

# A TEACHER'S PERSPECTIVE OF ICT INTEGRATION IN NORTHERN BORDERS PRIMARY SCHOOLS, SAUDI ARABIA

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## **ABSTRACT**

*The study aims to investigate why the ICT -related mandate fails to facilitate Saudi primary school teachers turn from formal ICT adopters into effective ICT implementers, discuss the possibility of ICT adoption for system-wide implementation in Saudi primary education by balancing systemic versus local implementation initiatives, and identify strategies for transformative change in the Saudi mandatory context of ICT adoption across educational stages. From the findings, it is recommended that Saudi primary school teachers should use their ICT adoption to collectively create a friendly ICT-related environment that is an alternative to Saudi traditional primary education.*

## **KEYWORDS**

*ICT integration, primary school, ICT implementer, Stages of concern, levels of use.*

## **1. INTRODUCTION**

The movement towards quality primary education is inherent in the ongoing ICT-related reform in Saudi Arabia. Saudi policy directives within the ongoing reform require for mandatory ICT adoption across educational levels. The mandate is given to 107,227 male and 110,328 female teachers who work in Saudi primary schools (Almalki & Williams, 2012, p. 43). However, the expectations of the mandate have not been realized, since the possibility of ICT adoption has failed to lead to ICT-related system-wide implementation. Mandatory ICT adoption in Saudi primary schools is not supported by the infrastructure, efficient training, and an ICT-related culture in educational practices. The efforts of reframing the educational environment in Saudi primary education are impeded because the mandate confirms the presence of some ICT tools in primary schools but neglects quality of ICT-related teaching. Teachers are not able to keep pace with the digital age, their ICT adoption accountability level is low, and they are poorly rewarded and motivated for their uses of technology (Alhandi, 2014, p. 3). This results in poor academic progress of Saudi students at the basic educational level. According to the recent national report (Saudi Arabia's Education System, 2014), half of the Saudi male students failed to succeed in acquiring a basic education after four years of primary school; although girls study better than boys, only one-third of girls acquired a basic education. Like other Arab countries, the Kingdom of Saudi Arabia demonstrates slow rates of incorporating technology into primary education (Alodiedat & Eyadat, 2008). The apparent discrepancy between mandatory ICT adoption and the movement towards ICT implementation needs investigation and analysis.

*This study aims to (1) evaluate the current ICT-related situation in primary schools located in the Northern Borders area of Saudi Arabia, (2) identify ICT-related priorities from a primary teacher*

perspective, and (3) develop ICT-related strategies to enhance the continuity of technology implementation within a holistic approach to Saudi education reform.

## **2. LITERATURE REVIEW**

A blended approach, combining the use of ICT and traditional methods of teaching, is most effective at the present stage of ICT integration worldwide (Hedberg, 2011; Al-Qahtani & Higgins, 2013). According to Hedberg (2011), higher levels of ICT use are correlated with an instructor's ability to prepare interactive sequences, create recorded sequences, direct access to resources, and utilize a range of construction tools. In 2004 the Saudi Ministry of Education launched an ICT-related reform, which is an attempt at creating a blended learning environment across educational stages in Saudi Arabia. Before the reform, it was a teacher's personal initiative to use available ICT tools. After the reform, all Saudi teachers automatically turned into ICT adopters. The mandate, however, was supported by neither the infrastructure nor proper training. A reforming decade has revealed many obstacles that are in the way of developing a disruptive pedagogy to integrate technology into traditional schooling. Local implementation initiatives are impeded by lack of funding and lack of ICT-related standards that can be recognized at the national level.

Surprisingly little research has been done regarding ICT integration in Saudi primary schools. Most research concentrates on the ICT-related reform at higher levels within the Saudi educational system. As the stages are transformed as if they were separate, no continuity in ICT integration across educational levels is observed. The primary stage of education is somewhat neglected by the Saudi ICT reformers. But transformative change should begin at this very initial level in response to the digital age. From current research, Saudi primary education shares with other stages of education similar obstacles such as lack of supporting technology, the absence of culture of teaching and learning in a blended environment, resistance of teachers, and others (Alebaikan and Troudi, 2010).

In Saudi primary schools ICT integration has stopped at mandatory ICT adoption. Lack of the ICT-related infrastructure has negative influences on the pace of ICT-related reform in Saudi primary education. Al Mulkim (2013) claims that Saudi primary school teachers have a low level of ICT skills, including Word, PowerPoint, and the Internet; this lack of technical skills impedes Saudi primary school teachers from effective uses of technology in the classroom.

Alhawiti (2013) states that sending emails, playing educational games on CDs, playing educational games online, publishing information on a wiki or blog, publishing information on a website, and communicating via Internet are six main activities in which primary school teachers from the Saudi Tabuk District of Education are involved. Chat tools and online collaborative activities with students are poorly used. In his research, Alhawiti has found that more than half of the participants reported their preferences to gather pictures online and synthesize information online (Alhawiti, 2013, p. 180). The surveyed teachers complain about lack of funding, inadequate access to technology, lack of technical support, and lack of professional development. At the same time, half of the participants assessed their ICT skills as small or moderate, while one third of the participants considered themselves to be largely skilled in using ICT. Alhawiti has identified such popular ICT activities among the participants as using online websites, searching for information online, and locating information online.

In line with the strategic view of improving the uses of ICT in Saudi primary schools, Almalki and Williams (2012) give priorities to such areas of improvement as teacher confidence, teacher competence, positive attitudes to the present of ICTs, ICT training, and local technical and administrative support.

Not only in the Saudi context but also worldwide is the ICT-related task of primary education specific. It is primary education that creates a solid basis for further ICT implementation. From this perspective, specifics of ICT-related primary education cannot be neglected because primary educators appear to be responsible for an ICT friendly blended learning environment that becomes a norm to both teachers and students at the outset of educational practices and experiences.

In this regard, Saudi primary education experiences the same problems as other primary educational systems worldwide. In his analysis of technology-enhanced learning in British primary and secondary schools, Passey (2006) identifies such problems for ICT integration as identification of the roles of ICT and learning, the nature and processes of learning with technology, impacts of discrete forms of ICT on the teaching and learning process, and adequate pedagogical uses of each technology. In their study of collaborative learning in Spanish primary schools, Garcia-Valcarcel and co-authors (2014) rightly claim that as early as primary education there is a strong demand for transformative change dealing with curriculum development, collaborative projects, teacher professional development, increased student learning, promoting student motivation and satisfaction, among other issues.

In Saudi Arabia, the roles of ICT at the primary level of education are still unidentified, the uses of ICT are haphazard and non-systemic, and appropriate uses of the limited number of devices that are available in primary schools are poorly studied. The Saudi primary teachers are under the pressure of local adoption of ICT within the limits of available ICT devices and standard implementation required by the ICT adoption mandate.

### **3. RESEARCH QUESTIONS**

Systemic transformative change of Saudi primary teachers from ICT adopters to ICT implementers is central to this study's research questions:

- (1) What prevents Saudi primary school teachers from becoming ICT implementers a decade after the launch of the ICT-related education reform?
- (2) What transformative change will turn Saudi primary school teachers into ICT implementers?
- (3) Is an ICT-related mandate an advantage or disadvantage in the Saudi primary school context?

### **4. RESEARCH METHODOLOGY**

This study adopts the grounded theory approach (Charmaz, 2006) within the qualitative inquiry framework based on simultaneous data collection and analysis. The grounded theory approach is used as an overarching methodology to study transformative change necessary for turning from mandatory ICT adopters to ICT implementers in the specific educational context.

Data were collected by means of structured directive interview, which is a fixed-format interview with all questions prepared beforehand. This type of interview is adjusted to a segregated system of education, enabling the male researcher to train the female assistant to conduct interviews in a Saudi primary school for girls. In compliance with the demands of a segregated system of education, the male researcher cannot conduct a face-to-face interview with a female teacher in a school for girls. He needs to female assistant who conducts a face-to-face interview using a list of prepared questions and making notes with regard to availability and access to the ICT tools observed. Data analysis by constant comparison between teacher performances in male and female primary schools is essential to study the segregated Saudi education system.

The evidence gathered is analyzed as follows: (1) initial probability sampling provides data for coding; (2) open coding of data; (3) analysis by the constant comparative method; (4) theoretical sorting of meaning; (5) identifying a core category; (6) integrating a central theoretical framework; (7) coding and analyzing; and (8) building a theoretical construct (O'Donoghue & Punch, 2003). The questions in the interview were compiled in accordance with the research questions in order to find out the meaning of the mandate to ICT adoption, uses of ICT tools, access to them and availability, perceptions of using ICT tools and their evaluation with regard to traditional methods of education. The grounded theory approach allows the researcher to follow the answers provided by the teachers without influencing their responses.

Data were collected from the Saudi Northern Borders province, which is the least populated part of Saudi Arabia with 320,000 people. It consists of three governorates: Arar, Rafha, and Turayf. The reasons for selecting this education district are as follows. First, the Northern Borders province is remote from the central parts of Saudi Arabia, so the reforming ICT-related process may be marked by certain peculiarities in comparison with other parts of Saudi Arabia. Second, no research has been done on ICT integration in this district, as the pilot projects of Saudi education reform are implemented in big urban centers like Jeddah and Riyadh. Third, the primary school teachers in this district may be less dependent on the guidelines of the Ministry of Education.

The CBAM model was used to transcribe and translate interviews were scored using stages of concern, so that each instance of talk was be coded with a stage of concern ranging from 1 to 6, corresponding to the CBAM model: Stage 0 – awareness level; Stage 1 – level of information; Stage 2 – personal level; Stage 3 – management level; Stage 4 – level of consequence; Stage 5 – collaboration level; and Stage 6 – level of refocusing. The levels of use describe the current state of each implementer. They are encoded in line with (Hall, 2010, p. 236): VI – Renewal (the teacher is seeking more effective alternatives to ICT integration); V – Integration (the teacher is making deliberate efforts to coordinate with other teachers in ICT uses); IVB – Refinement (the user is making changes to increase the outcomes of ICT use); IVA – Routine (the teacher is making few or no changes and has an established pattern of ICT use); III – Mechanical use (the teacher is using ICT in a poorly-coordinated manner); II – Preparation (the teacher gets prepared for ICT uses); I – Orientation (the teacher is seeking information about ICT use); 0 – Non-use (the teacher takes no action with respect to ICT use). Both stages of concern and levels of use were used as working codes.

#### *Data Collection*

Twelve teachers were interviewed (6 males and 6 females). Two teachers from the school for boys and 2 teachers from the school for girls from each governorate (a total of 4 teachers from Afar, 4 teachers from Rafha, and 4 teachers from Turayf) were interviewed. This equal presentation with the segregation system of education is important to avoid potential biases. The interviews were conducted in the interviewed teachers' natural surroundings, namely, in their classrooms and at their convenience, with the permission from the Northern Borders authorities.

The interview was recorded on tape following confirmation from the interviewees. The male researcher interviewed male teachers and his female assistant interviewed female teachers in compliance with the segregation system of education in Saudi Arabia. Participant observation was in line with grounded theory research. Notes about observations were complimentary to the interviews; the notes provided the observers (the researcher and his female assistant) with information that could be hidden by teachers and school administrators. Following the pattern that exists at the province's level, teachers from both schools for boys and schools for girls are equally represented in the sampling.

*Limitations of the study*

There are some limitations to this study, including time and costs, which meant that the sample was small and represented one region in relation to the current educational structure in Saudi Arabia . Since education is a constantly changing process, the application of the study may affect its results in another period of time.

*Data analysis*

*Data for coding*

The data collected show that primary schools for girls in the Northern Borders province of Saudi Arabia are better equipped with technology than primary schools for boys. Only Arar had computer laboratories in both schools for boys and for girls, which were equipped, respectively, with 20 and 30 computers. The school for boys in Turayf had no computer laboratory, whereas the school for girls in the same district had a computer laboratory equipped with 22 networked computers. In Rafha, neither the school for boys nor the school for girls had a computer laboratory. At the same time, all observed schools in Arar, Turayf, and Rafha had a Learning Resource Centre (LRC), whose ICT tools included a projector, a data display device, a smart whiteboard, and a computer. Many of these tools, however, were not in working condition. Neither school had all classes equipped with an ICT device. In those some classes that had a computer, a projector, or a data display device, these tools were often not in working condition. All teachers in charge of an LRC had limited computer skills. Insufficient technical support was reported by all interviewed teachers

*Open coding of data provided by interviewed female teachers*

The interviewed female teachers were all experienced (10-23 years of teaching) and mandatory ICT adopters. Although they did not use technology regularly, they thought that technology makes a change. One female teacher connected this change with positive influences on students' perceptions; one female teacher thought that the use of ICT is sometimes mandatory and sometimes revolutionary. All interviewed female teachers used ICT tools in all lessons, including presentations, educational films, maps, photos, and audio materials. Regularity of ICT use depended on the working condition of the available technologies.

The female teachers used ICTs because it is mandatory and recommended by school administration. Most female teachers claimed that the personal factor was important to them. Four female teachers responded that school administration did not reward them for using ICT; one female teacher was granted an appreciation certificate by school administration and the Educational Directorate, and one teacher was praised by school administration.

Four female teachers confirmed that uses of ICT influenced their lesson planning skills and classroom management. For example, one of the teachers said that she used technology to grab students' attention, motivate them, and achieve better results in discussing and explaining the material. Two teachers pointed out that their uses of ICT saved time and effort. Only one teacher was aware of appropriate uses of ICT ("a good use of them at the right time"). One teacher focused on quality education by using ICTs, and one teacher viewed ICTs as helping tools which are additional to conventional teaching methods. Five female teachers claimed that their uses of ICT were independent of mandatory ICT adoption, whereas only one female teacher claimed that her ICT uses were due to mandated ICT adoption and her personal interest in ICT tools. All female teachers thought that regular uses of ICT can make a change. For example, the female teacher from Turayf said that the use of smart phones in the classroom can make a change, but she acknowledged that the use of ICT needs to be balanced.

All interviewed female teachers rated their students' academic progress as "very good."All female teachers responded that it was necessary to use a smart whiteboard but in combination

with other teaching tools. The interviewed female teachers used projectors and data display devices; yet, only one female teacher from Turayf included a personal laptop and iPad in the list of ICT tools. All female interviewees were unable to determine the propriety of using ICT in their teaching: they complained about a lack of training or information about appropriate uses of ICT. Most of the interviewed female teachers discussed uses of ICT with their colleagues but they decided on using ICT individually (only one female teacher sometimes decides on ICT use collegially).

The interviewed female teachers suggested that the following new ICT-related standards would improve teacher performance: training courses for teachers, training courses for students, electronic tests and assessments, and the presence of a laboratory technician to help use ICTs (one teacher from Turayf had no suggestions because of her acknowledged poor knowledge of technology). The female teachers assessed uses of ICT in their schools as “excellent” (Rafha), “very good” (Arar), “good” (Turayf and Rafha), and “poor” (Turayf). Four of the teachers attended training courses and two had no training in using ICT. Each teacher formulated her view of quality education: “integrated updated vision” and “improvement of educational skills” (Arar), “minimizing routine” and contributing to societal Islamic and national beliefs (Turayf), implementing ambitions and successful educational processes (Rafha). Only one female teacher responded that her planning and pedagogy were sometimes at odds with ICT adoption.

All female teachers had their own view of a successful teacher: such a teacher is open to innovation (Arar), “knows how and when to use teaching in a timely appropriate way without losing time” (Arar), “encourages self-learning” (Turayf), “shapes students’ identities” (Turayf), “easily transforms information” (Rafha), and “is knowledgeable and motivating” (Rafha). Some female teachers connected meaningful uses of ICT with their mandate, whereas others focused on improvement. Almost all female teacher used ICTs, when they were available, to meet the demands of the digital age. The female teacher from Turayf believed that it was important to use ICTs in accordance with lesson objectives and the female teacher from Arar claimed that only trained teachers and students can use ICTs in a meaningful way.

With regard to the stages of concern, four female teachers were at the personal stage of concern: these teachers began asking questions about their own abilities, skills, and adequacies of using ICT. They viewed their uses of ICT as independent of administration support or rewarding and did not think that their mandate to ICT adoption was more important than their personal interest in improving their teaching performance. Two teachers, from Turayf and Rafha, were at the information stage of concern: they were aware of using ICT and strived to know more about it. Table 1 shows stages of concern among female teachers. This table indicates that all female teachers are ICT adopters but they cannot be considered ICT implementers, since their knowledge about technology was limited.

Table 1 : Stages of Concern (Female teachers)

Participant	Stage of Concern						
	0	1	2	3	4	5	6
FArar (1)			personal				
FArar (2)			personal				
FRafha (1)		information					
FRafha (2)			personal				
FTurayf (1)			personal				
FTurayf (2)		information					

As far as levels of use are concerned, one teacher (Rafha) was at the preparation level of use, as she was getting prepared for ICT use and had no ICT training. Five other teachers were at the mechanical level of use: they used technology but in a poorly-coordinated manner. Table 2 shows levels of use among the interviewed female teachers.

Table 2 : Levels of Use (Female Teachers)

Participant	Level of Use						
	VI	V	IV	III	II	I	0
FArar (1)				mechanical			
FArar (2)				mechanical			
FTurayf (1)				mechanical			
FTurayf (2)				mechanical			
FRafha (1)				mechanical			
FRafha (2)					preparation		

The comparison between stages of concern and levels of use indicates that three combinations can be singled out: (1) personal stage of concern/mechanical level of use (4 teachers); (2) information stage of concern/mechanical level of use (1 teacher); and (3) information stage of concern/preparation level of use (1 teacher).

The emerging categories from the data provided by the interviewed female teachers are:(1) ICT uses in the classroom are not accountable for a female teacher’s mandate to ICT adoption within the ongoing education reform; (2) ICT tools need to be combined with other teaching tools in a pedagogically appropriate way; (3) only standardized uses of ICT in compliance with Islamic and national beliefs will be appropriate in Saudi primary schools for girls; and (4) the successful teacher is open to innovation, motivates development of students’ identities, and encourages self-learning.

*Open coding of data provided by the interviewed male teachers*

The interviewed male teachers worked in primary schools from 14 to 24 years. Four male teachers used ICTs, whereas two male teachers failed to do so. One teacher from Rafha did not use technology because it was not available in his classroom setting; two teachers (Arar and Rafha) did not use ICT because, in their words, it was not mandatory. Two teachers (Arar and Turayf) used the technology because it made a difference.

Only one male teacher used ICTs regularly. Only one teacher (Rafha) was aware that his uses of ICT are mandatory; one teacher (Rafha) said that his uses were both mandatory and on his own initiative. All interviewed teachers from Arar and Turayf used technology on their own initiative. Only one teacher (Arar) was rewarded for his uses of technology. Both teachers from Arar responded that their uses of ICT had no influences on planning skills and classroom management; all other teachers valued ICTs for saving time and efforts (Rafha) and being an implementation element (Turayf).

No male teacher claimed that the ICT-related mandate played a role in ICT implementation. They all admitted to using technology regularly and they evaluated their students' progress as "good" and "excellent". Both male teachers from Arar liked using smart whiteboards, Turayf teachers liked PowerPoint presentations; Rafha teachers used smart whiteboards, projectors, and laptops. All male teachers, except one (Rafha), connected the use of a smart whiteboard with improved teacher performance. All male teachers but one responded that a classroom setting is a priority area for using technology; one teacher (Arar) spoke about implementation as a priority area. The male teachers from Turayf never discussed ICT uses collegially; one male teacher from Arar and one male teacher from Rafha sometimes discussed ICT uses collegially; two others from Arar and Rafha regularly discussed ICT uses with their colleagues. Only Arar teachers decided on uses of ICT both individually and collegially, while others used ICTs on their individual initiative. The male teachers from Rafha connected new standards of ICT-related education with appropriate uses of ICT; three male teachers thought that the presence of ICT tools in a classroom setting should be a standard; one male teacher from Turayf had difficulty answering this question. One male teacher from Turayf evaluated ICT use in his school as "excellent", whereas others thought ICT implementation was insufficient.

Half of the interviewed male teachers received no ICT training, whereas others were trained. The male teachers linked quality education with "active learning" (Arar), the presence of technology in a classroom setting (Arar), self-learning opportunities (Rafha), and good outcomes (Turayf). Only two male teachers (Arar, Rafha) responded that their planning skills and pedagogy were at odds with ICT adoption. All teachers but one (Rafha) acknowledged that they have grown professionally due to their uses of ICT. They were aware of the demands of the digital age and believed that technology helps save time and effort. They shared the opinion that ICTs needed to be built into education via available tools, both in a classroom setting and in a resource laboratory center. Presentation and active learning opportunities were valued by all the interviewed teachers.

Table 1 shows stages of concern inferred from the responses of the interviewed male teachers. Four teachers were at the information stage of concern; one teacher was at the personal stage, and one was at the management stage of concern.

Table 3 : Stages of Concern (Male Teachers)

Participant	Stage of Concern						
	0	1	2	3	4	5	6
MArar (1)				management			
MArar (2)		information					
MTurayf(1)			personal				
MTurayf (2)		information					
MRafha (1)		information					
MRafha (2)		information					

Table 4 shows that two of the interviewed male teachers are at the preparation, two at the mechanical, one at the routine, and one at the refinement level of use. The routine and refinement levels of use have differences, although they are included in the same level of use: the former indicates that the teacher has an established pattern of ICT use, whereas the latter points to the teacher who is making changes as an ICT implementer to increase outcomes of ICT uses.

Table 4 : Levels of Use (Male Teachers)

Participant	Level of Use						
	VI	V	IV	III	II	I	0
MArar (1)		refinement					
MArar (2)					preparation		
MTurayf (1)			routine				
MTurayf (2)				mechanical			
MRafha (1)					preparation		
MRafha (2)				mechanical			

Four types of combined stages of concern and levels of use among the interviewed male teachers can be singled out: (1) information stage of concern/preparation level of use (two teachers); (2) information stage of concern/mechanical level of use (two teachers); (3) personal stage of concern/routine level of use (1 teacher); and (4) management stage of concern/refinement level of use (1 teacher).

The emerging categories based on the responses of the interviewed male teachers can be formulated as: (1) ICT implementation depends on the presence of ICT in a classroom setting; (2) technology is present in schools but not in a classroom setting, which impedes ICT implementation; and (3) ICT implementation should be built into an overall teaching process as early as the primary level of education.

*Analysis by constant comparative method*

The interviewed female and male teachers shared only two combinations of stages of concern/levels of use: the information stage of concern/preparation level of use (one female teacher and two male teachers) and the information stage of concern/mechanical level of use (one female and two male teachers). Two combinations, namely the information stage of concern/mechanical level of use and the personal stage of concern/mechanical level of use characterized only female teachers. Half of the interviewed female teachers indicated the combined personal stage of concern/mechanical level of use. At the same time, two male teachers reached the fourth level of use, whereas no female teacher had done the same. Also, only one male teacher reached the management stage of concern. From the comparison, it can be assumed that female teachers with the personal stage of concern/mechanical level of use can move to the personal stage of concern/routine level of use or the management stage of concern/refinement level of use if they continue integrating ICT use into their teaching performances. At present, as this study shows, the information and personal stages of concern and preparation and mechanical levels of use prevail, among both female and male primary school teachers.

The emerging categories, based on the responses of the interviewed female and male teachers, can be generalized as follows: (1) ICT implementation depends on the presence of ICTs in Saudi primary schools, both for boys and for girls; (2) standardization of the uses of ICT will turn ICT adopters into ICT implementers; and (3) ICT implementation needs to be built into modern teaching practices in Saudi primary schools.

Table 5 shows the conditional relationship between these categories. First, ICT tools need to be available in a classroom setting, which will improve the learning environment with the present-day mandate for ICT integration. Second, standardization of the uses of available ICTs will become a mandatory change from traditional methods to their appropriate ICT-related alternatives, whose pedagogical uses will enrich the overall teaching methods used in primary schools. Third, the presence of ICT in the classroom and their standardized uses will facilitate ICT implementation as built into the innovative system of education in Saudi primary schools.

At present, Saudi primary teachers are mandated to adopt ICTs, which they cannot integrate into teaching without proper training and working ICT tools. When teachers are trained and working ICT tools are available in the classroom, teachers can be involved in ICT implementation. But as soon as teachers start implementing ICT tools, as only a few do of their own initiative, they question the appropriateness of such uses and pedagogical uses of ICT in teacher performance. They have a mandate to turn from traditional teaching methods but they do not know how, for example, active learning depends on ICT uses and what kinds of alternative ICT implementation are possible in teaching. They need training, available technology, and standardized ICT tools that harmonize with Islamic cultural and spiritual attitudes and beliefs. Through training, availability of ICT tools in the classroom, and standardization, Saudi primary teachers can turn into ICT implementers who are capable of integrating ICT into an overall process of education that meets the requirements of a rapidly changing digital age.

Table 5 shows the conditional relationship between the three emerging categories:

- (1) ICT implementation depends on the presence of ICTs in Saudi primary schools. With a mandate to integrate ICT in education, Saudi primary school teachers cannot move to higher stages of concern and levels of use because they cannot integrate the limited number of ICTs, which are often unavailable in the classroom or available but not in working condition, into teacher performance without training and access to working ICTs.
- (2) As soon as Saudi primary school teachers are trained and have access to working ICT tools in their immediate classroom settings, they can move to higher stages of concern and levels of use only when their ICT-related performance is supported by standardized uses of ICT.

Standardization solves such problems as availability of standardized ICT tools, training in standardized uses of appropriate ICT tools (for example, mandatory uses of a smart whiteboard in the classroom), and enhanced awareness of pedagogical uses of ICT as a way towards improving educational quality in the digital age.

- (3) ICT implementation is built into modern teaching in Saudi primary schools, implying that Saudi primary school teachers become ICT implementers who work in a teaching and learning environment that is marked by access to standardized ICT tools in working condition in every classroom and upgraded training of teachers as ICT implementers, whose teacher performance is rewarded by moving to higher stages of concern and levels of use.

Table 5 : The Conditional Relationship between Categories (based on Scott & Howell, 2008)

Category	What?	When?	Where?	Why?	How?	Consequence
ICT implementation depends on the presence of ICTs in Saudi primary schools.	Personal belief that ICT makes a change.	With access to ICTs and training.	In the Classroom .	To save time and effort.	Being trained for ICT uses that are available in the classroom.	Teachers can use ICT tools as helping aids.
Standardization of the uses of ICT in Saudi primary schools.	A mandatory change from traditional methods to their alternatives through standardized ICT uses.	On a regular basis.	In the classroom with a smart whiteboard, projector, and data display device.	To achieve appropriate ICT use.	As an educational tool in combination with other standardized tools available.	Teachers can consider the appropriateness of pedagogical uses of ICT available in the classroom.
ICT implementation is built into the modern teaching in Saudi primary schools.	Teachers become ICT implementers because they are aware of appropriateness of standardized uses of ICT tools.	During the ICT implementation process.	In the classroom with available workable ICTs.	Awareness of the transition to quality education; active learning; electronic tests and assessments.	The use of standardized ICT tools, including a smart whiteboard in every classroom.	Effective explanation of the material; representation of new information; revision and assessment of student progress; changed educational environment; better results from practice; Urging other teachers to use ICT in primary schools.

*Standardized ICT Implementation*

The above-mentioned emerging categories can be summarized in the core category “Standardized ICT implementation that is built into the overall teaching process.” In the Saudi context, which is conservative and not open to ICT-related change, primary school teachers need to move from ICT adoption to ICT implementation through reaching higher stages of concern and levels of use. Standardization of ICT tools can help those teachers who are at the bottom in the hierarchy of stages of concern and levels of use to be trained in how to increase the pace of this movement. Table 6 shows the core category with regard to processes, properties, dimensions, contexts, and modes of using ICT.

Table 6 : The Table Showing the Reflexive Coding Matrix (Scott & Howell, 2008, p. 9)

<b>Reflexive coding matrix</b>	
Core category	Standardized ICT implementation that is built into the overall teaching process.
Processes	-Moving from the information stage of concern and the preparatory level of use to higher stages of concern and levels of use. - Administration support and rewarding both individual and collegial efforts of teachers in their change from ICT adopters to ICT implementers.
Properties	- In primary schools, ICT is not considered an alternative to traditional planning and pedagogy. - ICT is additional to traditional methods of teaching. - ICT in the classroom can reform a school system.
Dimensions	- No standardized mandatory uses of ICT available. - Irregular uses of ICT due to limited access and poor training. - The primary school teacher prioritizes traditional methods of teaching.
Contexts	- Explanation of new material. - Preparing for a lesson. - Saving time and effort. - PowerPoint presentations. - Motivating students.
Modes for using ICT	- Effective primary school teaching can be achieved with standardized ICT use. - Collaboration in using ICT is necessary. - Little impact of ICT because teachers are not sufficiently trained and knowledgeable in ICT devices.

*Processes:* The interviewed primary school teachers have a poor understanding of ICT uses; for them, they are additional, supplementary aids but not an alternative method of teaching. The ongoing educational reform automatically turns all teachers into ICT adopters, but many of them do not know what this transformative change means. Their stages of concern and levels of use depend on their access to ICT tools in the classroom. From the present data, primary school teachers need a standardized range of ICT tools available (a smart whiteboard, a computer, a projector, and a data display device) whose potentials are explained to them through training and recommendations. At present, Saudi primary school teachers are not properly prepared for a change in paradigm.

*Properties:* In primary schools, the presence of ICTs in some classrooms and in a computer center is not considered as an alternative to traditional planning and pedagogy. Although most teachers

have to say that they are not at odds with technology because of the ICT mandate, they fail to integrate available technology in a systemic way. It is hard to move beyond mandatory ICT adoption because it is grounded in non-mandatory ICT implementation. The shapes of moving to higher stages of concern and levels of use are not clear to teachers because of the lack of standardization, administration support and rewards, poor training, and dependence on one's own initiative. Qualitative assessment of a changing paradigm due to the presence of ICT tools in curriculum development is absent in Saudi primary schools. Quality education requires the presence of some technology, which needs special skills to operate.

*Dimensions:* Being a mandatory ICT adopter, the primary school teacher fails to promote mandatory uses of ICT tools toward standardization. Limited access to a limited number of ICT tools results in irregular uses of ICT. Very few teachers have realized that their personal efforts and training can change the situation for the better. When they speak of standardization, they mean the presence of technology in the classroom, which is basically the same within one and the same school. Reporting on individual uses of the same ICT tools in similar situations, primary school teachers can turn to collegial uses of ICT, which they currently lack.

*Contexts:* Saudi primary school teachers are ICT adopters due to their mandate. They cannot be considered effective teachers without using ICT tools. They adopt such technology as projectors, data display devices, computers, and smart whiteboards (when they are available in their school) and they try to use one or some of them to retain their status as an ICT adopter. Some teachers have no training at all, some have little training, and very few others invest time and money in learning more about technology in primary schools. The context of the ongoing reform leaves primary schools with the most difficult problem: what technology needs to be present in the classroom from the early stage within the process of education and what can be standardized to encourage improvement. The interviewed primary school teachers shared the view that technology needs to be present in their immediate classroom setting. This demand is inherent in the call for standardization within the framework of mandatory ICT adoption. Primary school teachers are initial ICT implementers who are accountable for further implementation of technology across the overall process of education. In this, primary school teachers rely on training, which they need; however, training is not enough to go beyond mechanical uses of technology. From their responses, Saudi primary teachers need to be trained in appropriate uses of recommended and available technology. Although the personal initiative of many Saudi teachers is important, it is not enough to make the change from ICT adopters to ICT implementers.

*Modes for using ICT:* Effective primary school teaching in Saudi Arabia can be achieved with standardized uses of ICT; these devices can be standardized in continuity of all stages of education, so that both teachers and students can move towards improvement. As primary school faces up to the problem of ICT implementation, it should become a priority area of standardizing and training efforts. ICT-skilled primary school children will be an asset to higher stages within the overall process of education. Collaboration in using ICT is necessary with a view toward exploring such standards and ICT tools that are harmonious with Islamic beliefs and attitudes.

## **5. RESULTS AND INITIATIVES**

This section examines solutions adaptable to ICT integration in Saudi primary education. The solutions are discussed with regard to this paper's research questions.

### *A. The mandate as an obstacle to ICT implementation*

The present research has found that mandatory ICT adoption turns into an obstacle to ICT implementation because its aim is formal overall ICT adoption without an efficient infrastructure

and proper training that should be at the heart of ICT-related change. The mandate substitutes ICT implementation by ICT adoption. Primary school teachers have to use some technologies available but they depend on access to them, their availability and working condition. Hence, there is a need for reconsidering the value of the mandate within the overall systemic change. The mandate implies that there should be a standard that is adopted across Saudi Arabia with regard to ICT-related reform in primary education. ICT adoption, covered by the mandate, is only an initial step on the path of ICT integration whose continuity is supported by the ongoing, regular, flexible, and dynamic ICT implementation.

#### B. Primary school teachers as ICT implementers

Transformative change should begin from primary education that is supported in search of systemic ICT implementation initiatives. In this the role of the Ministry of Education is shaped as the guiding authority that is responsible for developing an infrastructure, similar to all primary schools in Saudi Arabia, training of primary teachers with a view to moving to higher stages of concern and levels of use. Transformative change is impeded because ICT adoption is taken by many primary school teachers for a necessity of using some ICTs without being competent in their pedagogical uses. Transformative change in Saudi primary schools should be linked with the development of integration pedagogy that uses the CBAM model in order to assess the teachers' progress to higher stages of concern and levels of use, as well as to the grounded research approach that identifies the potential obstacles and timely recommends what should be done to avoid them.

#### C. The mandate is both an advantage and disadvantage in Saudi primary education.

The twofold role of the mandate has both advantages and disadvantages. On the one hand, Saudi primary school teachers automatically turn into ICT adopters because it is required as essential to quality primary education. On the other hand, the Saudi primary school teachers are resistant to change because their mandate of ICT adoption does not identify their next steps towards ICT implementation. The use of ICT is in many ways declaratory and mechanical: the Saudi primary school teachers consider ICTs as additional to their traditional methods of teaching and their role is still secondary in relation to the dominant traditional methods of teaching.

#### D. Recommendations

From the present research, the Saudi primary school reformers should consider the following steps in transformative change: (1) identify the meaning of ICT adoption in primary education with regard to a gradual movement of teachers to higher stages of concern and levels of use as essential to their professional and personal growth; (b) supply teachers with the guidelines that explain the steps of turning from ICT adopters through proper training in standardized ICT tools recommended to be available in Saudi primary schools to ICT implementers who use their own motivation and initiative to adapt the available tools to their personal teaching practices on a regular basis; (3) organize ICT-related training programs whose aim to train ICT implementers by assessing their progress to higher stages of concern and levels of use. School administrators should be involved in building a school's ICT infrastructure whose standards help primary teachers turn from ICT adopters into ICT implementers; (4) develop a standard list of ICT tools that are available in ICT labs in primary schools; (5) include the presence of ICT tools in classroom settings as a standard required for primary schools.

## 6. CONCLUSION

The current ICT-related situation in primary schools located in the Northern Borders area of Saudi Arabia cannot be evaluated as efficient for ICT integration whose product, mandatory ICT adoption, is separated from the process of turning Saudi primary teachers from ICT adopters to

ICT implementers. ICT integration appears to be a process whose continuity is dependent on the primary school teachers' stages of concern and levels of use.

ICT-related priorities are formulated by some primary school teachers with little to no administrative support. Technology is not viewed in continuity with an overall ICT-related paradigm of change; it is thus strategic to work on standardized uses of ICT tools in Saudi primary schools. There is a strong demand for a holistic approach to the Saudi education reform and this cannot be the sole responsibility of badly-trained primary school teachers.

The CBAM model can be utilized as an effective instrument to assess primary teachers' development through stages of concern and levels of use within a holistic process of ICT integration. The grounded theory approach can help create integrative pedagogy that explores transformative change in primary education in all phases identified by combining the stages of concern and levels of use on the way from ICT adoption to ICT integration through the process of ICT implementation. The grounded theory approach analyzes the teachers' responses in the direction guided by the research questions. The teachers can contribute to the data collection when they reveal their own ideas about their change into ICT implementers and what standard ICT tools will make them modern, dynamic, and quality primary teachers.

The Saudi primary schools teachers' compromise that effective teaching can be achieved without uses of ICT prevents them from becoming ICT implementers, a decade after the launch of the ICT-related education reform. Access to standardized ICT tools, whose appropriateness and pedagogical uses are approved by the Saudi Ministry of Education, can influence transformative change of Saudi primary school teachers from mandatory ICT adopters into mandatory ICT implementers. The ICT-related mandate to ICT implementation will be an advantage in the Saudi primary school context, because it is primary schooling that nurtures digital-age learners and teachers who are prepared for continual learning and teaching with technology.

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