



**Master's Thesis of Public Administration** 

## Digital Literacy Program Implementation in Public Primary Schools

A Case Study of Nakuru West Sub-county, Kenya

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## Abstract

# Digital Literacy Program Implementation in Public Primary Schools

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In recent years, the Government of Kenya (GOK) has introduced initiatives focused on elevating the country to middle-income status. In the hopes of integrating ICT into the elementary education system, the government implemented the Digital Literacy Program (DLP)—providing tablets to schools nationwide and building a new curriculum that incorporates digital literacy into students' lives. The purpose of this dissertation is to use qualitative case study design to determine key factors impacting the implementation of the DLP in public primary schools across Nakuru West Sub-county, Kenya.

Through the lens of Richard Matland's ambiguity-conflict model, the study posits the following research questions: (1) How do perceptions of the characteristics of policy ambiguity and conflict affect the DLP implementation process in schools? (2) What are the key factors impacting DLP implementation? (3) Does Kenya's DLP align with Matland's model of experimental implementation?

The study then explores critical factors affecting the program's effectiveness in fostering pupils' digital competencies. Participants include primary school teachers from all twelve schools located in Nakuru West Sub-county. Data sources are surveys and interviews.

Upon analyzing its findings via thematic framework analysis and descriptive statistical methods, the study discusses barriers to implementing the DLP successfully. Finally, the study offers policy implications and recommendations for further research that could inform future solutions to the challenges of the program.

**Keywords:** information and communications technology (ICT), digital literacy program (DLP), policy implementation, ambiguity-conflict model, government policy, teacher training, ICT infrastructure

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### **Chapter 1. Introduction**

#### 1.1. Study Background

With the importance of digital literacy in the modern age, countries across the globe have embedded technology in their education systems. The benefits of digital literacy for primary school students have been widely discussed and researched. According to UNESCO, those that have integrated information & communications technology (hereafter ICT) have reaped benefits such as interactive multimodal platforms, instructional efficiency, and enhanced content comprehension. Denmark, Portugal, Finland, and Sweden are examples of those that have adopted ICT in primary schools, increased practice-based teaching, and used mobile-based technologies such as portable devices in class (OECD, 2016). Research suggests that students ought to foster new literacies and approaches to critical thinking to adapt to digitalized society (Kajee, 2018). As such, ICT has evolved into an ubiquitous tool for school structures to shape effective learning and educational growth.

Across Sub-Saharan Africa in particular, the implementation of digital literacy in primary schools has been mixed. While there have been successful initiatives in some countries, many others are facing challenges in integrating digital literacy into their education systems. One instance of positive progress is Rwanda's nationwide program to give primary school students access to laptops and digital resources. The country has made significant progress in integrating ICTs into its education system, including through the *One Laptop per Child* (OLPC) initiative, which has distributed over 200,000 laptops to primary school students since 2008. According to a UNESCO report's findings, among the opportunities connected to this program implementation are access to information, improved learning outcomes, employment prospects, and innovation and entrepreneurship (Wallet, 2015, p. 14).

However, there are still many hurdles to overcome for Sub-Saharan African countries with nascent digitalized education systems. These include but are not limited to scarce access to technology, inadequate infrastructure such as electricity and internet connectivity, and lack of trained teachers who can navigate ICT curriculum. In many rural areas, the absence of basic infrastructure renders it difficult to implement digital literacy programs effectively. Furthermore, some countries face language barriers in adapting digital literacy programs to local contexts, as many established digital programs have been designed for Western languages and classrooms, making them less relevant to African students (Wallet, 2015).

In Kenya's case, through *The Kenya Vision 2030*, the federal government has sought to transform the nation into a newly industrialized economy providing high quality of life by 2030 (2022). Such efforts have included reform across ten main sectors, including Science, Technology, and Innovation. The Government of Kenya (hereafter GOK) believes digital literacy to be a vital component of the mission that will boost the nation's economy and citizens' welfare (Kenya Institute of Curriculum Development [KICD], 2019).

Kenya's digital literacy program, also known as DLP or DigiSchool, is a national initiative aimed at introducing digital literacy to primary school children in the country. The GOK launched the DLP in 2013 to integrate technology in the education sector, in the hopes of innovating pedagogy and furthering economic development (DigiSchool, 2018). In particular, it envisioned equipping learners with the necessary skills to use computers and other digital devices. As stated by the ICT Authority (2022), the management of the program involves a multi-agency approach: the Ministry of Education for school infrastructure development, the Ministry of ICT, the Teacher Service Commission (TSC) for teacher training, the Kenya Institute of Curriculum Development (KICD) for required content, and Ministry of Energy for electricity supply (Kenya Department of Early Learning and Basic Education, 2020).

The DLP has several objectives, including increasing access to technology for all learners, improving the quality of education through technology integration, and promoting digital literacy and digital citizenship among learners. It is specifically anchored on five key interventions:

- 1. Provision of content for digital learning;
- 2. Provision of digital devices for both learners and teachers;
- 3. Capacity development for teachers and implementers;
- 4. Establishment of local assembly for digital devices and related accessories;
- 5. Broadband connectivity.

Additionally, the program was implemented in two phases. In the first phase, running from 2013 to 2016, the government distributed over 22,000 tablets, known as Learner Digital Devices (LDD), to Grade One pupils across the country. The program should have also successfully distributed two Teacher Digital Devices (TDD), Content Access Point (CAP), and one projector to each school. Another aspect of the program focuses on training teachers in digital literacy and integrating technology in teaching and learning. The national treasury raised KSH 13.4 billion for the DLP in its 2016/2017 budget, and these funds were intended to assist in the production of digital materials, the establishment of teacher training, and development of computer laboratories in all public primary schools (Rotich, 2016). In the second phase, running from 2020 to 2023, the government has targeted learners in Grades 4 through 6. Similar to the first phase, the fundamental components of Phase II are the provision of devices, development of digital content, teacher capacity building, power supply extension, and increased broadband connectivity within schools (Kenya Department of Early Learning and Basic Education, 2020, p. 8).

The program has generally been deemed successful, with over 1.2 million pupils and 75,000 teachers supposedly trained in digital literacy by the end of the first phase. However,

success remains contingent upon various conditions. Although most public primary schools in the country should have had digital technology installed, the implementation rate and frequency may be slow. Only a small number of primary school students may possess the fundamental ICT skills necessary to participate and learn in a digitally literate environment. Challenges include a lack of functioning devices, inadequate infrastructure or training, and limited internet connectivity in some areas. Although the Kenyan government remains committed, in order to move forward with the DLP, determining program implementation mechanisms and the critical factors affecting it can inform best implementation practice.

#### **1.2. Purpose of Research**

International experience, including across developed countries, has demonstrated the reality that policies or programs, once adopted, may not unfold as initially envisioned and often fall short of their intended outcomes (Calista, 1994). It is worth noting that policymakers often prioritize the end results or outputs, neglecting the significance of the implementation process itself, which holds valuable insights into the barriers hindering effective implementation (Mthethwa, 2012). Consequently, exploring the intricacies of the implementation process can provide valuable insights into the factors that shape the success or failure of programs.

Further, a review of the empirical literature shows that few studies thus far have examined the impacts of the aforementioned factors on the success of the Digital Literacy Program, especially in areas outside of capital city Nairobi; hence, there is a need for more academic research. Several dissertations have sought to investigate digital literacy on the ground level at public primary schools located in other provinces or regions of Kenya, yet none have explored the circumstances in the selected area for this study, and none have framed the issue within an ambiguity-conflict theoretical framework, to be later discussed. With this in mind, this paper aims to examine the mechanisms and influential factors involved in the implementation of Kenya's digital literacy program, with the aim of contributing to existing knowledge and informing future implementation best practices.

The purpose of this study is to evaluate implementation of the Digital Literacy Program in the twelve public primary schools located in Nakuru West Sub-county, Kenya. Data is to be collected via primary and secondary documents, followed by surveys and interviews with respondents comprising of ICT teachers and headteachers. Upon qualitative data analysis across the aforementioned twelve schools, this study hopes to draw from respondents' experiences and perspectives to identify the mechanisms of and factors influencing successful implementation of the DLP. The findings obtained from this research are expected to contribute new insights to policymakers regarding how to develop more comprehensive and tailored strategies that may enhance current education outcomes and propel Kenya towards accomplishing *Vision 2030*.

### **Chapter 2. Literature Review**

#### 2.1. Digital Literacy Concepts

The history of academic thought on digital literacy in schools can be traced back to the 1990s, notably Paul Gilster's book *Digital Literacy* published in 1997 (Pangrazio, et al., 2020, p. 444). Throughout the mid-1990s, with the development of the internet, the concept of digital literacy began to emerge as a way to describe the skills and competencies needed to critically navigate digital technologies. This included skills such as using computers, accessing and evaluating information online, as well as using digital tools for communication and collaboration (Lankshear & Knobel, 2008, p. 8).

Numerous definitions and perspectives of digital literacy have materialized over time, demonstrating the evolution of the concept from its early origins to its current use in educational contexts. For instance, the notion can be described as the consumption, creation, and communication of digital products (Spires & Bartlett, 2012; Spires, Paul, & Kerkhoff, 2019). Beyond the capacity to merely consume and obtain information through online reading and inquiry (Kimani & Onyancha, 2015; Leu et al., 2019), digital literacy involves the ability to craft digital texts, employing appropriate modes and features of digital platforms to convey one's thoughts effectively (Coiro, 2021; Leu et al., 2019). In addition, digital literacy enables individuals to participate, collaborate, and connect with people across geographical boundaries, as emphasized by Kerkhoff and Cloud (2020), Kim (2016), and Law, et al. (2018), thus extending the reach of their ideas. Although the concept of digital literacy is complex and multifaceted, the American Library Association developed a definition that has widely been referenced as "the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills" (2013, p. 2).

In the late 1990s and early 2000s, researchers began to explore the role of digital literacy in *education*, and how it could be integrated into the curriculum. This led to the development of models for digital literacy, one of the first being the Digital Literacy Framework developed by the UK government in 1999. The framework was intended to provide teachers and students with a clear set of standards for digital literacy. A report by the Office for Standards in Education (OFSTED) outlined four key components of the framework: finding and using information; developing ideas; exchanging information; and reviewing, modifying, and evaluating work. These four components were seen as imperative for developing pupils' digital literacy competencies, and they were designed to be implemented throughout all stages of education—from primary to secondary school (OFSTED, 2002).

Over the past couple decades, several other prominent frameworks have been discussed in the field, one of the most widely recognized being the UNESCO Digital Literacy Global Framework (DLGF) created in 2011. It identifies five key areas of digital literacy that are essential for individuals to fully participate in today's society:

- (1) Information and data literacy;
- (2) Communication and collaboration;
- (3) Digital content creation;
- (4) Safety and problem-solving;
- (5) Digital citizenship.

The DLGF emphasizes the importance of developing critical thinking and problem-solving skills, as well as the ability to use digital technologies for creative expression and innovation. The framework has been utilized by federal governments for designing digital literacy curricula, developing assessments, and evaluating digital literacy programs (Law et al., 2018).

While the implementation of the DLGF in African countries is still in its early stages, there is growing recognition of the importance of digital literacy for economic development and social inclusion. The Kenyan government, for instance, adopted the DLGF as the basis for the Digital Literacy Program, using it as a reference point for guiding initiatives.

#### 2.2. Digital Literacy Assessment

The UNESCO Digital Literacy Global Framework functions in accordance UN Sustainable Development Goal (SDG) Indicator 4.4.2, which aims to "substantially increase the number of youth and adults who have achieved at least a minimum level of proficiency in digital literacy skills" (Laanpere, 2019, p. 5). However, no standardized instruments currently exist for monitoring the SDG digital literacy indicator. Although much research has recommended alternative methodological approaches for assessing digital literacy skills, there is no global consensus in terms of what constitutes a "minimum" level of proficiency in digital literacy that would allow for the aggregation of national data. There still exists a considerable knowledge gap about the state of the youth's digital literacy skills on a macro level, and it remains crucial to continue developing assessment tools for monitoring digital literacy within the DLGF.

In 2018, the UNESCO Institute of Statistics (UIS) commissioned a report entitled *A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2* (Law et al.) to expand the extant framework. The report reviewed digital literacy assessment frameworks from 47 countries, drew upon consultations with experts, and raised three challenges. First, the report emphasizes a need to match existing digital skills assessment tools to the DLGF—there is no one-size-fits-all approach that can be used in all settings. Second, the report recommends the development of cost-effective, cross-national research and development programs to create digital literacy indicators and assessment instruments that are tailored to specific contexts (p. 27). Third, the report highlights the inconsistency in

measurement scales between the SDG Indicator and a new European standard on digital competence framework—DigComp. The SDG Indicator 4.4.2 aims for a minimum proficiency level, while DigComp distinguishes between eight proficiency levels (p. 28).

In general, professionals and stakeholders from diverse economic and regional backgrounds have agreed on the proposed Global Framework for Digital Literacy and the pathway mapping methodology. The UIS' research indicates that the DigComp 2.0 framework can serve as a valuable and appropriate foundation for developing a global digital literacy framework. Nevertheless, countries approach digital literacy differently in terms of concepts and implementation. It is important to note that the DigComp 2.0 competence framework only addresses the context of European countries, which are typically high-income and technologically advanced. To meet the needs of different countries such as Kenya, the proposed framework should include additional competencies.

#### 2.3. Factors of Digital Literacy Program Implementation

This section reviews the relevant literature regarding the adoption of ICT as it relates to school policy and leadership, teacher competence, and infrastructure.

Initially, educational policies revolving around digital literacy emphasized the development of ICT infrastructure yet underplayed the need to train teachers to utilize digital technologies into use while teaching and learning. However, various distinctions have now emerged among the beliefs on potential values of digital technologies placed in schools (UNESCO 2011). Among such variation is Sutherland et al's study (2004) suggesting that policy makers in educational settings should address ICT as inventions that supplement former and current technologies; therefore, school policies should regularly evaluate practices so as to calibrate digital literacy accordingly. Effective school leadership can better foster the use of digital learning materials by supporting a pervasive climate conducive to ICT infrastructure (Vermeulen et al, 2017). Aside from bringing in technology and innovative

platforms, collaboration and cooperative leadership is required to successfully assimilate them into more conventional education systems at schools (Hobbs & Coiro, 2019).

Teacher's beliefs, motives, abilities, and points of view all relate to the successful implementation of digital technologies. Many studies have indicated that teachers hold a major responsibility in the ways of accepting ICT and thus creating innovative customs within school structures. Sipilä (2010) asserts that integrating ICT in schools was only enabled by the confidence and competent attitudes of teachers who knew how to navigate technological infrastructure within learning environments. If instructors were given their own portable devices either at work or at home, then their individual use of technology would be enhanced and reflect in the classroom.

As for technological infrastructure, according to Montrieux et al, tablets used in classroom contexts do hold influence (2015). Innovations have allowed for new technical tools such as iPads or portable and cellular Android devices to invoke educational reform. Additional research findings have concluded that the use of tablets appear to positively influence student motivation and support more comprehensive learning experiences. With the need for rapid communication and uninterrupted connection to the interwebs, teachers are aware of the necessity for more advanced technological infrastructure (Cumming, Strnadova, & Singh 2014).

#### 2.4. Initiatives and Challenges in Kenya

In recent years, the GOK has established the Basic Education Curriculum Framework, which outlines the learning objectives and standards for the basic education system in Kenya, from early childhood education (ECE) to grade 12. The curriculum is based on sociocultural and constructivist theories, where learning is viewed as a communal activity of building knowledge, rather than mere acquisition (Dewey, 1966; Vygotsky, 1978). The structure is organized into four levels: Early Years Education (EYE) for children aged 3-5 years, Primary

Education for grades 1-6, Lower Secondary Education for grades 7-9, and Upper Secondary Education for grades 10-12. Each level has its own set of learning objectives, competencies, and assessment criteria. The framework is a competency-based curriculum (CBC), which aims to equip learners with skills and knowledge that are relevant to the societal as well as economic needs. Specifically, it calls for transformative teaching that advances seven core competencies: communication, collaboration, self-efficacy, critical thinking, creativity, citizenship, and digital literacy (KICD, 2019). The framework involves *learner-centered teaching*, meaning "to think of teaching with learning in the forefront and with the idea that we should consider teaching primarily in terms of its *impact on learner learning*" (KICD, 2019, p. 16).

The trend towards learner-centered teaching is consistent with efforts in other sub-Saharan African countries (Adedeji and Olaniya, 2011; Tabulawa, 2013). However, a comprehensive analysis of studies in sub-Saharan Africa revealed that the history of implementing learner-centered education has been marred by a significant number of failures (Schweisfurth, 2011). In a coastal Kenya study, Jukes et al. (2017) observed that teachers predominantly relied on lecture-based teaching methods using textbooks. Ngware, Mutisya, and Oketch (2012) conducted a mixed-methods study on schools in Kenya, which showed that while recitation—an activity where students participated but did not actively construct knowledge—was the most common teaching activity, other learner-centered practices such as co-constructed discussions were theoretically beneficial for student learning but accounted for less than 4% of English lessons. Ngware et al. concluded that this heavy emphasis on teacher-centered, reproductive teaching may not foster critical thinking in students. Such conclusions infer that further research is needed on how successful learner-centered teaching, paired with digital literacy instruction, may produce enhanced education outcomes.

Aligned with promoting learner-centered ideology, the Basic Education Curriculum Framework works in tandem with the Digital Literacy Program. Previous reports demonstrate that some distributed tablets remained unused, either due to the teachers' reluctance to incorporate technology in learning or their lack of knowledge in doing so (Wanzala & Nyamai, 2018). In Kenya, as in other developing countries, integrating technology into schools poses several challenges, including infrastructure problems such as power and internet outages, inadequate computer-to-student ratios, inadequate teacher knowledge of integrating technology with learning, lack of technical support, and an already overloaded curriculum that does not include digital literacy (Kerkhoff & Makubuya, 2022). Research in Kenya conducted by Heinrich et al. (2020) and Kerkhoff et al. (2020) demonstrated that even when schools are able to access technology, issues remain. Intentional, socio-culturally based digital literacy instruction is necessary for students to navigate digital texts skillfully and enhance academic learning in the future.

Numerous challenges arise with the integration of technology in schools located in low-income countries. Some obstacles stem from infrastructure problems, such as electrical and internet outages (Muriithi, Horner, & Pemberton, 2016; Stols et al., 2015). School-based obstacles include the high ratio of students to computers in classrooms—for example, 150:10—and teachers' insufficient knowledge on integrating technology with learning (Piper, et al., 2017; Tondeur, et al., 2015). An additional challenge to integrating technology is the lack of technical support to deliver training or fix devices when needed (Muriithi et al., 2016; Ogembo, Ngugi, & Pelowski, 2012). In the Kenyan context, an overloaded curriculum that doesn't include digital literacy integration is another significant challenge (Anyiendah, 2017; Gudu, 2015). Studies in the United States (Leu et al., 2019) and Kenya (Kimani & Onyancha, 2015) have indicated that students who do not develop digital literacy skills experience impediments to future academic learning. Other studies further validate purposeful digital literacy instruction in order for many students to navigate digital texts competently (Coiro, et al., 2015; Livingstone, et al., 2017).

#### **2.5. Theoretical Framework**

#### **2.5.1.** Policy Implementation

Policy implementation can be defined as "the mechanisms, resources, and relationships that link policies to programme action" (Mthethwa, 2012, p. 37). Policy implementation *theory* thus represents frameworks crucial for understanding how given policies are translated into respective actions. The following section of literature review explores the evolution of two primary approaches before discussing policy implementation theory within the field of education.

According to Goggin et al. (1990), the first phase of policy implementation research, spanning from approximately 1973 to 1978, primarily aimed to delineate and comprehend instances of policy implementation failure. However, during the second phase of implementation studies, roughly between 1978 and 1985, researchers expanded upon the case studies conducted in the first phase and proposed more extensive theoretical frameworks elucidating the causes of both failures and successes. Throughout this development two main paradigms have materialized: top-down and bottom-up.

Before discussing the two pathways, it is important to understand what is meant by *successful* policy implementation. Policy refers to the planned activities developed in response to an authoritative decision. These activities represent the plans of the policy designer to carry out the intentions expressed by the governing body, such as a legislature, court, or executive agency. The key question is whether success should be measured based on how closely the implementation aligns with the designer's plan, or by looking at the overall

outcomes and consequences of the implementation actions. This question is at the core of disagreements between top-down and bottom-up theorists (Matland, 1995, p. 154).

Top-down models, as posited by Elmore (1979), Sabatier (1986), Sabatier and Mazmanian (1989), emphasize three general factors that determine the probability of successful implementation: assessment of tractability of the problem, ability of statute to organize implementation, and non-statutory factors that influence execution. Top-down theorists push for measuring success based on specific outcomes directly linked to the program's legal foundation (Palumbo et al., 1984). As such, they advocate for governments to establish clear and consistent goals, minimize the extent of any required change, and delegate implementation to organizations sharing those goals. The significance of considering the "technical validity" of the causal relationship between policy goals, measures, and outcomes is emphasized by proponents of top-down approaches (Sabatier & Mazmanian, 1989).

Conversely, bottom-up approaches, explored by Maynard-Moody et al. (1990), Hjern and Hull (1982), Elmore (1979), and Lipsky (1980), adopt the perspective of the target population and service providers. These approaches argue that flexibility is crucial to achieving objectives, as centralized decision-making may not adequately respond to local circumstances. Hence, bottom-up theorists prefer a broader evaluation of implementation, whereby a program that produces "positive effects" can be considered successful (Palumbo et al., 1984). In sum, policy implementation theory has advanced by incorporating both top-down and bottom-up models, and it is essential to understand the interplay between the two. While top-down approaches prioritize authority-driven goal setting and organizational alignment, bottom-up approaches emphasize local adaptation and flexibility.

#### 2.5.2. Ambiguity-Conflict Model of Policy Implementation

Richard Matland (1995) synthesizes the top-down and bottom-up models. He contends that "policy implementation occurs on two levels" (p. 148). In other words, he

underscores the dual-level nature of policy implementation—centrally positioned actors formulate government programs at the macro level, while local groups respond by creating and implementing their own programs at the micro level. He contends that successful implementation is "to execute faithfully the goals and means present in the statutory mandates" (1995, p. 155).

Matland's approach—termed the "ambiguity-conflict model"—identifies two key elements as contributing to the success (or failure) of policy implementation: ambiguity and conflict. The levels of ambiguity and conflict are used to understand how different approaches to policy implementation occur. Within this frame of mind, ambiguity refers to the level of clear and consistent information about an issue; it involves uncertainty about the causes, consequences, or appropriate solutions to a problem. Chun & Rainey (2005) expand on this by asserting that goal ambiguity refers to the extent to which an organizational goal or set of goals allows room for interpretation; when an organizational goal allows for multiple interpretations, it loses its clear meaning and becomes ambiguous. The ambiguity then causes miscommunication, which can frequently lead to implementation failure. According to Matland, policy actors' perceptions of ambiguity in goals and means dictates the impact of contextual factors. (Matland, 1995).

On the other hand, conflict generally refers to the level of disagreement or contention among stakeholders regarding a policy; Matland characterizes the notion as the situation where "more than one organisation sees a policy as directly relevant to its interests and when the organisations have incongruous views" (p. 156). In order for conflict to arise, certain conditions must be met, including the interdependence of actors, conflicting objectives, and a perception that interactions result in a zero-sum outcome (Dahrendorf 1958). When multiple entities perceive a policy as directly relevant to their interests yet hold contrasting views, conflict emerges. These differences can arise from disagreements over the stated goals of a policy or the planned activities to implement it. Disputes over policy means can come up due to jurisdictional issues or disagreements regarding the most suitable approaches to achieve the agreed-upon goals. For instance, while digital education may be an agreed-upon goal, an engineer, economist, and lawyer may advocate for distinct means to accomplish it. The intensity of conflict escalates with increasing incompatibility of concerns and the perceived stakes for each actor. "The more important a decision is, the more aggressive behavior will be" (Matland, 1995, p. 157). Additionally, the more actors that are involved in policy implementation, the more conflict may emanate due to a greater number of potentially competing viewpoints. For instance, the GOK's DLP outlines involvement from a plethora of bodies including the Ministry of Education, Ministry of Energy, Ministry of ICT, Teacher Service Commission, and Kenya Institute of Curriculum Development. This implies a larger likelihood of looming conflict, as opposed to a single ministry taking charge of the program. To this end, policy conflict exacerbates the difficulty of successful policy implementation.

Within the field of education, then, policy implementation theory seeks to explain the processes, dynamics, and factors involved in putting educational policies into practice. It focuses on how policies are translated from formal guidelines or directives into actions and practices within educational institutions.

This study adopted Matland's ambiguity-conflict model as the theoretical framework to guide the analysis of the Government of Kenya's digital literacy program implementation. Although a review of the literature showcases many applicable theories, Matland's ambiguity-conflict model in particular provides a valuable framework for researching the digital literacy program implementation at primary schools. His model incorporates essential findings from previous research on policy implementation and has been widely utilized in the analysis of policy-practice relationships, implementation outcomes, and the factors influencing implementation success or failure. Further, the framework emphasizes the

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significance of goal ambiguity and conflict that may arise due to varying interests and objectives among stakeholders involved in policy implementation.

In the context of a digital literacy program, in which multiple actors such as government officials, teachers, administrators, and technology providers are involved, interpretations and understanding of program goals likely differ. The presence of ambiguity and conflict is highly relevant. By applying Matland's theoretical framework, we can assess the extent of goal ambiguity, examine how conflicting interests may hinder effective implementation, and propose strategies to mitigate these challenges. It offers a nuanced and comprehensive lens to not only understand the complexities of implementing digital literacy programs but also yield insights into the importance of reducing ambiguity to enhance ICT program outcomes. By embracing this model, the study aimed to leverage the valuable insights it has already generated in the field of policy implementation analysis.

The model integrates these two dimensions within a four-cell matrix, depicted in Figure 1, where each cell represents a unique approach to implementation guided by a central principle that determines its resulting outcomes. The placement of specific policies depends on the domestic circumstances of each country, and the degree of ambiguity and the degree of conflict are best viewed as interconnected axes (Gakou-Kakeu et al., 2020).

As demonstrated in Figure 1, when there is low conflict and low ambiguity, implementation is *administrative*. According to decision-making theory, situations with low levels of ambiguity and conflict offer ideal conditions for a rational decision-making process. In these circumstances, clear goals are established, and a known technology or means for addressing the problem is available. In the realm of administrative implementation, the central principle is that outcomes are influenced by the availability of *resources*. When adequate resources are allocated to a program, the desired outcome is highly likely to be achieved (Matland, 1995).

When there is high conflict but low ambiguity, implementation is *political*. In such models of decision making, actors have well-defined goals, but disagreements occur because these goals are incompatible with one another. Conflicts can also arise regarding the means to achieve those goals. It is during the process of designing the implementation policy that conflicts tend to arise and intense battles ensue. The key principle in political implementation is that the success of implementation is determined by *power*. In some instances, a single actor or a coalition of actors may possess enough power to impose their will on others. Alternatively, actors may engage in bargaining and negotiation to reach a mutual agreement (Matland, 1995).

When there is low conflict but high ambiguity, implementation is *experimental*. If a policy demonstrates significant ambiguity and minimal conflict, the outcomes primarily rely on the engagement and involvement of key actors. In this approach, the central principle guiding implementation is the dominance of *contextual conditions*, or surrounding circumstances. These conditions are prone to significant variations across different sites, leading to diverse outcomes. As for decision-making, this type of implementation comprises a process whereby actors, problems, solutions, and choice opportunities come together in unpredictable ways. Experimental implementation inherently involves problematic preferences and uncertain technology. The key determinant is the active participation and intensity of involvement of the participants. Their level of engagement in decision-making is influenced by their level of commitment, competing demands on their time, physical proximity to the decision-making venue, and various other factors (Matland, 1995).

Finally, when there is high conflict and high ambiguity, implementation is *symbolic*. It may initially seem unlikely for a policy to possess both high levels of ambiguity and conflict. While scholars often suggest increasing ambiguity to reduce conflict, Matland argues that there are indeed policies or programs that exhibit both characteristics. These policies,

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particularly those that invoke highly significant symbols, can generate substantial conflict even when the policy itself is vague. Symbolic policies serve to establish new goals, reaffirm commitment to existing goals, or highlight important values and principles. The presence of high conflict is significant as it shapes the process of reaching resolutions. Additionally, the high level of ambiguity leads to varying outcomes across different sites. The central principle in such cases is that the outcome is determined by the *coalition strength*. The direction of policy is influenced by the coalition of actors at the local level who possess control over the available resources. and how well it works will rely on the strength of the coalition (Matland, 1995).

|                  | Low Conflict   | High Conflict  |
|------------------|--|--|
| Low<br>Ambiguity | <ul> <li>Administrative Implementation:<br/>Resources</li> <li>Objectives are clearly defined<br/>with an established approach<br/>for problem-solving</li> <li>A central governing body<br/>possesses the necessary<br/>knowledge, resources, and<br/>authority to implement the<br/>intended policy</li> <li>Implementation follows a<br/>hierarchical structure, with<br/>instruction flow from higher to<br/>lower levels</li> <li>The policy is explicitly outlined<br/>at each level, and there is<br/>consensus on roles and<br/>responsibilities</li> <li>Consistent and comparable<br/>outcomes are observed across<br/>various local contexts or sites at<br/>a smaller scale</li> </ul> | <ul> <li>Political Implementation:</li> <li>Power</li> <li>Disagreements arise over<br/>both desired objectives and<br/>strategies</li> <li>The implementation process<br/>is a significant arena where<br/>conflicts emerge</li> <li>Power dynamics shape the<br/>outcomes of implementation<br/>outcomes</li> <li>Compliance cannot be<br/>assumed; it requires active<br/>engagement and effort</li> <li>Low ambiguity ensures that<br/>monitoring and compliance<br/>becomes more<br/>straightforward</li> </ul> |

Figure 1. The Ambiguity-Conflict Matrix: Policy Implementation Processes

| High      | <b>Experimental Implementation:</b>  | Symbolic Implementation:  |
|-----------|--|---|
| Ambiguity | <b>Contextual Conditions</b>   | <b>Coalition Strength</b>   |
| Amoiguity | <ul> <li>Actors involved significantly<br/>influence outcomes</li> <li>Outcomes vary across different<br/>sites</li> <li>Predicting outcomes is<br/>challenging</li> <li>Local entrepreneurs have<br/>opportunities to shape local<br/>policies</li> <li>Limited relevance of<br/>compliance monitoring<br/>mechanisms</li> <li>The policy may lose priority<br/>and receive less attention</li> </ul> | <ul> <li>Combination of factors may appear implausible</li> <li>Salient symbols can generate high conflict, even with vague policies</li> <li>Outcomes will differ among different sites</li> <li>Outcome variations depend on the strength of local coalitions</li> <li>Policy ambiguity hinders monitoring of activities</li> </ul> |

#### **Research Questions:**

- How do perceptions of the characteristics of policy ambiguity and conflict affect the DLP implementation process in schools?
- 2) What are the key factors impacting DLP implementation?
- 3) Does Kenya's DLP align with Matland's model of experimental implementation?

#### 2.5.4. Sociocultural Theory

The experimental implementation approach, as defined by Matland's model (1995), acknowledges that policies interact with complex social and cultural factors, and the implementation depends heavily on contextual conditions, or the actors present in the microimplementing environment. When researching program or policy implementation, incorporating Lev Vygotsky's sociocultural theory (1978) as a theoretical framework can fill in the gaps left by Richard Matland's ambiguity-conflict model. Matland's model focuses primarily on policy ambiguity and conflict as key factors influencing implementation success.

Considering the study seeks to answer whether the GOK's Digital Literacy Program aligns with the experimental implementation model, Vygotsky's sociocultural theory offers a broader perspective that considers localized educational contexts in which implementation occurs.

Literature review on digital literacy reveals a particularly influential theoretical position derived from Lev Vygotsky (1978), which underscores the social practices and cultural contexts of literacy. When applied to digital literacy, Vygotsky's sociocultural theory suggests that digital literacy development occurs through social interactions with others inside a given setting, such as a school. Cognitive processes associated with the acquisition of digital literacy skills and knowledge is therefore influenced by the social and cultural practices and values within that context (Erstad & Gillen, 2019, p. 34).

The theory is characterized by two main concepts. According to Vygotsky (1978), learning is most effective when it occurs within the "zone of proximal development" (ZPD), which refers to the range of tasks that a learner can accomplish with the support and guidance of a "more knowledgeable other" (MKO). The MKO refers to an individual who possesses greater knowledge on a specific task than the learner, such as a teacher or an older adult. In the context of digital literacy, this means that learners can develop their digital literacy skills and knowledge through interactions with more experienced *teachers* who can provide guidance and support.

Vygotsky's arguments provide a valuable theoretical framework for schools in understanding the complex contexts that can not only shape the development of digital literacy skills, but also dominate the digital literacy program implementation process. As such, the following case study may also operate within Vygotsky's theories, especially towards investigating the training and competence of teachers (MKO) in influencing DLP implementation outcomes.

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### **Chapter 3. Methodology**

#### 3.1. Research Design

This study employs a descriptive embedded case study design to evaluate factors relevant to public primary schools' success in implementing the DLP in Nakuru West Sub-county. Descriptive case studies aim to depict a phenomenon with the goal being to answer questions of "how," "who," "what," "when," and "where" (Yin, 2003). An embedded case study design is a type of research design that combines both survey research and case study research methods, typically involving data collection via interviews or observations. As an embedded case study design is meant to explore phenomena on a deeper level, it has proven to be particularly useful in the field of education. Therefore, the purpose of framing this research as an embedded case study lies in investigating multiple occurrences amidst scarce knowledge of and limited resources for program progress. The project collected survey data from a sample population, then selected a subset of participants to conduct interviews for an in-depth exploration of digital literacy program implementation.

#### **3.2.** Conceptualization and Operationalization

The Ambiguity-Conflict Model considers both ambiguity of means and ambiguity of goals. In this study, ambiguity of means is operationalized by examining school teachers' understanding of the technology required for implementing the DLP, their comprehension of the roles involved in the implementation process, and the challenges posed by their respective local environments that may hinder the enactment of the DLP. Ambiguity of goals pertains to the extent to which school teachers grasp the intended objectives of the DLP as designed.

Policy conflict, as defined by Matland (1995), refers to the clash of objectives and the perception of interactions as zero-sum. In operationalizing policy conflict, the study evaluates

school teachers' perceptions of the credibility of the DLP, specifically assessing whether they believe that implementing the program would result in greater benefits than losses for themselves or the community. Additionally, the study considers any pushback from local stakeholders as an indication of potential conflicts between the proposed objectives and the actors involved.

Within the Ambiguity-Conflict Model, successful implementation is characterized by adherence to the prescribed goals set by the statutory designer (Matland, 1995). Extending this definition, the study considers successful implementation as evidence that teachers comprehend and intend to carry out the program in a manner consistent with the DLP's prescribed goals.

#### **3.3. Definition of Population**

The target population consists of the twelve public primary schools in Nakuru West Sub-county: Kaptembwo, Heshima, Eileen Ngochoch, Prisons Primary, Mogoon, Kiptende, Mwariki, Mama Ngina, Nakuru West, Kibowen Komen, Milimani, and Moi. The sampling frame derives from the official DigiSchool online directory. Considering that this study intended for all twelve schools to participate, no particular sampling methods were necessary in order to select certain schools above others. Regarding sample size and selection, purposive sampling was utilized to comprise a sample size of one head teacher and one ICT teacher from each school, constituting a survey target sample of twenty-four respondents total. If a school had two or more ICT teachers, random sampling was employed to give equal chance for each participant to participate.

#### 3.4. Data Collection

Prior to data collection, the researcher obtained compulsory ethics approval from Kabarak University Research Ethics Committee (KUREC). The National Commission for Science, Technology and Innovation (NACOSTI) granted a permit (see Appendix 3), per legal requirements, which was then submitted to the Commissioner of Nakuru County as well as the County Director of Education in order to conduct authorized research. Once authorized and granted permission by each of the selected public primary schools, the researcher collected data from respondents in Nakuru West Sub-county in February 2023.

Considering that an important aspect of qualitative case study methodology is the usage of more in-depth methods and assuming that data obtained from respondents' surveys would be insufficient, oral interviews with both an ICT teacher and head teacher were conducted at each school. The researcher audio recorded face-to-face interviews in English—duration of each lasting from 10 to 40 minutes with an average of 25 minutes—and took on a sequential approach that allowed for insights gained earlier to enlighten later interviews. The interview topic guide was informed by existing literature on DLP implementation research (see Appendix 2).

Surveys consisting of close-ended and open-ended questions were used to collect data only from ICT teachers, and they captured demographic characteristics such as age, sex, education, teaching experience, and subjects taught (see Appendix 1 for survey). The close-ended questions provided structured responses, intended to be tabulated and analyzed via descriptive statistics, while the open-ended questions provided an appropriate space for comprehensive insights. All study instruments were written in English. The study acknowledges the potential bias and consequent drawbacks associated with surveys. For instance, social desirability bias refers to participants providing answers that they believe are more socially acceptable or desirable, rather than accurately reflecting their true beliefs or behavior, and can affect the internal validity of the study.

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#### 3.5. Reliability and Validity of Study Instruments

Reliability refers to the consistency and stability of a measurement tool or instrument, and various strategies ensured dependability in the data collection and analysis processes. Primarily, the researcher developed standardized protocols for conducting interviews and administering surveys, which should have minimized variation. Additionally, the researcher performed a pilot study to test instruments and identify any ambiguities before the main study. Two public primary schools located outside of Nakuru West Sub-county but within the Nakuru West consituency were selected for piloting the research instruments, and they were excluded from the main study. The researcher surveyed one ICT teacher and 1 head teacher. By piloting the instruments, the researcher verified that they were capable of producing the expected results. The results of the pilot study were used to refine the instruments and enhance reliability before their administration, which included making necessary corrections such as rephrasing unclear questions or specifying terminology.

Validity refers to the extent to which a study instrument measures what it is intended to measure. If a measurement is valid, it accurately captures the construct or concept of interest without introducing bias or extraneous factors. Multiple issues of validity arise in qualitative case study design, including but not limited to researcher bias, lack of quantification, sampling limitation, and context-specific information that restricts the generalizability of findings. With this in mind, the researcher employed several methodologies to help ensure validity of the case study, namely triangulation. The study intentionally collected data from multiple sources, including interviews, surveys, and document analysis. The convergence of findings from different sources strengthens the credibility of the results and increases the confidence in their applicability.

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#### **3.6. Analytical Framework**

The study subjected verbatim interview transcripts and field notes to thematic framework analysis as the preferred method, due to its suitability for exploring complex qualitative data and identifying recurrent patterns or themes (Srivastava, 2009). The method offers a systematic yet flexible structure to organize and interpret the rich interview data obtained from teachers. This approach aligns with the study's research objectives, enabling us to uncover common knowledge or variations across the schools and contribute valuable insights about the challenges and successes of the DLP. As presented by Figure 2, the analytical process involves the following five stages:

- 1) Familiarization;
- 2) Thematic framework identification;
- 3) Coding;
- 4) Matrix charting;
- 5) Interpretation.

In the familiarization stage, the researcher extensively listened to audio recordings of interviews before annotating transcripts, taking notes, and gaining an overview of ideas. During the framework identification stage, the researcher used prior notes and began to recognize emerging concepts in the data set—these initial concepts formed the basis of a thematic framework to be used to filter and classify information. During the coding stage, the researcher highlighted relevant phrases and text segments that corresponded to particular themes in the interview guide. Additional codes may have been generated based on the notion of open coding; in other words, coding anything that might be relevant from as many different perspectives as possible. During the charting stage, specific pieces of data indexed in the previous step were arranged into a matrix consisting of sub-categories and themes. The

final stage, mapping and interpretation, involved analyzing characteristics laid out in the matrix and developing findings. This method of analysis employed an inductive approach to find similarities amidst the coded data, produce and summarize main themes, then align findings to Matland's ambiguity-conflict model. Separately, the study used descriptive statistics to analyze demographic characteristics as well as question responses from the collected survey data.





#### **3.7. Ethical Considerations**

As previously mentioned, mandatory ethics approval to conduct the study was obtained from KUREC. The study's objectives constituted not only documentation-based research but also the aforementioned interviews and surveys with school teachers. To that end, data collection directly involved human subjects and various ethical considerations constraints were considered. Primarily, it remained essential to obtain informed consent from all participants, clarifying voluntary participation and ensuring they understood the purpose of the interviews. The researcher distributed informed consent forms to be signed beforehand (see Appendix 4 for sample), personally conducted the surveys, and immediately collected all responses. This ensured anonymity, confidentiality, and a 100% response rate from the participants. All interview data was stored privately by the researcher, and any identifying information was protected within the framework analysis process. Such considerations were deemed necessary to protect the autonomy and dignity of the stakeholders participating in the study, and to uphold ethical standards in research.

## **Chapter 4. Analysis and Discussion**

#### 4.1. Survey Results

A total of twelve ICT teachers from Nakuru West Sub-county schools completed the survey. A summary of the distribution of respondents by demographic characteristics including age, sex, education level, teaching experience, and subjects taught is presented in Table 1. It can be noted that half of the respondents fall between 30 to 39 years of age, while the other half are between 40 and 49 years of age. Majority (58%) of the respondents are male, while 42% are female. With regard to education level, the largest share of respondents (75%) possess a Bachelor's degree, while 17% hold at least an Associate's degree. As for teaching experience, most respondents either have 6 to 10 years (33%) or 11 to 15 years (33%), with 17% having taught 16 to 20 years—this does not necessarily imply that the entirety of a given respondents teach multiple subjects, the most common subject being Science (83%), followed by Mathematics (67%), then Social Science (42%) and Language Studies (42%).

| Variable  | Category            | Frequency | Percentage |
|-----------|---------------------|-----------|------------|
|           | 20-29 years         | 0         | 0%         |
| Age       | 30-39 years         | 6         | 50%        |
|           | 40-49 years         | 6         | 50%        |
|           | 50 years or more    | 0         | 0%         |
| Sex       | Male                | 7         | 58%        |
|           | Female              | 5         | 42%        |
| Education | No formal education | 0         | 0%         |
|           | Basic education     | 0         | 0%         |
|           | Secondary education | 1         | 8%         |
|           | Bachelor's degree   | 9         | 75%        |

Table 1. Demographic Characteristics of Survey Respondents

|                     | Associate's degree | 2  | 17% |
|---------------------|--------------------|----|-----|
|                     | Master's degree    | 0  | 0%  |
|                     | Doctorate degree   | 0  | 0%  |
|                     | Less than 1 year   | 0  | 0%  |
|                     | 1-5 years          | 1  | 8%  |
| Teaching Experience | 6-10 years         | 4  | 33% |
|                     | 11-15 years        | 4  | 33% |
|                     | 16-20 years        | 2  | 17% |
|                     | More than 20 years | 0  | 0%  |
| Subjects Taught     | English            | 2  | 17% |
|                     | Science            | 10 | 83% |
|                     | Social Science     | 5  | 42% |
|                     | Mathematics        | 8  | 67% |
|                     | Physical Education | 1  | 8%  |
|                     | Language Studies   | 5  | 42% |
|                     | Religious Studies  | 1  | 8%  |
|                     | Computer Science   | 3  | 25% |
|                     | Music              | 1  | 8%  |

#### **4.2 Interview Results**

Twenty-four respondents were interviewed, and both the head teacher and designated ICT teacher at each school participated in the study. The findings of the interviews are divided into two parts: the first part addresses the two aspects of Matland's model (1995), specifically looking at the degrees of ambiguity and conflict inherent in the DLP implemented in the twelve schools. The subsequent part explores the factors that influenced the levels of policy ambiguity and conflict in these schools. To illustrate the extent of participants' agreement around these issues, the study uses the terms "few" (n  $\leq$  5 participants), "some" (n = 6-10 participants), "many" (n = 11-15 participants), and "most" (n  $\geq$  16 participants).
# 4.3. Perceptions of Policy Ambiguity and Conflict

In order to evaluate the levels of ambiguity and conflict pertaining to the goals and means of the DLP in Nakuru West Sub-county, participants were asked about their opinions regarding the clarity of the GOK's nationwide DLP and its implementation methods. In terms of conflict, participants were asked about their agreement with the DLP's goals and its implementation approaches. In line with the second and third stages of thematic framework analysis, Table 2 below exhibits how interview data was coded then categorized into themes that represent the content of responses. The development of initial categories, and subsequent themes, was guided by the study's research objectives, emergent issues voiced by the participants, and recurring points about particular experiences found in the participants' transcripts.

| Exemplary Quotes  | Initial Categories  | Main Theme(s)  |
|---|---|--|
| "The teachers handling those classes,<br>they have not been employed by the<br>Teacher Service Commission. So,<br>therefore, it's not clear what they should  | Unclear expectations from<br>the government on<br>implementation              | Lack of Clarity in<br>Policy Characteristics<br>and Guidelines |
| teach."   | Insufficiently defined goals  |  |
| "They still have to clearly define what<br>they actually want from us and what they<br>actually desire for us to implement  | Generalized DLP<br>objectives   |  |
| little more clear statements should be given"   | Challenges in<br>understanding guidelines                                     |  |
| "For us, the policy goals from the  | Confusion   |  |
| government are all agreed upon and they<br>are knownbut precisely how we as a<br>school should reach them, accomplish<br>them, that part is vague for us."  | Discrepancies between<br>published guidelines and<br>practical implementation |  |
| "I get questions about the Learner Digital<br>Devicesin the guideline it is mandatory<br>to bring up broken devices to be fixed,<br>but according to the Ministry staff, we<br>don't have to submit themSo, which |   |  |

#### Table 2. Coding Matrix

should we listen to?"

| should we listen to:   |  |  |
|--|--|--|
| "They do not know how to work the<br>devicesthey're saying they don't know<br>how ICT works, how to figure out issues,<br>what they have to do when the curriculum   | Teachers' limited<br>knowledge and skills in<br>using ICT devices                                  | Teachers' Digital<br>Literacy Training and<br>Competence |
| asks them to access a link."   | Most need assistance   |  |
| "Some teachers have the right attitude but<br>there are those who do not want to alter<br>their ways of teachingthey do not want<br>to learn a completely new way of digital<br>education, and they are more traditional."   | Resistance to adapt to<br>digital teaching methods<br>More willingness to adapt                    |  |
| "The problem for good implementation is<br>that the teachers don't know about ICT,<br>WiFi connectionso that's why I've<br>been seeing they will not acknowledge<br>the guidelines or mandates in class<br>because of their scarce knowledge. They<br>do not know how to operate the devices,<br>how to teach the students to use them<br>properly." | among younger, tech-savvy<br>teachers<br>Impact of age and<br>experience on teachers'<br>attitudes |  |
| "The younger teachers who have more<br>experience with technology are more<br>willing, they're more enthusiastic to<br>adapt the classroom learning for the<br>DLPthe older ones want to stick to<br>printed materialsthey don't want to<br>shift to digital platforms and online<br>learning."  |  |  |
| "The older teachers see the DLP as<br>departure from trusted methods, they do<br>not want to deal with the challenges in<br>adopting the program 100%they do not<br>want to wholly embrace it because it<br>means changing too many things."   |  |  |
| "It's not a success because they don't even know what DLP means"   |  |  |
| "There are those who can operate the equipment without assistance, but not many"   |  |  |
| "They don't have adequate time for<br>learning, because they have other<br>responsibilities to carry out."   | Limited time available for<br>professional development<br>and training                             | Time Constraints and<br>School Workload                  |
| "Most teachers have multiple subjects,<br>and they all require separate  | Balancing multiple subjects  |  |

| workloadsSo, they have to take<br>initiative to attend extra trainings, learn<br>from the expertsbut they don't have the<br>time, it's a time factor."  | and responsibilities leads to time constraints  |   |
|---|---|---|
| "I know most of the schools don't have<br>the softwares installed to teach DLP<br>adequatelyfor instance, in grade 6<br>they're learning coding but the software<br>was not provided neither by KICD nor<br>Ministry of Education, so I had to install<br>the software myself even for other<br>schools"<br>"The confusion among our teachers is the<br>functionality of the devices, the ICT<br>resourceswe have a schedule telling<br>when the teachers can take the LDD's<br>from the computer lab, but if it's not<br>communicated clearly how to use the<br>devices, there is no point right?" | Not enough available tech<br>tools for effective teaching<br>Problems in accessing and<br>maintaining working<br>devices<br>Lack of support for<br>equipment repairs and<br>maintenance<br>KICD and/or Ministry of<br>Education not providing<br>software | Inadequate ICT<br>Resources and<br>Infrastructure             |
| "And the devices which are not in use, we<br>were told somebody would come and do<br>some repairs from the headquarters, but<br>nobody has comethen we were told to<br>just leave the devices that are not<br>functioning."   |   |   |
| "I wish someone would come to our<br>school and examine again what we have<br>in the classrooms, because we do not<br>know very wellidentifying any<br>potential problems or gaps that block the<br>effective delivery of the program."   |   |   |
| "When we are not clear about which<br>resources are available to us, it is tough<br>for the teachers to plan accordinglywe<br>struggle to determine how best to invest<br>the school's money and time or how to<br>replace certain devices or tools or<br>anything else we need for DLP."   |   |   |
| "I feel that the Ministry of Education<br>could be giving schools more constant<br>support I have the impression that,<br>even though we knew why certain things<br>needed to be done, we did not know<br>exactly how they should be done."<br>"Maybe do not know it's a serious thing,<br>it's a hard thing, for us to change how we   | Desire for consistent<br>support from Ministry of<br>Education<br>Call for precise guidance<br>on program<br>implementation   | Need for Clear<br>Support and<br>Direction from<br>Government |

teach and put ICT into the way we teach."

"For facilitating, we do think they provides us with direction, but support is also demonstrated in the way we are permitted to run the program in our own way at our school...If some of us are having difficulties integrating ICT, it is up to everyone to do their best, and I think the government understands that."

"We see it all on paper, on the website, but we have not fully implemented this into practice, and we do not know how. When the government authorities published DLP guidelines, they should have told us exactly when and where to start and cooperate more so that we can understand better."

"The devices which are not in use, we were told somebody would come and do some repairs from the headquarters, but nobody has come...then we were told to just leave the devices that are not functioning."

Seeking direction on managing specific aspects of the program

Contradictory instructions

### 4.3.1. Perceptions of policy ambiguity

Overall, participants' responses across the twelve schools in Nakuru West Sub-county pointed to high levels of perceived policy ambiguity. Many ICT teachers and head teachers described the DLP's goals, curriculum, or instructions as unclear.

"The teachers handling those classes, they have not been employed by the Teacher Service Commission. So, therefore, it's not clear what they should teach." (Participant 3).

"They [the national government] still have to clearly define what they actually want from us and what they actually desire for us to implement... little more clear statements should be given from the Ministry, the authority who's in charge." (Participant 7).

Participants from a few schools did indicate positive views, believing that the DLP's goals and means were unambiguous.

*"It's clear, easy to understand, and if we have any questions, we know who to ask."* (Participant 15).

#### 4.3.2. Perceptions of policy conflict

Participants' responses overall revealed policy conflict levels being low across the twelve schools. Some directly indicated the absence of conflict, while others were either in agreement with policy goals or did not mention them at all during the interviews.

"I agree with the digital literacy program goals because I think it's important for us to adapt to these changes and I think I can perform the tasks that are requested of us." (Participant 16).

"I have no objection towards the digital literacy program, I think it's a positive movement for the county, the country...the policy is forward-thinking and the goals are a nice priority." (Participant 2).

### 4.4. Policy Ambiguity and Conflict in Key Factors

The themes extracted from the interviews are mapped onto Matland's model to identify the critical factors associated with successful DLP implementation in the study county. The main themes pulled from the interviews were: teacher training and competence, ICT infrastructure, government involvement, and policy characteristics. The following section will discuss the underlying factors of each theme as related to policy ambiguity, then to policy conflict.

### **Teacher training and competence**

Most participants shared the thought that, despite their efforts, the teachers' lack of awareness and/or understanding of the DLP curriculum remained a major obstacle to implementation. They suspected that these problems stemmed from teachers' general perceived ambiguity regarding the proper means of integrating ICT into the classroom

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setting. Similarly, they cited lack of relevant training—such as insufficient workshops—as a facilitating factor, which obscured expectations and thus increased ambiguity. A few also indicated that, for the teachers who did not receive any training at all, the lack of knowledge acted as a formidable barrier and resulted in implementation delay.

"They [teachers] do not know how to work the devices...they're saying they don't know how ICT works, how to figure out issues, what they have to do when the curriculum asks them to access a link." (Participant 1).

"The problem for good implementation is that the teachers don't know much of anything about ICT, WiFi connection...so that's why I've been seeing they will not acknowledge the guidelines or mandates in class because of their scarce knowledge. They do not know how to operate the devices, how to teach the students to use them properly." (Participant 11).

*"It's not a success because they [teachers] don't even know what DLP means..."* Participant 10).

"There are those [teachers] who can operate the equipment without assistance, but not many..." (Participant 14).

Many participants—especially head teachers—pointed to a lack of teachers' strong will toward program implementation, believing that this derived from resistance to change or the unknown. Further, they disclosed that older teachers who are not familiar with exposure to technology may feel uncomfortable using digital tools; the lack of familiarity leads to skepticism or reluctance.

"Some teachers have the right attitude but others...there are those who do not want to alter their ways of teaching...they do not want to learn a completely new way of digital education, and they are more traditional" (Participant 8).

"The younger teachers who have more experience with technology are more willing, they're more enthusiastic to adapt the classroom learning for the DLP...the older ones want to stick to printed materials...they do not want to shift to digital platforms and online learning." (Participant 4).

"The older teachers see the DLP as departure from trusted methods, they do not want to deal with the challenges in adopting the program 100%...they do not want to wholly embrace it because it means changing too many things." (Participant 18).

Some participants discussed transitioning from traditional teaching methods to online learning with the DLP, singling out the notion that teachers often need to invest additional time to familiarize themselves with the Learner Digital Devices and adapt their instructional approaches.

"They don't have adequate time for learning, because they have other responsibilities to carry out." (Participant 4).

"Most teachers have multiple subjects, and they all require separate workloads...So, they have to take initiative to attend extra trainings, learn from the experts...but they don't have the time, it's a time factor." (Participant 14).

Meanwhile, successful DLP implementation was credited by a few participants as the personal efforts of some of the teachers at school who happened to already possess the technical knowledge required to install software, troubleshoot Internet connectivity, or solve Learner Digital Device issues.

"I know most of the schools don't have the softwares installed to teach DLP adequately...for instance, in grade 6 they're learning coding but the software was not provided neither by KICD nor Ministry of Education, so I had to install the software myself even for other schools...even something simple like Microsoft Word, Microsoft Excel...the devices just came without." (Participant 10).

#### **ICT infrastructure**

Many participants voiced concerns over ambiguity in ICT equipment availability or quality, explaining that either themselves or other teachers did not know the types of infrastructure outlined by the DLP. Even more so, they were not aware of the extent of the school's existing resources, including wifi connectivity, routers, and devices essential for successful implementation.

"I wish someone would come to our school and examine again what we have in the classrooms, because we do not know very well...identifying any potential problems or gaps that block the effective delivery of the program." (Participant 9).

"The confusion among our teachers is the functionality of the devices, the ICT resources...we have a schedule telling when the teachers can take the LDD's from the computer lab, but if it's not communicated clearly how to use the devices, there is no point right?" (Participant 3).

Some participants were uncertain about accessible ICT resources at their own schools, such as when more funding would be allocated to fix issues or plan for infrastructure improvements—they mentioned this as a reason behind inadequate DLP implementation.

"When we are not clear about which resources are available to us, it is tough for the teachers to plan accordingly...we struggle to determine how best to invest the school's money and time or how to replace certain devices or tools or anything else we need for DLP." (Participant 17).

#### **Government involvement**

Many participants across schools agreed that government involvement, or lack thereof, particularly from Ministry of Education staff, was a contributing factor to increasing policy ambiguity. Participants claimed little engagment and communication between decision-makers and school-level program implementors throughout the process, which raised policy ambiguity by neglecting to ensure an understanding of how the DLP was to be laid out. Although Ministry of Education staff did provide schools with assistance when called upon, participants pointed out that the absence of continuous support decreased confidence levels and became a considerable barrier contributing to increased ambiguity, which inhibited the efficiency of the implementation process. Some participants considered to be the duty of Ministry of Education members to explain and provide more comprehensive training on DLP implementation.

"I feel that the Ministry of Education could be giving schools more constant support... I have the impression that, even though we knew why certain things needed to be done, we did not know exactly how they should be done." (Participant 9).

"Maybe [the government] does not know it's a serious thing, it's a hard thing, for us to change how we teach and put ICT into the way we teach." (Participant 3).

Interestingly, however, administrative or government lenience was cited by some participants as a factor for alleviating conflict in DLP implementation means. This was evident in providing schools with a sense of independence within the program structure and allowing each school the autonomy and legitimacy to execute the implementation process according to its own priorities.

"For facilitating, we do think they [the government] provides us with direction, but support is also demonstrated in the way we are permitted to run the program in our own way at our school...If some of us are having difficulties integrating ICT, it is up to everyone to do their best, and I think the government understands that" (Participant 2).

In a similar vein, it is intriguing to note that none of the participants necessarily cited decreased government involvement as a factor impacting policy conflict.

### **Policy characteristics**

Participants identified the inherent policy characteristics of the DLP, as specified in publicly available government documents or handbooks, as a factor that facilitated its implementation. Some participants highlighted that the policy was formulated in a way that posed challenges for implementers to comprehend its intended objectives and the methods of implementation. In other words, it was emphasized that the policy's lack of straightforward information contributed to the presence of ambiguity.

"We see it all on paper, on the website, but we have not fully implemented this into practice, and we do not know how. When the government authorities published DLP guidelines, they should have told us exactly when and where to start and cooperate more so that we can understand better." (Participant 15).

Some participants also noted a lack of clarity in the sense that there was inconsistency in the information being provided to them, which led to schools running the DLP individually based on their own beliefs of what was required, leading to variations.

"Sometimes, I get questions about the Learner Digital Devices...in the guideline it is mandatory to bring up broken devices to be fixed, but according to the Ministrty staff, we don't have to submit them...So, which should we listen to?" (Participant 19).

"...And the devices which are not in use, we were told somebody would come and do some repairs from the headquarters, but nobody has come...then we were told to just leave the devices that are not functioning." (Participant 23).

A few participants praised the policy's unambivalent goals, yet commented on the ambiguity of means, expressing a lack of understanding of the technology.

"For us, the policy goals from the government are all agreed upon and they are known...but precisely how we as a school should reach them, accomplish them, that part is vague for us." (Participant 21).

Given the above analysis, participants' perceptions and the factors identified suggest high ambiguity and low conflict, pointing to the experimental implementation approach.

Figure 3 portrays Kenya's placement on the ambiguity-conflict matrix.

*Figure 3. Study country's position on ambiguity-conflict matrix based on perceptions of policy ambiguity and conflict* 



#### Adapted from Matland (1995).

### **4.5. Discussion of Findings**

This is the first study to employ Matland's ambiguity-conflict model of policy implementation (1995) to analyze and identify the GOK's Digital Literacy Program implementation process. By utilizing a qualitative approach centered on interviews, the study was able to gain a comprehensive understanding of the mechanisms, facilitators, and barriers influencing the implementation of the digital literacy program. Through the application of Matland's model, specifically examining the levels of policy ambiguity and conflict during development and implementation, the study provided a unique and manageable framework for identifying the implementation process and factors contributing to its success.

The findings of this study indicate that key elements crucial to the DLP's implementation encompass government support and involvement, policy characteristics (including realistic objectives, as well as clear goals and means), teacher training, and ICT infrastructure planning. However, in most of the schools examined in the case study, these elements were either lacking or inadequately addressed, which may explain the program's

unsatisfactory implementation. In the ensuing discussion, each of these elements will be explored through Matland's model, along with other existing literature on policy implementation.

It is known that government support plays a crucial role in motivating implementors at the local level and facilitating successful program implementation (Pigot, 2019). Conversely, a lack of engagement from senior officials can lead to feelings of isolation and insecurity among implementors. Moreover, government support helps address structural obstacles such as resource shortages that can hinder implementation effectiveness (Liua et al., 2015). According to Matland's model, these aspects of managerial support contribute to reducing policy ambiguity and conflict. In Nakuru West Sub-county, policymakers did not grant enough steady support throughout the entire process by way of initiating and guiding the DLP's implementation. These actions increased policy ambiguity by becoming impediments that created confusion regarding implementors' roles, although they did not particularly cause conflict regarding policy goals and means of achievement. To motivate implementors to follow through with implementation, this aspect needs to change.

In many developing countries, policies are often formulated with ambitious goals without adequate consideration of local contextual factors, resulting in an implementation gap and unfulfilled policy goals (Osman, 2002). Policy clarity is a significant factor influencing implementation, as supported by various studies (Sabatier & Mazmanian, 1979; Brynard, 2009; Havers et al., 2020). This aligns with Matland's model (1995), which connects policy ambiguity to goal clarity and the impact of local conditions on implementation. In the case of the GOK's Digital Literacy Program, the instructions provided in handbooks and documents were perceived as insufficiently clear in defining the roles and responsibilities at each stage, indicating a high level of ambiguity according to Matland's model. As a result, variations in implementation emerged among different schools.

Given the significant role played by human resources in the process of policy implementation, ensuring appropriate training and orientation regarding the policy becomes a crucial priority (Mwendera, 2019). Policy implementors who receive proper training demonstrate enhanced competence and self-confidence, enabling them to overcome potential obstacles they may encounter (Brynard, 2009). In the case of all schools examined in Nakuru West Sub-county, teachers did receive initial workshop training, which promoted the implementation process by ensuring that all involved parties accepted their roles and responsibilities. However, the absence of consistent or ongoing training specifically related to the DLP resulted in a lack of policy knowledge among teachers, particularly those without prior experience in digitalized education (i.e., high ambiguity). Moving forward, Kenyan policymakers would do well to incorporate more comprehensive and robust training programs.

Ambiguity surrounding a school's ICT resources and infrastructure, especially if it is deemed insufficient, can significantly hinder the successful implementation of a digital literacy program. In the case of Nakuru West, the local implementors' lack of clarity regarding tools such as the LDD's, routers and WiFi led to confusion as well as a delayed implementation process. Although policy conflict regarding ICT infrastructure was not identified as a considerable obstacle, there was a general consensus among schools on greater perceived policy ambiguity. Findings suggest that conducting a needs assessment of ICT infrastructure—and planning accordingly—before implementing a digital literacy program at the local level is of paramount importance. Such an assessment allows for a comprehensive evaluation of a given school's resources, which yields insights into the extent of the school's readiness to embrace digital learning.

Applying Matland's model to key factors influencing the implementation of the DLP along with participants' perspectives enabled the discernment of policy ambiguity and

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conflict levels, as well as the type of implementation strategy being utilized. Participants' views and the identified factors indicate a high level of ambiguity and low conflict, answering the study's research question with experimental implementation as Kenya's model.

In this case, success varies depending on the specific locations and contextual factors such as the actors involved and the availability of resources. The implementation process is influenced by each school's understanding of the program and their access to resources. Therefore, it is recommended that policymakers in Kenya adopt a more structured approach in developing and implementing digital literacy programs to reduce ambiguity and move towards "administrative implementation."

# **Chapter 5. Conclusion**

In the digital age, countries must prioritize the incorporation of technology within their education systems. This necessitates the implementation of policies aimed at adopting digital literacy skills and innovative approaches to critical thinking. Using Matland's model, this qualitative case study sought to identify mechanisms of and factors influencing successful digital literacy program implementation. The findings can provide valuable insights into the challenges and opportunities associated with ICT integration into education system, and they can inform policy recommendations for best implementation practice in Kenya as well as other developing African countries with budding digitalized education systems.

### 5.1. Policy Implications and Recommendations

The GOK's DLP model can be characterized as experimental implementation; thus, factors involved in the local context, such as which participants are active and which resources are being used, should greatly influence implementation. Based on the study's findings regarding mechanisms that impact successful DLP implementation, several policy recommendations can be put forward. These recommendations align with the existing literature and advocate for reduced policy ambiguity and conflict, to facilitate an enhanced implementation process in the future:

- Foster strong relationships between government policymakers and local implementors (school administrators and teachers) through consistent engagement and communication, providing guidance and motivation.
- Organize consistent training sessions for all stakeholders involved throughout the academic year, building their understanding of the policy's goals and means of implementation.

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- Develop a local, comprehensive guideline, based on the national DLP directives, that clearly defines the means of implementation as well as the roles of all parties involved; enforce it through legislation.
- Prioritize planning before policy implementation—examining the required ICT infrastructure by way of a needs assessment, setting achievable objectives with appropriate timelines, and allowing for necessary adjustments.
- Establish a non-punitive monitoring and evaluation process to ensure consistency, accuracy, and compliance during policy implementation.

### 5.2. Limitations of the Study

This study has a few limitations that should be considered. One of the them lies in the possibility of response bias. This bias could have arisen from interviewees' reluctance to express criticism towards policymakers or government officials, possibly due to concerns about repercussions or desires to present a favorable image. However, steps were taken to address this issue by ensuring participants' anonymity. Additionally, participants' responses could have been influenced by memory limitations, potentially leading to exaggerations or inaccuracies. To minimize this, information was cross-verified through multiple participants, compared with existing literature, and clarified with participants when necessary.

Another potential limitation pertains to the absence of data collection from other stakeholders or special interest groups, such as ministry staff or community leaders. Including knowledge from multiple perspectives would have provided a more comprehensive and nuanced understanding of the topic under investigation. Lastly, the scope of this study constrained a more dynamic analysis reflecting changes over time. Such a limitation implies that the study primarily offers a snapshot of a specific point in time, potentially missing valuable insights into the history or evolution of the DLP since its inception.

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On the other hand, the study has notable strengths. One of the strengths lies in its theoretical framework, derived from policy implementation research yet unused in any prior studies exploring digital literacy policy in Kenya. Furthermore, the qualitative approach employed in the study yielded detailed information on the policy implementation process in a specific county, which can be applicable to other regions of the country.

### 5.3. Future Research

The insights gained from studying Nakuru West Sub-county can inform the development and implementation of digital literacy policies to better align with *Kenya's Vision 2030*. However, given the aforementioned limitations, future research could explore the perspectives and roles of other entities, such as different ministry staff, educational professionals, and community stakeholders, affecting the Digital Literacy Program and its implementation. Additionally, analysis of the DLP over time was unfortunately outside of the scope of this study. Future research could conduct longitudinal studies to comprehend the long-term impact of the DLP, either in the selected area or another geographical area. Tracking schools' progress over an extended period would provide deeper insights into the sustainability and effectiveness of the DLP. Similarly, comparative studies across different regions of Kenya could be beneficial for discovering broader variations in DLP implementation. Finally, it would be of great interest to develop a research design incorporating students' individual digital literacy competencies, as a result of DLP implementation. This would allow for quantitative analysis of program outcomes on a macro level, yet it would a much larger dataset, namely a relevant standardized assessment.

# **Bibliography**

- Adedeji, S.O., & Olaniyan, O. (2011). Improving the conditions of teachers and teaching in rural schools across African countries. Addis Ababa, Ethiopia: UNESCO International Institute for Capacity Building in Africa. Retrieved from https://www.iicba.unesco.org/sites/default/files/medias/fichiers/2023/05/Fundamental %20series%202.pdf
- American Library Association. (2013). Digital Literacy, Libraries, and Public Policy: Report of the Office for Information Technology Policy's Digital Literacy Task Force. Retrieved from https://www.ala.org/advocacy/sites/ala.org.advocacy/files/content/ legislation/ala dltf final report january2013.pdf
- Anyiendah, M.S. (2017). Challenges faced by teachers when teaching English in public primary schools in Kenya. Frontiers in Education, 2, Article 13. https://doi.org/10.3389/feduc.2017.00013
- Brynard, P. A. (2009). Mapping the factors that influence policy implementation. *Journal of Public Administration*, 44(3.1), 557-577.
- Calista, D.J. (1994). Policy Implementation. In S.S. Nagel (Ed.), Encyclopedia of Policy Studies (2nd ed., pp. 117-155). New York: CRC Press.
- Chun, Y. H., & Rainey, H. G. (2005). Goal ambiguity and organizational performance in US federal agencies. *Journal of Public Administration Research and Theory*, 15(4), 529-557. https://doi.org/10.1093/jopart/mui030
- Coiro, J. (2021). Toward a multifaceted heuristic of digital reading to inform assessment, research, practice, and policy. Reading Research Quarterly, 56(1), 9–31. https://doi.org/10.1002/rrq.302
- Coiro, J., Coscarelli, C., Maykel, C., & Forzani, E. (2015). Investigating criteria that seventh graders use to evaluate the quality of online information. *Journal of Adolescent & Adult Literacy*, 59(3), 287–297. https://doi.org/10.1002/jaal.448
- Cumming T, Strnadova I, Singh S. iPads as instructional tools to enhance learning opportunities for students with developmental disabilities: An action research project. Action Research. 2014; 12,151–176. https://doi.org/10.1177/1476750314525480
- Dahrendorf, R. (1958). Toward a Theory of Social Conflict. *Journal of Conflict Resolution*, 2(2), 170–183. http://www.jstor.org/stable/172974

- DigiSchool. (2018). *Milestones achieved*. Nairobi, Kenya: Ministry of Information, Communication and Technology: Retrieved from http://icta.go.ke/digischool/ milestones/
- Elmore, R. F. (1979). Backward Mapping: Implementation Research and Policy Decisions. Political Science Quarterly, 94(4), 601–616. https://doi.org/10.2307/2149628
- Erstad, O., & Gillen, J. (2019). Digital literacy practices in early childhood: theorisations. In
  O. Erstad, R. Flewitt, B. Kümmelring-Meibauer, & I. S. Pereira (Eds.), Routledge
  Handbook of Digital Literacies in Early Childhood (pp. 31-44). Taylor & Francis.
  https://doi.org/10.4324/9780203730638
- Goggin, Malcolm L., Ann Bowman, James P. Lester, and Laurence O'Toole, Jr. 1990.Implementation Theory and Practice: Toward a Third Generation. Glenview, IL: Scott, Foresman.
- Gudu, B.O. (2015). Teaching speaking skills in English language using classroom activities in secondary school level in Eldoret municipality, Kenya. *Journal of Education and Practice*, 6(35), 55–63.
- Hattie, J. (2012). Visible learning for teachers: Maximizing impact on learning. New York, NY: Routledge. https://doi.org/10.4324/9780203181522
- Havers, S. M., Martin, E. K., Wilson, A., & Hall, L. (2020). A systematic review and meta-synthesis of policy intervention characteristics that influence the implementation of government-directed policy in the hospital setting: Implications for infection prevention and control. *Journal of Infection Prevention*, 21(3), 84-96.
- Heinrich, C.J., Darling-Aduana, J., & Martin, C. (2020). The potential and prerequisites of effective tablet integration in rural Kenya. *British Journal of Educational Technology*, 51(2), 498–514. https://doi.org/10.1111/bjet.12870
- Hobbs, R. & Coiro, J. (2019). Design Features of a Professional Development Program in Digital Literacy, *Journal of Adolescent & Adult Literacy*, 62 (4), 401-409. https://doi.org/10.1002/jaal.907
- Hull, C. J., & Hjern, B. (1987). Helping small firms grow: An implementation approach.
- Laanpere, M. (2019). Recommendations on Assessment tools for monitoring digital literacy within UNESCO's Digital Literacy Global Framework. https://unesdoc.unesco.org/ark:/48223/pf0000366740
- Liua, G. H. W., Wang, E. T. G., & Chua, C. E. H. (2015). Persuasion and management support for IT projects. *International Journal of Project Management*, 33(6), 1249-1261.

- Kajee, L. (2018). Teacher education students engaging with digital identity narratives. South African Journal of Education, 38(2), Article 1501. https://doi.org/10.15700/saje.v38n2a1501
- Kenya Department of Early Learning and Basic Education. (2020). ICT Interns to Support Digital Literacy Programme Handbook. Ministry of Education.
- Kenya Institute of Curriculum Development. (2019). *Basic Education Curriculum Framework*. Nairobi, Kenya: Author. Retrieved from https://kicd.ac.ke/ curriculum-reform/basic-education-curriculum-framework/
- Kerkhoff, S.N., & Cloud, M. (2020). Equipping teachers with globally competent practices: A mixed methods study on integrating global competence and teacher education. *International Journal of Educational Research*, 103, Article 101629. https://doi.org/10.1016/j.ijer.2020.101629
- Kerkhoff, S. N., & Makubuya, T. (2022). Professional development on digital literacy and transformative teaching in a low-income country: A case study of rural Kenya.
  Reading Research Quarterly, 57(1), 287-305. https://doi.org/10.1002/rrq.392
- Kerkhoff, S.N., Spires, H.A., & Wanyonyi, P. (2020). Teaching new literacies and inquiry: A grassroots effort to bring about educational change in Kenya. *Journal of Adolescent & Adult Literacy*, 64(2), 145–156. https://doi.org/10.1002/jaal.1067
- Kimani, H.N., & Onyancha, O.B. (2015). Information literacy skills among incoming first-year undergraduate students at the Catholic University of Eastern Africa in Kenya. Innovation, 2015(51), 22–45. http://hdl.handle.net/10500/14461
- Kuyoro, S., Awodele O. & Okolie, S. (2012). ICT: An Effective Tool in Human Development. *International Journal of Humanities and Social Science*, 2(7), 157-162. http://www.ijhssnet.com/journals/Vol\_2\_No\_7\_April\_2012/17.pdf
- Lankshear, C., & Knobel, M. (2008). Digital literacies: Concepts, policies and practices. Peter Lang Publishing.
- Law, N. W. Y., Woo, D. J., de la Torre, J., & Wong, K. W. G. (2018). A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2.
- Leu, D.J., Kinzer, C.K., Coiro, J., Castek, J., & Henry, L.A. (2018). New literacies: A dual-level theory of the changing nature of literacy, instruction, and assessment. In *Theoretical Models and Processes of Literacy*, 319-346. Routledge.
- Livingstone, S., Nandi, A., Banaji, S., & Stoilova, M. (2017). Young adolescents and digital media uses, risks and opportunities in low-and middle-income countries: A rapid evidence review. London, UK: Gage.

https://www.gage.odi.org/wp-content/uploads/2019/01/Young-Adolescents-Digital-M edia-FINAL.pdf

- Lipsky, M. (1978). Standing the study of public policy implementation on its head. *American Politics and Public Policy*, 16.
- Love, A.J. (2003). Beyond the Black Box: Strengthening Performance Measurement through Implementation Evaluation. Canadian Evaluation Society. Retrieved from https://evaluationcanada.ca/distribution/20031126\_love\_arnold.pdf
- Matland, R. E. (1995). Synthesizing the implementation literature: The ambiguity-conflict model of policy implementation. *Journal of Public Administration Research and Theory*, 5(2), 145-174. http://www.jstor.org/stable/1181674
- Maynard-Moody, S., Musheno, M., & Palumbo, D. (1990). Street-wise social policy: Resolving the dilemma of street-level influence and successful implementation. *Western Political Quarterly*, 43(4), 833-848. https://doi.org/10.1177/106591299004300409
- Montrieux H, Vanderlinde R, Schellens T, De Marez L (2015) Teaching and Learning with Mobile Technology: A Qualitative Explorative Study about the Introduction of Tablet Devices in Secondary Education. PLOS ONE 10(12): e0144008. https://doi.org/10.1371/journal.pone.0144008
- Mthethwa, R. M. (2012). Critical dimensions for policy implementation. *African Journal of Public Affairs*, 5(2), 36-47. https://repository.up.ac.za/handle/2263/20618
- Muriithi, P., Horner, D., & Pemberton, L. (2016). Factors contributing to adoption and use of information and communication technologies within research collaborations in Kenya. *Information Technology for Development*, 22(Suppl. 1), 84–100. https://doi.org/10.1080/02681102.2015.1121856
- Mwendera, C. A., de Jager, C., Longwe, H., Kumwenda, S., Hongoro, C., Phiri, K., et al. (2019). Challenges to the implementation of malaria policies in Malawi. BMC Health Services Research, 19, 194.
- Nedungadi, P.P., Menon, R., Gutjahr, G., Erickson, L. and Raman, R. (2018). Towards an inclusive digital literacy framework for digital India. *Education* + *Training*, 60(6), 516-528. https://doi.org/10.1108/ET-03-2018-0061
- OECD (2016), Innovating Education and Educating for Innovation: The Power of Digital Technologies and Skills, Educational Research and Innovation, OECD Publishing, Paris, https://doi.org/10.1787/9789264265097-en.

- Office for Standards in Education (OFSTED). (2002). Information and communications technology (ICT) in schools: Effectiveness of computer technology in primary schools. Retrieved from https://files.eric.ed.gov/fulltext/ED469760.pdf
- Ogembo, J.G., Ngugi, B.K., & Pelowski, M. (2012). Computerizing primary schools in rural Kenya: Outstanding challenges and possible solutions. *The Electronic Journal of Information Systems in Developing Countries*, 52(1), 1–17. https://doi.org/10.1002/j.1681-4835.2012.tb00371.x
- Osman, F. (2002). Implementation gap: The case of the health policy of Bangladesh. *South Asian Studies*, 17(1), 13-36.
- Palumbo, D. J., Maynard-Moody, S., & Wright, P. (1984). Measuring degrees of successful implementation: Achieving policy versus statutory goals. *Evaluation Review*, 8(1), 45-74. https://doi.org/10.1177/0193841X8400800103
- Pangrazio, L., Godhe, A. L., & Ledesma, A. G. L. (2020). What is digital literacy? A comparative review of publications across three language contexts. *E-learning and Digital Media*, 17(6), 442-459. https://doi.org/10.1177/2042753020946291
- Pigot, M., Miller, C. E., Rockman, R. B., & Grenyer, B. F. S. (2019). Barriers and facilitators to the implementation of a stepped care intervention for personality disorder in mental health services. *Personality and Mental Health*, 13(4), 230-238.
- Piper, B., Oyanga, A., Mejia, J., & Pouezevara, S. (2017). Implementing large-scale instructional technology in Kenya: Changing instructional practice and developing accountability in a national education system. *International Journal of Education and Development Using Information and Communication Technology*, 13(3), 57–79. https://www.learntechlib.org/p/182157/
- Rotich, H. K. (2016, June 8). Budget Statement for the Fiscal Year 2016/2017 (Republic of Kenya, The National Treasury). Retrieved from https://www.treasury.go.ke/wp-content/uploads/2021/03/2016-2017-BUDGET-STAT EMENT.pdf
- Sabatier, P. A. (1986). Top-down and Bottom-up Approaches to Implementation Research: A Critical Analysis and Suggested Synthesis. *Journal of Public Policy*, 6(1), 21–48. http://www.jstor.org/stable/3998354
- Mazmanian, D., & Sabatier, P. A. (1989). Implementation and Public Policy (rev. ed.). Latham, MD: University Press of America. Retrieved from http://www.des.ucdavis.edu/Faculty/Sabatier/mazmaniansabatier.pdf

- Sipilä, K. (2010). The impact of laptop provision on teacher attitudes towards ICT. *Technology, Pedagogy and Education*, 19(1), 3–16. https://doi.org/10.1080/14759390903579257
- Spires, H.A., & Bartlett, M. (2012). Digital literacies and learning: Designing a path forward (White Paper No. 5). Raleigh: Friday Institute, North Carolina State University. Retrieved from https://www.fi.ncsu.edu/wp-content/uploads/2013/ 05/digital-literacies-and-learning.pdf
- Spires, H. A., Paul, C. M., & Kerkhoff, S. N. (2019). Digital literacy for the 21st century. In Advanced Methodologies and Technologies in Library Science, Information Management, and Scholarly Inquiry (pp. 12-21). IGI Global.
- Srivastava, A., & Thomson, S. B. (2009). Framework analysis: a qualitative methodology for applied policy research. *Journal of Administration & Governance*, 4(2), 72-79.
- Stols, G., Ferreira, R., Pelser, A., Olivier, W.A., Van der Merwe, A., De Villiers, C., & Venter, S. (2015). Perceptions and needs of South African mathematics teachers concerning their use of technology for instruction. *South African Journal of Education*, 35(4), Article 1209. https://doi.org/10.15700/saje.v35n4a1209
- Sutherland, R., Armstrong, V., Barnes, S., Brawn, R., Breeze, N., Gall, M., Matthewman, S., Olivero, F., Taylor, A., Triggs, P., Wishart. J., & John, P. (2004). Transforming teaching and learning: embedding ICT into everyday classroom practices. *Journal of Computer Assisted Learning*, 20, 413–425. https://doi.org/10.1111/j.1365-2729.2004.00104.x
- The ICT Authority (2022). *The Laptop Project: Executive Summary*. Digischool. https://www.digischool.go.ke/Home/executivesummary
- Tondeur, J., Krug, D., Bill, M., Smulders, M., & Zhu, C. (2015). Integrating ICT in Kenyan secondary schools: An exploratory case study of a professional development programme. *Technology, Pedagogy and Education*, 24(5), 565–584. https://doi.org/10.1080/1475939X.2015.1091786
- Vermeulen, M., Kreijns, K., Van B.,H.& Van, A.F. (2017). The role of transformative leadership, ICT infrastructure and learning climate in teachers' use of digital learning materials during their classes. *British Journal of Educational Technology*, 48(6), 1427-1440. https://doi.org/10.1111/bjet.12478
- Vygotsky, L.S. (1978). Mind in society: The development of higher psychological processes (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds. & Trans.). Cambridge, MA: Harvard University Press.

- Wallet, P. (2015). Information and Communication Technology (ICT) in Education in sub-Saharan Africa: A comparative analysis of basic e-readiness in schools. http://dx.doi.org/10.15220/978-92-9189-178-8-en
- Wanzala, O., & Nyamai, F. (2018, July 22). Big hurdles thwart Jubilee's laptops plan. Nation. Africa. Retrieved from https://nation.africa/kenya/news/big-hurdlesthwart-jubilee-s-laptops-plan-69972
- (2022). About Vision 2030. Kenya Vision 2030. http://vision2030.go.ke/about-vision-2030/

# Appendix

Appendix 1. Survey for ICT teachers

## A. General Background

- 1. Sex
- □ Male
- □ Female
- $\Box$  Prefer not to say
- 2. Age
- □ 20-29 years
- □ 30-39 years
- □ 40-49 years
- $\Box$  50 years or more
- 3. What is the highest level of education you have completed?
  - $\Box$  No formal education
  - $\hfill\square$  Basic education
  - $\Box$  Secondary education
  - □ Bachelor's degree
  - $\Box$  Associate's degree
  - □ Master's degree
  - □ Doctorate degree

### B. ICT Teaching Experience

- 1. What subject(s) do you teach? (Select all that apply).
  - English
  - □ Science
  - □ Social Science
  - □ Mathematics
  - □ Language Studies
  - □ Religious Studies
  - □ Computer Science
  - □ Physical Education
  - □ Music

- 2. Including this year, how many years have you been teaching?
  - $\Box$  Less than 1 year
  - $\Box$  1-5 years
  - □ 6-10 years
  - □ 11-15 years
  - □ 16-20 years
  - $\Box$  More than 20 years
- 3. State your proficiency/knowledge of the Digital Literacy Program.
  - □ None
  - □ Basic
  - □ Intermediate
  - □ Advanced
- 4. How is ICT taught in your subject(s)?

|   | Yes                                    | No |
|---|--|----|
| ICT is taught as a separate subject                               |  |    |
| ICT is integrated in my subject<br>due to my discretion           |  |    |
| ICT is integrated in my subject<br>due to curriculum requirements |  |    |
| Do you use computers and/or the                                   | internet for the following activities? | ?  |
|   | Yes                                    | No |

Teaching classes

- 6. How often do you use computers and/or the internet in your classes?
  - □ Never

Preparing lessons

5.

- □ Rarely
- $\Box$  Sometimes
- □ Often

 $\Box$  All the time

### C. ICT Teaching Access & Support

- 1. Is stable and consistent power supply available at school?
  - □ Rarely
  - □ Sometimes
  - □ Often
  - □ Always
- 2. Is sufficient network coverage accessible at school?
  - □ Yes
  - 🗆 No
  - □ Sometimes
  - □ Other:\_\_\_\_\_
- 3. When you use ICT to teach, what equipment is available?

|  | Never | Rarely | Sometimes | Often | All the time |
|--|-------|--------|-----------|-------|--------------|
| Only the teacher is<br>equipped with<br>devices              |       |        |           |       |              |
| Both students and<br>teacher are<br>equipped with<br>devices |       |        |           |       |              |
| devices  |       |        |           |       |              |

- 4. Does the school provide teachers with devices (laptops, tablet PC, desktop computers, etc.) for individual use?
  - □ Yes
  - 🗆 No
- 5. Is each student in your class(es) assigned a Digital Learning Device?

□ Yes

🗌 No

- 6. Who provides ICT support at your school?
  - $\Box$  A more experienced teacher
  - □ In-school ICT coordinator

- $\Box$  Other school staff
- □ Out-of-school expert
- □ Online helpdesk or community

# D. ICT-based Activities and Material

1. Which of the following materials have you used when teaching classes with computers and/or the internet?

|                       | Yes | No |
|-----------------------|-----|----|
| Existing DLP material |     |    |
| Material from other   |     |    |
| online sources        |     |    |

### E. Teachers' Skills

1. Did all teachers participate in the ICT training sessions last year?

□ Yes

🗆 No

### 2. How often do you utilize the following skills?

|  | Never | Rarely | Sometimes | Often |
|--|-------|--------|-----------|-------|
| Use a word processing program                                    |       |        |           |       |
| Use a spreadsheet<br>(eg - Excel)                                |       |        |           |       |
| Use email to communicate   |       |        |           |       |
| Email a file<br>attachment                                       |       |        |           |       |
| Create a Powerpoint<br>presentation (with<br>audio and/or video) |       |        |           |       |

Download and/or 
upload curriculum
from/to websites

- F. <u>School Leadership</u>
  - 1. Does the Teacher Service Commission provide an email address for all teachers?
    - □ Yes
    - 🗆 No
  - 2. Does your school use the given electronic registration systems?
    - □ Yes
    - 🗆 No

### G. DLP Implementation

- 1. Do you believe your school has sufficient infrastructure for the DLP?
  - □ Yes
  - 🗌 No
- 2. Do you believe the DLP is a success at your school?
  - □ Yes
  - 🗌 No
- 3. If "No" to the above question, why do you think so?

- 4. On a scale of 1 to 5, please rate the implementation of the DLP.
  - $\Box$  1 Poor
  - $\Box$  2 Average
  - $\Box$  3 Good
  - $\Box$  4 Very Good
  - $\Box$  5 Excellent

### Appendix 2. Interview guide for teachers

School population

- How many teachers does your school have this academic school year?
- How many students does your school have this academic year?

School ICT infrastructure

- What types of ICT equipment are used in teaching & learning?
- Approximately how much of this equipment is working or operational2?
- Who provides maintenance to your ICT equipment?
- Is your school connected to any type of network?

Support to teachers using ICT

• In the past two years (2021 to 2022) how many of your teachers have undergone competence training in ICT?

Challenges to the use of ICT

• What challenges have you faced that hindered your ability to provide ICT teaching and learning in your school?

School policy on the use of ICT

- What are the strategies used regarding the use of ICT in teaching and learning? Opinion
  - How are computers and the internet used in your school by the students?
  - How does ICT impact teaching and learning?
  - What plans does your school have to help fully utilize ICT?
  - How clear do you feel are the DLP's policies, and instructions?
  - How do you feel about the DLP's goals? Do you agree or disagree? Why or why not?

Head teacher computer use

• How do you use the computer and internet in your office?

Division of responsibilities

- Who is responsible for procuring ICT infrastructure?
- Who is responsible for determining course content?
- Who is responsible for organizing the teacher training?

Appendix 3. NACOSTI Research Permit

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| lational Commision for Science, Technology and Innovation -  | - National Commision for Science, Technology and Innovation   |
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### Appendix 4. Informed Consent Form



### KABARAK UNIVERSITY RESEARCH ETHICS COMMITTEE

#### ADULT INFORMED CONSENT FORM (TEMPLATE)

(The form is written in English language but can be translated to Kiswahili or any other appropriate language)

STUDY TITLE Implementation of Digital Literacy Program in Public Primary Schools: A Case Study of Nakuru West Sub-county, Kenya

PI Sydney Park

Affiliated Institution Seoul National University

Co-investigator(s)\_\_\_\_\_ Affiliated Institution(s)

### INTRODUCTION

You are invited to participate in this research study being undertaken by the above listed investigators. This form will help you gather information about the study so that you can voluntarily decide whether you want to participate or not. You are encouraged to ask any question regarding the research process as well as any benefit or risk that you may accrue by participating. After you have adequately been informed about the study, you will be requested to either agree or decline to participate. Upon agreeing to participate in the study, you will be further requested to affirm that by appending your signature/thumbprint on this form. Accepting or declining to participate in this study does not in any way waive the following rights which you're entitled to:

- a) Voluntary participation in the study;
- b) Withdrawing from the study at any time without the obligation of having to give an explanation and;
- c) Access to services which you're entitled to

A copy of this form will be provided to you for your own records

Should I continue YES/NO

This study has been reviewed and approved by Kabarak University Research Ethics Committee (KUREC)

### What is the Purpose of the Study?

The main reason(s) for conducting this study is to answer the following questions:

- 1. How do school policy and leadership affect implementation of the digital literacy program?
- How does to show? to inits and connectors influence melowerstation of the divital literature measure.
- 2. How does teachers' training and competence influence mplementation of the digital literacy program?

3. How does ICT infrastructure impact implementation of the digital literacy program?

(In order to answer these research questions, you are requested to voluntarily answer question(s) and/or accept some procedures performed on you)

#### Who can Take Part in the Study?

Outline the inclusion and exclusion criteria Head teachers and ICT teachers, only at public primary schools in the Nakuru West Sub-county area that have received the DLP. Specify the sample size A sample size of 12 schools will be selected, representative of the entire target population of 12 schools. In Case You Agree to Participate in the Study, What Will Happen?

This is what is going to happen once you have agreed to participate in the study:

• First, include a statement about the time commitments of the research for the participant including both the duration of the research and follow-up, if relevant.

For each participant, the time commitment of the research should not extend beyond 30 minutes on-site. Follow-up will not be relevant unless clarification is needed.

• Second, a qualified and well-trained interviewer will ask you questions in a private place where you will feel comfortable. In case there is any question you feel uncomfortable responding to, you will not be coerced to respond. The questions will be on the following areas: (list the areas below)

The questions will be about school policy, school leadership, teachers' training and competence, and ICT infrastructure.

- Third, after the interview, the following procedures will be done {detailed information on any procedures to be undertaken by the investigator(s)}
   After the interview, the PI will check for errors before transcribing the interview, coding, and analyzing using descriptive statistical techniques.
- Last, you are requested to provide your contact details (phone number or any other reliable form of contact). This will help reach you in case new information regarding the study emerges. Other reason(s) for requesting your contact details is (are)

• The contact details you will provide shall remain confidential to the lead researcher (PI).

#### What Potential Risks are Associated with Participation in this Study?

Any research involving human subjects has the potential of imposing a number of risks/harms or discomfort including psychological, physical, emotional, environmental, cultural etc. {*The risks depend upon the nature and type of study and the interventions. State and explain the risk to the participant. Explain to the participant how this risk will be mitigated*}

In this study, there may be information risks such as loss of privacy or psychological risks such as stress, discomfort, or confusion in answering questions. However, to mitigate these risks, the PI will incorporate procedures to protect data confidentiality and notify participants of their right to skip questions or withdraw from the questionnaire/interview if necessary.

#### Privacy & Confidentiality

Privacy is the right of an individual to have some control over how his or her personal information/data is collected, used, and/or disclosed. Confidentiality is the duty to ensure information (data) is kept secret only to the extent possible/reasonable. {*Explain to the participants how privacy and confidentiality will be upheld. Explain to the participant any extra precautions, you will take to ensure safety and anonymity. How well data will be handled and after how long will the data be discarded and how the data will be discarded*}

The PI will personally deliver questionnaires and/or record interviews, then immediately retrieve them to ensure 100% return rate. All participants' responses in the questionnaires and/or interviews will be anonymized and treated in the strictest confidence. No individual or school will be identifiable in the published reports.

In case you aren't comfortable answering any of the questions during the interview because of feeling embarrassed or uncomfortable, it will be within your rights to decline. Otherwise every measure has been taken to ensure that the interview is conducted in a private area with minimal to no interference so that you feel comfortable.

In case of clinical procedures: You may experience some discomfort/pain after {State the procedure} \_\_\_\_\_\_\_\_. This may even cause some {state the effects of the procedure}

If at all you suffer any injury, illness or complication(s) by participating in this study, kindly contact us immediately using the contact details provided at the bottom of this form. you will be attended to by the study clinician and if there is need for further assessment or treatment you will be referred accordingly

#### What Benefits are you Going to Accrue by Participating in the Study

{Benefits may be divided into benefits to the individual, benefits to the community in which the individual resides, and benefits to society as a whole as a result of finding an answer to the research question. Mention those that will be actual benefits not entitlements}

{*Highlight the significance of the study*}

This study will benefit the residents of Nakuru West Sub-county by discovering how their schools can improve or better implement digital literacy, specific to their communities. Further, if proven useful, these findings can contribute to the relevant body of knowledge and perhaps help the GOK to identify critical areas concerning technologies moving forward.

#### What Will it Cost You to Participate in the Study?

*{Will the participant incur any cost in order to participate in the study? Explain it clearly to the participant}* 

The participant will not incur any costs in order to participate in the study.

Will Any Expenditure that You Incur by Participating in the Study be Refunded? Or will you be Paid for Participating in the Study? {Explain clearly to the participant whether or not they will be reimbursed}

No expenditures shall be incurred by way of participating in the study. Willing respondents of the questionnaires and/or interviews will participate in the study voluntarily.

#### In Case I Have any Further Questions/ Concerns in Future Whom Should I Contact?

In the event that you need further clarification or questions regarding your continued participation in the study feel free to contact the PI {*Provide the contacts of the PI*}. In case of concerns regarding your rights and/or obligations as a research participant do not hesitate to contact the secretary, KUREC on {*KUREC contact*}

Phone number: +821064661613 or +254737945508 Email: sydneyjp@snu.ac.kr

#### What Alternative Options are Available to Me?

The decision on whether to participate or not is absolutely voluntary. You will be free to withdraw from the study at any point during the study without providing any explanation.

#### How Will the Findings of this Study be Communicated or Shared?

{*Provide a detailed plan of how feedback of the study findings will be given*}

<u>Findings of this research study will be made available after the PI produces a report that is a requirement for partial</u> completion of a Global Master's Degree of Public Administration at Seoul National University. The findings will only ever be used for academic purposes.

#### Statement of Consent

I have comprehensively read the consent form or/the information has been comprehensively read to me by the researcher. I have understood what the study is about and all the questions and concerns that I had have been responded to in a clear and concise. The study benefits and foreseeable risks have been explained to me. I totally understand that my decision to participate in this study is voluntary and I have the right to withdraw at any point during the study.

#### I freely consent to participate in this study

Signing this form does not in any way imply that I have given up the rights am entitled to as a participant

| I agree to participate in this research             | YES | NO |
|---|-----|----|
| I agree to provide my contact details for follow-up | YES | NO |
| Participant's Name                                  |     |    |

| Participant's Signature/Thumb | print 1 | Date |
|-------------------------------|---------|------|
|                               |         |      |
## 국문초록

## 공립 초등학교 디지털 사용능력 프로그램 실행에 관한 연구: 케냐나쿠루 웨스트 사례

## **Sydney Joy Park**

서울대학교 행정대학원

글로벌행정전공

최근 몇 년 동안 케냐 정부(GOK)는 케냐를 중산층으로 격상시키는 데 초점을 맞춘 이니셔티브를 도입했습니다. ICT를 초등 교육 시스템에 통합할 수 있기를 바라며, 정부는 디지털 사용능력 프로그램(DLP)을 시행하여 전국의 학교에 태블릿을 제공하고 학생들의 삶에 디지털 사용능력과 학생 중심의 교육을 통합하는 새로운 커리큘럼을 구축했습니다. 본 논문의 목적은 질적 사례 연구 설계를 사용하여 케냐 Nakuru West Sub-County 전역의 공립 초등학교에서 DLP의 구현을 탐색하는 것입니다.

이 연구는 Richard Matland의 모호성-갈등 모델의 렌즈를 통해 DLP가 실험적 구현과 일치한다고 가정한 다음, 학생들의 디지털 역량을 육성하는 데있어서 프로그램의 효과에 영향을 미치는 중요한 요소들을 탐구합니다. 참가자들은 나쿠루 웨스트 서브 카운티에 위치한 12개 학교의 초등학교 교사들을 포함합니다. 데이터 출처는 설문 조사와 인터뷰입니다. 주제적 프레임워크 분석과 기술적 통계 방법을 통해 결과를 분석한 이 연구는 DLP를 성공적으로 구현하기 위한 문제점들을 논의하기 전에 가설을 확인합니다. 마지막으로, 이

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연구는 프로그램의 과제에 대한 향후 해결책을 알려줄 수 있는 추가 연구에 대한 정책 시사점과 권고 사항을 제공합니다.

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