Employing ICTs in Kindergartens in Remote Areas of Jordan: Teachers' Perspectives on Uses, Importance and Challenges

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Abstract: With Coronavirus disease (COVID-19) impacting the way we learn; information and communication technologies (ICTs) play an ever-increasing role in young children's learning making it crucial to understand the importance and challenges of using ICTs in kindergartens from teachers' perspectives. The present study, therefore explored the perspectives of teachers in remote areas of Jordan regarding the degree of ICT use, its importance in kindergartens, and potential challenges. To achieve the objective of the study, a quantitative questionnaire was developed and distributed to 263 female kindergarten teachers in remote areas of Jordan. Results indicated that the degree of use and importance of ICTs from teachers' perspectives was "average". Further, the study identified several challenges that appeared to hinder teachers' use of ICTs in kindergartens. Teachers who held a bachelor degree were significantly more likely to employ ICTs in their teaching than those who did not. Yet, there were no significant differences according to the number of training courses in ICTs and experience teachers had. Recommendations and implications for facilitating the use of ICTs in kindergarten education concluded this paper.

Keywords: *ICTs in Kindergarten, kindergarten teachers, kindergarten education, Jordan.*

Introduction

Recent world challenges have forced educational systems globally to rethink the way we educate our kindergarten children, with a move away from traditional ways of teaching towards modernizing curricula that can be digitally delivered. Supporting this shift, the United Nations Educational, Scientific and Cultural Organization (UNESCO) suggests that new ICTs should be an integral part of formal education to achieve the Education for All (EFA) goals (Bokova, 2014). The kindergarten stage of education is one of the most important stages of the individual's life (Bastable & Dart, 2008) as this is where the foundations of learning occur. It is therefore argued that to produce the desired results a comprehensive and integrated scientific curriculum that suits the needs of children is needed. For this to occur it is essential that educational environments and staff are technologically and educationally qualified and trained at all levels.

Recognizing the importance of this stage of education, the development of ICT literacy along with the child's attitude towards technology emerges in kindergarten making it important that we understand enablers and barriers to employing these teaching resources. It can be argued that the development of ICT skills in children depends on teachers' abilities and attitudes towards using ICTs in their teaching. Therefore, it is crucial for kindergarten teachers to form positive attitudes toward ICTs (Adu & Olatundun, 2013; Rajsp & Fosnaric, 2014).

Hence, integration of ICTs into kindergarten education will not succeed without teachers having a complete awareness of the importance of such technology on children's education and positive attitudes toward employing ICTs in their teaching. Therefore, the present study examined the degree to which kindergarten teachers in remote areas where schools are less affluent in terms of educational provision, employed ICTs. The challenges they faced and their attitudes to using ICTs in their teaching were also explored.

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Literature Review

With the fast-growing development of information and educational technology, and the use of the Internet, many new concepts have emerged, including e-learning, online classrooms, smart schools, virtual and distance learning. These concepts have revolutionized education systems globally leading to the development of new teaching methods and techniques. For learners, such development has increased their independence in acquiring information while increasing their educational attainment, and skill development (Renee, 2005; Smeets, 2005).

Studies (e.g., Allan & Travis, 2016; Ghavifekr & Rosdy, 2015; Hashmi et al., 2019; Kim, 2006; Kirkwood, 2014) showed that integrating ICTs into education has many positive benefits such as increasing motivation for learning, expanding learner perceptions, cooperation among learners, and making the curriculum more learning and thought provoking. At the kindergarten level, recent research (e.g., Abdi & Cavus, 2019; Angga et al., 2018; Kim, 2020; Tamtama & Suryanto, 2020; Theodotou & Kaitsa-Kulovana, 2012) confirms that children who work with ICTs have greater success in their schools and, can better communicate with others thus highlighting the importance of integrating technology in the kindergarten stage.

In addition, research has highlighted that integration of ICTs into kindergarten education develops a child's ability to observe, imagine, and recognize shapes and sizes while supporting creativity and discovery (Ghavifekr & Rosdy, 2015; Kabadayi, 2006; Nikolopoulou, 2020; Shawareb, 2011). However, the integration of ICTs in kindergarten education cannot be effective without having technologically competent teachers with positive attitudes towards ICTs. Therefore, pre-service and in-service kindergarten teachers need to be equipped with the necessary technological competencies and skills especially in light of the global pandemic caused by the Coronavirus (COVID-19) which subsequently forced schools to use ICTS as a learning platform when students were being schooled at home and online.

Several studies (e.g., Jovanovia et al., 2020; Konca et al., 2016; Ndibalema, 2014; Preradovic et al., 2017; Zaranis & Oikonomidis, 2016) have explored teacher's acceptance and attitudes towards using new technologies in the classroom. While the results revealed positive attitudes and acceptance of ICTs by teachers, they rarely used ICTs regularly in their teaching possibly, because they do not feel confident enough about their ability to use ICTs and feel that students are more skilled and knowledgeable than they are. In addition, the lack of teacher awareness of available technologies and how they can be employed to support instruction delivery can be hurdles to teachers' use of ICTs (Morris, 2010).

Moreover, research shows that there is a gap between what kindergarten teachers are taught at university and what they apply in the classroom (Almas & Krumsvik, 2008; Kalogiannakis, 2010; Tondeur et al., 2016). Although they have basic computing skills, they are not sufficient for them to teach proficiently using ICTs (Adu & Olatundun, 2013; Esfijani & Zamani, 2020; Masoumi, 2021). This suggests that Initial Teacher Education should include ICT specific courses to enhance pre-service teachers' confidence in employing ICTs in their contexts.

In addition to the above, other obstacles that might hinder kindergarten teachers using ICTs in teaching have been widely reported (e.g., Liu & Pange, 2015; Mutohar, 2012; Umar & Abu Hassan, 2015). Such obstacles included lack of technical and administrative support, insufficient training opportunities, lack of time, shortage of software, lack of understanding of how to use ICTs in the early years' settings, lack of teachers' interest and professional development.

In reviewing the above, and given the importance of the kindergarten stage in the development and learning of the child, the current research explored the degree and importance of using ICTs in kindergartens and the obstacles that teachers face in remote areas of Jordan. This study will provide policy-makers in the education sector with a tool to measure the degree of use and importance of ICTs in kindergarten education in remote areas of Jordan. In addition, it will encourage other researchers to conduct studies in the field of ICTs in other stages of education.

Study problem and questions

The Ministry of Education in Jordan has recently implemented several projects related to the adoption of ICTs in Jordanian educational contexts. The Jordanian Government supported this initiative by undertaking the implementation of these projects while striving to make them successful. To achieve success, this work requires cooperation, concerted efforts and participation from all stakeholders and sectors. For this to be successful, it is important to understand barriers to the implementation of ICTs. Kindergartens are educational institutions that are not without problems related to preparing kindergarten teachers and qualifying them academically and technologically.

The kindergarten teacher has a great responsibility in supporting the achievement and development of her students. Renee (2005) notes that how a kindergarten teacher responds to addressing problems that students face may be due to their level of experience and competence; a finding that is supported by Kaufman and Pianta, (2000) who found that poor preparation of the kindergarten teacher, together with a lack of competences are the main problems facing kindergartens in the area of ICTs. Therefore, this study is driven by the urgent need to identify problems that may hinder the progress of education in kindergartens, namely those related to the use of ICTs as these are of great importance in preparing children for the future.

Consequently, the current research was motivated to investigate the use of ICTs in teaching kindergarten children in remote areas of Jordan and potential barriers to their implementation. More specifically, the present study will address the following questions:

1. What, from teachers' perspectives, is the degree of using ICTs by teachers in kindergartens in remote areas of Jordan?
2. What, from teachers' perspectives, is the importance of using ICTs in kindergartens in remote areas of Jordan?
3. What, from teachers' perspectives, are the obstacles of using ICTs in kindergartens in remote areas of Jordan?
4. How does the degree of using ICTs differ among kindergarten teachers according to their educational qualification, training courses in ICTs and teaching experience?

Methodology

Research design

The present study used a quantitative research design. The researchers developed a self-administered questionnaire. The questionnaire consisted of two main sections and three subsections. The first section collected demographic information about the participants and the other sections measured the kindergarten teachers' perspectives regarding the degree of ICT use, its importance in kindergartens, and potential challenges that might face the ICTs in kindergartens.

Participants

The study population consisted of 290 female kindergarten teachers were employed remote areas in the directorates of education in Northeastern Badia, Northwestern Badia, and Southern Badia according to statistics of Queen Rania Center for Education and Information Technology in Jordan for the year of 2019/2020. Table 1 presents the distribution of the study population.

Table 1. Distribution of the study population

Directorate	Total government kindergarten classes	Total private kindergarten classes
Northeastern Badia	60	7
Northwestern Badia	104	35
Southern Badia	51	13
Total	215	75

Employing purposive sampling techniques, the questionnaire was distributed to all members of the study population and 267 questionnaires were returned. Four questionnaires were excluded for invalidity and statistical analysis. The number of valid questionnaires was 263 constituting 91% of the total study population. Table 2 presents the distribution of the study sample according to the study variables.

Table 2. Distribution of the sample according to the study variables

Variable	Variable category	Number	Percentage
Educational qualification	Lower than bachelor	183	69.6
	Bachelor and higher	80	30.4
Number of training courses ICTs	Nothing	172	65.4
	5 or less	78	29.7
	6-10	13	4.9
Teaching experience in years	5 or less	97	36.9
	6-10	153	58.2
	More than 10	13	4.9

Instrument

The study instrument was a quantitative questionnaire developed by the present researchers. The questionnaire consisted of 2 main sections: Section 1 included general demographic information of the participants; and Section 2 contained the questionnaire items and consisted of three subsections: Section A comprises 21 items that examine teachers' perspectives on the degree of ICT use in kindergartens; Section B comprises 7 items that examine teachers' perspectives on the importance of using ICTs in kindergartens; and Section C comprises 21 items that investigate the

obstacles of using ICTs in kindergartens from the teachers' perspectives. Participants' responses were classified according to the Likert scale as explained in the next sections.

Validity and reliability of the instrument

The study instrument was presented to nine faculty members in the field of childhood, psychology and educational technology, where they were asked to judge the linguistic integrity of the items, clarity of their content, and their ability to achieve the study objectives. Based on the experts, judgment and obtained values, the Content Validity Index (CVI) was calculated and found to be 0.84. Thus, the content of the instrument was validated. Further, as shown in Table 3, the factor analysis was carried out to test the construct validity of the study instrument. The analysis was conducted on 49 items of the scale distributed on three fields: use, importance, and obstacles of ICTs. The value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.909 which is greater than 0.05 indicating the accuracy of the sample for analysis, while the Bartlett Test, which shows the correlation between the scale items, indicates that the value of Chi-Square 17131.904 is statistically significant at the level of error of 0.05 and degrees of freedom of 1176.

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.909
Bartlett's Test of Sphericity	Approx. Chi-Square	17131.904
	df	1176
	Sig.	.000

In addition, Table 4 shows three factors that explain 67.155% of the variance, and all Initial Eigenvalues values are greater than 1.

Table 4. Result for the Extraction of Component Factors

Factor	Initial Eigenvalues		
	Total	%of Variance	% Cumulative
1	17.781	36.288	36.288
2	10.930	22.307	58.595
3	4.194	8.559	67.155

Furthermore, the factor analysis was also carried out by VARIMAX method, where the results showed that all items of the study instrument were saturated with values greater than 0.3 on the factor to which they belong.

The validity of the internal consistency of each item of the instrument was verified by finding the correlation of each item with the total score of the field, to which it belongs, by finding correlation coefficients using the Pearson Correlation Coefficient as illustrated in Table 5.

Table 5. Validity of the internal consistency of the study instrument

Field	Item No	Correlation Coefficient	Field	Item No	Correlation Coefficient	Field	Item No	Correlation Coefficient
Use of ICTs in teaching kindergarten children	1	*0.845	Importance of using ICTs in teaching kindergarten children	1	*0.332	Obstacles of using ICTs in teaching kindergarten children	1	*0.485
	2	*0.776		2	*0.683		2	*0.266
	3	*0.829		3	*0.472		3	*0.478
	4	*0.803		4	*0.708		4	*0.579
	5	*0.810		5	*0.801		5	*0.241
	6	*0.718		6	*0.794		6	*0.922
	7	*0.786		7	*0.808		7	*0.934
	8	*0.851					8	*0.922
	9	*0.857					9	*0.934
	10	*0.831					10	*0.922
	11	*0.792					11	*0.879
	12	*0.838					12	*0.871
	13	*0.886					13	*0.927
	14	*0.866					14	*0.942
	15	*0.797					15	*0.943
	16	*0.814					16	*0.892
	17	*0.828					17	*0.948
	18	*0.654					18	*0.949
	19	*0.570					19	*0.936
	20	*0.661					20	*0.909
	21	*0.664					21	*0.891

Table 5 shows that all the correlation coefficients of the items were positive and statistically significant for each item in the field to which it belongs, indicating that it is suitable for the purposes of the study. This indicates the strength of the internal coherence of the items of each field of the instrument.

The stability of the study instrument was calculated by Cronbach's Alpha. As presented in Table 6, the total stability of the field of ICTs use was 0.969 and the field of importance of ICTs use was 0.716, while the field of obstacles of ICTs use was 0.968. As shown in Table 5, all correlation coefficients of the study instrument fields are high and suitable for the purpose of the study.

Table 6. Values of the study instrument's stability coefficients

Field	Number of Items	Cronbach's Alpha
Use of ICTs in teaching kindergarten children	21	0.969
Importance of using ICTs in teaching kindergarten children	7	0.716
Obstacles of using ICTs in teaching kindergarten children	21	0.968

The items of the ICTs use scale were answered according to the three-point Likert scale, where the answers to the items took three grades (high, average and low) and weights given were 3, 2 and 1 respectively. To determine the degree of ICTs use, the following calculation was performed:

High Score (3) - Lower Score (1) ÷ 3 (number of levels) = 0.66. The number 0.66 is the length of the category. Consequently, as presented in Table 7 the following categories will be adopted:

Table 7. Classification of degree of ICTs use

Category	Degree
1.00 -1.66	low
1.67 - 2.33	Average
2.34 -3.00	High

The items of the scale of the importance of using ICTs and the scale of the obstacles of using ICTs in kindergartens were answered according to a five-point Likert scale. The responses to the items took five degrees (strongly agree, agree, neutral, disagree, strongly disagree) and weights given were 5, 4, 3, 2, and 1 respectively. To determine the degree of importance of ICTs and obstacles, the following calculation was performed:

High Score (5) - Lower Score (1) ÷ 3 (number of levels) = 1.33. The number 1.33 is the length of the category. Consequently, as presented in Table 8 the following categories will be adopted:

Table 8. Classification of degree of ICTs importance and obstacles

Category	Degree
1.00 -2.33	Low agreement
2.34 - 3.67	Average agreement
3.68 -5.00	High agreement

Statistical analysis

Frequencies and percentages were determined to describe the characteristics of the study sample. Means and standard deviations were calculated to answer the first question. Additionally, an ANOVA test was conducted to answer the second question to identify the significance of differences. The CVI, factor analysis, correlation coefficient of Pearson, and Cronbach's alpha were used to test the validity and reliability of the study instrument.

Results

Results of the study are discussed according to the research questions as follow:

Results of question one:

What, from teachers' perspectives, is the degree of using ICTs by teachers in kindergartens in remote areas in Jordan?

To answer this question, the mean and standard deviations were calculated for each item of the scale of the ICTs use in kindergarten education as shown in Table 9.

Table 9. Means and standard deviations for the degree of kindergarten teachers' use of ICTs in teaching kindergarten children

No	Item	Rank	Mean	SD	Degree
1	Viewing simulation software	2	1.94	0.95	Average
2	Planning the teaching and learning process	11	1.87	0.95	Average
3	Creating, saving, and retrieving files or folders	6	1.91	0.90	Average
4	curricular activities	18	1.81	0.83	Average
5	Extracurricular activities	14	1.84	0.93	Average
6	Making electronic files for children	13	1.86	0.92	Average
7	Internet connection and browsing	9	1.89	0.92	Average
8	Creating databases for children	7	1.90	0.96	Average
9	Providing entertainment programs for children	3	1.94	0.89	Average
10	Children assessment process	16	1.82	0.82	Average
11	Making educational software using some applications such as (PowerPoint)	17	1.82	0.87	Average
12	Preparing work papers for children	1	1.97	0.83	Average
13	Improving the educational process in terms of providing activities, teaching methods and others	8	1.90	0.86	Average
14	Playing video and audio (multimedia)	10	1.88	0.89	Average
15	Preparing illustrated tests for children	12	1.87	0.87	Average
16	Producing educational materials	5	1.91	0.87	Average
17	Introducing educational materials in various ways	4	1.91	0.87	Average
18	Providing activities appropriate to the characteristics of learners	15	1.83	0.84	Average
19	Producing remedial programs for educational situations	21	1.52	0.70	Low
20	Initializing the educational setting for children	19	1.69	0.80	Average
21	Setting up and using an email account	20	1.62	0.79	Low
	Total Score		1.84	0.69	Average

Table 9 shows that the means ranged from 1.52 to 1.97 with a total mean of 1.84 and a standard deviation of 0.69, indicating that the use of ICTs in teaching kindergarten children by teachers was "average". This could be due to the lack of encouragement of teachers by schools to use ICTs, which consequently reduced significantly the better use of ICTs in all aspects of the process of teaching leading to "average" use of ICTs. As shown in Table 9 statement 12, which states that "preparing work papers for children", ranked first with a mean of 1.97 and a standard deviation of 0.83 indicates an "average" degree of use of ICTs by the teachers. On the other hand, statement 19, "the production of therapeutic programs for educational settings", ranked last with a mean of 1.52 and a standard deviation of 0.70 indicating low use.

Results of question two:

What, from teachers' perspectives, is the importance of using ICTs in kindergartens in remote areas of Jordan?

To answer this question the means and standard deviations were calculated for each item of the scale of the importance of using ICTs in kindergartens as shown in Table 10.

Table 10. Means and standard deviations for the importance of using kindergarten teachers ICTs in teaching kindergarten children

No	Item	Rank	Mean	SD	Degree
1	Achieving integration with the curriculum in the development of literacy and numeracy skills.	7	2.17	1.35	Low
2	Improving and increasing academic achievement	5	3.57	1.27	Average
3	The thrill of children to the computer corner	6	2.30	1.49	Low
4	Developing a spirit of cooperation between children from a young age.	4	3.82	1.21	High
5	Developing children's confidence in dealing with computer technologies from a young age.	1	4.05	1.14	High
6	Developing communication skills using computer	3	3.92	1.08	High
7	Assisting in the development of teaching and lifelong learning skills	2	3.98	1.18	High
	Total		3.40	0.67	Average

Table 10 shows that the means ranged from 4.05 to 2.17 with a total mean of 3.40 and a standard deviation of 0.67 indicating that the importance of using ICTs in kindergartens from the kindergarten teachers' perspectives was

"average". As shown in Table 10, statement 5, "development of confidence in children by dealing with computer technologies from a young age", ranked first indicating a high degree of agreement, whereas statement 1, "achieving integration with the curriculum in the development of literacy and numeracy skills", ranked last indicating a low degree of agreement.

Results of question three:

What, from teachers' perspectives, are the obstacles of using ICTs in kindergartens in remote areas of Jordan?

To answer this question, the means and standard deviations were calculated for each item of the scale of the obstacles of using ICTs in kindergartens, as shown in Table 11.

Table 11. Means and standard deviations for the obstacles of kindergarten teachers' use of ICTs in teaching kindergarten children

No	Item	Rank	Mean	SD	Degree
1	Lack of computers and their accessories in classrooms	3	3.96	1.06	High
2	There are malfunctions in many computers in the kindergarten when used	20	2.29	1.50	Low
3	The technological tools available are not modern	2	4.10	1.12	High
4	Many educational sites dedicated to children require a prior subscription	1	4.14	1.15	High
5	Lack of knowledge of computer-based teaching methods	21	2.27	1.63	Low
6	There is no desire in children to learn through the computer	13	3.65	1.47	Average
7	Lack of experience in using computer in education	11	3.68	1.50	High
8	There is no encouragement from kindergarten management for teachers to utilize e-learning techniques	9	3.69	1.51	High
9	lack of Internet connection in the kindergarten	15	3.63	1.51	Average
10	My unwillingness to produce computerized educational programs	14	3.64	1.49	Average
11	My Low ability to integrate computer programs in the educational process	18	3.56	1.46	Average
12	My poor ability to manage time when using computer in education	16	3.62	1.48	Average
13	My inability to address technical errors while using computer in education	8	3.70	1.51	High
14	Lack of knowledge of using computer peripherals (such as printer, datashow) in order to use them in education	7	3.70	1.49	High
15	My inability to keep abreast of technological development in the field of educational software	17	3.60	1.44	Average
16	I am not officially obliged to use computer in the educational process	19	3.54	1.44	Average
17	My unwillingness to initiate the use of computers in the educational process for fear of failure	5	3.75	1.52	High
18	The use of computers in the educational process increases the burdens on me	6	3.72	1.53	High
19	Lack of training courses for teachers who are interested in the use and employment of computers in education	4	3.83	1.55	High
20	The existing kindergarten curricula does not support the use of computers in education	12	3.65	1.51	Average
21	Lack of ready-made educational software that can be used by teachers in accordance with the curriculum units prescribed for kindergartens	10	3.69	1.51	High
	Total score		3.59	1.14	Average

Table 11 shows that the means ranged from 4.14 to 2.27, with a total mean of 3.59 and a standard deviation of 1.14, indicating that the impediments to the use of ICTs in kindergarten education from perspectives of teachers was of an "average" degree. As illustrated in Table 11 most of the obstacles faced by teachers centre on the subscriptions needed to engage with educational sites, outdated technological tools, lack of computers and their accessories in classrooms, and lack of training courses for teachers who are interested in the use and employment of computers in education.

Results of question four:

How does the degree of using ICTs differ among kindergarten teachers according to their educational qualification, training course in ICTs and teaching experience?

To answer this question the means, standard deviations, were calculated and one-way analysis of variance was used according to the following study variables: educational qualification, training in ICTs, and teaching experience as shown in Table 12.

Table 12. Means and standard deviations according to study variables (qualification, training in technology, and teaching experience)

Variable	Variable category	Number	Mean	SD
Educational qualification	Lower than bachelor	183	1.79	0.68
	Bachelor and higher	80	1.97	0.67
Number of training courses in ICTs	Nothing	172	1.87	0.72
	5 or less	78	1.74	0.63
	6-10	13	2.05	0.51
Teaching experience in years	5 or less	97	1.85	0.65
	6-10	153	1.82	0.72
	More than 10	13	2.04	0.52

Table 12 shows the means and standard deviations according to the variables of the study, i.e., educational qualification, training courses in ICTs and teaching experience. The table illustrates apparent differences in the use of ICTs from the kindergarten teachers' perspectives, which tend to favor the bachelor degree and higher according to the educational qualification. In addition, these differences tend to favor teachers who hold 6 to 10 training courses in ICTs. Differences in the use of ICTs among kindergarten teachers according to experience tend to favor those who had more than 10 years teaching experience. To test the significant differences the one-way analysis of variance was conducted. Before conducting the one-way analysis of variance, a normal distribution test was used for the degree of ICT use for each set of independent variables (educational qualification, training courses in ICTs, experience). As shown in Table 11 the results indicate a normal distribution for each group of independent variables, where the value of the statistical significance of the Kolmogorov-Smirnov test was higher than 0.05.

Table 13. Results of Kolmogorov-Smirnov test

Variable	Variable category	Kolmogorov-Smirnov		
		Statistic	df	Sig
Educational qualification	Lower than bachelor	.524	183	.056
	Bachelor and higher	.621	80	.061
Number of training courses in ICTs	Nothing	.568	172	.054
	5 or less	.475	78	.057
	6-10	.229	13	.063
Teaching experience in years	5 or less	.551	97	.061
	6-10	.581	153	.055
	More than 10	229	13	.060

Homogeneity was also tested and the results presented in Table 14. The results indicated the presence of homogeneity, where the value of the statistical significance of the Levene's test was greater than 0.05.

Table 14. Results of Levene's test for testing homogeneity of variances

Variable	Levene's Statistic	df1	df2	Sig
Qualification	.465	1	261	.496
Number of training courses in computer technology	1.141	2	260	.351
Teaching experience in years	1.099	2	260	.247

Table 15 shows the results of one-way analysis of variance to test differences in the degree of using ICTs in kindergartens according to variables, i.e., educational qualification, training courses in ICTs, and teaching experience.

Table 15. One-way analysis of variance to test differences in the degree of use of ICTs from the kindergarten teachers' perspectives according to educational qualification, training courses in technology, and teaching experience

Independent Variable	Variance Source	Total squares	DF	Mean of squares	F Value	Significance level	Effect Size (Eta Squared)
Educational qualification	Between groups	1.924	1	1.924	4.149	0.043*	0.02
	Within groups	121.037	261	0.464			
	Total	122.961	262				
Number of training course in ICTs	Between groups	1.561	2	0.781	1.672	0.190	0.01
	Within groups	121.399	260	0.467			
	Total	122.961	262				
Teaching experience in years	Between groups	0.639	2	0.320	0.680	0.508	0.00
	Within groups	122.321	260	0.470			
	Total	122.961	262				

The differences are statistically significant at (p<.05).

It is noted from Table 15 that there is a significant difference in the degree of using ICTs from the kindergarten teachers' perspectives. This difference is attributed to the difference in their educational qualification. The calculated p value was 4.149 and its significance level was 0.043, which is lower than the minimum value at which there are statistically significant differences (a =.05). The results of the analysis did not show differences in the degree of using ICTs due to the difference in both the number of training courses in ICTs and teaching experience. The calculated p-values were 1.672 and 0.680 respectively and the statistical significance of them were higher than the minimum value at which there is a statistically significant difference (a = .05).

The results also indicated that there were no significant differences at the significance level (α =.05) in the responses of the participants towards the degree of using ICTs from teachers' perspectives according to number of training courses in ICTs and experience.

Discussion

The first question raised in the present research was concerned with the teachers' perspectives on the degree of their use of ICTs in remote areas of Jordan. The study results revealed that the use of ICTs in teaching kindergarten children was "average" and the use of ICTs was mostly limited to preparing work papers for children. This result reflects the findings of the OECD (Organisation for Economic Co-operation and Development) publications, which identified several countries in Europe where ICT use in schools remains below the OECD average (Eickelmann & Vennemann, 2017). This result may be due to several reasons such as lack of encouragement by kindergartens to use ICTs, teachers' unwillingness to use ICT in the educational process for fear of failure, teaching burden, and lack of training courses or it may be due to teachers' attitudes towards technology. Preradovic et al. (2017) argued that teachers' attitudes towards technology play an important role in implementing ICTs in their teaching. That is, the more positive attitudes teachers have towards ICTs the more likely to implement ICTs in their teaching.

Furthermore, the study findings showed that kindergarten teachers' production of therapeutic programs for educational settings was low. This finding may resulted from the lack of time available for teachers to produce remedial programs for educational settings. In addition, teachers do not have enough knowledge and experience in designing and producing educational software. Production of software needs high competencies in the preparation, design and implementation, which requires computer specialists. Research (e.g., Chen et al., 2021; Lorenz et al., 2015; Nikolopoulou & Gialamas, 2015) showed that lack of time, technological competencies, and technical or pedagogical support can serve as barriers to teachers in their attempt in implementing ICTs in their teaching.

Many teachers in kindergartens highlighted that the school curriculum did not require the use of ICTs skills, thus they were less inclined to develop these skills, whether to produce educational materials or to improve the educational process. This result is in line with the finding of Ozdemir (2017) who found in his study that one of the obstacles preventing teachers from applying ICT in their teaching was the unsuitability of Turkish curriculum for ICT. This finding indicates that school curriculum should be developed so that ICTs can be easily integrated into it.

In addition, although officials encourage developing teachers' technological skills and modernizing the educational systems at all levels to make the teacher highly capable in using technology, the reality was different from the

viewpoint of a number of teachers working in kindergartens. This may require instructions from official authorities requiring kindergarten owners to train their teachers in effective employment of ICT skills in teaching. Furthermore, teachers are convinced that the use of technology in their work will increase their burdens, which is further exasperated, as the use of technology in kindergartens is a new experience.

The other question asked in the present research was about the importance of using ICTs in kindergartens in remote areas of Jordan from teachers' perspectives. The results indicated that the importance of using ICTs in kindergartens from the kindergarten teachers' perspectives was "average". Most of the teachers indicated that the development of confidence in children in dealing with computer technologies from a young age is important. Also, the teachers pointed to the importance of ICT in helping them develop teaching and lifelong learning skills. However, on the other hand, they showed a low degree of importance of the ICTs in achieving integration with the curriculum in the development of literacy and numeracy skills.

It can be noted that the results of the degree of importance of ICTs corresponds to the results of the degree of ICTs use. The phrases that appeared with low levels of ICT use showed high levels of importance. The researchers attributed this result to teachers' awareness of the importance of computers in kindergarten education, and their perception of the role computers play in future educational process. This shows the importance of acquiring the skills and competencies related to using the computer in kindergarten education, which was confirmed by the result of statement 5 in the results section, "developing confidence in children by dealing with computer technologies from a young age", which ranked first. However, kindergarten teachers indicated the need for developments in some areas in kindergartens, which is confirmed by answering statement 1 in the results section, "achieving integration with the curriculum in the development of literacy and numeracy skills", ranked last. These results are in line with findings of other research (e.g., Chen, et al., 2021; Ghavifekr & Rosdy, 2015; Kalogiannakis, 2010; Preradovic et al., 2017), which indicated that kindergarten teachers are aware of the importance of ICT in changing the quality of children's learning and the role of the kindergarten teachers in making this change.

Another question asked in the present study concerned the obstacles of using ICTs in kindergartens in remote areas of Jordan. The study findings indicated that the impediments to the use of ICTs in kindergarten education from perspectives of teachers was of an "average" degree. Most of the obstacles faced by teachers centre on the subscriptions needed to engage with educational sites, outdated technological tools, lack of computers and their accessories in classrooms, and lack of training for teachers who are interested in using computers in education. These obstacles could deter teachers from developing technological skills and using ICTs in their teaching of kindergarten children. The above result supports the findings of other studies (e.g., Hsu, 2016; Liu & Pange, 2015; Magen-Nagar & Firstater, 2019; Nikolopoulou & Gialamas, 2015; Umar & Abu Hassan, 2015) which showed that a lack of technical and administrative support, inadequate training opportunities, lack of time, and lack of professional development were the most cited of obstacles faced by teachers.

On the other hand, the least cited obstacles faced by teachers centred on a lack of knowledge of computer-based teaching methods and computer malfunctions in the kindergarten when used. This latter result could be due to more than one reason as mentioned in teachers' answers, including that a high percentage of teachers possessed computer skills while studying at universities or colleges as compulsory study requirements in their academic programs. These computer related subjects were sufficient and had educational applications from the perspectives of teachers.

Regarding whether the degree of ICT use differs among kindergarten teachers according to educational qualifications, training in technology and teaching experience, the results showed significant differences in the degree of using ICTs according to educational qualification favoring the bachelor degree and higher. This may be due to time spent studying a bachelor's degree and higher which is twice as long as a college diploma. In addition, the number of subjects taken during their study were twice the number taken in the college diploma. Among these subjects, there were twice ICTs subjects, as a compulsory university requirement, at the bachelor's degree than at the college diploma degree.

Finally, the results indicated that there were no significant differences in the participants' responses to the degree of ICT use from teachers' perspectives according to the number of ICT training courses and teaching experience. This means that the number of ICT training course and years of experience does not have a clear role in the use of ICTs in education, and this may also be due to teachers' belief that the training courses are of theoretical nature without real practical applications that help teachers in the use of ICTs in education. Ihmeideh and Al-Maadadi (2018) found in their study that training in-service teacher to integrate ICT into teaching had a positive impact on teachers' perceptions and practices and reduced the obstacles teachers faced in employing ICTs in their teaching. Hence, it is of paramount importance to technically qualify teachers to change their beliefs about ICTs and achieve the objectives of the educational process and to enroll them in practical ICT training courses so that teachers can acquire the necessary knowledge and skills in an easy and fast way to use ICTs effectively in education.

Conclusion

The present study explored the perspectives of kindergarten teachers in remote areas in Jordan regarding the degree of use, importance of ICTs in kindergartens, and potential challenges. Results indicated that the use and importance of

ICTs from teachers' perspectives were of an "average" degree. Teachers valued the importance of using ICTs in their teaching, which confirms teachers' awareness of the future role that ICTs are expected to play in the educational process, and this has already happened during the COVID-19 pandemic where there has been a complete reliance on ICTs in teaching and learning.

However, the teachers expressed a number of obstacles that hindered the integration of ICTs in the educational process. These obstacles indicate the lack of interest in the pre-school stage from the relevant authorities, especially in terms of developing technological skills of teachers, and this urgently calls for qualifying teachers in kindergartens to use ICTs to keep pace with modern educational developments and overcome the obstacles.

Furthermore, the results showed that teachers who held a bachelor degree and higher, had higher use of ICTs in teaching than those who held a diploma qualification. As aforesaid this may be due to the time spent studying a bachelor's degree and the number of ICT subjects taken were twice the time and number taken in the college diploma. These results may benefit policymakers in the education sector by drawing their attention to the degree of ICT use in kindergartens and barriers that might hinder this use and teachers' beliefs about the importance of ICTs in education.

Recommendations

The present study results revealed that the degree of use and importance of ICTs in kindergartens from teachers' perspectives was "average". This result calls, especially after COVID-19 pandemic, for expansion of the adoption of ICT integration into kindergarten education and calls for training teachers on the basics of computing and how to implement activities using computer programs as a kind of innovation in teaching methods to attract children's attention and motivate them to learn. Further, it is recommended that the ICT courses offered by Jordanian universities to pre-service kindergarten teachers should be of a practical nature and not be offered only in theory. That is, the focus should be on teaching with ICTs, rather than teaching about ICTs.

Furthermore, the integration of ICTs in kindergarten education cannot be effective without having teachers with positive attitudes towards ICTs. Therefore, pre-service and in-service kindergarten teachers need to recognize the crucial role of technology in the educational process and be motivated by educating them through seminars and workshops about the importance of ICTs in facilitating the teaching process in all its aspects.

In addition, with the presence of the COVID-19 pandemic, the need has even increased to expand the use of ICTs in terms of developing a clear strategy by those who are in charge of the educational process, which can contribute to defining a clear vision for the integration of ICTs in kindergartens. This also requires providing the necessary instructions for the use of ICTs through professional supervisors in this field, besides finding effective solutions to the obstacles that limit the use of ICTs in the educational process. This suggests carrying in-depth studies on ICT integration based on what obstacles teachers face while using ICTs in their daily teaching.

Finally, it must be noted that the participants in the current study were female teachers, because the majority of kindergarten teachers in Jordan are female. Therefore, it will be interesting in future research, perhaps in other countries, to involve male teachers in their investigations to gain new insights into ICT integration and use in kindergarten.

Limitations

The findings of the present study are limited to the validity of the instrument and methodology used. Besides, the study participants were female teachers from kindergartens in the North-Eastern Badia, North-West Badia, and South Badia in Jordan. Hence, it is highly recommended for future research to consider involving male teachers from other parts of Jordan.

Authorship Contribution Statement

Alomyan: Conceptualization, design, analysis, writing, final approval. Alelaimat: Editing, supervision, editing and critical revision of manuscript.

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