

# A Review Of: Integrating ICT in Sudanese Kindergartens In Order To Improve Cognitive Development

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## ABSTRACT

Integration of Information and Communication Technologies (ICT) in education support and enhance teaching and learning process, also to make education keep pace with technological development in all aspects of life to be more attractive to children, in addition to reduce the use of children the technological educational applications and programs at random which may not be suitable for the child's age and mental abilities.

The integration of ICT with education can develop children's computer awareness and appreciation of the importance and role of this technology in all areas help the child to learn the conscious transaction with the data of the age and its requirements.

**Keywords :**— ICT, Integrated Educational Model, Sudanese Children, Education.

## I. INTRODUCTION

Education is related to society and, like other human activities, changes as conditions change. The direction of changes is identified through educational concepts. (Wajszczyk 2014)

Young children are being exposed to computers both at home and school regardless of conflict regarding the appropriateness and potential impact of information and communication technology (ICT) on young children's development. There are many studies that predominantly trigger debates but they lack empirical support and are too broad in its scope. (McCarrick, K., & Li, X. 2007)

Information and communication technology (ICT) can support the educational process that focuses on building the capacity of teachers. (Goma et al. 2013) noted that the use of ICT in classroom education is critical to providing opportunities for teachers and students to continue to use out of school learning. The term ICT refers to technologies that are used to collect, store, edit and transmit information in various forms. ICT can improve school's management and functions in addition to learning activities. It should be noted that the introduction of ICT in schools has affected the change in school performance and activities.(Wajszczyk 2014)

## II. LITERATURE REVIEW

ICT have become a regular part of lives of most people including preschool children which it can play an important role in education. Successfully integration of ICT into

preschool education requires suitable engagement of pedagogues who are computer literate and ICT experts.

Digital technologies enable a new method of education, especially formal education, as it adds many advantages, including the development of children individually and help in dealing with children with special needs, but taking into account the disadvantages of dealing with computers.(Sehnalová 2014)

The (Shanahan-Braun, T. A. 2009) study was to investigate two questions first one how beneficial computers are related to cognitive, language, social development with preschool aged students. The second one does digital media, in early childhood education, affect student achievement?

The results show that using computers may be beneficial as an additional tool for remedial purposes with children who are at risk or who are identified as having learning difficulties and that children talk and interact using computer.

Computers have not been proven to be more beneficial for the typical developing child compared to traditional preschool activities. However, preschool children need to be prepared to use technology by the time they enter into the K-12 system.

Information and communication technologies (ICT) is represent an important role in education thus there is a need for advanced uses of ICT in education. Also it is needful to supply a framework or strategic view for ICT policy achievement to assistance the educational system to improve teaching and learning process. (Adam and Huang 2017) and also (Wilson, Scalise, & Gochyev, 2016) admit that ICT

plays a large role in preparing people for their profession especially through education.

In education, teachers are required to be able to integrate ICT into teaching and learning activities, both in the classroom and outside the classroom, because of their usefulness in creating a new learning environment, developing teaching methods, and improving the quality of education.

Using ICT in education can also affect the development of teaching method due to the local needs in more effective ways in use the ICT during the teaching and learning processes. Traditional ways of teaching cannot sustain successfully in ICT integrated classrooms; thus the teachers have to perform their methods in teaching. (Hadijah, S., & Shalawati, S. 2017)

(Hadijah, S., & Shalawati, S. 2017) suggest the teachers should be completely motivated and supported to engage with ICT in their teaching activities. Many teachers around the world began suffice of advanced technology products. However, some challenges remain inescapable, affecting the effectiveness of ICT integration in the teaching and learning process. (Hadijah, S., & Shalawati, S. 2017)

General education in Sudan consists of kindergarten where children reside two years before joining primary or basic education where students study six years, then three years in middle school and then secondary school where students study three years. (Adam and Huang 2017)

Sudan is one of the developing countries and is in the early stages of integrating ICT in the teaching and learning process. The ICT policy for education began in 2002. In 2004, ICT was introduced into secondary education curricula. A number of computers were installed in schools (about 50 per cent of secondary schools) with an average of 10 computers per school. The Internet connection is mainly through dial-up and asymmetric digital subscriber line (ADSL).

However, in higher education systems, it is only through ADSL. The US intends to provide computers at all levels of education by 2015, as agreed at the ICT Summit in Geneva. The ICT curriculum was introduced in the fourth grade. The government and the private sector supply access to the Internet as a resource for learning, also the teachers have been trained on the essentials of ICT. (Hamdi 2007)  
The Ministry of Education has started supplying schools and teachers' institutes with computers.

There is an initiative to develop the Education Management Information System. The Government has opened up competitive communications investments. A license was granted to newcomers using advanced technologies aimed at increasing the reach and accessibility of ICT and making products affordable. Although there is an open market in the provision of Internet services (Tijani 2010), there is one

Internet service provider (Sudanet), and the private sector is planning to open more Internet cafes in Khartoum. In infrastructure and capital investment, including management systems and human capital (Elamin 2004) According to Fatima, there are many constraints to the best implementation of ICT throughout the country, despite promising efforts and policies by the government and other bodies such as: Communicate with Poverty and lack of resources and political turmoil have placed ICT on the list of priorities for basic needs in most regions of the Sudan, and the civil war is hampering implementation at the national level. In addition to funding and donor interest in Sudan, with the number of restrictions imposed; (Abdelgadir and Ahmed 2016)

The objective of (Adam and Huang 2017) study is to investigate the situation for ICT in general education in Sudan, and also to determine the benefits of ICT in education system.

From (Adam and Huang 2017) opinion integrating ICT in general education in Sudan can improve the educational system. ICT Policy represent the first position in many studies which means that it is a fundamental in an educational development. Thus ICT policy in Sudan should be studied to helps on progress of the country in promoting ICT in general education.

In developing countries ICT has the power to make changes in education but it needs continual efforts and a future outlook; because, developing countries face diversity in the achievement of infrastructure, curricula, capacity building, and usage of ICT in schools.

Enable schools to access ICT tools is requirement. but, these tools cannot be initiate without clear policies and master plans. This study investigates the ICT policy plans in Sudan to define the extent to which these policies involve to international ICT trends in education and to consider the direction of an educational body such as UNESCO.

Sudan, along with many developing countries in sub-Saharan Africa and the Middle East, needs repair that integrate ICT in education.

As well as follow-up to UNESCO's goals and objectives for ICT implementation in their education many countries such as the United States of America, Europe and Asia (Korea, China), Africa and the Middle East (Tanzania, Kenya and Egypt) have developed policies and plans, including frameworks and models. (Adam and Huang 2017)

(Adam and Huang 2017) study contains of two plans of ICT in education and its results showed the need for policy emphasis on using ICT in education, general education in Sudan requires better technology equipment, in addition primary and secondary education need to formulate.

The aims of (Wang, Reeves and Coster 2014) study to facilitate science teachers' use of information and communication technologies (ICT) as cognitive tools to shift their practices from traditional teacher-centered methods to constructivist, student-centered ones. This study portrays the benefits of implementation the design-based research (DBR) to improve of a teacher professional development (PD).<sup>25</sup>

middleschool science teachers from 24 schools; whose implementation of cognitive tools with their students in science classrooms, was participate on this study. To study the impact of the cognitive tools implementation on teachers' classroom practices and students' development of new literacy skills a mixed-methodology was used. The results show that there is a certain change in their classroom practices such as allowing students to take control over the use of technology, and positive impact on students' ICT skills and science learning.

(Li, X., & Atkins, M. S. 2004) study aims to explore the association between early computer accessibility, frequency of use and cognitive, psychomotor development among young children. 122 preschool children were participants in this study and firstly the information respect to family characteristics and children's early computer use was collected from parents. Many tests were administered to the children such as the Bender Visual Motor Gestalt Test; the Boehm Test of Basic Concepts, Third Edition Preschool; the Test of Gross Motor Development, Second Edition; and a short form of the Wechsler Preschool and Primary Scales of Intelligence-Revised. To estimate the association between early computer experience and cognitive and motor development they used bivariate and multivariate analyses. The results show that early computer exposure before or during the preschool years is associated with development of preschool concepts and cognition among young children. However, frequency of use did not reveal such a relationship; neither did the ownership of other child electronic or video games in the household.

The aims of (McCarrick, K., & Li, X. 2007) study is to discuss the current empirical studies from 1985-2004 on the impact of computer use on preschooler's social, cognitive, language development, and motivation.

The main objective of the preschool education to complement the role of the family in child rearing. Preschool education institutions should create ways and means of attracting and supporting children to assist them in vocational care during the period of school education.(Sehnalová 2014)

Most of the children on the present age have experience in using a wide range of techniques in their homes before they go to kindergarten and were likely to get games that mimic devices such as mobile phones and laptops as well as a range of entertainment technologies such as interactive television, DVD players, electronic musical instruments, And CD players.(Plowman, Stephen, and Mcpake 2008)

On the digital age, the Kindergarten and school's teachers should create an environment for students to acquire the ability to search, organize and use information from various sources and learn how to use information technology (IT) in a creative and productive way. (Wajszczyk 2014)

Many previous studies have confirmed the benefits of ICT integration with education, especially pre-school education, as they have the potential to influence people and environments surrounding children's education and provide opportunities and modern methods in educating children. (Bolstad 2004)

With the development of technology in our lives, the role of the education specialist must change because some educational assets are outdated. Teachers should promote critical cogitation skills, support information literacy and prop collaborative activity to prepare students for living in the 21st century. Whereas the essential teaching skills in the 21st century are the potential for collaboration with others and the ability to communicate through technology.(Wajszczyk 2014) From the opinion of parents and practitioners many children live in a digital environment, where they use ICT tools at home and their family and practitioners allows and promote them to use ICT tools. There appears to be a gap between children's access to and use of ICT at home and in early years settings, and between state maintained and non-maintained sectors.(Aubrey and Dahl 2014)

ICT have swept the modern society and are soon being used in different areas. Every child should have the right to become a skilled ICT user, and should be able to operate the computer and its functions as their right to technological literacy.(Sonja and Pramling 2012)

In 2007, many researchers have undertaken a range of activities in the field of ICT integration in early childhood education to major understand the integration of ICT in learning and playing activities for preschool children.

Kalas and a group of researchers conducted a study by the UNESCO Institute for Information Technology in Education on the potential of ICT in early childhood care and education and its development in many countries.They were able to deal with many early childhood care centers, conducted a group case study, obtained valuable results, and reviewed the risks confront the integration of ICT and pre-school education.

Most children confront a computer before going to school which means Early Childhood Care and Education (ECCE)cannot disregard the impact on these children, already earliest childhood practitioners and researchers are looking for strategies to better integrate ICT on the learning objectives of pre-school children in a way that is closer to 21st century expectations and requirements.

Many writers in ECCE present a set of safety concerns which include harmful physical effects, children's learning, cognitive, social, and emotional development, exposure to harmful contents and new technologies displacing other important learning and play activities. Most of these writers often have in mind individual playing of computer games without familiarity current modern trends in many innovative ECCE centers.

Properly integration of ICT in early children education opens new ways to engage in attractive and relevant play, learning, communication, reconnaissance, and development. In addition to social interactions and change the learning relationships between children and teachers. (Kalas 2013)

Integration of ICT in education has a multiplier effect throughout the education system, by promoting learning and improves the student's skill. In addition, ICT in education can improve the global economy through creating a skilled workforce and facilitating social mobility.

Some writers believe that ICT can help to bring abstract concepts to life using images, sounds, movement, animations and simulations. On the same time others dispute that ICT are merely a delivery mechanism for teaching and learning, while it is the foundational pedagogy that matters. (Clark, 1983; 1994)

The abstract of recent study which it summarizing 25 previous meta-analyzes based on more than 40 years of research that computer uses in classrooms had a positive overall effect on achievement (Tamim et al., 2011). In addition to other factors are also vital, such as effective teacher training and the proper linkage between the use of ICT and sound teaching methods.(Wallet 2014)

Integration of ICT in education helps children to deliver content and activities that originated and support strong and productive emotions for children which it can serve as the environment and the tools for development of a child.

(Siraj-Blatchford 2006) reflect on how ICT could support in Early Children Education, and recognize many key areas of them such as communication and collaboration which they naturally appear in collaborative problem solving, creativity, socio-dramatic play and learning to learn.(Kalaš 2010)

There are three areas of learning that can be supported by the use of technologies such as expanding knowledge in the world which included what is referred to as subject knowledge in schools, acquiring operational skills which referred to understanding the functions of items such as the mouse and on/off switches as well as the ability to operate them, which often relies on motor skills and developing procedures for learning which encompassed a range of affective, social and cognitive features of learning to learn which were given high priority in preschool settings, as well as learning about the cultural roles of technology in the home context.(Plowman, Stephen, and Mcpake 2008)

The impact of using ICT in early education based on a literature review, a qualitative study, teachers views and their opinion it can be concluded that is positive on students in most cases.(Wajszyzyk 2014)

### **III. RESEARCH SCOPE**

In this research, we introduce a novel schema that introduces an effective model for integrating ICT in Sudan's kindergartens education to improve cognitive development.

### **IV. SOCIETAL MOTIVATIONS**

Children's education need teachers who are aware of the importance of individual differences and are sensitive to individual needs and can adapt to the curriculum as we need teachers accept and consider its existence as normal

among students, Sudan's kindergartens have not yet prepared to deal with individual differences, the children with the same age use the same textbooks and follow the same curriculum.

Therefore, it is necessary to consider the individual differences in learning, using teaching methods that take into account these individual differences among children and adapt the learning environment suited to their abilities.

There are many teaching methods that give importance to individual differences such as:

- a) Method of the group of one capacity: Some schools divide students according to their mental abilities, and this method puts students homogeneous mentally in one division, has been strongly criticized on the basis that such distribution may lead to the students' sense of differentiation, and thus may reflect on their own perception in their academic and social life, and such distribution also deprives the less intelligent students of the learning abilities of their smart colleagues.
- b) The method of random division: Educators in modern school tend to divide the students randomly so that each class includes different students in the preparation for individual differences by testing methods of teaching methods that suit the preparations and abilities of each student, but this does not ensure the full homogeneity that the teacher seeks to divide children.
- c) The method of collective learning: One of the advantages of this method is that instead of relying on one teacher in teaching one subject in the classroom, it uses a group of teachers who are responsible for the planning, implementation and division of the curriculum and uses this approach in primary and secondary schools and each teacher has competence in a particular subject and be from It is appropriate to have an educational counselor with the group, but applying this method requires the presence of qualified teachers in specialties as well as it may be difficult for children to receive information from several parties.

The integration of ICT in Sudan's preschool education can mitigate the individual differences between the children in which the proposed education model helps in modifying the teaching method, which the child can get scientific material in a manner suitable for each child, visual, reading or hearing method.

The large gap that exists between the families on the one hand and the kindergartens on the other. It is noted that many parents resort to the situation of their children in kindergartens, regardless of the conditions of the kindergarten and the quality of the services they perform

and the possibilities available to them. That the child's educational, psychological and social services in the kindergarten may not be echoed or reinforced by many families' due to the lack of cooperation between the home and these institutions, thus depriving the child of great educational opportunities.

We believe that the best way to support the relationship between home and kindergarten lies in the constant contact between the family and teachers and kindergarten management through coordinated interviews between parents, teachers in kindergartens, but this method may not be suitable for many parents for different reasons. An Integrated Model for Kindergartens in Sudan can be the solution for many parents because it provides them with accurate follow-up of educational services and psychosocial care, thus strengthening the communication between Kindergarten and the family to provide better educational opportunities.

**V. RESEARCH PROBLEMS**

- Sudan's kindergartens have not yet prepared to deal with individual differences, in which the children with the same age use the same textbooks and follow the same curriculum.
- The large gap that exists between the families and the kindergartens. Where many parents resort to the situation of their children in kindergartens, regardless of the conditions of the kindergarten and the quality of the services they perform and the possibilities available to them.
- The child's educational, psychological and social services in the kindergarten may not be echoed or reinforced by many family dues to the weak of cooperation between the home and these institutions, thus depriving the child of great educational opportunities.
- The current education Sudanese system in preschool depends on limited methods of education.
- With the spread of technology in this age, children's education needs to be determined to keep pace with this development so that education is more attractive.
- There are many applications and tutorials for children and many parents are allowed to use them by their children without knowing the advantages and disadvantages of these programs may be unrelated to the child's age or mental abilities and others.

**VI. RESEARCH QUESTIONS**

1. Can an integrating of ICT in Sudanese kindergartens improves the learning outcomes?
2. Can the introduction of ICT in Sudanese kindergartens help the children to understand new topics more quickly?

3. Can the implementing of ICT allow parents of kindergarten students to follow their children's progress/delay better and more reliable, compared to the parents who do not have this ICT facility?

**VII. HYPOTHESES**

ICT has made considerable changes in most of our lives, where it could support communication, collaboration, cognitive development, creativity, socio-dramatic play, and learning to learn.

The integration of ICT in education helps to develop children and the use of information and communications technology inevitably can enhance children's learning and encourage investment, cooperation, discussion, innovation, problem solving, risk and flexible thinking.

Integration of ICT in Sudan's preschool education can solve the individual differences between the children in which the proposed education model helps in modifying the teaching method, which the child can get scientific material in a manner suitable for each child, visual, reading or hearing method.

Hypothesis: Using Information and Communication Technology (ICT) in Sudanese kindergartens increase general academic achievement.

Hypothesis: The introduction of ICT in kindergartens helps the children to understand new information with low time.

Hypothesis: The introduction of ICT allows parents to follow up their children better and more reliable, compared to the parents who do not have this ICT facility.

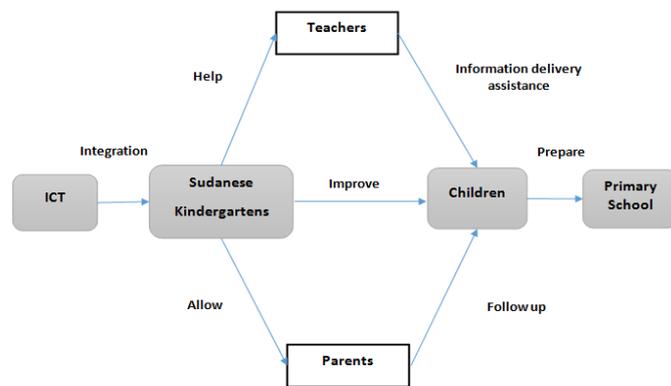


Fig. 1 Schematic view of hypothesis.

**VIII. OBJECTIVES**

1. Integration of ICT to improve Sudanese Pre-School education via building an integrated educational model.
2. Modifying the teaching method which the child can get scientific material in a manner suitable for each one, visual method, reading method or hearing method to handle the problem of individual differences in Sudan's preschool education.

- Abolished the gap between families and kindergartens so as to enhance educational, psychological and social services from both parties to provide greater educational opportunities for children.

## IX. METHODOLOGY

In this research, we want to build an educational application to help in children's learning. The advantages of this application are suitable to children's age, the application style is more attractive to the children, and it contains a different way to help children learning.

My suggestion to the methodology is using Design Based Research Methodology, where the aims of this methodology is to better understand the learning processes of children; and to design and develop advanced educational interferences, which support children's learning and cognitive development. It is an interdisciplinary approach, in which researchers and practitioners try to build pertinent theories of learning through designing, developing, studying and iteratively refining interventions for learning.



Fig.2 Design Based Research Methodology.

From the above schema (Figure 2) after we identified the problem and defined the objectives, we proposed Computerize Sudanese Curriculum for Preschool Education (CSCPE) which is educational application helps in children's learning and coverage all KG1 National Curriculum.

After designing the proposed application in step 3 (Figure 2), we should evaluate the effectiveness and the efficiency of this application (CSCPE) by execute a pretest for the children evolving in our experiment, and other test after using the application (CSCPE) then compare the results. The Design Based Research Methodology allows developing the application and reevaluation.

The data can be collect from multiple sources, mostly through participatory observations, interviews with responsible teachers, parents and children in additional to the pre and after test data.

## EXPECTED OUTCOMES

The integration of ICT in preschool education can enable learning via a transformative impact that leads to new children centered learning models and helps to promote intellectual creativity, solve the individual differences between the children, problem solving skills, encourage investment, cooperation, discussion, innovation, flexible thinking, communication skills and other forms of higher thinking all this lead to cognitive development.

An Integrated Model for Kindergartens in Sudan can be the solution for many parents because it provides them with accurate follow-up of educational services and psychosocial care, thus strengthening the communication between Kindergarten and the family to provide better educational opportunities.

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