Strategies and Action Plans for Integrating ICT into Saudi Elementary Schools Curricula: The Case of Tabuk District of Education

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***Abstract*—The primary goal of this study was to obtain empirical data on the current use of information technology by elementary school teachers and students in the Tabuk District of Education to suggest strategies and action plans for integrating educational technologies in Saudi elementary schools. More specifically, the study aimed to give an overview of Tabuk elementary teachers' current level of integration of information and communication technologies (ICTs) in their teaching and to examine their perceptions of obstacles and challenges that may affect integrating ICTs in instruction. Based on the results of this study, recommendations for practice, administrators, and future research were proposed.**

***Index Terms*—Education technology, ICT integration, instructional technology.**

I. Introduction

The world we live in today is very different from what it was during the past century. This shift is a direct result of the rapid development of technological innovations. Although the 19th century was characterized by the Industrial Revolution that increased human production capacity, the 20th century witnessed tremendous development in computer technology that helped humans invent new ways to live and work. Education is perhaps most affected by this technological development given the huge changes that resulted from the use of computer technologies. Therefore, most countries throughout the world have integrated technology innovations in schools using different methods to increase the quality of teaching and learning [1], [2].

However, to be effective and successful, the integration process must be based on evidence-based policy formulation. Thus, the primary goal of this study was to obtain empirical data on the current use of information technology by elementary school teachers and students in the Tabuk District of Education to suggest strategies and action plans for integrating educational technologies in Saudi elementary schools. More specifically, the study aimed to (a) give an overview of Tabuk elementary teachers' current level of integration of information and communication technologies (ICTs) in their teaching, (b) give an overview of the various hardware and software available for the teachers, (c) examine teachers' perceptions of obstacles and challenges that may affect integrating ICTs in instruction, (d) identify the availability of technical and instructional support for integrating ICTs in instruction, (e) examine teachers' perceptions of their own personal technical expertise, (f) examine teachers' perceptions of the importance of integrating different ICTs in instruction, and (g) investigate the relationship between teachers' selected personal characteristics and the teachers' current ICT integration level.

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II. The Importance of ICT in Schools

According to the Partnership for 21st Century Skills (P21) [3], a group of major business and education organizations formed in 2002, there is a profound gap between the knowledge and skills that most students learn in schools and what students need to know to succeed in typical 21st-century communities and workplaces. P21 argues that economic, technological, informational, and political factors have dramatically changed the way people live and work. As a result of these changes, students today are expected to spend their adult lives working in a multitasking, technology-driven world. Thus, to prepare students, we must commit to ensuring that all students—regardless of their economic background—have equal access to this new technological world [3].

Learners in the 21st century are exposed to different types of ICTs, including computers, digital mobile devices (iPods, smartphones, etc.), and online games. Learners know how to access the Internet, participate in social networks (Facebook, Twitter, etc.), send e-mails, and exchange images and videos. Thus, the teachers of such tech-savvy students should infuse technology in instruction to gain their students' attention and increase their motivation for learning. In addition, with a state-funded technology mandate, teachers are increasingly required to use technology, not only to improve students' learning but also to enrich professional practice and provide positive models for students, colleagues, and the community. According to P21, "Education that prepares students for learning in this complex, digital society will be more meaningful to students and, ultimately, more effective in preparing them for the future" [3].

Throughout the world, many countries have realized the vital role of ICT in improving the quality of education and started to integrate ICTs in schools using different ways [1], [4]. For example, the Australian Department of Education, along with state and territory governments, has established a

national framework for the Digital Education Revolution. The goal of this framework was to "contribute sustainable and meaningful change to teaching and learning in Australian schools to prepare students for further education and training and for living and working in a digital world" [5]. This framework identified 10 elements for successfully and effectively integrating ICT. These included the following:

1) Personalizing and extending student learning;
2) Enabling leadership;
3) Supporting professional learning;
4) Connecting learning beyond the school;
5) Improving student assessment and reporting;
6) Developing, measuring, and monitoring student ICT capabilities;
7) Accessing and utilizing student information;
8) Providing, accessing, and managing teaching and learning processes;
9) Automating business processes; and
10) Providing reliable infrastructure.

For each element, a set of statements describes the schools' progressive level of readiness. The three levels of readiness included in the framework are the developing school, the accomplished school, and the leading school [5].

Similarly, the Northern Ireland Department of Education, based on extensive discussions with all of the mainstream stakeholders in the school service and contributions from various conferences and meetings, has developed a new strategy for integrating ICT in schools called emPowering Schools. The strategy focuses on the role of technology in enhancing and transforming education in schools. The strategy also called for integrating education technology across the complex range of school services, encompassing curriculum development, school leadership, and professional development. According to the Northern Ireland Department of Education [6], the emPowering Schools Strategy aims to do the following:

1) Enhance and individualize learners' educational experience, helping them to enjoy learning, improve their performance, and raise standards;
2) Improve the learners' standards in literacy, numeracy and other areas of study;
3) Elevate learners' creativity, developing their digital and visual literacies;
4) Personalize learning and teaching and improve arrangements for assessment, record-keeping and reporting;
5) Provide learners with an appropriate blend of non-technological and online methods of teaching, connecting them to other learners through online networks;
6) Help learners develop the skills needed to be economically active in the global knowledge economy; and
7) Blur the boundary between learning in and out of school, extending the partnership between the school, the home, and the community.

III. ICT Integration Strategies

Wang [7] constructed a generic model of ICT integration based on the following three theoretical foundations: constructivist learning theories, the design of interactivity, and the usefulness of a system. He claimed that since cognitive constructivists believe that learners construct their own knowledge based on their previous experiences and new information and teachers are facilitators in the learning environment, pedagogical design should support and satisfy the needs of individual learners and enable teachers to scaffold learners during the learning process. In addition, he claimed that since social constructivists believe that learning is promoted through interactive processes of discussion and information sharing, the pedagogical design of the learning environment should encourage such collaboration.

Lim [8] examined and analyzed how ICT was implemented and effectively integrated in Singapore schools in a way that helped learners engage in higher-order thinking. According to Lim, Singapore schools started integrating ICT in 1997 when the first Masterplan (MP1) was launched. The major goal of MP1 was to "ensure that schools integrated ICT in their curriculum so as to develop a culture of thinking, lifelong learning, and social responsibility" [8]. By 2002, the ICT integration process in Singapore schools had achieved a significant level of development and constancy. By the end of 2000, Lim and other four researchers from the Singapore Ministry of Education proposed a three year-research study entitled "Effective integration of ICT in Singapore schools: Pedagogical and policy implications." The study emphasized the following findings:

1) There were three elements of well-managed ICT lessons: availability of ICT tools, establishment of disciplinary educational rules and procedures, and division of labor among teachers, teaching assistants (TAs), and students.
2) In the ICT-mediated learning environment, learners have more autonomy and control over their own learning and learning sequences.
3) In the ICT-mediated learning environment, teachers use various scaffolding strategies to help learners accomplish learning tasks. These strategies include orienting activities, peer interactions, prompts, and modeling.
4) Policy makers and school administrators in the case studies have adopted some strategies to manage the barriers to effective ICT integration. These strategies include planning peer demonstrations, initiating industry-teacher partnership, equipping teachers with laptops, and creating a shared ICT vision and integration plan.

MacDonald [9] claimed that investigating a community of practice (CoP) through a designed-based study can contribute to effective research on ICT. According to MacDonald, research studies suggest that only a few teachers integrate ICT in their curriculum in ways that enhance student learning. These studies attributed the low level of ICT integration to the lack of professional development. Therefore, MacDonald asserted that professional development programs should be "ongoing and designed to address particular teachers' needs regarding how and when to use ICTs" [9]. He also asserted that a CoP can be an effective mode of professional development to support ICT integration in curriculum especially when it is supported by design-based research.

Goktas, Yildirim, and Yildirim [10] conducted a study to define the major barriers and possible enablers for integrating ICTs in Turkey's pre-service teacher education programs. The study results revealed that most stakeholders believed that "lack of in-service training," "lack of appropriate software and materials," and "lack of hardware" were the main obstacles for ICT integration into pre-service teacher education programs. In addition to these obstacles, the qualitative data revealed the following as major obstacles: inadequate number of ICT-related courses, lack of technology plans, crowded classrooms, lack of computers and other presentation equipment, lack of successful institutional models for Schools for Teachers Education (STEs), lack of motivation of the teacher educators, and lack of motivation of prospective teachers.

Robertson, Grady, Fluck, and Webb [11] conducted a study to outline issues and themes that Australian school leaders perceive important to effectively and successfully integrate ICT in their schools' curricula. Using a flexible interview structure, the research team conducted 64 conversations with principals, classrooms teachers, ICT coordinators, and a technical support person in 50 primary schools in Tasmania. Following are the five most important themes mentioned by the school-based participants:

1) 23 % of participants viewed professional development programs for teachers, technicians, and aides as important to successfully integrate ICT.
2) 28 % of participants indicated that the reliability of ICT hardware and software is an integral consideration.
3) 30 % of the participants mentioned that students need to acquire ICT-related skills.
4) 22 % of the participants believed that the implementation of ICT in schools should coincide with changes in school structures, processes, and pedagogies.

UNESCO's Division of Education [12] has suggested an ICT development model. The new model conceives ICT development as a continuum along which an educational organization or individual educators can use to identify the approach that relates to the growth of ICT for their particular context. The new model included four broad approaches through which educational institutions and educators can adopt and use ICT. These are the emerging approach, applying approach, infusing approach, and transforming approach. According to this model, schools that are at the beginning stages of ICT development demonstrate the *emerging approach*. These schools begin to purchase some computing equipment and software. Administrators and teachers in such schools are just starting to discover the attributes and consequences of using ICTs for school management and integrating them into curriculum. Schools at this early stage of development still depend on the traditional style of education in which teachers are the center of the educational environment. The curricula of these schools increasingly integrate the basic skills and knowledge regarding ICT that will assist the schools in progressing to the following stage of development.

In the *applying stage of development*, schools usually develop their understanding of the role of ICT in learning. Administrators and teachers in these schools use ICT to complete tasks related to school management and curriculum development (e.g., the use of electronic slide presentations and word-processed handouts). However, teachers still largely control the learning environment, and ICT tools are usually used to complete required lessons and assessed on predetermined content. Learners in such schools have access to technology by using one or two classroom computers and computer labs. ICT in this stage of development is perceived and taught as a separate subject area. Thus, for these schools to move to the next stage of ICT development, they must implement an ICT-based curriculum that increases ICT across various subject areas [12].

Schools at the *infusing stage of development* have different types of technology innovations in classrooms and the administration. Teachers in such schools have already discovered new ways through which they can use ICT to change their personal productivity and professional practice. The curriculum has also changed to include subject areas to mirror real-world applications. Learners in such schools have access to technology that helps them select projects and ICT tools that motivate learning and show the learners' knowledge across subject areas [12].

The *transforming approach*, the last stage of ICT development, is associated with schools that have used ICT to creatively develop and improve the school organization. During this stage, ICT becomes a vital part of the day-to-day personal productivity and professional practice. The learner is the center of the curriculum. For instance, students may work with community leaders to solve local problems by accessing, analyzing, reporting, and presenting information with ICT tools. Learners have unlimited access to ICT and are held responsible for their own learning [12].

IV. Research Questions

The following research questions were addressed:

1) To what extent are elementary school teachers in the Tabuk District integrating ICTs in instruction?
2) What types of ICTs are available for elementary school teachers in the Tabuk District?
3) What are the perceived obstacles and challenges to integrating ICTs in instruction?
4) What types of technical and instructional support are available to teachers for integrating ICTs in their instruction?
5) What are teachers' perceptions of the importance of integrating ICTs in instruction?
6) Are there distinguishing characteristics between teachers who report no or minimal integration of ICTs in instruction and teachers who report extensive integration?

V. Research Methodology

The research design of this study was descriptive and correlational. This type of research was chosen since it would provide the researcher with a quantitative description of (a) the current use of information technology by elementary school teachers, (b), their attitudes about and perceptions of ICT integration, and (c) the obstacles and challenges that may

prevent such integration. The purpose of survey research is to generalize from a sample to a population, which enables researchers to make inferences about some characteristics, attitudes, opinions, or behavior of this population. There are many advantages of using survey research, including the economy of the design and the rapid turnaround in data collection. However, the most important advantage of using this type of research is the ability to identify attributes of a large population from a small group of individuals [13], [14].

Data were collected using a self-administered and cross-sectional questionnaire. Self-administered questionnaires help researchers to (a) measure variables with numerous values or response categories, (b) investigate attitudes and opinions, and (c) describe the characteristics of a large population [14]. According to Kumar [15], cross-sectional studies or, as they sometimes called, one-shot or status studies, are the most common design used in social sciences. The main purpose of cross-sectional studies is to find out "the prevalence of a phenomenon, situation, problem, attitude or issue, by taking a cross-section of the problem" [15]. Thus, cross-sectional studies, which are useful in obtaining an overview picture as it stands at the time of the study, are employed in this study to present data about the sample. In addition, inferential statistics were used to allow the researcher to make inferences about the population of teachers in Saudi schools based on findings from the sample of teachers in the Tabuk District of Education [16].

The target population of this study included all elementary school teachers in the Tabuk District. The survey instrument used in this study was designed by Hutchison [17], who examined U.S. literacy teachers' perceptions of barriers to successfully integrating ICT in instruction and identified the demographic environmental factors affecting such integration. The sampling design of this population was single-stage probability sampling. The sample was randomly selected using a systematic random sampling procedure [13], [16]. In this study, the sample size was one-tenth of the population size as suggested by Grinnell [18]. According to Grinnell, usually a sample size of one-tenth of the population, with a minimum of 30, is considered sufficient to provide reasonable control over sampling error.

Of the 120 randomly selected teachers, a total of 81 responses were received within the predetermined response period. Of these responses, 69 were usable, resulting in a usable response rate of 57.5 %.

VI. Results and Major Conclusions

A. Findings Related to Question 1

The first question was designed to assess the extent to which teachers use ICTs in their classrooms. *A total ICT use score* was calculated for each teacher based on the extent to which they integrate each skill in instruction. Interpretations for each skill reported being used were based on the following scales: small extent = 1 point, moderate extent = 2 points, and large extent = 3 points. The scores were added together to create a composite *total ICT use score*. The total possible score was 54. Table I summarizes the frequency of using ICTs in instructional activities as reported by the teachers. There were six activities that more than half of the teachers reported using to a "small extent." These included sending e-mail, playing educational games on CD, playing educational games online, publishing information on a wiki or blog, publishing information on a website, communicating using Instant Messenger or other chat tools, and collaborating online with students from other classes. However, more than half of the teachers reported using the following activities to a moderate or large extent: gathering pictures online and synthesizing information online.

B. Findings Related to Question 2

The second research question targeted to give an overview of the varied hardware and software available for the teachers. Table II summarizes the results. The data indicated that most teachers have access to Internet-connected computers in their schools; however, less than a quarter of the teachers reported access to Internet-connected computers inside classrooms. However, about two-thirds of the respondents reported the digital projectors are available. The least common ICTs in classroom are PDAs.

TABLE I: Relative Frequency of Using Information and Communication Technologies in Instructional Activities (N = 69)

Statement	Small extent		Moderate extent		Large extent		Not applicable	
	f	%	*f*	%	*f*	%	*f*	%
Creating a Word document	25	36.2	16	23.2	15	21.7	13	18.8
Sending e-mail	38	55.1	10	14.5	12	17.4	9	13.0
Playing educational games on a CD	36	52.2	12	17.4	12	17.4	9	13.0
Playing educational games online	41	59.4	11	15.9	9	13.0	8	11.6
Gathering pictures online	23	33.3	21	30.4	14	20.3	11	15.9
Reading a book online	26	37.7	15	21.7	14	20.3	11	14.5
Creating a multimedia presentation	28	40.6	22	31.9	9	13.0	10	14.5
Using online websites	15	21.7	12	17.4	17	24.6	25	36.2
Publishing information on a wiki or blog	50	72.5	11	15.9	6	8.7	2	2.9
Publishing information on a website	39	56.5	18	26.1	10	14.5	2	2.9
Communicating using Instant Messenger (IM) or other chat tools	35	50.7	14	20.3	10	14.5	10	14.5
Formulating questions to research online	23	33.3	13	18.8	12	17.4	21	30.4
Locating information online	16	23.2	10	14.5	15	21.7	28	40.6
Evaluating information online	32	46.4	15	21.7	11	15.9	11	15.9
Synthesizing information online	26	37.7	19	27.5	16	23.2	8	11.6
Searching for information online	10	14.5	15	21.7	12	17.4	32	46.4
Using specific search strategies to search for information online	25	36.2	23	33.3	9	13.0	12	17.4
Collaborating online with students from other classes	45	65.2	13	18.8	6	8.7	5	7.2

C. Findings Related to Question 3

TABLE III: TEACHERS' PERCEPTIONS OF POTENTIAL OBSTACLES AND CHALLENGES TO INTEGRATING ICTS (N = 69)

Obstacle	Not at all (%)	Small extent (%)	Moderate extent (%)	Large extent (%)	Not applicable
I don't think technology is reliable	56.6	20.3	10.1	2.9	10.1
I don't know how to use technology	39.1	30.4	10.1	5.8	14.5
I don't understand how to integrate technology in my teaching	34.8	30.4	15.9	2.9	15.9
I don't think technology fits my beliefs about learning	34.8	34.8	8.7	4.3	15.9
I don't think I have enough time to prepare to use technology	39.1	30.4	13.0	7.2	10.1
I don't believe technology integration is useful	36.2	21.7	13.0	5.8	23.2
I don't understand copyright issues	42.0	26.1	7.2	8.7	15.9
I have difficulty controlling what information students access online	31.9	31.9	17.4	10.1	8.7
I don't know how to evaluate or assess students when they work online	34.8	36.2	17.4	4.3	7.2
I have difficulty managing the classroom when students are working on computers	52.2	21.7	15.9	2.9	7.2
I don't know how skilled my students are at using technology	33.3	26.1	17.4	20.3	2.9
Lack of access to technology	31.9	15.9	10.1	37.7	4.3
Lack of incentives to use technology	29.0	15.9	21.7	33.3	0
Lack of time during a class period	34.8	20.3	24.6	17.4	2.9
Lack of technical support	14.5	27.5	18.8	37.7	1.4
Lack of professional development on how to integrate technology	23.2	24.6	15.9	34.8	1.4
Lack of funding	21.7	14.5	11.6	50.7	1.4
Lack of support from administrators	18.8	21.7	13.0	43.5	2.9

TABLE II: TEACHERS' ACCESS TO HARDWARE AND SOFTWARE (N = 69)

Hardware or software	Percent of teachers reporting access
Internet-connected computer(s) in the classroom	23.2
Internet-connected computer(s) in the school (outside the classroom)	72.5
Laptop computer at school for personal use	42.0
Laptop computers for each student	7.2
Digital projector	66.7
Interactive whiteboard	43.5
Student email	13.0
Document camera	23.2
Digital video recording equipment	13.0
Digital camera	21.7
Personal Data Assistant (PDA)	10.1

The third research question was designed to determine the perceived obstacles and challenges to integrating ICTs in instruction. Teachers were asked to define the extent to which they believe possible challenges and obstacles may prevent them from integrating ICTs in teaching. Table III summarizes the teachers' responses to each potential obstacle/challenge.

The results showed that more than half of the respondents believe that lack of funding is the greatest obstacle to ICT integration, followed by lack of support from administrators. Other obstacles included lack of access to technology (37.7 %), lack of incentives to use technology (33.3 %), lack of technical support (37.7 %), and lack of professional development on how to integrate technology (34.8 %).

D. Findings Related to Question 4

The purpose of the fourth question was to identify types of technical and instructional support available to teachers for integrating ICTs in teaching. Table IV lists the various types of technical support and the percentage of availability for each type of support as reported by teachers. About half of the teachers reported in-school instructional support was available; however, technical support was not available for most teachers at the school and district levels. Moreover, the results indicated that teachers were provided more support at the school level than at the district level. About one-fifth of the respondents reported no assistance was provided.

TABLE IV: SUPPORT AVAILABLE TO TEACHERS FOR INTEGRATING ICTS (N = 69)

Type of support	Percentage of teachers with this support available
In-school technology coordinator (for instructional support)	49.3
In-school technology coordinator (for technical support)	17.4
District technology coordinator (for instructional support)	29.0
District technology coordinator (for technical support)	15.9
Administrative support (for obtaining resources, PD, etc.)	36.2
Library/media specialist	40.6
Another teacher who assists with technology	33.3
No assistance is provided	21.7

TABLE V: TEACHERS' PERCEPTIONS OF THE IMPORTANCE OF INTEGRATING VARIOUS ICTS IN INSTRUCTION (N = 69)

Instructional activity	Not at all (%)	Small extent (%)	Moderate extent (%)	Large extent (%)	Not sure (%)
Creating a Word document	29.0	21.7	11.6	36.2	1.4
Sending e-mail	37.7	14.5	21.7	21.7	4.3
Playing educational games on a CD	31.9	21.7	21.7	24.6	0
Playing educational games online	31.9	20.3	24.6	23.2	0
Gathering pictures online	20.3	27.5	18.8	33.3	0
Reading a book online	20.3	23.2	24.6	31.9	0
Creating a multimedia presentation	18.8	24.6	18.8	37.7	0
Using online websites	14.5	21.7	13.0	50.7	0
Publishing information on a wiki or blog	34.8	21.7	21.7	17.4	4.3
Publishing information on a website	27.5	27.5	21.7	20.3	2.9
Communicating using Instant Messenger (IM) or other chat tools	31.9	21.7	18.8	24.6	2.9
Formulating questions to research online	26.1	20.3	17.4	36.2	0
Locating information online	17.4	15.9	18.8	47.8	0
Evaluating information online	26.1	23.2	20.3	26.1	4.3
Synthesizing information online	29.0	21.7	15.9	31.9	1.4
Searching for information online	14.5	15.9	17.4	50.7	1.4
Using specific search strategies to search for information online	27.5	20.3	27.5	24.6	0
Collaborating online with students from other classes	36.2	14.5	15.9	29.0	4.3

Teachers were also asked to evaluate their own abilities in using technology in teaching in general and how prepared they believe they are in terms of teaching students the technical skills they may need. Most of the teachers (43.5 %) believe that they are prepared to a large extent to teach the students the technical skills they may need. In contrast, only four teachers (5.8 %) believe that they are not prepared at all. About half of the respondents (49.3 %) believe that they are skilled at using technology in general.

More than half of the teachers (59.4 %) believe that they are skilled at using digital technology for instruction to a small or a moderate extent. More than one-third of the respondents (37.7 %), however, believe that they are largely skilled at using digital technology for instruction.

When asked about whether they would increase the level of ICT integration in their own instruction, most teachers (60.9 %) reported that they would largely increase their ICT integration.

E. Findings Related to Question 5

The fifth question was designed to assess teachers' perceptions of the importance of integrating a number of ICTs into their instruction. Respondents were asked to indicate how important they believe integrating each defined ICT is, assuming the ICTs were available. Table V illustrates the results for the various ICTs.

Of the 18 instructional activities that included integrating various ICTs, three activities were reported to be the most important. These were "using online websites" (50.7 %), "searching for information online" (50.7 %), and "locating information online" (47.8 %). However, the least important activities were reported are "sending e-mails" (37.7 %), "collaborating online with students from other classes" (36.2 %), and "publishing information on a wiki or a blog" (34.8 %).

F. Findings Related to Question 6

The purpose of the sixth research question was to examine whether teachers' selected personal characteristics differ between those who report no or minimal integration of ICTs in instruction and teachers who reported extensive integration. The relationship between teachers' total ICT use (the total ICT use score) and teachers' selected characteristics included (a) whether a child has ever helped the teacher learn to use a new technology, (b) whether the teachers have children of their own, (c) the extent to which teachers believe they are skilled at using technology in general, (d) the extent to which teachers reported that they would like to increase their ICT level of integration, and (e) the number of years of teaching experience.

To evaluate the relationship between teachers' total ICT use (the total ICT use score) and whether a child has ever helped them learn to use a new technology, an independent sample t-test was conducted. The test revealed that there is no statistically significant difference in total ICT use score among respondents based on whether a child has ever helped them learn to use a new technology.

To evaluate the relationship between teachers' total ICT use (the total ICT use score) and whether they have children of their own, an independent sample t-test was conducted. The test revealed that there is no statistically significant difference in total ICT use score among respondents based on whether they have children of their own.

A one-way analysis of variance (ANOVA) was then conducted to evaluate the differences in the total ICT score based on the extent to which teachers believe they are skilled at using technology in general. The independent variable,

teachers' belief about their technology skills, included four levels: not skilled at all, skilled to a small extent, skilled to a moderate extent, and skilled to a large extent. The dependent variable was the total ICT scores of the four groups. The ANOVA was significant, $F(3,65) = 3.30$, $p < 0.05$ ($\eta^2 = 0.13$).

A Tukey honestly significant difference (HSD) post-hoc test was conducted to evaluate pairwise differences among the means of the four groups. Analysis revealed that there were no significant differences among the means of the four groups ($p > 0.05$).

A one-way analysis of variance was then conducted to evaluate the differences in total ICT score based on the extent to which teachers indicated that they would like to increase the integration of ICTs in their instruction. The independent variable, the extent to which teachers would like to increase the integration of ICTs into their instruction, included four levels: not at all, to a small extent, to a moderate extent, and to a large extent. The dependent variable was the total ICT scores of the four groups. The ANOVA was significant, $F(3,65) = 5.10$, $p < 0.05$ ($\eta^2 = 0.19$).

A Tukey HSD post-hoc test was conducted to evaluate pairwise differences among the means of the four groups. Analysis revealed that there was a significant difference in the means between teachers who indicated that they would not at all increase their ICT integration and those who indicated that they would increase their ICT integration to a large extent. Teachers who indicated that they would increase their ICT integration to a large extent had significantly higher total ICT use scores ($M = 23.43$, $p = .03$) compared to those who indicated that they would not at all increase their ICTs integration ($M = 1.67$). In addition, there was a significant difference in the means between the group that indicated that they would increase their ICT integration to a large extent and the one that indicated that they would increase their ICT integration to a small extent. Teachers who indicated that they would increase their ICT integration to a large extent had significantly higher total ICT use scores ($M = 23.43$, $p = 0.03$) compared to those who indicated that they would increase their ICT integration to a small extent ($M = 8.43$).

A one-way analysis of variance was then conducted to evaluate the differences in total ICT score based on years of teaching experience. The independent variable, years of teaching experience, included four levels: 1-7 years, 8-14 years, 15-21 years, and 22 or more years. The dependent variable was the total ICT scores of the four groups. The ANOVA was not significant, ($p > 0.05$).

VII. Limitations of the Study

Several limitations might affect the results of this study. The possible limitations were as follows: (1) The participants of this study came from elementary schools in the Tabuk District of Education. The study was limited to the teachers in these schools; administrators and students were not included. (2) This study did not cover all of the factors affecting ICT integration in elementary school curricula. Other factors such as age, gender, and type of school (private vs. public) that may affect such integration were not included in this study.

VIII. Recommendations for Practice

Based on the results of this study, the following recommendations are offered to the administrators in Saudi education districts:

1) Each school should establish/develop a central unit to serve as a clearinghouse for information and projects regarding ICT integration. Establishing this unit would help in providing teachers with information about the availability of ICTs, instructional training, and support needed to implement the changes in teaching methodology necessary to integrate ICTs. This unit should also provide sufficient and reliable technical support for teachers and students.
2) Training programs should be conducted throughout the academic year. These programs should be provided by the central unit and designed to provide teachers with "hand-on" workshops and seminars on integrating ICTs. These training sessions should include not only workshops and tutorials but also collaboration between experienced and non-experienced teachers. Thus, schools should encourage experienced teachers to demonstrate to their peers how they are effectively integrating ICTs in instruction based on their philosophy and pedagogy. This can be done through face-to-face showcases or conferences in which teachers are given the opportunity to demonstrate innovative learning-centered pedagogies that they had successfully implemented.
3) Training sessions should cover various topics such as course development, best practices, online interaction, technology training, and the most current literature and research on integrating ICTs. In addition, Saudi districts of education build their own training programs based on a detailed assessment for their teachers' instructional needs and expectations. This requires a needs analysis before any training programs are launched.
4) The results showed that more than half of the respondents believe that lack of funding is the greatest obstacle to integrating ICTs, followed by lack of support from administrators and lack of access to technology. Thus, the Saudi Ministry of Education should establish district-level ICTs integration policies to ensure that teachers interested in integrating ICTs in instruction are supported by the administration and provided with the technology needed to support such integration including computer labs and high-speed Internet access. These district-level ICTs policies should also cover policies regarding incentives (e.g., monetary support and rewards) copyright issues, promotion, and tenure.

IX. Recommendations for Future Research

In light of the findings of this study, the researcher recommends the following areas for future research:

1) Although extensive research has been conducted in the United States and other countries on teachers' perceptions of integrating ICTs, very little is available on teachers at Saudi schools. Since many factors can influence such integration, further research should be

conducted that includes more teachers to reach more conclusive results. This would not only support the findings of this study but also extend the knowledge base available for administrators.

2) This study focused on the perceptions of teachers regarding integrating ICTs. Future studies should extend this work and focus on how students and administrators view integrating ICTs.
3) Rogers' diffusion of innovation theory should be employed as the theoretical framework of future studies to identify adopter categories among the teachers in relation to integrating ICTs. This would be helpful in understanding how to provide support that is effective for different categories of teachers (i.e., early adopters vs. late adopters) [19].
4) This study should be replicated in additional Saudi districts of education and at other levels of schools (i.e., middle schools and high schools).

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