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Crossing the Digital Divide: A Review of Literature on Information and Communication Technology Usage in Schools

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Abstract. This review of literature explores research in multiple areas that are relevant to the implementation of information and communication technology (ICT) use in school districts in Saudi Arabia. This review examines the national priorities in Saudi Arabia and their relevance to ICT usage in education. This review also highlights the research-based rationale for using ICT in education, including its benefits to teachers and students. In addition, this review examines both the individual and systemic barriers to ICT implementation, especially as these barriers may inform our understanding of the barriers present in Saudi Arabian schools. For the same reason, this review discusses potential solutions to these challenges. Additional themes discussed include the use of ICT in e-learning, a need for teacher training in ICT, and a need for support from the Ministry of Education. A particular emphasis is placed on Tearle's (2004) *A Theoretical and Instrumental Framework for Implementing Change in ICT in Education,* as this framework provides a useful and appropriate framework for future study.

Keywords. Information and communication technology (ICT), e-learning, teacher training, education in Saudi Arabia, digital divide

Introduction

The purpose of this study is to explore how Information Communication Technology (ICT) is used by schools and teachers in the Al-Ula district of the Kingdom of Saudi Arabia (KSA), in order to identify the specific barriers to implementing ICT and recommend possible ways to improve the quality of e-learning in Al-Ula and similar school districts. Because no specific research has been conducted about Al-Ula, the relevant literature for this study includes articles on issues about ICT learning generally; articles about implementing ICT learning in developing countries such as Bangladesh, Turkey, and India; and articles about education and ICT learning in Saudi Arabia. Although there is much agreement in the literature about the importance of and difficulties in implementing ICT learning, there is also a strong sense that each country and even each school district (or school) has its own specific issues. For this reason, researching the particular barriers and needs of the schools in Al-Ula will be important for finding a successful and sustainable approach to implementing ICT learning there.

The literature review that follows will explore research in multiple areas that are relevant to this study. First, the review will examine the national priorities that have been established in Saudi Arabia and their relevance to ICT usage in education. Then, this review will examine the research-based rationale for using ICT in education, its benefits to teachers and students. Next, this review will examine both the individual and systemic barriers to ICT implementation,

especially as these barriers may inform our understanding of the barriers present in Al-Ula schools. For the same reason, this review will discuss potential solutions to these challenges. And finally, this literature review will analyze Tearle's (2004) *A Theoretical and Instrumental Framework for Implementing Change in ICT in Education,* as this framework provides a useful and appropriate framework for this study.

National Priorities for ICT Use

In Saudi Arabia, the Ministry of Education is responsible for establishing the national educational policy, setting objectives for the educational system, and allocating resources to school districts. As such, the priorities of the Ministry are essential to the operation of local schools, so it is important to understand what those priorities are. In 2019, the Ministry of Education in Saudi Arabia published a document entitled*Vision 2030*, which provided an overview of the direction for education and the role of technology within the vision for the education of the kingdom's youth. Although the *Vision 2030* plan has ambitious and positive elements that steer the education sector in a positive direction, it does not contain a high level of specificity or a precise strategy. However, it does outline the objectives and priorities for the educational systems. These include:

Developing Philosophy, Policy, and Goals of Curricula, Means of Development, Mechanism Activation, and connecting all these means with the programs of Teacher Preparation and his professional development; Developing such teaching methods, that focus on Learner not on Teacher, and concentrate on inculcating skills, personality development, improving confidence, and promoting spirit of creativeness; Developing Attractive, Preferred, and Stimulating school environment, connecting it with supportive and integrated services systems; Comprehensive Education for persons with disabilities, and providing appropriate support to all its categories; Providing pre-primary education opportunities and expanding it, providing kindergartens, and activating its link with education system. (*Vision 2030*, n.d., para. 1)

Vision 2030 addresses the national educational objectives, including professional development and a focus on the learner, but lacks a specific direction to achieve those objectives. As such, it is unclear how these objectives are to be carried out at the local level. It is also unclear how much funding and other resources will be provided to fund these priorities.

Some evidence from the literature suggests that national policy in Saudi Arabia has not often translated into local school practice (Tondeur, van Keer, van Braak, & Valcke, 2008). Tondeur et al. (2008) examined local school policy and practiceof ICT integration from the perspectives of both the principals and teachers within those schools. Within the KSA, the authors looked at "the complex systemic nature of ICT integration, including the role of national policies (macro level) and local school policies (meso-level)" (p. 213). Based on the data they collected from both teachers and principals in 60 different schools, the authors found that it was essential for staff in local schools to have a clear sense of ICT implementation policy and goals. They alsonoted that the connection between national policy and local practice has not often been clear, and therefore stressed the importance of developing a "shared vision" about how ICT is to be used in the classroom.

Establishing this shared vision involves not just top-down messaging from the Ministry, but also bottom-up input from teachers who participate in developing decisions and creating clear goals.Teachers have often been overlooked in developing a school's ICT policy, which has a negative impact on the integration of ICT in the classroom. Tondeur et al. (2008) found that"successful ICT integration becomes much more likely when teachers share the values expressed within the school policy and understand their implications" (p. 220). Tondeur et al.

demonstrated the importance of acknowledging the pivotal role of teachers in effecting change and that a dialogue among principals, teachers, and other stakeholders is essential. They also noted that "the aspirations of national educational authorities to foster ICT integration in schools do not easily result in concrete changes in instructional practices at class level" (p. 213). One of the primary reasons for this is that differences between schools often makes general policies and reforms difficult to actually implement. This mayespecially applyto schools like those in the Al-Ula district, which are often not as supported or recognized as schools in more urban centers. For this reason, educational improvement or innovation efforts should include local leadership of the school principals to create the right conditions to implement a shared ICT policy that meet the specific needs of their schools.

ICT in E-Learning

Much of the focus of research into ICT implementation has been focused on its purpose in education, how it relates to the teaching and learning objectives of educational institutions (Alshammari, 2014; Edwyn, 2001; Pall & Batra, 2016; Pelgrum, 2001). Alshammari (2014) argued that technology will improve the learning process by making curriculum content both more accessible and more understandable to students, thereby improving their educational outcomes, as well as contributing to the professional growth of teachers. Technology not only helps students learn faster and makes information more accessible. As students are increasingly using technology in their daily lives, they are becoming more accustomed to learning through technology, and using technology in the classroom will help these students understand content in ways that traditional learning increasingly will not.

Pall and Batra (2016) also examined how schools might adopt ICT in order to determine how to make ICT effective for instruction in the classroom. In their review of multiple studies focused on educational uses of ICT in India, Pall and Batraexplored how to foster a better educational environment while looking at the barriers to implementing the best ICT learning experience. They noted that ICT learning offers great potential student-centered learning, capable of improving the quality of education for everyone regardless of the experience or qualifications of the immediate faculty. As has historically been the case in the KSA, education in India has mostly been passive learning with lectures delivered by the teacher. In passive learning, the teacher is the main focus of classroom content, though they may do their best to attempt to understand the plays students' needs, abilities, and interests. In an active learning approach, the student is encouraged to be an engaged participant in determining the content of their learning. According to Pall and Batra, ICT can play a central role in active learning. "Encouraging ICT and self-learning, ability to address complex problems, encourages team work and allows critical thinking" (p. 78). In active learning using ICT, the teacher is more of a facilitator, and unlike traditional learning, the teacher is only one of the producers of knowledge, as that responsibility is shared with the student.

With a focus similar to Ball and Patra (2016), Pelgrum (2001) focused on the role of technology in autonomous learning or student-led learning. Through surveys collected from school staff, Pelgrum rated the quality of the schools with regards to active learning, based upon eight activities being present in the schools:

- students developing abilities to undertake independent learning;
- providing weaker students with additional instruction;
- organizing teaching and learning so that differences in entrance level, learning pace, and learning route are considered;
- students learning to search for information, process data, and present information;
- students being largely responsible for controlling their own learning progress;

- students learning and/or working during lessons at their own pace;
- students involved in cooperative and/or project-based learning; and
- combining parts of school subjects with one another (multidisciplinary approach).

Pelgrum was interested in the importance of autonomous learning strategies and how active learning generally can be facilitated by ICT.

Pelgrum (2001) contrasted the learning experiences in traditional and ICT classrooms, or in "industrial" and "information" societies. According to Pelgrum, an industrial society school is isolated, with access to information being confined to the school. The ways in which the school is functioning are not transparent or open beyond the confines of the school or district, whereas "information society" education is integrated so that information is openly available. In a traditional classroom, the teacher is an initiator of instruction and teaches from a "top-down" approach, placing less emphasis on students' communication skills, whereas in an information society, the teacher guides the students in independent learning and helps them find their own appropriate instructional paths with a much greater emphasis on communication skills. Pelgrum claimed that in a traditional classroom setting, learning was mostly passive, and there is not very much teamwork. In addition, parents are less involved in the learning process and there is less of a model on which to base their participation. On the other hand, in an information society school, parents play a very active role in the learning process and can provide models to the students (Pelgrum, 2001). Based on the findings of both Ball and Patra (2016) and Pelgrum (2001), it appears that ICT has the potential to promote active learning in classrooms, to get both students and parents more engaged in the learning process.

Edwyn (2001) extended the ideas of Ball and Patra (2016) and Pelgrum (2001), presenting three categories of reasons for including ICT in education: economic, social, and pedagogical. Similar to Ball and Patra, Edwyn argued that ICT learning has the potential to radically improve the ways in which students learn, as ICT helps create more active learners and changes the dynamic between student and teacher to one where the student can take more control over and be more empowered by his or her own learning experience. Edwyn noted that ICT education teaches students how to think for themselves, to think critically. Referring to the needs of the economy and the importance of technology and learning, Edwyn noted that it is important for students to understand information and communication technology for employability in the 21st century and for participating in the global marketplace. The social rationale is that in order to function socially, young people will have to be knowledgeable about technology. In order to function socially within and outside of the workplace, technology has become an essential life skill.

Edwyn (2001) argued that these three rationales overlap and will increasingly overlap as technology develops and becomes increasingly integrated into people's lives. He presented a compelling argument about how ICT changes the relationship between learning in school and out of school.

The critical relationships between home and school that stimulate quality learning when they work will become more important with the advent of ICT. Traditionally school work has been supplemented by homework, but homework that was very much seen as a reinforcement of formal school activity. (p. 14)

The distinction between traditional homework and possibilities for learning outside the classroom through the internet and other access to media is compelling. Edwyn (2001) emphasized the need for a radical curriculum change and stressed that there is increasingly no longer an option to choose between traditional forms of education and learning. Instead, ICT learning is going to be the only kind of learning in the future, and in many areas it already is. It is the new global form of communication, information, and understanding, so that anyone who

is not connected is going to be increasingly at a disadvantage. In other words, using ICT learning is not just a new way to learn, it is also teaching students how to be digitally literate, as it engenders "a sophisticated set of competences pervading workplace, community and social life, including information-handling skills, and the capacity to make judgments about relevance and reliability when searching on the internet" (p. 15). Given the importance of ICT, Edwyn further asked how we can help ensure that certain areas and certain disenfranchised people are not discriminated against because they are technologically illiterate and do not have access to technology or do not know how to use it in a sophisticated way.

Barriers and Solutions toICT Implementation

While some research has focused on the benefits of ICT use, other research has explored the barriers to implementing ICT. In one sense, these barriers can be framed as being either extrinsic or intrinsic, meaning that some challenges exist outside of the individual, like training, policy, and infrastructure, and some challenges exist within the individual, like their personal beliefs, experiences, and abilities. When viewing barriers within the context of schools, some challenges may be more focused on teachers and staff, while others may be systemic or institutional, viewing the policies and practices that either help or hinder ICT implementation.

Individual Barriers to ICT Implementation

A significant amount of research into ICT implementation has focused on the individual barriers to ICT implementation—the skills, attitudes, and beliefs of the staff (especially teachers, but also principals) who are responsible for implementing ICT. Based on surveys from schools in multiple developing countries, Pelgrum (2001) also offers insightful analysis of many of the barriers interfering with successful ICT implementation in education. At the time of Pelgrum'sstudy, many developing countries did not yet have regular access to the internet. Pelgrum's findings are still relevant to areas of the world that are behind in the development of their use of technology in the classroom, such as Al-Ula, because issues that faced ICT implementation 10 or 15 years ago in places like the United States are still affecting developing countries today. Based on his findings, Pelgrum noted that teachers did not often have the training necessary to implement ICT successfully, and therefore stressed the importance of teacher training and professional development. Pelgrum also pointed out that the school principals who organize and facilitate training and resources and who are arguably the most important stakeholders.

The Necessity for Teacher Training

Like Pelgrum, Edwyn (2001) stressed the importance of ICT training and continued education for teachers, because their roles in schools will change along with advancements in ICT. In other words, ICT should be "both the object of professional growth and the medium through which it is achieved. Without adequate investment in teacher professional development and enhanced professional activities, effective technology integration into schools cannot succeed" (p. 16). Especially in rural areas, ICT encourages and requires a new way of integrating learning within school and learning outside of school. It allows for communication among students, teachers, parents, and the community in a variety of ways that would not have been possible without these technological advances. Thus, the question becomes how to integrate ICT learning into a curriculum when students are not familiar with the digital culture and lack the infrastructure necessary for ICT success.

As Alwani and Soomro (2010) pointed out, the benefits of ICT training and professional development for teachers was not just an increase in their skills, but an increase in their

willingness to implement ICT. Their article, which was focused on ICT implementation in Saudi Arabia specifically, examined the psychological effects of the stress of failure on teachers and their teaching experiences when trying to incorporate unfamiliar techniques into their traditional classroom experiences. The authors found that if teachers do not feel confident or prepared to use technology, they could fear looking incapable in front of their students. That is, the teacher could have a fear of failure that hinders their use of ICT. As Alwani and Soomro noted:

Fear of failure is reinforced by failure to use IT successfully. The more a teacher internalizes previous failures, the less likely it is that he/she will be able to solve new compatibility issues. The more demands there are on teachers to make IT work in the classroom, the more fear of failure. (p. 37)

For this reason, success in ICT implementation therefore depends at least to some extent on the teacher feeling confident using the technology, which will also give students feel the impression that the teacher is an authority in using technology. This regard from students will also positively reinforce teachers' ability to teach their subject matter competently, especially to students who are probably more familiar with new technologies than their teachers are.

The notion that training not only contributes to a persons' abilities, but improves their confidence was further supported by King (2002), who examined graduate student teachers' perceptions and beliefs about professional development in ICT. In this study, participants "revealed that technology changed their perspective of their profession in two ways. Regarding their perspective of their profession, technology learning transformed (1) their concept of the role of the educator and (2) their worldview of education" (p. 290). The power of professional development altered the very opinion and perspective that educators held on education, suggesting that through the use of strategic professional development, schools and institutions can have an altering effect on their staff, thereby changing the quality of education received by their students.

Additionally, the use of technological professional development was found to alter the self-confidence of teachers (King, 2006; Mishra & Kelly, 2006). This is evident in King's (2002) claim that "participants' accounts repeatedly reflect that these educators not only have a change in perspective about technology use and technology application to education, but also about their empowerment, greater confidence, and self-directed learning" (p. 292). King further suggested that the focus of professional development should not just be on skills, but on "incorporating group discussions, collaborative work groups, and curriculum development can help faculty to begin to challenge their concepts of teaching and learning as they learn educational technology" (p. 294). This method of professional development takes the focus away from the specific elements of technology to the application of technology to education, and makes it more likely that teachers will be confident in applying their ICT skills in a real-world context.

Al-Hazmi (2003) further outlined the appropriate focus of teacher education programs in Saudi Arabia, noting that "clear targets in knowledge and behavior should be defined through needs analyses that take into consideration such factors as teachers' general level of education, level of language competence, level of professional competence, and beliefs about education" (p. 343). In other words, the content and structure of training should be based upon an assessment of a teacher's current ability and knowledge as well as language background and their overall beliefs about education. As varying professional development programs are developed, these elements must also be considered to provide the most effective structure and direction for the professional development activities.

Institutional/Systemic Challenges

Looking at the challenges at a more systemic level, Al-Asmari and Rabb Khan (2014) presented the history of ICT learning in KSA and analyzed the problems the country faces. Al-Asmari and Rabb Khan recognized a need for a stronger infrastructure and a clearer policy statement from the government while also developing onsite and local support and training that recognizes individual and micro-cultural needs within the Kingdom. Relatedly, in order to get educators and students comfortable using the technology to achieve, they noted that teachers need a direct, hands-on approach to be instructed in training and, as importantly, teachers need motivation to actually implement these technologies. The authors noted that having a support structure on site might be the best way to achieve this. Students need teachers to be educated and trained, and teachers need to feel comfortable and supported by the administration and a local infrastructure. Yet the institutions and the government in Saudi Arabia have not yet developed the best way to accomplish this, and without that overarching support, will be difficult to implement ICT successfully. As Al-Asmari and Rabb Khan stated: "Academic institutions in Saudi Arabia do not have the basic understanding of effective e-learning. Hence, they do not provide the basics tools to support e-learning" (p. 9). This concern appears to be a nationwide problem, but may also be one that is even more noticeable in rural areas such as Al-Ula.

Focusing on the way curriculum is implemented systemically, Pall and Batra (2016) addressed the difficulty of adhering to an ICT educational model, noting that it can be difficult to follow a one-size fits all approach because different kinds of schools and different kinds of students have different learning needs that can now be taken into consideration because of the options technology offers. Increasingly, students are growing up with ICT as part of their daily lives. Technology gives children more control over their worlds, which are more interactive with many more choices. At the same time, this openness can only exist within a clearly established infrastructure. Especially in areas that are not as developed like rural India, Pall and Batra (2016) noted that policy support at all levels is essential for successful integration of ICT in education. Alshammari (2014) also noted the particular problems of integrating ICT in schools in more rural areas, which is why hands-on teacher training, consistent policy, and a sustained, "on the ground" support presence is essential for making the transition. By finding quality educators and resources, several areas that have difficulties with education could use technology to help make this learning more accessible; however, these rural areas have more difficulty because of the lack of resources for finding trained teachers and budgets to support buying technological tools for learning.

Necessity of Ministry-Level Support

Some researchers have argued that addressing systemic-level challenges requires a greater level of support for and guidance on ICT implementation from national government agencies (Al Mulhim, 2014;Khan, Hasan, & Clement, 2012). Focusing specifically on Saudi Arabia, Al Mulhim (2014) argued that for KSA to successfully implement ICT learning, the Ministry must revise its approach to ICT curricula and emphasize getting institutions and teachers caught up on current technology and keep up as technology continues to advance within the classroom setting. They noted that, without the support of the government, the barriers between school and teacher reinforce each other, especially school barriers affecting teacher confidence and understanding or enthusiasm about using these new technologies in the classrooms. "Without proper training or support and without the proper equipment or being able

to update the equipment, teacher morale will be low, and therefore, the chance of using these new technologies will be low" (p. 487). For this reason, more effective and consistent training could change the attitudes of teachers toward ICT, which is an essential factor for success in ICT implementation (Tearle, 2004).

Al Mulhim (2014) proposed that training packages should be developed and policies created that extend throughout the Kingdom and are uniformly emphasized and shared, noting that "it would be vital to create a database of technology media and resources that suit the Saudi curricula and culture" (p. 491). Al Mulhim has identified what may be the most significant barrier to ICT implementation: a lack of consistent support from the Ministry. New hardware and software are an essential element of ICT implementation, but without a clear and consistent policy to follow, ICT implementation will not be successful. As Al Mulhim explained, the training that has been available from the Ministry has been substandard. Some teachers who were interviewed in the article complained that the training sessions run by the training department in Riyadh were surprisingly unprofessional, given that they were government sponsored.

Focusing on a country with concerns similar to the KSA, Khan et al. (2012) focused on barriers to implementing ICT learning in Bangladesh. Although Saudi Arabia is in many ways developed, theAl-Uladistrict faces similar barriers and issues to Bangladesh when it comes to implementing ICT. In their study, Khan et al. noted thelack of ICT resources and infrastructure in Bangladesh and noted how this was one the primary reasons why ICT cannot be implemented or cannot be sustained in the country. This lack of resources might be not only a lack of funds, but also failure to disseminatethose funds to districts or individual schools is not controlled, organized, or regulated. Just as Tondeur et al. (2008) noted the need for a "shared vision," Khan et al. pointed to a need to create or develop a unified mission or plan that goes from the government down to the individual classrooms, noting that a shared vision or unified policy is an essential element to successful ICT implementation in a developing country or area:

The stakeholders and responsible authorities including teachers and other staff should be aware of the importance of technology in developing student's learning and should strive to overcome the barriers which prevent the use of technology in classroom settings, so that students can benefit effectively from this ICT. (p. 73)

Thus, the goal is to educate both the government and the teachers about the benefits of ICT, so that together they can devise and implement a coherent ICT learning policy.

This shared vision and coordination between teachers and the Ministry is essential because, without teacher support, any policy the Ministry tries to implement will not be successful. Recognition from teachers that ICT has become a necessary component of pedagogy in the 21st century is an essential part of ICT implementation, but teachers can display resistance to ICT use when it has not been implementing effectively (Khan et al., 2012). They note that "Teachers' attitudes have been found to be major predictors of the use of new technologies in instructional settings" (p. 71). They also note that governmental support for ICT implementation is a significant factor that influences teachers' attitudes toward ICT use. Teachers with less knowledge about computers but with positive attitudes actually have more success with ICT learning and implementation than teachers who have negative attitudes or resist the technology, even if they are more educated about that technology. Therefore, if teachers want to successfully use technology in their classes, they need to a positive attitude, which can only be developed if the teachers are first made comfortable with technology and know how to use it effectively.

Theoretical Framework for ICT Implementation

With the research literature discussed above in mind, a useful framework for the current study can be found in Tearle's (2004) *A Theoretical and Instrumental Framework for Implementing Change in ICT in Education.*According to this theory, ICT change implementation is most effective when it takes the organization, the individual, practical/material artefacts, and the change process into account. According to Tearle (2004), we can determine the likelihood of success within an organization undergoing ICT implementation by examining the extent to which these factors are present. By definition, practical/material factors the resources, equipment, and infrastructure needed to implement the desired changes. Practical/material factors also include training and technical support. In terms of organizational factors, the overall culture, practices, and processes of a whole school must be supportive of ICT implementation in order for it to be effective. In particular, Tearle noted that change implementation requires strong whole school leadership, a school culture that encourages learning that is both adaptive and collaborative, a change-orientated nature of the whole school, a positive and proactive attitude to external influences, and well-established whole school internal processes. In other words, the school must have a culture that is supportive of ICT implementation through a culture that is oriented toward learning and adaptability. In addition, the school must have processes in place for strategically planning and implementing change. When considering individual factors, Tearle focused on the attitudes, motivations, and beliefs about ICT of individuals within the organization. The key question when looking at the individual factors is: do the people within the organization hold attitudes, motivations, and beliefs that are supportive of ICT implementation, or are they likely to be resistant?Tearle also considered the change process itself to be an important measure of the likelihood of success in ICT implementation. In essence, change implementation factors focus on how an organization intentionally carries out a change, and asks: what are the processes that the organization follows in order to implement change, what are the stages that individuals within the organization pass through as they implement change, and how is the success of the change assessed? When looking at the change process itself, the underlying idea is that organizations will be more successful at implementing change when they follow an intentional process that has benchmarks for success that can be measured, and that adjustments can be made in order to meet those benchmarks as needed.

As the current study will focus on the factors within Al-Ula schools that either support or hinder ICT implementation, Tearle's (2004) framework is appropriate for this study. Tearle's framework has also been applied by Al Mofarreh(2016), who assessed used Tearle's framework to assess the extent to which the KSA's national ICT policy was effectively implemented in Saudi Arabian schools. In his study, Al Mofarreh confirmed the findings of other studies on ICT implementation, noting that a lack of training, a "top-down" implementation approach, and a lack of material resources hindered ICT implementation. As the focus of this study was mostly on the effectiveness of implementing the national policy, Al Mofarreh made recommendations on how the policy could be improved and implemented more effectively, including establishing a "shared vision" similar to the one advocated for by Tondeur et al. (2008).

Summary

The ultimate goal of ICT learning is to establish a global standard that could lead to a universal language of digital literacy, where everyone has equal access to information and will be trained in how to research and communicate critically and effectively using a variety of ever developing technologies. However, as the literature suggests, not all areas in developing countries have attained that standard, creating a need to examine the specific ways in which

ICT is either being hindered or promoted in those areas. The literature reviewed in this chapter demonstrates some of the common barriers and solutions to ICT implementation, both at the individual and systemic level. From the literature, we know that ICT implementation can be hindered at the individual (e.g. teacher) level not just by a lack of skill, but by a lack of confidence and/or a fear of failure that can lead to resistance to ICT implementation. According to the literature, training and professional development for teachers should focus not just on skills, but on building confidence and creating a culture of collaboration around ICT implementation. From the literature, multiple systemic concerns were identified, including a lack of clear policy and direction from national government agencies and a lack of resources or funding to implement ICT successfully. We can also see that establishing a shared vision of ICT implementation that includes all stakeholders (including teachers) in a collaborative effort to develop policies and practices offers a positive direction forward. At the same time, much of the literature on ICT was conducted in countries and/or areas that face challenges that are different from the challenges faced in small town and rural, under-resourced areas such as Al-Ula in Saudi Arabia. This presents a gap in the literature that could be filled with additional research into ICT usage in Al-Ula and similar areas.

Based on the information that is available in the literature, it seems that to successfully implement ICT in rural areas or areas that are particularly resistant to technology, it is crucial to have a common understanding and consistent support at all levels, from the government to the district to the school and its administration to the faculty, and finally to the student body and support staff. If there is no direction or coherent training, the teachers will feel like failures, but if, as is often the case, ICT is being imposed by policy without a clear agenda or understanding of the teachers' needs and desires, the teachers could become resentful about ICT. When teachers are already overburdened, classes are filled, school days and curriculum have already been established, finding the time both to learn and to begin to include these technologies into the curriculum could be a challenge. And, until there is effective training and proper equipment and support, and the teachers become comfortable using it, it is going to be a process that hinders learning. In Saudi towns like Al-Ula, their lack of resources and support and lack of exposure may make these difficulties even more challenging for them to overcome, and there may be specific ways in which these areas can confront these challenges. With this in mind, it would be useful to collect data in small towns such as Al-Ula in Saudi Arabia. In particular, it would be useful to hear about the challenges faced by professionals in these areas that have the most direct experiences with them—the teachers and principals working in Al-Ula schools—as the voices of these professionals are currently absent from the literature. Through interviews and surveys, the perspectives of these professionals can offer insight into both the challenges they face and the ways in which those challenges might be overcome.

A useful approach to this type of study would be viewing Al-Ula schools through the lens of Tearle's (2004) *A Theoretical and Instrumental Framework for Implementing Change in ICT in Education*and applying it to Al-Ula schools. This framework could be an effective lens through which to examine Al-Ula schools, as it emphasizes multiple dimensions of ICT implementation, including the organization (the educational system, schools), the individual (teachers, principals), practical and material artefacts (resources, management, training, support), and the change process itself. Chapter 3 will describe the research methods in more detail.

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