A POLICY FRAMEWORK FOR

Bridging the Gender Divide in Digital Technology Courses and Careers in Kenya

ECHIDNA GLOBAL SCHOLARS PROGRAM

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20 YEARS
Center for Universal Education at BROOKINGS

Executive Summary

Kenya's digital technology advancements—chief among them the mobile money transfer application referred to as Mpesa—has led to the country's status as an emerging digital economy. However, the long strides in the move toward a fully-fledged digital economy are not reflected in the digital technology workforce with regard to gender balance. While digital technology careers are highly touted as the jobs of the future, women occupy less than 30 percent of digital technology positions in Kenya. The root cause of the problem can be traced to disadvantages that girls and young women accumulate throughout their years in education.

This study takes a qualitative approach in trying to identify the root causes for the exclusion of girls and young women from digital technology courses at all levels of education—namely lower primary, upper primary, junior high school, senior high school, and the tertiary level in both rural and urban communities. The study identifies various cumulative factors that contribute to fewer women taking up digital technology courses, such as: inadequate infrastructure; insufficient staffing and training of digital technology personnel at learning institutions; the negative impact of gendered social norms; poor advocacy of digital technology careers and the absence of vocational counseling; and the lack of women role models.

To increase the number of women in digital technology careers, we must improve institutional digital technology infrastructure at all levels of education, enhance the training of digital technology personnel within all levels of education, build girls' interest in digital technology-related courses from the earliest years, increase digital technology advocacy and awareness among girls, and enhance vocational counseling on digital technology careers

I. Introduction

We live in a fast-paced digital world, full of adaptability, dynamism, and rapid evolution. Take for example that around 10–15 years ago, multi-million-dollar information communication technology (ICT) companies like Lyft, Pinterest, Slack, and Uber had not even been launched. Yet certain aspects within the digital technology industry have not kept pace with the same rapid evolutionary processes as the rest of the sector—gender equity chief among them.

As of July 2022, technology careers made up 25 percent of the world's "top jobs," with 3 of the 5 highest-paying jobs being in digital technology (Indeed, 2022). These types of jobs in addition to other science, technology, engineering, and math (STEM)-related jobs will continue to have a high occupational demand as projected in Table 1 below, with a 10.8 percent worldwide increase in STEM jobs and positions in computing, engineering, and advanced manufacturing leading the way.

Employment in software development is projected to grow by 22 percent compared to only 4.6 percent in non-STEM occupations (BLS, 2022), an indication that STEM jobs and in particular digital jobs are indeed the jobs of the future.

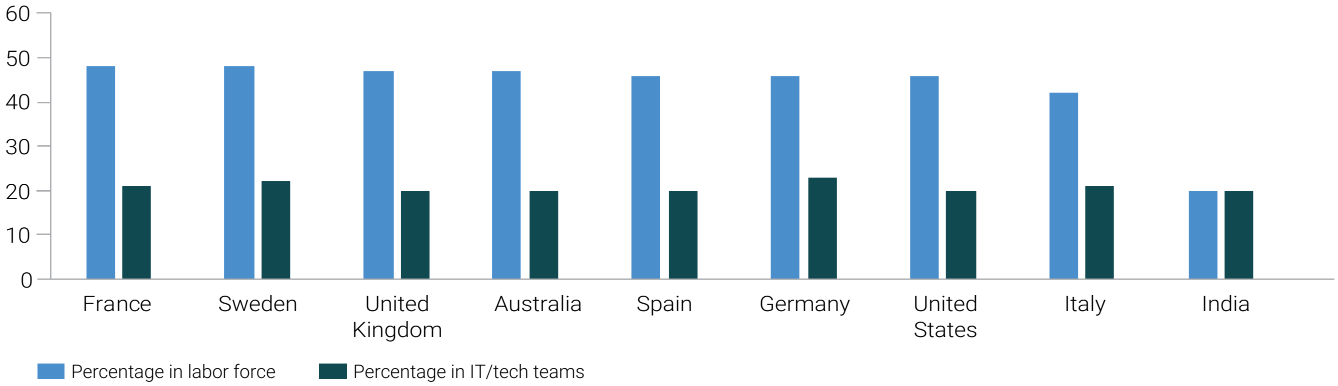
Yet most girls and young women have continued to miss out on technology-related career opportunities, as reflected in the huge gender disparities in digital careers witnessed around the world (WEF, 2021). Data from a select group of countries shows that while women make up a reasonable average of 44 percent of employees at information communication technology companies worldwide, women represent only 25 percent when taking into account direct involvement with digital technology and/or employment on digital technology teams (Statista, 2021; see Figure 1).

TABLE 1. Employment in STEM occupations in 2021 and projections in 2031

OCCUPATION CATEGORY	EMPLOYMENT 2021	EMPLOYMENT 2031	EMPLOYMENT CHANGE 2021–31	PERCENT EMPLOYMENT CHANGE, 2021–31
Total, all occupations	158,134.7	166,452.1	8,317.4	5.3%
STEM occupations	9,880.2	10,944.2	1,064.0	10.8%
Non-STEM occupations	148,254.5	155,508.0	7,253.5	4.9%

Source: U.S. Bureau of Labor Statistics

FIGURE 1. Distribution of women in digital technology companies in select countries



Source: Statista 2021.

Given these two trends—a worldwide shortage of women in the digital technology workplace and the disappearance of administrative and clerical positions—the move to digital economies will likely result in increased rates of unemployment among women across sub-Saharan Africa.

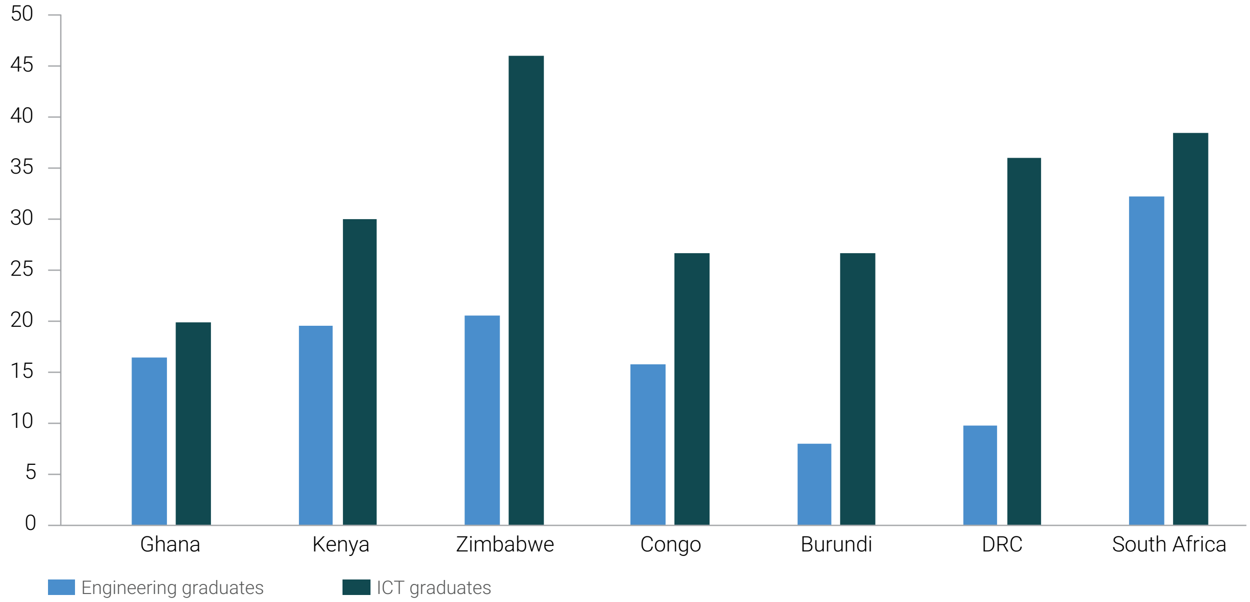
Annually compiled data indicates that the number of women working on digital technology within the industry never seems to go beyond an average of 30 percent of the workforce (ILOSTA, 2019). In Europe, for example, the gender gap is extremely high in disruptive skills, or the ability to bring about innovative approaches to improving products and services and thus making them affordable and easily accessible, with women occupying less than 18 percent of positions in artificial intelligence, cloud computing, and data science (WEF, 2020).

The lack of workforce diversity with regard to gender is a recurrent problem even in the major tech companies. Only one-third of the workforces at Amazon, Apple, Facebook, Google, and Microsoft are made up of women. Women are especially underrepresented in software engineering, at only 14 percent worldwide (Statista, 2021). Taking into consideration the overriding fact that less than one-third of the global digital technology workforce is made up of women (Statista, 2021), it can therefore be inferred that a significant barrier exists with regard to women securing even entry-level positions in ICT jobs.

In sub-Saharan Africa, less than one-third of the digital technology workforce is comprised of women (UNESCO, 2021), which is highly consistent with global trends. The exclusion of women from digital technology careers should be viewed as a worrying trend when coupled with the decline in job growth in fields traditionally made up of women. The first job casualties brought on by rapid advancements in digital technology are administrative, clerical, and non-skilled positions largely held by women, a factor that puts the job security of most women in the region highly at risk (McKinsey, 2019).

Given these two trends—a worldwide shortage of women in the digital technology workplace and the disappearance of administrative and clerical positions—the move to digital economies will likely result in increased rates of unemployment among women across sub-Saharan Africa. The gender disparities in participation in ICT-related careers could negatively impact gender equality and economic empowerment efforts underway in the region.

FIGURE 2. Graduation rates for women enrolling in engineering and ICT degrees



Source: UNESCO, 2017.

It is worth noting that the gender gap in the ICT workforce begins early, as very few girls take up digital technology-related courses at the tertiary level of education. As can be seen in Figure 2, Kenya lags behind several countries in the region, including Zimbabwe, South Africa, and the Democratic Republic of Congo, when it comes to the rate of women graduating from university with an ICT degree. It seems to be fairing slightly better than Congo and Burundi and far better than Ghana.

Though young women's enrollment in ICT courses at the tertiary education level in sub-Saharan Africa seems to be slightly higher than in engineering courses, this has yet to translate into significant changes in the gender composition of STEM- and digital-technology-related careers. It is worth noting that there exists a strong gender imbalance globally with regard to women's representation in the STEM fields, and even more so in sub-Saharan Africa (UNESCO, 2017). Based on the current trajectories, sub-Saharan Africa will only close its existing gender gap in digital technology careers in 95 years. (WEF, 2021). There is, therefore, a need to understand the root causes of girls' exclusion from digital technology education across the entire schooling spectrum, from lower primary- to tertiary-level education.

A quick perusal of various universities' graduation booklets reveals the low number of women graduating university with information-technology-related degrees. **This phenomenon has been termed the "leaky pipeline," where women and girls may have a low rate of advancement in their ICT-related studies, thus culminating in underrepresentation in ICT careers.** The low graduation rates contribute to the reduced number of women eligible for careers in digital technology.

The low female participation in degree courses at university level and the subsequent low female graduation rates in Kenya are indications that barriers in the uptake of technology careers start at earlier schooling levels and continue to be present at every stage of girls' and young women's lives. Yet very little effort has been made to mitigate this, hence the need for a study across the education trajectory.

Any attempt at mitigating the gender divide in digital technology should bear in mind that despite the fact that education can play a major role in narrowing this gap, it can also impact negatively by creating and maintaining gender differences. Education therefore can either be at the forefront of reproducing social gender inequalities or it may act as an effective tool for interrupting and/or transforming them.

This study investigated the root cause behind girls and women not being able to take up digital-technology-related courses in Kenya. It seeks to identify interventions that can be put in place

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to increase girls' uptake in digital technology courses at the earliest stages of education and propose a policy framework for bridging the gender divide in digital technology careers in Kenya.

Context: Current Interventions

There exist a number of policies in Kenya that aim at encouraging more school-going children to embrace courses that will lead them to a digital career (Barasa, 2021). These initiatives, however, seem to have done very little to bridge the gender divide in digital technology careers in Kenya (OECD, 2018). The various initiatives that were put in place have faced a range of challenges, chief among them inadequate infrastructure such as electricity and internet connectivity; lack of training and continuous professional development (CPD) opportunities on the pedagogical use of digital technologies for teachers; the existence and concurrent use of multiple data systems at different educational institutions, which leads to a mismatch of teacher, student, and school information and data sets; the high cost of digital devices; and funding shortfalls and delays in disbursement, impacting the operation of various capacity-building programs for teachers. A digital divide between rural and urban areas also continues to perpetuate existing education inequalities (Barasa, 2021).

The existence of such well-intentioned policies is yet to effectively address the issue of gender disparity in ICT careers. That said, however, the Kenyan government has in the past set up a number of initiatives aimed at promoting ICT careers among school-going children, as indicated below:

A. THE LAPTOPS-FOR-SCHOOLS PROGRAM

In 2012, the Kenyan government invested in an ambitious program dubbed "laptops for schools," which failed to take off mainly due to a poor implementation strategy that was exacerbated by huge infrastructural and financial challenges (Wambugu et al., 2017). While the idea was noble, it failed to take into consideration the challenges associated with lack of infrastructure, especially in rural areas, particularly a dearth of trained teachers on top of social economic and gender inequalities. The failure to attempt to address these challenges before introducing the laptops-for-schools' program may have greatly hampered the successful implementation of the program.

B. THE DIGITAL LITERACY PROGRAMME

In 2016, the Kenyan government initiated the Digital Literacy Programme (DLP) with the aim of distributing digital devices to primary school students and training teachers in the delivery of digital-learning content. Overall, approximately 81,000 teachers were trained under the program, though there was no specific focus on gender or the gender divide. The Ministry of Education, Science and Technology and the Teachers' Service Commission (TSC) also targeted teachers for ICT training to provide both basic and enhanced ICT competencies.

C. CODING-FOR-SCHOOLS' INITIATIVE

In August 2022, the outgoing administration, through the Kenya Institute of Curriculum Development, introduced coding (computer programming) as a subject into the primary and secondary school curriculum. The aim of the program is to impart coding knowledge to primary and secondary school children and promote entrepreneurship through startups while also teaching hard and soft skills. However, it stands the risk of not being successfully implemented due to the fact that the same challenges that faced the laptops-for-schools' program, namely lack of infrastructure, untrained teachers, and social economic and gender inequalities that have yet to be addressed.

While the current policy initiatives seek to attract all children to digital technology courses, they fail to consider existing infrastructural needs, teacher training requirements, socio-economic disadvantages, and—more importantly—persistent gender disparities. There is, therefore, a need to propose a better approach to mitigating the cumulative disadvantages that lead to the exclusion of women from digital careers.

II. Methodology

This policy brief presents research that seeks to identify the root causes behind the exclusion of girls from digital technology education at all levels while taking into consideration both urban and rural areas, from primary through junior and senior high school and on to the tertiary level. The study not only examined the academic context of the mechanisms excluding girls at these levels, but also analyzed the influence of early life events on the future career choices of young women and girls with regard to ICT careers. In doing so, this study attempted to understand the cumulative effects of factors that lead to gender-based exclusion and the policies that seek to address this problem, as well as remedial measures that could be put in place.

The data used to draft this brief come from focus group discussions with girls, age 7 to 22, studying at all levels of education in four counties in Kenya. An emphasis was placed on rural versus urban-based learning institutions. One-on-one interviews were also conducted with stakeholders, such as teachers, school administrators and owners, school board representatives, and education ministry officials. See Appendix A for a detailed description of the methodology.

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III. Findings

Given the different focus groups involved in the study, the investigations produced varied findings that applied to different categories of the population. For that reason, it was necessary for the findings to be discussed under the main categories of primary school level, secondary school level and tertiary level, though in some cases the findings were different for the lower primary, upper primary, junior secondary school, and senior secondary levels of education

A. FACTORS IMPACTING BOTH BOYS AND GIRLS

1. Inadequate infrastructure

Despite the measures put in place to have more learners partake of digital education, all the learning institutions incorporated in the study reported some form of infrastructural inadequacies.

The rural-based primary schools that were included in the study either did not have basic electric power supply or were in the process of having power supply services made available to them. Some of the same rural primary schools did not have a single space that could easily be converted into a computer lab, and none of these schools had either computers or internet connectivity.

Urban primary schools had electricity and half of them had a computer lab with computers in it. However, the labs were not accessible due to malfunctioning machines or lack of personnel to either supervise the labs or teach ICT-related courses. In one case, the pupils never used the computer lab for learning ICT and reported that they visited it to learn something unrelated to ICT, without ever using the computing facilities in the room.

Secondary schools in both urban and rural settings were found to have the basic infrastructural requirements of electric supply. Some rural schools, however, lacked computers and computer labs and had no space for setting one up. One high school had a computer lab and computers in it, but the lab was always locked due to lack of trained personnel.

At the tertiary level of education, all the institutions involved in the study had reasonable electric supply, computer lab space, computers, computer peripherals and internet connectivity. Most, however, had a larger student population than the available facilities could handle and were forced to advise their students to carry their own computing devices to campus, a solution that clearly disadvantages those students and parents that have financial challenges.

These findings are an indication that at every level of education there is either a lack of ICT infrastructure or an existence of infrastructure that is highly inadequate.

2. Inadequate training and insufficient number of ICT personnel at learning institutions

There seemed to be a highly insufficient number of ICT personnel at all levels in the educational institutions that were involved in this study. Most institutions had fewer than two individuals that could tutor ICT courses, manage ICT facilities, or both.

When asked whether they had ICT personnel working at the institution both in terms of teachers and support staff, **all but one** of the primary schools reported not having any ICT personnel among either their teaching or support staff. This was the case even though some of the institutions already had ICT infrastructure in the form of computer labs in place. The same question was posed at the secondary-level institutions, and only one had a teacher designated to teach ICT and one ICT support staff person. The other institutions had neither a teacher who could teach ICT nor a designated ICT support staff person, and one of them had an inaccessible computer lab since they had no one to either manage it or tutor the students. All the tertiary institutions reported having both ICT teaching and support staff in place, but they all admitted that they did not meet the required student-to-academic staff ratio, which is set at 1:10 by the Commission for Higher Education.

A follow-up question was also posed to the institutions as to whether any of their staff have been trained or are undergoing training on ICT teaching support. All primary schools in the study indicated that their staff have never undergone and are not currently undergoing any form of ICT training. One secondary school indicated that it had trained personnel in place for both teaching and support while another indicated that it had a member of teaching staff who had been trained in ICT and could tutor the students as well. The remainder of the secondary schools indicated that none of their staff members had any form of ICT training. Given that all tertiary institutions involved in the study have ICT-related schools, institutes, and departments, they all reported having trained ICT academic and support staff in place, though they insisted that they were highly understaffed.

From the findings there seems to be a correlation between the lack of training for ICT teaching and support staff and the insufficient number of ICT personnel at most of the learning institutions.

In addition, the findings also unearthed the fact that there are very few women ICT teachers and/or ICT support staff from the lowest to the highest level of education. Some tertiary institutions did not have a single woman member of faculty in either an ICT related department or a technology-related faculty.

B. FACTORS IMPACTING GIRLS SPECIFICALLY

1. Negative impact of gendered social norms

Girls in all the focus groups were asked whether they were made to feel that certain homestead chores were meant for girls while others, especially physical chores, were meant for boys. All of those in the lower-primary and upper-primary focus groups at the primary school level reported that they were not made to feel that certain chores within the homestead setting were reserved for either boys or girls. A few girls in both junior and senior levels of secondary school reported that within the homestead environment they have sometimes been made to feel that certain chores are a preserve of girls while others are a preserve of boys. Most of the girls at the tertiary level reported having been made, within the homestead setting, to feel that certain chores are a preserve of girls while others are a preserve of boys.

When asked whether they have ever been made to feel or told that certain careers are meant for men while others are meant for women, all of those in the lower primary and upper primary focus groups at the primary school level reported that they had never been made to feel that way. The majority of the girls at junior high school also reported they had never been made to feel that certain careers are meant for boys while others are meant for girls. However, a sizable number of girls at senior secondary and a majority of those at the tertiary level of education felt that at one point or another they have either been made to feel or have been told outright that certain careers are meant for boys while others are meant for girls. One particular young woman pursuing a bachelor's degree in information technology at one of the local universities indicated that her elder male cousins wondered loudly how, as a woman, she would be able to work on home fiber cable installation, since the job required climbing or working on top of poles, an activity that they considered a preserve for boys and young men.

When asked to name a career that they were highly interested in pursuing, the career choice for girls in lower primary, upper primary and junior secondary did not reveal any inclination toward historically gendered occupations. However, the career choice for most girls in senior secondary revealed an inclination toward careers that have traditionally been occupied by women. As already confirmed by previous studies (UNESCO, 2017), very few young women in the focus group for the tertiary level of education were pursuing studies in engineering, science, or even digital technology.

The above evidence shows us that there is a relationship between gendered social norms and the type of careers that women may end up finding themselves in. A girl who is exposed

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to various cumulative gendered social norms may end up not considering themselves admissible into a digital technology course.

2. Lack of awareness by girls of the existence of digital technology jobs

Girls in the focus groups at the lower primary, upper primary, and junior high school level of education were not aware that ICT jobs existed. Indeed, none of them were able to name a single ICT job. They did, however, understand that one can use a computer while working in any career—one girl gave an example of a nurse using a computer to keep patient records. Very few girls at the senior secondary level were aware that one can have a career in computing, though most of them were not quite sure what exactly such a career would entail. The young women at the tertiary education level who were studying ICT-related courses had a clearer picture of what constitutes ICT careers, but some of those who were not studying ICT-related courses were not sure of what exactly an ICT career entails.

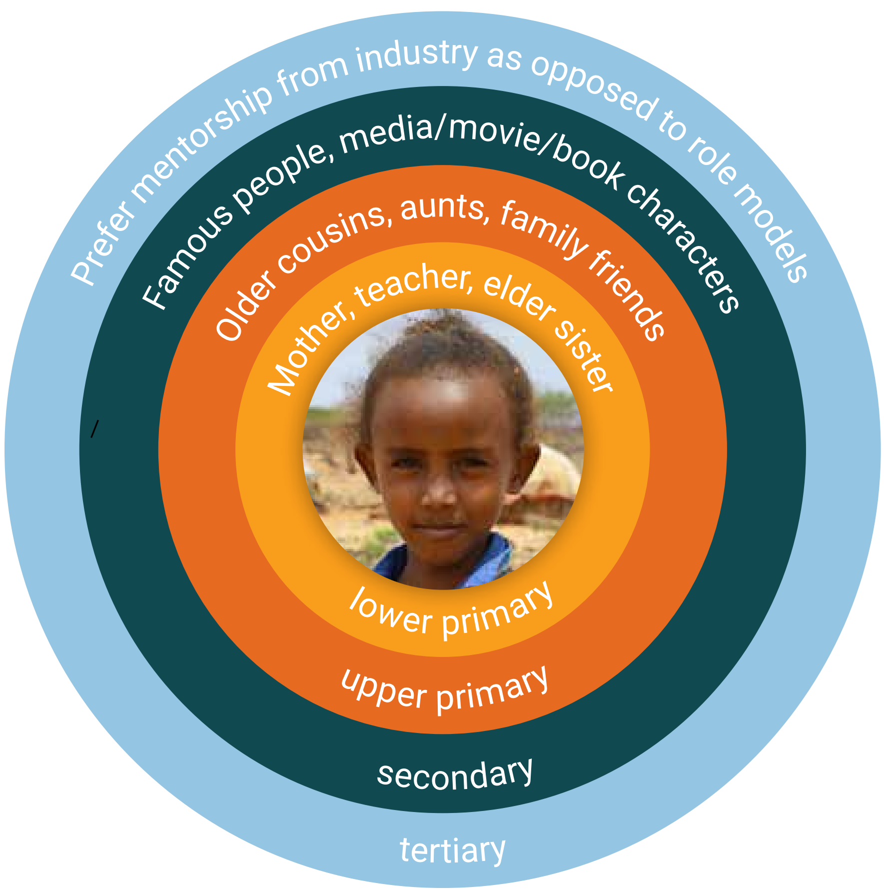
When asked whether they had come across any literature and/or images of ICT careers in their books or reading materials in school, the majority of the girls in all the focus groups responded in the negative.

3. Lack of women role models in digital technology from an early age

The majority of girls at the lower primary level of education base their career choices on women who are close to them in their lives—in most cases their mother, teacher, or elder sister (Figure 3). The pool of role models expands slightly at the upper primary level of education with other individuals such as older cousins, aunts, family friends, and famous people coming into the picture, and the pool continues to grow wider at the secondary school level.

Most of the young women at the tertiary level of education, however, feel that they are more in need of mentors as opposed to role models, though a respectable number of them had role models whose pick was far-reaching and wide.

FIGURE 3. Girls' pool of role models from lower primary, upper primary, secondary, and tertiary levels of schooling



4. Inadequate vocational counseling

As already indicated, none of the girls at the primary level and few of the girls at the secondary level of education in this study could name either a career in digital technology or a person working in digital technology. In addition to that, most young women at the tertiary level who were not studying ICT-related courses found it difficult to identify a particular ICT career.

Most of the young women who were pursuing ICT-related courses at tertiary level had a reasonable amount of knowledge of digital careers but almost all revealed that the ICT course that they were pursuing was arrived at as an alternative option after they were unable to gain admission to their first-choice course.

The above findings point to the conclusion that there is inadequate vocational counseling at all levels of education, especially with relation to digital careers.

5. Poor advocacy of digital technology careers

At all the primary and secondary levels of education, the girls in the focus groups could not identify any women working in the ICT industry, and none could identify a particular digital technology career (Table 2). Meanwhile, a sizable number of them named neurosurgery as one of their preferred career choices. This could easily be attributed to two simultaneous phenomena: (1) that they did not know of anyone working in the digital technology industry or did not have anyone in their circle working within the industry, and (2) that when the top student in the Kenyan primary education certificate national exams in 2020—a girl—was interviewed by mainstream media, she indicated that she wanted to be a neurosurgeon, and this could have created a lot of interest in neurosurgery for girls to consider it as a career option.

Poor advocacy for digital careers among girls at all levels of primary and secondary education could be contributing to fewer girls having knowledge about digital technology careers.

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TABLE 2. Findings summary

EDUCATION LEVEL	LOWER PRIMARY	UPPER PRIMARY	JUNIOR SECONDARY	SENIOR SECONDARY	TERTIARY
CUMULATIVE DISADVANTAGES	Inadequate infrastructure				
	Insufficient number of female ICT personnel at learning institutions				
				Negative impact of gendered social norms	Negative impact of gendered social norms
	Poor advocacy for digital technology careers			Low of awareness by girls of existence of digital technology jobs	
	Lack of women role models in digital technology				
			Inadequate vocational counseling		

IV. Recommendations

In general, irrespective of the target group, for meaningful progress to take place regarding the uptake of ICT-related courses in Kenya, there needs to be a policy in place that ensures that the objective is met with a full focus on ensuring gender equality. The following policy interventions must be considered.

A. INTERVENTIONS BENEFITING BOTH BOYS AND GIRLS

1. Improve institutional ICT infrastructure at all levels of education

There is a great need to improve infrastructure at the primary and secondary levels of education. The Kenyan Ministry of Education needs to identify primary and secondary schools that fall under the category of technical schools within the newly introduced competency-based curriculum and prioritize ensuring that the schools have access to electricity, enough room that can be converted into computer labs, and computing equipment, peripherals, and internet. In addition, 50 percent of such schools should either be girls' schools or, if mixed, they should ensure that 50 percent of their ICT learners are girls. Such an initiative could be actualized through the support of development partners, donor organizations, and multinational corporate organizations.

2. Enhance training of ICT personnel within institutions at all levels of education

The Teachers Service Commission, the central teacher-employment body in Kenya, can also play a role as a stopgap measure in identifying a select number of women teachers, preferably from the abovementioned select technical primary and secondary schools, for enrollment in an ICT Training of Trainers (ToT) program. The graduates from such a program can then fulfill roles at their respective schools for training girls and for technical support. Such an initiative could also be actualized through the support of development partners; donor organizations; and multinational corporate organizations and big-tech companies operating in East Africa.

B. GENDER-RESPONSIVE INTERVENTIONS

1. Build girls' interest in ICT-related courses from the earliest years

The Kenya Institute of Curriculum Development needs not only to ensure that the next editions of recommended textbooks and study materials, at all levels of primary and secondary school education, contain literature and images of ICT careers but also that such content prominently features women in the ICT job space.

There is also a need for the Ministry of Education in conjunction with the ICT ministry to partner with big-tech companies operating in East Africa, most of which are already pushing for more women in digital careers, to assist in putting in place a girls coding program at both primary and secondary levels as well as ICT-related extravaganzas, events, and hackathons for girls. Such initiatives will not only create ICT awareness for young girls but will also enable them to build self confidence in their own abilities to rely on digital technology to handle various tasks and solve real-life problems.

2. Increase ICT advocacy and awareness among girls

Girls at the lowest level of education are clearly not exposed to ICT role models, which then hampers their interest and uptake of ICT-related courses. There is a need to introduce women role models to girls at the earliest stages of learning. This needs to be done from a local- and international perspective where local and international potential ICT role models are introduced to the girls. One way to amplify these at both levels of education is through sensitization sessions that include the viewing of video clips of said role models. The clips can also be shared with parents, guardians, and/or teachers to enable the girls' frequent and continued access to the materials. Print, electronic, and social media can also be brought in to assist in the awareness campaigns. This kind of advocacy will go a long way in aiding the exposure of young girls to other potential ICT role models outside their close circles.

It is equally important for more women who are successfully plying their trade in the ICT industry to be identified and invited to be part of mentorship programs where they can have group discussion sessions with girls at the lower primary school level, learning sessions with girls at the upper primary school and junior high school levels, coding sessions at senior high school level, and hackathons and mentorship programs for young women at the tertiary level of education.

3. Enhance vocational counseling on digital technology careers

Given that entry to university is based on individual subject performance coupled with the overall performance of the Kenya Certificate of Secondary Education examination and that secondary school students choose their subject in the second year of education, it is important that vocational counseling sessions are held with the students, especially girls, so they can choose relevant subjects that are admissible for ICT-related courses at the tertiary level of education (Table 3).

TABLE 3. Recommendations summary

<table>
<tr><th>EDUCATION LEVEL</th><th>LOWER PRIMARY</th><th>UPPER PRIMARY</th><th>JUNIOR SECONDARY</th><th>SENIOR SECONDARY</th><th>TERTIARY</th></tr>
<tr><td rowspan="5">INTERVENTIONS</td><td colspan="5">Improve institutional ICT infrastructure</td></tr>
<tr><td colspan="5">Enhance training of ICT personnel</td></tr>
<tr><td colspan="4">Build interest in ICT-related courses</td><td></td></tr>
<tr><td colspan="4">Increase advocacy and awareness</td><td>Mentorship</td></tr>
<tr><td colspan="2"></td><td colspan="3">Enhance vocational counseling</td></tr>
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APPENDIX 1
Methodology

The methodology involved a combination of qualitative and quantitative methods that included secondary data-sourcing from existing literature and online data interrogation as well as primary data collection via relevant stakeholders and institutions. Each of the proposed study methods were aimed at addressing specific study objectives or research questions. Some key information-area objectives were addressed by more than one method while, inversely, one research method addressed more than one study objective. The study involved the following:

SECONDARY RESEARCH

The secondary research was the first phase of the study and was conducted via the desk review process. This phase assisted in the development of a holistic understanding of root causes for girls and women not taking up digital-technology-related courses in Kenya. The exercise covered all sectors of education. Desk reviews were conducted to scan available literature and helped deeply understand the problem. It also attempted to address the historical evolution of the problem by examining historical data. A desk review of case studies was also conducted.

PRIMARY RESEARCH

Both qualitative and quantitative methods were used in this phase. Primary research was conducted to collect quantitative data from various organizations, learning institutions, students, and teachers with the aim of acquiring an in-depth understanding of the problem. In depth interviews and focus group discussions formed an integral part of this phase. Adequate tools were designed for the purpose of data collection, including questionnaires, webinar guides, interview guides, and a consultation agenda.

POPULATION

Generally, the study was concerned with ensuring that we have more women adopting digital technology careers with intervention measures being driven via the education system. We therefore considered girls and women aged 7-22 as being our target population. They were then grouped as follows:

TABLE A1: Focus groups guide

METHOD	AGE GROUP IN YEARS	EDUCATIONAL LEVEL	INSTITUTION	SETTING
Focus group discussions with girls	7–9	Grade 1–3	Lower primary	8 primary schools in Kakamega, Nairobi, Mombasa, and Kilifi Counties 4 rural, 4 urban
	10–12	Standard 5–8/ Grade 4–6	Upper primary	
	13–15	Form 1–2	Junior secondary school	4 high schools in Kakamega, Nairobi, Mombasa, and Kilifi Counties 2 rural, 2 urban
	16–18	Form 3–4	Senior secondary school	
	19–22	Tertiary institutions	Post-secondary education	4 universities
1-on-1 interviews with stake holders	Adults	N/A	Primary schools	2 board members 2 head teachers 4 teachers
			Secondary schools	1 principal 2 teachers
			Education ministry officials	2 ministry officials
			Kenya Institute of Curriculum Development	1 official

TABLE A2: Evidence and methods

RESEARCH QUESTION	EVIDENCE	METHOD(S)	SOURCE(S)/PARTICIPANT(S)
What are the factors that lead to girls and women being excluded from digital-technology-related courses at primary, secondary, and tertiary levels of education in Kenya?	Number of girls and young women studying ICT-related courses at each education level as compared to boys and young men	Document review data	UK. Department of International Development (DFID) reports USAID Save the Children World Bank reports UNESCO reports Journal publications African Development Bank reports Ministry of Education Kenya reports and publications Kenya National Bureau of Statistics
How do the combined effects of the factors above lead to the exclusion of girls and women from digital-technology-related courses at all levels of education in Kenya?	Reasons for girls and women's exclusion from and/or exclusion in taking up ICT-related courses	Focus groups	Girls in lower primary, upper primary, junior secondary, senior secondary and tertiary schools in rural and urban contexts
What are the policies and practices that can be put in place to increase girl's uptake in digital-technology-related courses in Kenya from the lowest to the highest levels of education?	Existence of national-level policies	Document review	Basic education curriculum framework
			Policy documents
			Ministerial guidelines
	Existence of county-level policies	Document review	Basic education curriculum framework Policy documents Ministerial guidelines
	Existence of county-level policies		
How can an educational policy framework and its implementation aid in bridging the gender divide in digital technology careers in Kenya?	Perspective of policymakers on current approach	1-on-1 interviews	National-level actors
	Case studies	Document review	International-level documents

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The Echidna Global Scholars Program at the Center for Universal Education (CUE) at Brookings seeks to catalyze and amplify the impact of local leaders working to advance gender equality in and through education across the Global South.

During a six-month fellowship, Echidna Global Scholars conduct individual research focused on improving learning opportunities and life outcomes for girls, young women, and gender non-conforming people, develop their leadership and evidence-based policy skills, build substantive knowledge on gender and global education issues, and expand their pathways for impact. Upon completion of the fellowship, scholars transition to the Echidna Alumni Network, a growing community of practice aimed at promoting their significant, sustained, and collective influence on gender-transformative education globally and locally.