Integrating ICT in the Sudanese Kindergartens by Means of Developing a Computerized Application for The Pre-School Education, In Order to Improve Cognitive Development:

DR. AMGAD ATTA ABDELMAGEED MOHAMMED[1], DR. SUHANDA SAFALDEEN MOHAMMED DRAR[2], DR. ANWER MUSTAFA HILAL[3], PROFESSOR. LARS RUNE CHRISTENSEN[4]

. 1. Department of Computer and Self Development, Preparatory Year Deanship, Prince Sattam Bin Abdulaziz University, Al-Kharj 11942, Saudi Arabia. Ahfad University for Women, Sudan).
2. 2. University of Science & Technology- College of Computer Science and Information, Sudan
3. 3. Department of Computer and Self Development, Preparatory Year Deanship,
4. **Prince Sattam Bin Abdulaziz University**, Al-Kharj 11942, Saudi Arabia.
5. 4. IT-University of Copenhagen, Head of Technologies in Practice Research Group (TiP), Denmark.
6. Corresponding author: Dr. Amgad Atta (amg.mohammed@psau.edu.sa)

Summary

The current Sudanese preschool system depends on limited methods of education, children's education needs to be equipped to keep pace with technological development, also, the large gap that exists between the families and the Kindergartens, where many parents have no idea on how their child progresses in the KG context. The aim of this research is to integrate ICT in the preschool education to enhance and improve the preschool education, by building an Integrated Educational Application (Computerized Application for Preschool Education CAPE) which will help to improve the learning outcomes. The researchers used the Experimental Research Methodology, the characteristic of CAPE application is; suitable for children's age, the application style is more attractive to the children and contains a different way to help children get learning. Alawaeel and the Smart Child Kindergartens in Republic of Sudan were selected as a sample of the study, with sample size specifically, 50 children's. Also, the Central Bank of Sudan Kindergarten was selected as one of the institutional Kindergartens for easy communication with parents of children with a sample size 21 children. The study found that; using CAPE application in KG enables children to increase general learning effects and developing child's cognitive skills. Also, the children who were allowed to use CAPE by their parents are performed better in the overall evaluation of KG lessons. Also, using the CAPE in the Pre-School education helps the parents following their children's progress better and more reliable. The researcher recommends that to apply the computerized application and includes the second level. Also, converting the computerized program into an application to be used by children by their self, without the intervention of parents.

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Key words:

Sudanese Kindergartens, CAPE, Children, Preschool Education technology, Cognitive skills.

1. Introduction

Pre-School children learn to recognize the simple things around them, their names and importance. Such as, beginning with the knowledge of senses, animals, plants, seasons, geometric shapes, numbers, letters and other simple things. The aim of this study is to introduce ICT Application in Sudanese Pre-School Education, in order to help children to recognize and understand these things, in a simple and multiple ways for easy access to information for all children with different mental and cognitive abilities. In this research, one of the primary objective for the Researcher is to evaluate the impact of integrating ICT in Sudanese Pre-School Education in cognitive development. The Sudanese education has a long history, and the Sudanese people learned to read and write Egyptian during the Kingdom of Kush (1070 BC - 350 AD). Regular education began with the establishment of khalawi (plural of khalwa,i.e. religious classroom), which are believed to have originated with the spread of Islam in the thirteenth century, and whose role was limited to memorization and interpretation of the Koran, teaching Islamic jurisprudence and the basics of Arabic and arithmetic. The number of khalawi in 1899 during the Mahdia State was estimated at 1,500, contributing to the literacy of about 60,000 children.

I. THE PROBLEM STATEMENT

1. Despite the progress in Pre-School Education, it is still faces many problems and challenges, which include:
2. The current Sudanese Pre-School system is depending on limited methods of education, in which the teaching aids are insufficient and not up-to-date.

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3. With the spread of technology in this era, children's education need to be equipped with the new technologies in order to keep pace with this growing development, to make the learning process more attractive and easier by integrating new technology of ICT with the syllabus.
4. The large gap that exists between the families and the KG (Kindergartens), where many parents have no idea on how their child progresses in the KG context, this result in poor communication among them.
5. In the KGs there are some activities that children they really loved and interact with, such as playing with clay, which is an exercise to develops the skills of children, but when s/he returns home and tries to apply the same activity. However, this can be prevented by his/her mother as his/her clothes will get dirty for example, the child may confuse "is it playing with clay useful or not?"
6. The child's educational, psychological and social services in the KG may not be applauded by most of the families due to the weak communication between the home and these institutions, thus depriving the child of better educational opportunities.
7. Most of parents allow their children to use many applications and tutorials randomly without checking the application, its details may not fit to the child's age or mental abilities etc.

II. Process for Design

The proposed educational application "Computerize Application for Pre-School Education" CAPE which is an educational application support children's learning and coverage all KG1 National Curriculum, the Researchers convinced that; the design of CAPE application is suitable for children's age, the application style is more attractive to the children, and it contains a different way to help children learning.

After designing the proposed application, the Researchers built the Pre-Test questions, which including the cognitive development concept. Also, Parents and Teachers Questionnaires, then they refer the application, Pre-Test, and the Questionnaires through a seven experts and specialists (as show on list of arbitrators), then the Researchers evaluated the effectiveness and the efficiency of the application CAPE by executing Pre-Test for the children involving in our experiment, and second Test after using the application CAPE, then compared the results using statistical program UML.

III. Research Sample

8. The sample was selected in a deliberate way (Purposeful Sample). The selection criteria are, the KG should have two KG1 classes and ICT tools to display the application. Such as, projector, computer device and monitor are available.
9. In order to select the KGs, the Researchers conducted an interview with the director of the education office of Khartoum North locality in Republic of Sudan, to search for KGs with the required specifications; the data were not available at office. However, the Researchers was informed about a monthly meeting of all the Directors of KGs and the Researchers conducted a group interview with all the Directors of KGs in Khartoum North. Then Alawaeel KG and the Smart Child KG were selected as a sample of the study.
10. Also, the Central Bank of Sudan KG was selected as one of the institutional KGs for easy communication with parents of children and because this category represents mothers who spend most of their time at work and do not have enough time to follow their children, accurately in the study aspect related to providing KG and family integration.

IV. MANOVA Test

11. The Researchers applied the Multivariate analysis of variance (MANOVA) which is an ANOVA with several dependent variables, and one or more independent variables to test the following hypotheses:
12. Using the Computerized Application for Pre-School Education CAPE in Sudanese KGs enhances children's learning and develop their cognitive skills, such as recognizing characters and numbers; which result in enhancing and increasing general learning effects.
13. Parents with low interest in following their children and suffering from a lack of time and energy ignore their children's progress regardless of ICT support.

The Researchers second primary objectives is to confirm that there is a significant relationship between the independent variables which are represent Groups, Class, Parent Situation (for example the worker Mother) because the parent's situation represent the class of parents who have a lack time to follow up their children, co-variables which are the types of ICT applications and the Number of Hours, and the dependent variables which are Learning Progress and explore further ICT.

The Descriptive Statistics table describes the basic features of the data in the study. It is providing simple summaries about the sample and the measures. In which the following table contains the distribution of the class (Traditional/ CAPE), parent situation (Employee/ Housewife), means standard deviations and total numbers for each dependent variable (Learning progress, explore further ICT) in turn.

2. Tables, Figures and Equations

2.1 Tables and Figures

Table 1 Descriptive Statistics

	Class	Parent_Situation	Mean	Std. Deviation	N
Learning_Progres	Traditional	Employee	2.917	2.5380	6
		House wife	7.500	4.2720	3
		Total	4.444	3.7203	9
	CAPE	Employee	10.000	4.2088	8
		House wife	9.500	4.9497	4
		Total	9.833	4.2444	12
	Total	Employee	6.964	5.0248	14
		House wife	8.643	4.4132	7
		Total	7.524	4.7866	21
Explore_ICT	Traditional	Employee	.50	.548	6
		House wife	3	.577	3
		Total	4	.527	9
	CAPE	Employee	0	.535	8
		House wife	5	.500	4
		Total	8	.515	12
	Total	Employee	0	.519	14
		House wife	7	.535	7
		Total	2	.512	21

Box's Test of Equality of Covariance Matrices

	5.625 .446 9 535.454 .910

The Box's Test of Equality of Covariance Matrices checks the assumption of homogeneity of covariance across the groups using sig < .05 as a criterion.

In MANOVA, several statistics measures are available, such as Pillai's Trace, Wilks' Lambda, Hotelling's Trace and Roy's Largest Root.

The value of sig is .910 is greater than 0.05 this means the condition of contrast homogeneity is achieved.

This indicates that there are no significant differences between the covariance matrices. Therefore, the assumption is not violated and Wilk's Lambda is an appropriate test to use.

The precondition for the Wilk's Lambda test is that the data have a normal distribution. To legitimate this analytic approach, we should proceed with the normality test.

From the normality test table 2 and figures the data in the normal distribution.

The following table shows the main results of the MANOVA test. The column of real interest is the one containing the significance values (Sig) of these F ratios.

The intercept is the estimate of the dependent variable when all the independent variables are 0.

The F value is representative of the degree of difference in the dependent variable created by the independent variable.

Table 2 Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	f	Sig.	Statistic	Df	Sig.
Learning Progress	.165	21	.140	.917	21	.074
Explore_ICT	.348	21	.000	.640	21	.000

a. Lilliefors Significance Correction

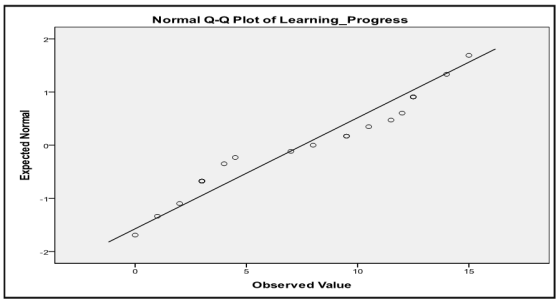

Figure 1: Tests of Normality for Learning Progress

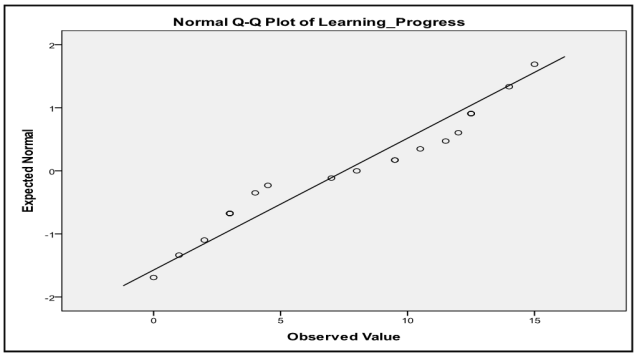

Figure 2: Tests of Normality for Learning Progress

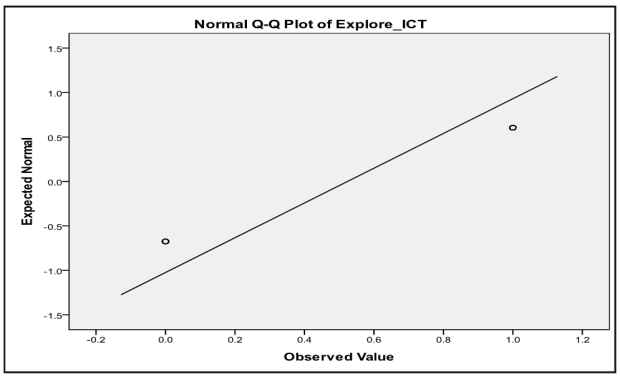

Figure 3: Tests of Normality for Expected ICT

Table 3 Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Wilks' Lambda	.384	11.246a	2.000	14.000	.001	.616
ICT Applications	Wilks' Lambda	.584	4.990a	2.000	14.000	.023	.416
Hours	Wilks' Lambda	.951	.359a	2.000	14.000	.705	.049
Group	Wilks' Lambda	1.000	.a	.000	14.500	.	.
Class	Wilks' Lambda	1.000	.a	.000	14.500	.	.
Parent Situation	Wilks' Lambda	.897	.805a	2.000	14.000	.467	.103
Group * Class	Wilks' Lambda	1.000	.a	.000	14.500	.	.
Group * Parent_Situation	Wilks' Lambda	1.000	.a	.000	14.500	.	.
Class * Parent_Situation	Wilks' Lambda	1.000	.a	.000	14.500	.	.
Group * Class * Parent_Situation	Wilks' Lambda	.000	.a	.000	14.500	.	.

a. An exact statistic which is provides more accurate results pertaining to statistical testing and interval estimation by eliminating procedures based on asymptotic and approximate statistical methods.
b. The statistic is an upper bound on F that yields a lower bound on the significance level.

From the above table, the value of sign for Pillai's Trace, Wilks' Lambda, Hotelling's Trace, Roy's Largest Root tests is 0.00 which is less than 0.05 and that means there is a significant statistical difference between the two groups. The direction of this effect illustrated in the following table:

Table 4 Estimated Marginal Means

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Learning Progress	Control	6.109a,b	1.771	2.335	9.884
	Experimental	9.196a,b	1.411	6.190	12.203
Explore ICT	Control	.330a,b	.186	-.066	.725
	Experimental	.741a,b	.148	.426	1.056

The results showed that; the learning effects and the desire to explore ICT by the children who used the CAPE in the class are higher than the children who did not use the CAPE, regardless their parents' situation, and that is confirming the first hypothesis "Using Information and Communication Technology (ICT) in Sudanese KGs increase general learning effects".

According to the parent's situation, the results showed that; the learning effects and the desire to convey the use of ICT by the "Housewives" Mothers are higher than at the children with Working Mothers.
This indicates that; using ICT in the class has the most powerful effect on children's learning outcomes and their desire of exploring ICT complemented by the parents' follow up.

CONCLUSION:

This study was conducted to examine the impact of using ICT in Pre-School Education on Sudanese kindergartens for the first-level children's, and the Researchers obtained the following results:

- Using CAPE in KG enables children to increase general learning effects.
- Children whose parent are agreed and allowed their child to use ICTs are performed better in KG.
- Using CAPE in education helps the parents follow their children's progress better and more reliable.
- Using CAPE in KG develop children cognitive skills.
- Using CAPE at home supports homework and revision.
- Children enjoy using CAPE in KG: ICT makes learning more fun.
- Using the CAPE in KG provides children to access attractive learning materials.

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