Issues**. *J Educ Comp Res*. 21. 345-362.
- Markopoulos P., Bekker M. (2003). **Interaction Design and Children Interacting with Computer**. 15(2). 141-9.
- Miller MD, McInerney WD (1993). **Effect on Achievement of a Home/School Computer Project**. *J. Res Technol Educ*. 27. 198-210.
- **National Center for Education Statistics (2003). Young Children's Access to Computers in the Home and at School in 1999 and 2000 (NCES 2003-0360)**. Washington, DC: US Department of Education, National Center for Education Statistics.

- Rideout, VJ, Vandewater, EA, and Wartella, EA. (2000). **Zero to six: Electronic Media in the Lives of Infants, Toddlers and Preschoolers.** Menlo Park, CA: Henry J. Kaiser. 41-5
- S.A, Spooner and American Academy of Pediatrics Setting Committee Preschoolers (2004). **Computers and School Readiness: Are we on to Something?** Pediatrics. 114 (3). 852.
- Siraj-Blatchford, J. & Siraj-Blatchford, I. (2001). **IBM Kidsmart Early Learning Programme, UK Evaluation Report-Phase 1. 2000-2001.** London: IBM. 23-6.
- Subrahanyam K, Greenfield PM, kraut RE, Gross EF (2001). **The Impact of Computer Use on Children's and Adolescents' Development.** Appl Dev Psychol. 22. 7-30.
- Subrahanyam K, Kraut RE, Greenfield PM, Gross EF (2000). **The Impact of Home Computer Use on Children's Activities and Development.** Future Child. 10. 123-144.
- Xiaoming L, and Melissa S. (2004). **Early Childhood Computer Experience and Cognitive and Motor Development.** Pediatrics. 113(6). 1715-22.
- Van Scoter, J., Ellis, D. & Railsback, J. (2001). **Technology in Early Childhood Education Finding the Balance.** Portland, or: Northwest Regional Educational Laboratory. [online] <http://www.net.org/earlyconnections/byrequest.pdf>.