



## Digital Education in Cameroon: An Analysis into Available Tools and Perceptions Regarding Benefits, Barriers, and Access to e-Learning Tools in Southwest Cameroon

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*"One child, one teacher, one book, one pen can change the world."*

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## **Abstract**

The digital revolution has transformed our society so much so that in 2016, the United Nations General Assembly declared access to the internet was a human right. In education, digital tools support and facilitate learning, especially in the context of a global pandemic, when much of learning was forced into a remote alternative. However, digital access is plagued by inequalities, especially in sub-Saharan Africa. Limited digital infrastructure, unreliable electricity support, high financial costs and limited digital skills amongst school workforce hinders full realization and utilization of digital tools in learning and teaching in the region.

This study seeks to promote Goal 4 of the United Nation's 2030 Agenda for Sustainable Development to ensure equitable and sustainable digital access for students. The purpose of this research is to better understand digital access and digital education in Southwest Cameroon, to explore what factors the benefits and limitations of e-learning in the region. The study focused on students in Forms 2-5, Lower Sixth and Upper Sixth, and their parents/guardians and teachers. The results reiterated findings from previous research: infrastructural challenges, limited access to digital hardware and lack of teacher training are key barriers to e-learning in the region. The study also found that students feel involved in the decision-making process for digital education but less so that their opinions are reflected in the decisions made, and that female students face greater barriers to digital education and accessing e-learning tools than their male counterparts. Government intervention, along with the active participation of community organizations, parents/guardians, school staff and students, is required to address the inequalities in digital access that limit e-learning in Southwest Cameroon.

## **About SODEI**

Solidarity and Development Initiative (SODEI) is a UK registered charity working to inspire, engage and empower children and young persons in Cameroon by increasing their chances to succeed through education. We do this by promoting equitable access to quality education through research and advocacy, skills training, and education support. We also create spaces and platforms to foster participation in youth and community development activities.

Our vision is a society where children and young people have equitable access to quality education and opportunities, where they can confidently participate as agents of change and development while making positive contributions to decision-making in their homes, communities, and nation.

## Table of Contents

Abstract .....	2
About SODEI .....	2
Introduction.....	4
Research Importance .....	5
Research Purpose .....	5
Literature Review.....	6
Defining Internet Access .....	8
Methodology .....	8
Response Rates .....	9
Limitations .....	9
Findings .....	9
What does digital access look like in Southwest Cameroon? .....	9
What is the perception of digital education in Southwest Cameroon? .....	14
Discussion of Findings.....	23
Recommendations .....	26
References .....	27

## Introduction

In 2016, the United Nations General Assembly recognized the link between global interconnectivity and human progress, and of the existence of a digital divide between those who can and cannot access the internet, computers, and other ICT (Information and Communication Technology)<sup>1</sup>. Digital access is the ability for people to utilize ICT and to participate in an increasingly interconnected and digital world. Digital education and e-learning tools are extensions of digital access, being the facilitation of learning through the usage of ICT. The UN and UNICEF have tied digital access to a child's right to education, affirming that as the world becomes more connected through ICT, children require digital access to grow, learn, and succeed in a modern economy<sup>2</sup>. But digital access is plagued by inequalities, specifically in sub-Saharan Africa.

The joint 2020 report by UNICEF and ITU (International Telecommunication Union) determined that "only 5 per cent of children and young people aged 25 years or less in West and Central Africa, and just 13 per cent in South Asia and in Eastern and Southern Africa, have internet access at home, compared to 59 per cent in Eastern Europe and Central Asia."<sup>3</sup> Internet connectivity is essentially non-existent among the poorest 20% of households in sub-Saharan Africa, which severely limits their ability to learn and to compete in the modern, global economy. The picture in Cameroon is no different than much of sub-Saharan Africa: limited digital infrastructure, unreliable internet and electricity support, high financial costs, and limited digital skills amongst teachers and the school workforce hinders the full realization and utilization of digital tools in learning and teaching in learning in Southwest Cameroon.

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<sup>1</sup> Bediang, G., Stoll, B., Geissbuhler, A., Klohn, A. M., Stuckelberger, A., Nko'o, S., & Chastonay, P. (2013). Computer literacy and E-learning perception in Cameroon: the case of Yaounde Faculty of Medicine and Biomedical Sciences. *BMC Medical Education*, 13(1). <https://doi.org/10.1186/1472-6920-13-57>

<sup>2</sup> In their 2016 declaration, the UN emphasized "that access to information on the Internet facilitates vast opportunities for affordable and inclusive education globally, thereby being an important tool to facilitate the promotion of the right to education." In their 2020 report, *How Many Children and Young People Have Internet Access at Home*, UNICEF stated that "The digitalization of society has made ICT skills and access to technology important, but the COVID-19 pandemic has turned these things into essential human rights in terms of the educational, social and professional needs of children and young people. The lack of connectivity among the most marginalized populations – children and young people from poor households and rural areas – places them at an extreme disadvantage, and all but eliminates any chance they might have of participating in the modern economy."

<sup>3</sup> UNICEF. (2020a). *How Many Children and Young People Have Internet Access at Home*. In [www.unicef.org](http://www.unicef.org). <https://www.unicef.org/media/88381/file/How-many-children-and-young-people-have-internet-access-at-home-2020.pdf>

“Lack of connectivity doesn’t just limit children and young people’s ability to connect online. It prevents them from competing in the modern economy. It isolates them from the world. And in the event of school closures, such as those currently experienced by millions due to COVID-19, it causes them to lose out on education. Put bluntly: Lack of internet access is costing the next generation their futures.”<sup>4</sup> - Henrietta Fore, UNICEF Executive Director

## Research Importance

SODEI’s work is inspired by SDG 4, a Sustainable Development Goal set by the United Nations, which aims to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.”<sup>5</sup> We seek to significantly contribute to achieving SDG target 4.4 which is to, “by 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.”<sup>6</sup> The global COVID-19 pandemic has exacerbated inequalities in education, making a remote alternative to education is not only a necessity, but a human right in order to ensure that children have quality technical, vocational and tertiary education. <sup>7</sup>

## Research Purpose

The purpose of this research is to better understand digital education in Southwest Cameroon by examining access to e-learning tools and exploring perceptions of digital access by various stakeholders, focusing on students, parents/guardians, and teachers. The aim is to determine what digital access looks like in the region, identify potential gaps in access to e-learning tools, and discuss the benefits and challenges associated with digital access in education. Further, this research also aims to support digital access as a human right.

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<sup>4</sup> UNICEF. (2020, November 30). *Two thirds of the world’s school-age children have no internet access at home, new UNICEF-ITU report says*. [www.unicef.org](https://www.unicef.org/press-releases/two-thirds-worlds-school-age-children-have-no-internet-access-home-new-unicef-itu). <https://www.unicef.org/press-releases/two-thirds-worlds-school-age-children-have-no-internet-access-home-new-unicef-itu>

<sup>5</sup> United Nations. (2021). *Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all — SDG Indicators*. [Unstats.un.org](https://unstats.un.org/sdgs/report/2017/goal-04/). <https://unstats.un.org/sdgs/report/2017/goal-04/>

<sup>6</sup> *Ibid.*, 4.

<sup>7</sup> The UN’s 2020 report on sustainable development found that 91% of all students were kept out of school due to closures, and at least 500 million students are unable to access remote learning opportunities. United Nations. (2020). *Education - United Nations Sustainable Development*. United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/education/>

## Literature Review

Several studies have been completed regarding the nature of digital access, utilization of ICT, and e-learning in Cameroon. Farinkia (2018) surveyed 350 Form Four students and 18 teachers from 6 government general education schools in the Fako Division in Southwest Cameroon, with the goal of determining what limits ICT implementation in secondary schools. For this analysis, government schools were selected as they already have ICT in their facilities, typically computer laboratories. Through their research, the author determined seven factors hindered ICT implementation in schools within the region: in order of descending frequency these were “inadequate number of computers...unreliable internet connectivity...absence of trained support personnel...shortage of teachers to teach computer studies...lack of accessories such as uninterrupted power supply units...frequent interruption of electricity supply...{and} unsupportive rules and regulations”.<sup>8</sup>

Bediang et al. (2013) surveyed 307 students, residents, and lecturers from the Yaoundé Faculty of Medicine and Biomedical Sciences (FMBS), located in the Centre Region of Cameroon<sup>9</sup>. The purpose of this research was to uncover perceptions about the potential of e-learning at the school. Most of the survey respondents utilized ICT, typically accessing the internet at home or in a cybercafé, through a laptop. Despite high levels of ICT usage, most students (about two thirds) were not familiar with e-learning, nor had they ever accessed e-learning resources. The authors attributed this to the fact that e-learning was a relatively new concept at the time the survey was conducted. The high levels of ICT usage in their study could also be attributed to the highly technical nature of the student’s studies (medical and biomedical sciences) as opposed to the study by Farinkia (2018) which was focused on younger students pursuing general education curriculum.

Haji et al. (2017) surveyed 320 teachers from 16 secondary schools in Cameroon to determine their perceptions on ICT usage, access, and implementation in schools. The researchers found that the use of ICT was limited due to “low confidence and low competencies of the teachers, formal opposition by teachers to use pedagogical tools

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<sup>8</sup> Farinkia, N. (2018). Factors that Hinder the Implementation of Information and Communication Technology (ICT) in Public Secondary Schools in Fako Division, South West Region of Cameroon. *International Journal of Trend in Research and Development*, 5(5), 251–258. <http://www.ijtrd.com/papers/IJTRD17975.pdf>

<sup>9</sup> FMBS is mentioned as having made significant efforts in improving access and utility of ICT on the school’s campus. Bediang, G., Stoll, B., Geissbuhler, A., Klohn, A. M., Stuckelberger, A., Nko’o, S., & Chastonay, P. (2013). Computer literacy and E-learning perception in Cameroon: the case of Yaounde Faculty of Medicine and Biomedical Sciences. *BMC Medical Education*, 13(1). <https://doi.org/10.1186/1472-6920-13-57>

that they were not initially trained to be utilised in a professional way.”<sup>10</sup> The research also determined that schools were unevenly equipped with ICT.<sup>11</sup> Like Farinkia (2018), low usage was linked to lack of ICT familiarity, training, and support for teachers and to an insufficient number of computers for student or teacher use. Infrastructural limitations, particularly with lack or limited electricity in rural regions, further hinders the implementation of ICT in schools.

Penard et al.’s (2015) research on the usage and adoption of internet in Africa found a two-level digital divide that helps explain the differences and similarities discussed in Haji et al. (2017), Bediang et al. (2013) and Farinkia (2018). Penard et al. (2015) analysed household survey data from 2,650 individuals, representative of the populations of Douala (Littoral Region), Limbe and Buea (Southwest Region) in Cameroon. The researchers found that older generations were less likely to access the internet: “young and educated individuals are more likely to use the Internet in Cameroon. The probability of using the Internet is also higher for male, as well as for English-speaking and computer savvy individuals.” The difference between Farinkia (2018) and Bediang et al. (2013) can be explained through existence of two levels of a digital divide expressed in Penard et al. (2015): there is “a first-level divide between those who have already adopted information technologies and those who (still) have not (i.e. an accessibility divide); and a second-level divide within the adopters, between those able to master use of these technologies and those with a skills deficit in operating these technologies (i.e. a usage divide).”<sup>12</sup>

Existing research suggests that there is an interest in utilizing ICT in schools in Southwest Cameroon, but lack of training and support makes overcoming pedagogical differences challenging; teachers are reluctant to implement new technologies with which they are unfamiliar. Infrastructural challenges, inadequate supplies of digital hardware, software, and other technologies further inhibit the implementation of ICT in schools. Digital access is limited which restricts a child’s right to education in the modern, global economy.

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<sup>10</sup> Haji, S., Moluayonge, G., & Park, I. (2017). Teachers’ Use of Information and Communications Technology in Education: Cameroon Secondary Schools Perspectives. *The Turkish Online Journal of Educational Technology*, 16(3). <https://files.eric.ed.gov/fulltext/EJ1152582.pdf>

<sup>11</sup> “In some schools, computers are concentrated in computer laboratories or school libraries, in others computers are only found in the staffrooms and administrative offices.” Ibid., 10.

<sup>12</sup> Penard, T., Poussing, N., Mukoko, B., & Tamokwe Piaptie, G. B. (2015). Internet adoption and usage patterns in Africa: Evidence from Cameroon. *Technology in Society*, 42, 71–80. <https://doi.org/10.1016/j.techsoc.2015.03.004>

## Defining Internet Access

Before discussing the research in detail, the authors felt it pertinent to define access as considered in the analysis. Access to the internet should not be assumed to mean a direct connection to the internet. In this research, internet access is the ability to connect to the internet through any means, including a computer, tablet, or through mobile data or a cellular device. Further, it does not equate to uninterrupted connection or the ability to continually access the internet at one's leisure. As noted above, access outside of schools, public buildings, workplaces, and internet cafes is largely categorized by cell phones and other mobile devices.

## Methodology

Primary data collection was performed in the Southwest region of Cameroon, specifically in Buea and Limbe, and comprised of a cross-sectional survey, interviews, and a focus group discussion. Target population are those students, school staff, and parents and guardians in the two cities mentioned above, focusing on students in Forms 1-5, Lower Sixth, and Upper Sixth.

### *Cross Sectional Survey and Interviews*

The cross-sectional survey was disseminated to the three groups indicated in the target population above. Surveys included similar questions, tailored to the group queried. Data collected included basic demographic information (while maintaining participant anonymity), perceptions of access to the internet and e-learning tools, understanding of digital access and e-learning, and opinions regarding the effectiveness of e-learning tools. Parent and guardian surveys were disseminated through the online social media platforms of Facebook, LinkedIn, Instagram, and WhatsApp. Student and school staff surveys were also offered through the same online platforms, but were primarily disseminated in person, with SODEI volunteers working directly with school staff to schedule, distribute, collect, and collate responses.

### *Interviews and Focus Group Discussions*

In addition to the surveys, SODEI staff and volunteers conducted six Zoom and in-person interviews with teaching staff from schools in Buea and Limbe. The purpose of these interviews was to gain additional context through open-ended questions on the use of and access to e-learning tools. For the focus group, nine students from Forms 1-5, and Lower Sixth participated in an open discussion with SODEI volunteers. The goal was to ascertain their perceptions on the use of e-learning tools, access to the internet, and the availability of computer learning in school and in after-school programs.



## Response Rates

814 students from Buea and Limbe, in Forms 2-5, Lower Sixth, and Upper Sixth participated in the online or the paper versions of the survey. Gender balance was uneven: 59.09% female, 37.71% male, and 3.19% did not indicate their gender. Balance based on type of school was also uneven: 21.13% government, 31.45% mission, and 47.42% private. Parents and guardians, and school staff participation was significantly lower than that of students: 20 parents and guardians, and 39 school staff participated in the surveys.

## Limitations

Due to limited participation from parents, guardians, and school staff, this evaluation will not seek to substantially compare adult responses to those of students. The disparity in the number of respondents per staff role makes it difficult to compare across groups (7 administration, 3 IT support, 4 leadership, and 24 teachers). More research is necessary before a proper analysis based on staff role can be completed. Additionally, there is a close connection between student form and their type of school: government students were largely in Form 3, mission students in Forms 4-5, and private in Forms 4-5 and Lower Sixth. Comparisons will be made to discern differences based on the type of school but not on form.

## Findings

### What does digital access look like in Southwest Cameroon?

#### 1.1 What digital hardware do young people in Southwest Cameroon have access to?

Participating students were asked to identify which device(s) they were able to access the internet with, at home and at school (see Chart 1.1.A, below). In both, students were asked to select all devices with which they could access the internet: desktop, laptop, tablet, mobile phone, computer training program, or none. Generally, students reported higher levels of access to the internet through a desktop computer or mobile phone (though this access differs between home and school), some via a laptop computer, and low tendencies via a tablet or computer training program.

**Chart 1.1.A: Student Access to the Internet, by Number of Devices**

Access to Internet at School	Government	Mission	Private	Overall
No Access to Internet at School	14.53%	16.41%	8.03%	<b>12.04%</b>
Access to Internet through One Device	75.58%	78.91%	84.20%	<b>80.71%</b>
Access to Internet through Multiple Devices	9.88%	4.69%	7.77%	<b>7.25%</b>

<b>Access to Internet at Home</b>	<b>Government</b>	<b>Mission</b>	<b>Private</b>	<b>Overall</b>
No Access to Internet at Home	2.91%	4.69%	0.00%	<b>2.09%</b>
Access to Internet through One Device	79.07%	93.36%	83.42%	<b>85.63%</b>
Access to Internet through Multiple Devices	18.02%	1.95%	16.58%	<b>12.29%</b>

Despite reporting high levels of access to the internet both at home and at school, students participating in the focus group discussion noted that the actual ability to use digital hardware is limited. One student stated that “access to digital devices for learning is good both at home and in the after-school program though very limited at school” and another stated that the reason there is “limited access to the internet and computers in school is because the computer labs are mostly closed.”

**1.1.1 Is there a difference in internet access between home and school?**

There is a significant difference in access to devices for the internet between school and home: students indicated being able to access the internet through a desktop computer at school (52.95%) and through a mobile phone at home (61.18%). Access to a desktop computer drops to 16.83% at home, and to 10.20% for a mobile phone at school. Further, students were slightly more likely to have access to a laptop computer at home than at school (22.24% and 12.04%, respectively). While 12.04% of students indicated an inability to access the internet at school, only 2.09% indicated this limitation at home.

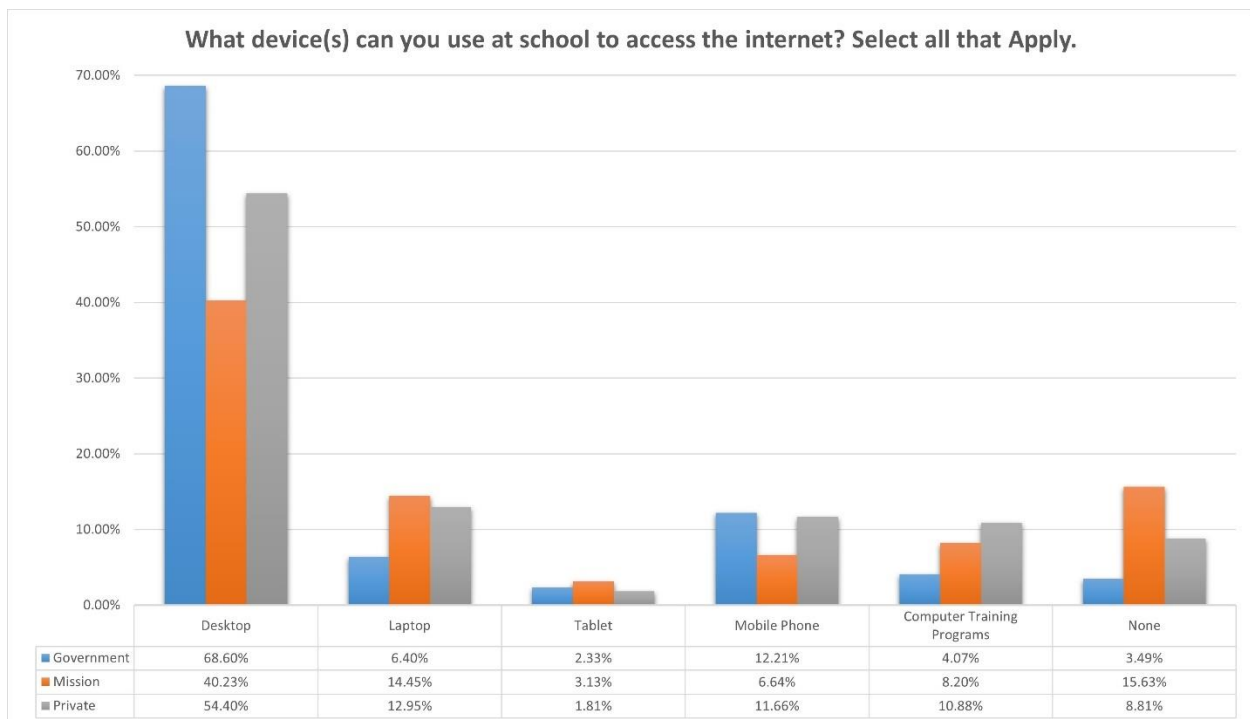
**1.1.2 Is there a difference in internet access based on demographic characteristics (type of school or gender)?**

The availability of certain hardware at school is linked to the type of school the student attends (see Figure 1.1.B. and Figure 1.1.C). Though students indicated a higher tendency to access the internet through a desktop computer at school than any other device, those attending a government school were the most likely to have access to this device, with 68.60% of students, as compared to mission at 40.23% and private at 54.40%. Government students were also the least likely to access the internet at school through a laptop computer (6.40% for government, as compared to 14.45% for mission and 12.95% for private students). Mission students generally indicated lower levels of access to the internet at school (15.63% stated that they had no access to the internet while at school) but tended to access the internet through a laptop or computer training program, when available. Private and Government students had indicated near equal access to the internet at school via their mobile phone (11.66% for private, 12.21% for government, but this drops to 6.64% for mission).

There is a similar discrepancy with access to the internet at home, based on the type of school a student attends. Students indicated a higher tendency to access the internet at home through a mobile phone, but those attending a mission school were less likely to have access (42.97% of mission students have access to the internet through a mobile phone at home, as compared to 65.70% of government and 71.24% of private)<sup>13</sup>. Government students were slightly more likely to indicate having no access to the internet at home: 7.56% for government, as compared to 2.59% for private and 2.73% for mission. Government and private students were more likely to have internet access through multiple devices at home than at school (increasing by about 9 percentage points from home to school), but mission students were slightly less likely to have access to multiple devices at home (dropping 2.74 percentage points from school to home).

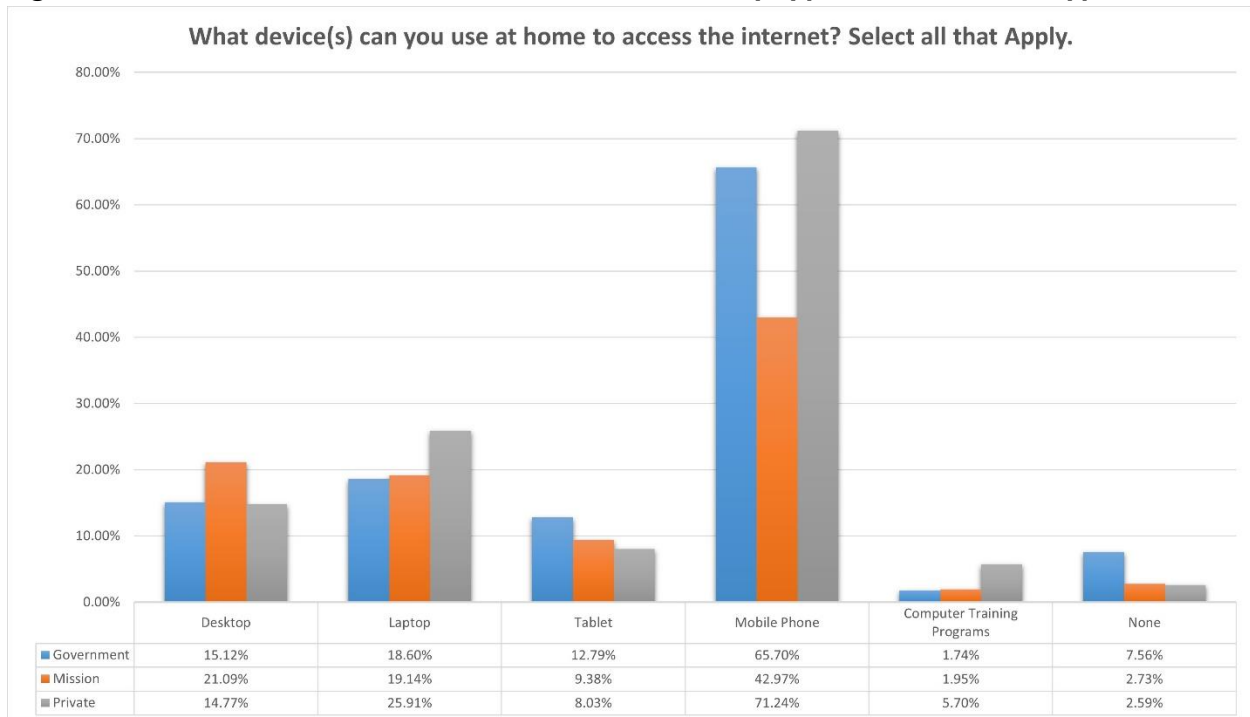
The survey responses did not indicate a significant difference in access to certain devices nor access at home based on the student’s gender. However, male students were slightly more likely to not have access to any devices for the internet at school (15.03% for male, 10.48% for female) and female students were more likely to have access to one device at school (82.81% for female, 76.47% for male).

**Figure 1.1.B: Student Access to the Internet at School by Type of Device and Type of School**



<sup>13</sup> It is pertinent to note that most mission schools surveyed are boarding schools, but further research is necessary to determine the difference in digital access and e-learning between day and boarding schools.

**Figure 1.1.C: Student Access to the Internet at Home by Type of Device and Type of School**



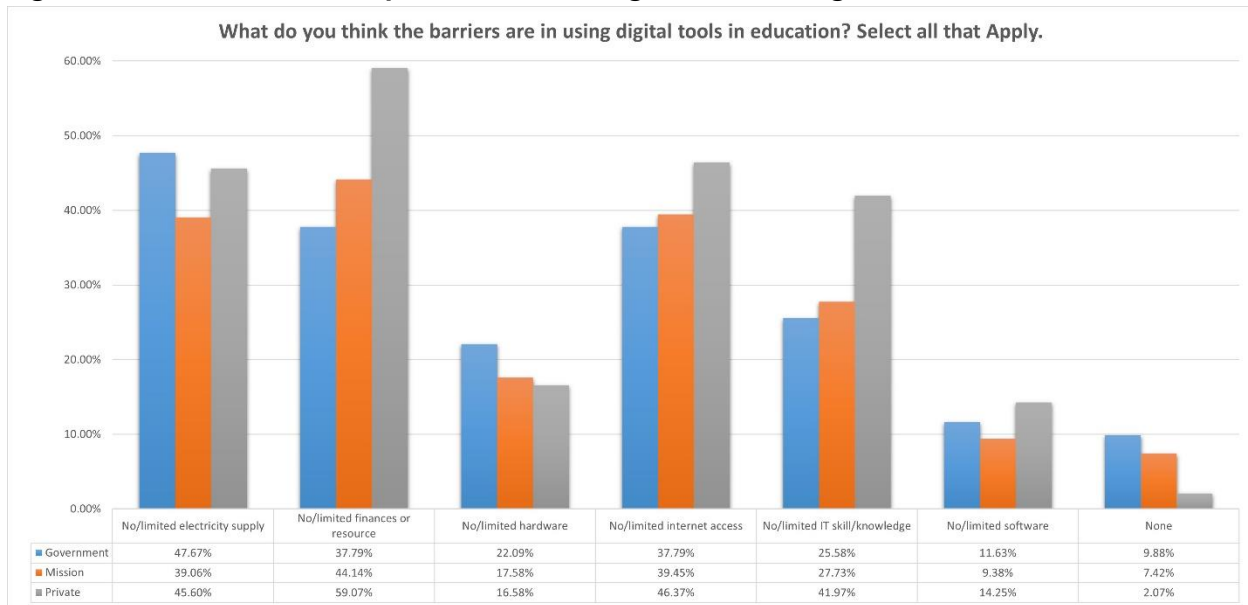
**1.2 What does internet access (connectivity and infrastructure) look like in Southwest Cameroon, from a student's perspective?**

Despite indicating high levels of access to at least one device for the internet, 63.27% of students stated that infrastructural challenges limit connectivity (see Figure 1.2.A, below) and inhibit the use of digital tools in education. While students stated that they have access to devices capable of connecting to the internet, 43.98% indicated that limited electricity and 42.38% that limited internet connectivity pose a challenge in utilizing e-learning tools (students were given the option to select all challenges that apply). In the open-ended section of the survey, one student expressed frustration with the available infrastructure:

“I have a problem with digital education at school because there is always the problem of limited computers or lack of energy making it difficult for students to study. It is frustrating.” – Student in Southwest Cameroon

Other students noted that it was “stressful” that network services should be improved, and that a “good internet connection will help learning online.”

**Figure 1.2.A: Student Perceptions Concerning Barriers to Digital Tools in Education**



**1.2.1 Is there a difference in perceptions of connectivity based on demographic characteristics (type of school or gender)?**

Private school students were slightly more likely to indicate that a lack of or limited internet access was a barrier to using digital tools in education: 46.37% for private, as compared to 37.79% for government and 39.45% for mission. Mission students were slightly less likely to indicate that a lack of or limited electricity was a barrier to e-learning: 39.06% for mission, as compared to 45.60% for private and 47.67% for government. Female students were slightly more likely than male to note electrical infrastructure as a barrier: 47.17% of female and 39.22% of male students indicated that no or limited electricity was a barrier.

**1.3 What are the perceptions of access for parents and guardians?**

Parents and guardians were asked about their child’s access to the internet at home in their version of the survey. Half (10/20) indicated that their child could access the internet through a desktop computer at home, six indicated a laptop computer, and six indicated that their child(ren) was unable to access the internet at home. In the open-ended section, one parent / guardian stated that “many schools need well equipped multimedia centres” to improve access.

Most (14/20) of responding parents stated that challenges associated with limited internet or electricity posed a barrier for utilizing e-learning tools in Southwest Cameroon. In the open-ended responses, parents and guardians also suggested that mobile data inhibited their child(ren)’s ability to connect to the internet:

“I think there's still much to be done when it comes to digital learning in Cameroon starting from sensitization and even programming. Programs need to be developed at moments that will make students follow up on such learning. Network access and dark outs also need to be considered for an effective digital learning in Cameroon. Getting mobile data is another obstacle.” – Parent/Guardian in Southwest Cameroon

Another one of the responding parents stated that “digital learning will be more effective if our children could afford the necessary gadgets and data connection to access the internet.”

#### **1.4 What are the perceptions of access for school staff?**

School staff were not asked to identify the types of devices students were able to access the internet with at school but were instead provided the opportunity to offer open-ended feedback on digital access via interviews. Generally, staff indicated that limited access to hardware and infrastructural challenges associated with electricity and internet connectivity negatively impacted digital access in Southwest Cameroon.

While staff noted that desktop computers and computer labs were available in their schools, there was an insufficient number for both students and teachers to utilize, with one stating that “often three students {are} using one computer.” Computer lab time is also restricted, with students having access for only 30-90 minutes per week in some schools and in others the “use of these computer labs is mostly limited to students who offer computer sciences. And even those who offer the subject only go to a multimedia center during practicals for computer science studies.”

As for infrastructural challenges, school staff noted that “difficulties with electricity” hindered their ability to power ICT hardware. Others stated that the expense associated with internet connectivity or purchasing mobile data limits digital access. Beyond the expense, staff also indicated that there was a need for a stable network to facilitate e-learning and that the “number of students who have access to the internet is very low.”

### **What is the perception of digital education in Southwest Cameroon?**

#### **2.1 What matters most to students with digital access and e-learning?**

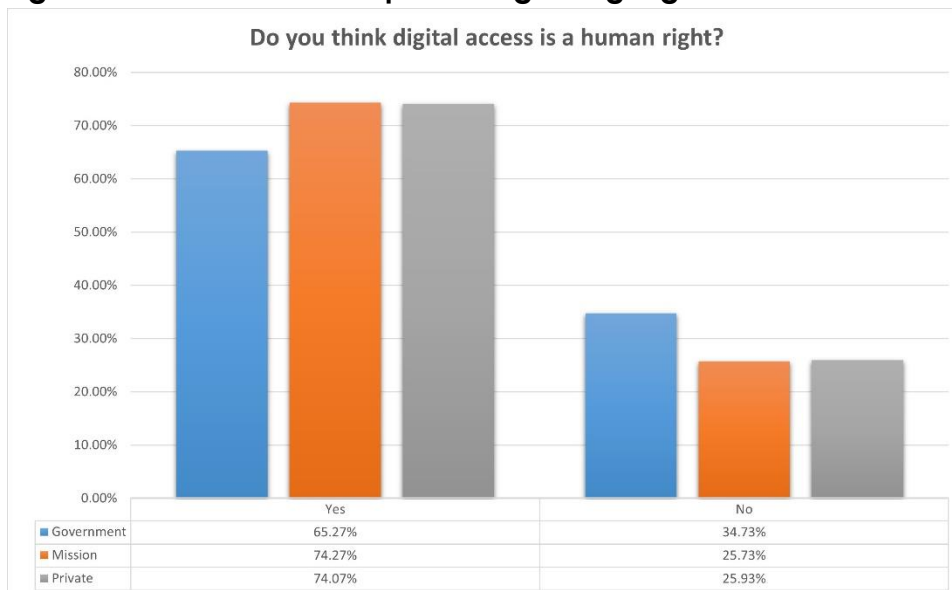
In addition to being asked about their perceptions of digital access in Southwest Cameroon, students were asked if they felt e-learning has a place in education and if digital access is a human right. Students overwhelmingly stated that digital learning has a place in education, with 95.97% choosing yes. There was no significant difference in student responses based on the type of school they attend or on their gender. In the survey responses, 20.61% of students who provided open-ended

feedback indicated that digital learning should be encouraged as it enhanced traditional educational means and made studying easier, more flexible, and more accessible, with one stating that “digital education encourages the use of internet by students and the ability to make good use of it.” Several student participants noted drawbacks associated with digital learning and expressed concerns about limited access, with one stating that e-learning would “be effective if we could access high level of technology like the developed world” and another that students could be distracted by everything one can access through the internet:

“Digital education is very good but at the same time distractive as students gain access [to] other things when they are online. These distractions makes [sic] them not to concentrate on the learning platform.” - student in Southwest Cameroon

Despite a high perception that e-learning has a place in education, students did not express an equally strong feeling regarding digital access as a human right, with only 72.26% indicating that yes, digital access is a human right (see Figure 2.1A, below). Students attending a government school were less likely to feel that digital access is a human right (65.27% for government, as opposed to 74.27% for mission and 74.07% for private school students). Perception regarding digital access as a human right did not differ significantly based on gender.

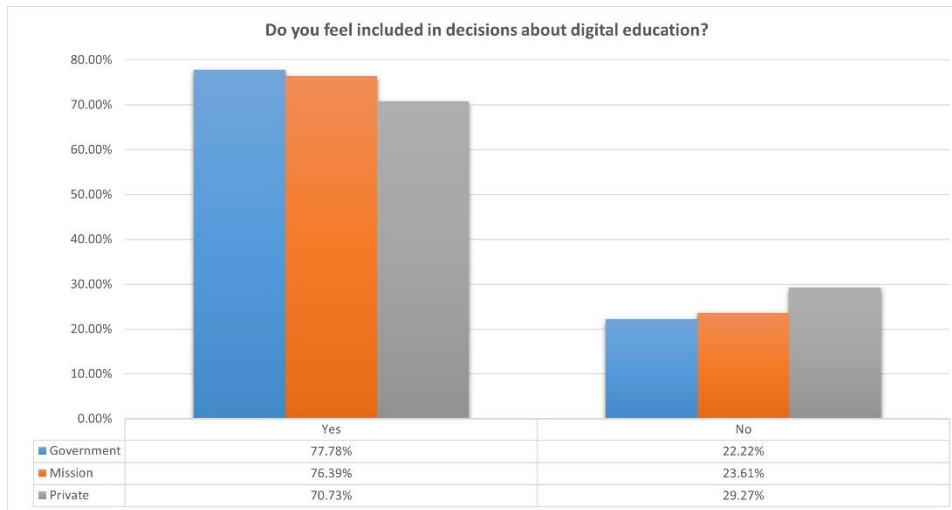
**Figure 2.1.A: Student Perceptions Regarding Digital Access as a Human Right**



## 2.2 Do students feel included in decision-making regarding the use of e-learning tools in education?

Students generally feel included in the decision-making process with respect to digital education, but their level of inclusion is linked to the type of school they attend and to their gender. Overall, 73.85% of students indicated that they felt included in decisions made about digital education. Private school students were less likely to feel included: 70.73% for private, as compared to 76.39% and 77.78% in mission and government school students, respectively (see Figure 2.2.A, below). Female students were less likely to indicate feeling included in decisions about digital education: 70.80% for female, as compared to 79.64% of male students.

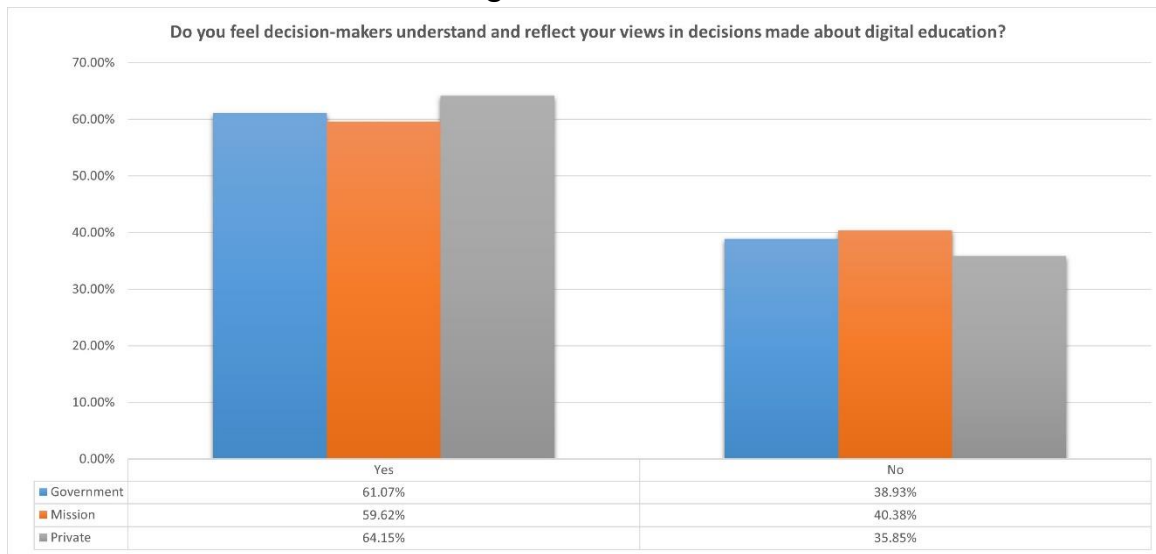
**Figure 2.2.A: Student Perceptions Regarding Their Inclusion in Decisions about Digital Education**



Students indicated stronger feelings about inclusion in decisions made about digital education as opposed to feeling like decision-makers understand and reflect their views in decisions made about digital education. While 73.85% of students feel included in the decision-making process, only 62.17% of students feel that their views are reflected in the decisions made (see Figure 2.2.B, below). Private school students were slightly more likely to feel that their views were reflected, but the percentage difference is minimal. There is not a significant difference between male and female students (63.20% for male and 62.47% for female).



**Figure 2.2.B: Student Perceptions on if Decision-Makers Understand and Reflect Their Views in Decisions Made about Digital Education**



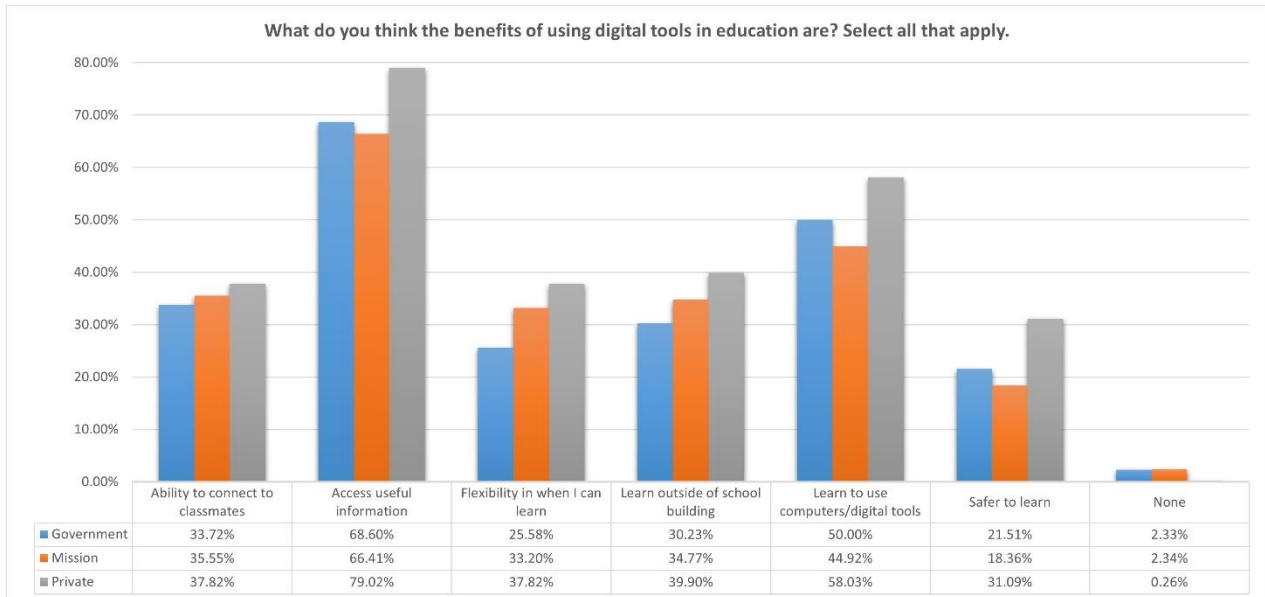
### **2.3 What do students perceive as the benefits or challenges associated with digital access and in utilizing e-learning tools?**

Student survey participants were asked to select all benefits they believed were associated with utilizing digital tools in education from the following list: ability to connect to classmates, access useful information, flexibility when they can learn, learn outside the school building, learn to use computers/digital tools, safer to learn, or none. Most students, 72.85%, indicated that the ability to access useful information was a benefit to utilizing digital tools in education. The ability to learn how to use computers and digital tools was the second most likely benefit to be identified, with 52.21% pointing to this as a positive.

#### **2.3.1 Is there a difference in perceptions of benefits/barriers to digital access based on demographic characteristics (type of school or gender)?**

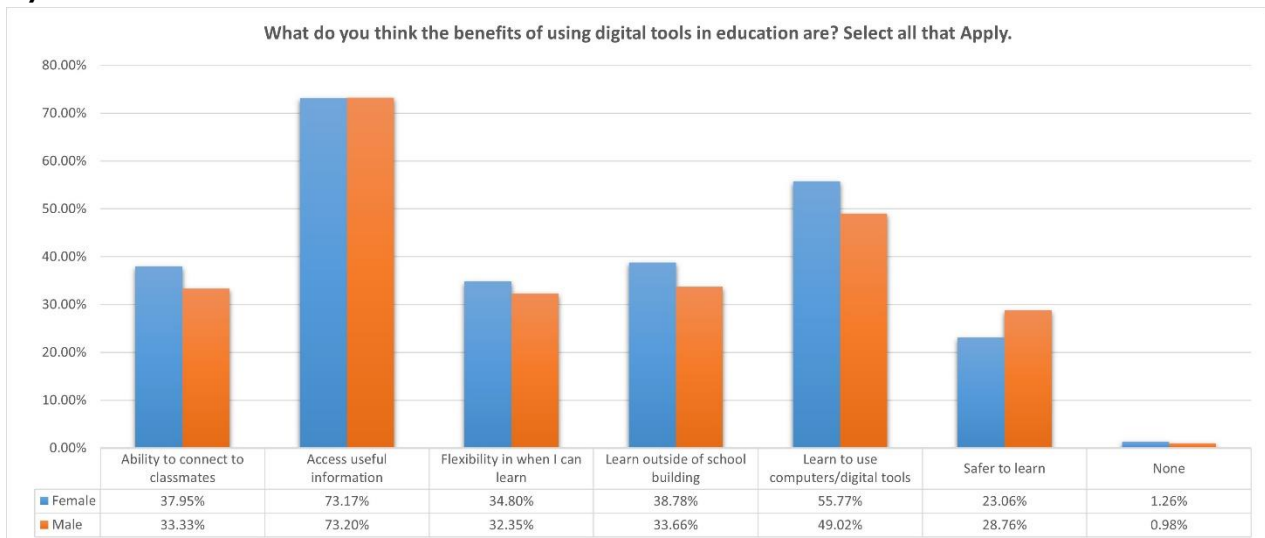
Private school students were more likely than government or mission school students to indicate any of the available options as a benefit to digital education (see Figure 2.3.1.A, below). Private school students more frequently selected that accessing useful information (79.02% for private, as compared to 68.60% for government and 66.41% for mission) and safer to learn (58.03% for private, as compared to 50.00% for government and 44.92% for mission) as benefits for digital tools in education. Government students were the least likely to feel that flexibility in when they can learn was a benefit (25.58% for government, as compared to 33.20% for mission and 37.82% for private).

**Figure 2.3.1.A: Student Perceptions Regarding Benefits of Using Digital Tools in Education, by Type of School**



There were few differences with student perceptions regarding the benefits of digital tools in education, based on gender (see Figure 2.3.1.B, below). Female students were typically more likely to see any one of the options provided as a benefit, with the exception that male students were more likely to choose safer to learn as an option: 28.76% for male, as compared to 23.06% for female students. The greatest difference between female and male perceptions of digital tool benefits was with the ability to learn to use computers/digital tools: 55.77% for female, 49.02% for male students.

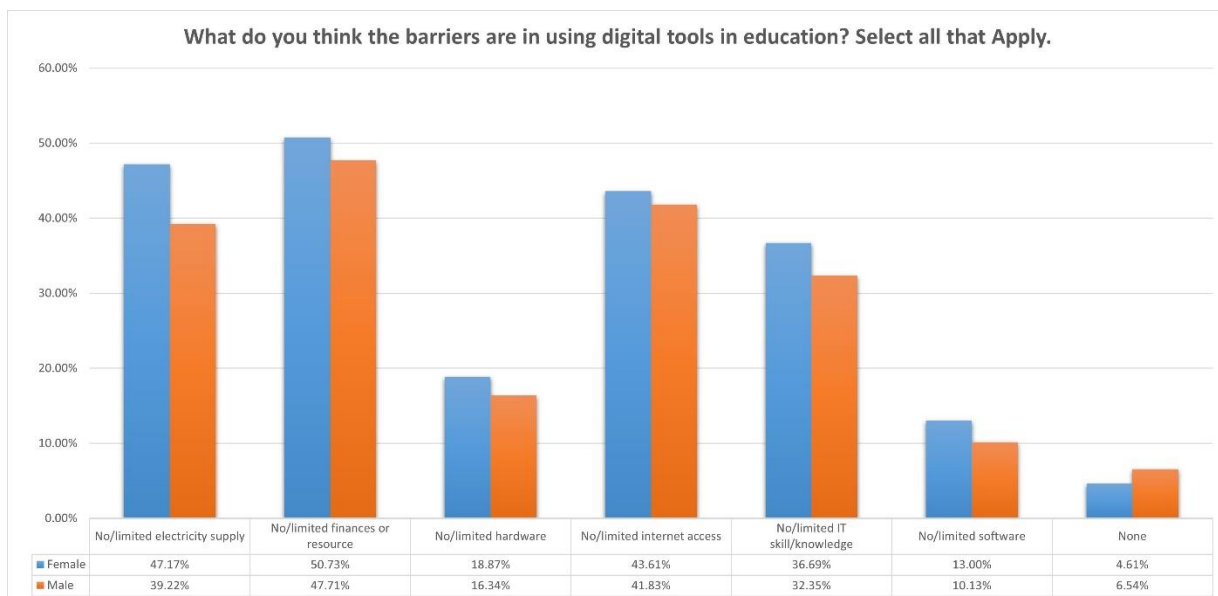
**Figure 2.3.1.B: Student Perceptions Regarding Benefits of Using Digital Tools in Education, by Gender**



As mentioned above, infrastructural challenges like limited electricity and unstable internet connectivity inhibit the use of digital tools in education (see Figure 1.2.A, above). While students see infrastructural challenges as limiting, they were more likely to indicate that a lack of or limited finances or resources as a barrier to utilizing digital tools in education (49.88%, as compared to 43.98% who chose limited electricity and 42.38% for limited internet access). Private school students were significantly more likely select financial limitations as a key barrier: 59.07% for private, 44.14% for mission, and 37.79% for government students. Similarly, private school students were the most likely to point to limited IT skill and knowledge as inhibiting the use of digital tools in education: 41.97% for private, 27.73% for mission, and 25.58% for government students.

For every option listed as a potential barrier, female students were more likely to choose it as inhibiting the use of digital tools in education than male students (See Figure 2.3.1.C, below). Though infrequent, male students were slightly more likely to indicate that there were no barriers to using digital tools in education than female (6.54% and 4.61%, respectively). The greatest disparity between male and female students in indicating barriers was found with limited or lack of electricity supply, where 47.17% of female and 39.22% of male students chose this option as a barrier.

**Figure 2.3.1.C: Student Perceptions Regarding Barriers to Using Digital Tools in Education, by Gender**



**2.3.2 What changes do students believe are necessary to overcome challenges and who needs to engage to bring these about?**

In the open-ended response section of the survey, students indicated changes were necessary to three major categories: infrastructure, access to digital devices, and

improvements to the way digital education is implemented in Cameroon. Student comments regarding infrastructure were general in nature, with some mentioning the “need for good internet,” that “network services should be improved,” and that there “needs improvement [sic] on network connection.”

Students were more specific when addressing challenges related to hardware and access to devices necessary for digital education. Several stated the government was responsible for providing laptops or other digital devices to ensure digital education is possible in Cameroon, with most of these students indicating that the government should provide free computers to students to enable e-learning (see Table 2.3.2.A, below). Beyond this provision, some students stated that computer labs should be improved or added to schools. Lastly, students indicated that they and teachers needed training or guidance to effectively utilize digital tools and the internet, with one commenting that “students and teachers should be taught how the digital system work before implementing it on them,” and another that “the use of digital tools by students need guidance.”

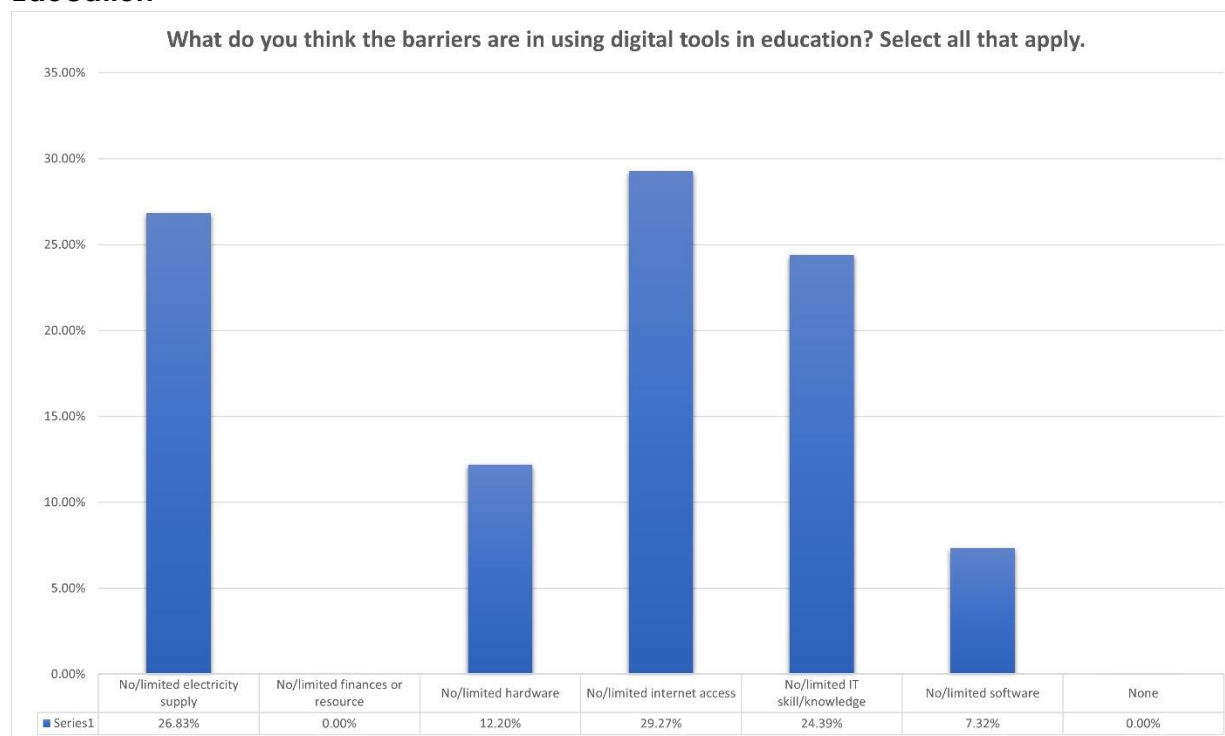
**Table 2.3.2.A: Student Open-Ended Responses Regarding the Government’s Responsibilities to Overcome Challenges to Digital Learning**

1	Schools should be able to encourage students, each student in a class should have access to digital education and a computer given by the government to each student.
2	The government have to look for a means for the students to partly have classes online in case of another disaster or pandemic
3	Government give free laptops
4	Government should create free digital education centres for students to increase standards of education
5	Governments and school authorities should enable and encourage e-learning in school or at home.
6	Government should organised online studies
7	government should provide free laptops
8	Government should provide laptop to all of the students
9	Government should provide portable computers for students to be able to create an online channel for each class to facilitate studies.
10	The government should buy computers or laptops for all the students if affordable.
11	The government should provide digital access (computers) to students so that they can have easy access to the internet.
12	Yes, the government should provide computers to all the students in Cameroon so that learning at home will be more effective.
13	Yes, the government should try to provide tools for students to access the internet for example computers and phones.

## 2.4 What are the perceptions of digital education for parents and guardians?

All (20) parents and guardians participating in the study selected that digital learning is important for their child’s education, with most pointing to their child(ren)’s ability to access useful information (45.00%) or to learn outside of the school building (25.00%) as mattering the most to them. Like student responses, parents/guardians were more likely to indicate infrastructural challenges (lack or limited electricity and internet) and limited IT skill and knowledge as barriers to using digital tools in education (26.83% indicated limitations with electricity, 29.27% with internet access, and 24.39% IT skill/knowledge) (see Figure 2.3.2.A, below).

**Figure 2.4.A: Parent or Guardian Perceptions Regarding Barriers to Using Digital Tools in Education**



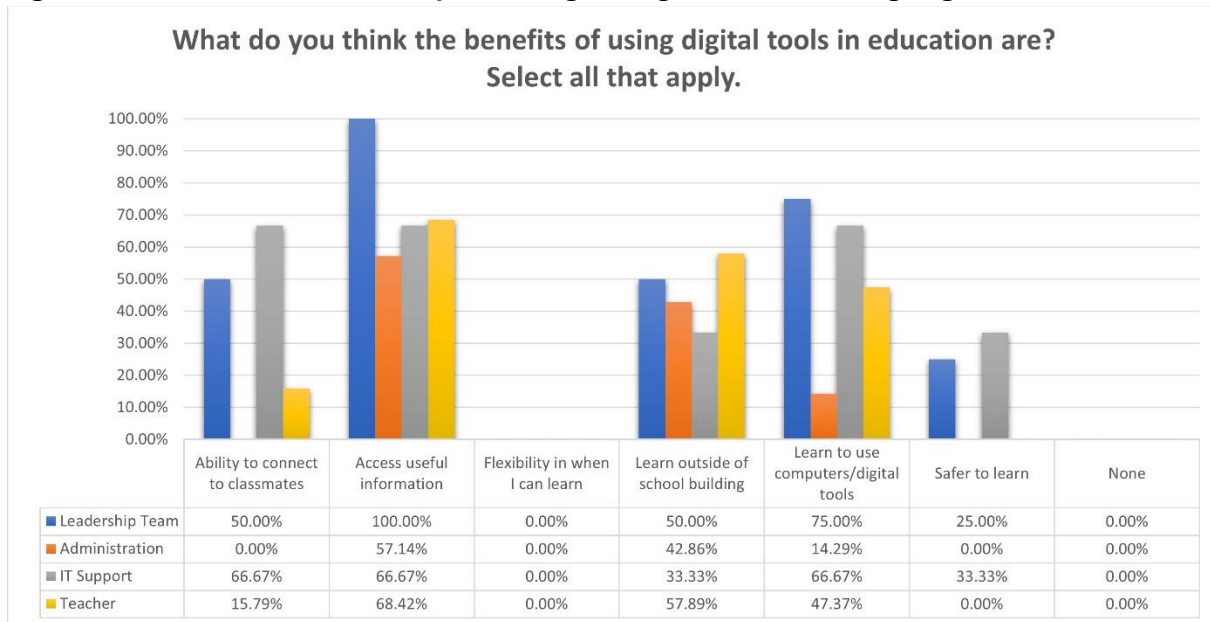
In their open-ended responses, parents and guardians suggested ways to overcome challenges associated with implementing digital tools in education like “low the cost of internet connection; improvement of electricity network and distribution; low the cost of digital materials” and “resources should be made available especially for learners such as cheaper and easier ways to acquire data for accessing online classes.”

## 2.5 What are the perceptions of digital education for school staff?

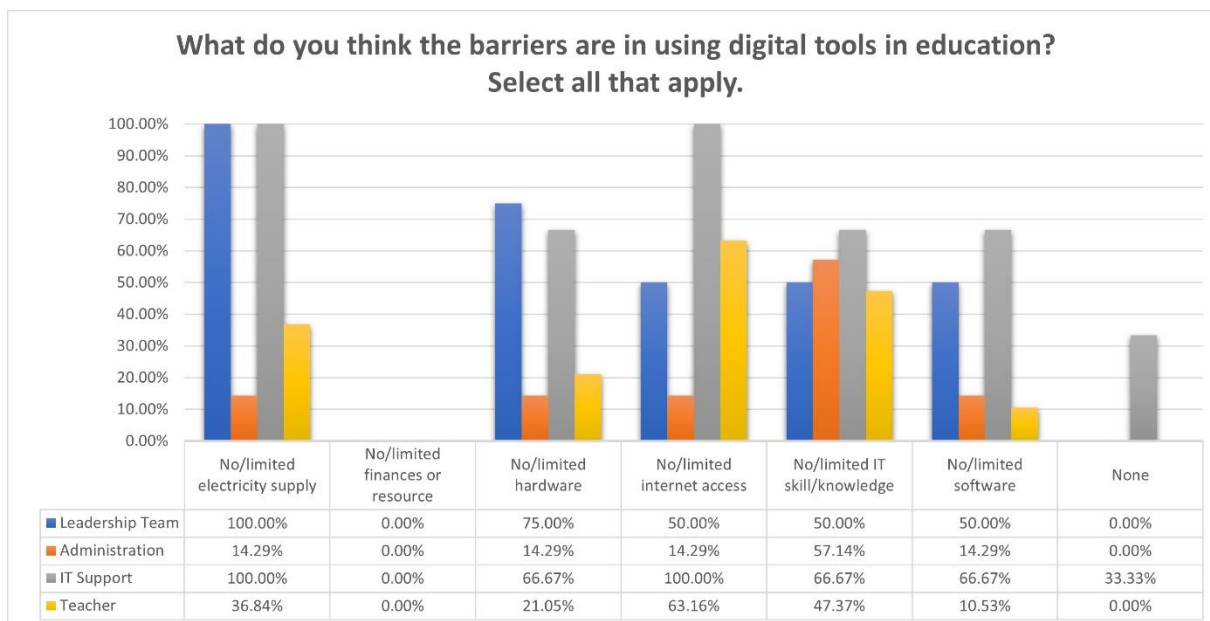
Like parents and guardians, of the 35 participating school staff, most indicated that student ability to access useful information (36.36%) was a benefit to using digital

tools in education (see Figure 2.5.A, below). School staff also pointed to student ability to learn outside of the school building (25.76%) and to learn to use computers/digital tools (24.24%) as benefits. For barriers, school staff indicated that a lack of or limited electricity (21.74%), of internet access (27.54%) and of IT skill/knowledge (24.64%) (see Figure 2.5.B, below).

**Figure 2.5.A: School Staff Perceptions Regarding Benefits of Using Digital Tools in Education**



**Figure 2.5.B: School Staff Perceptions Regarding Barriers to Using Digital Tools in Education**



## Discussion of Findings

### 3.1 The full realization of digital access and e-learning in Southwest Cameroon is limited by infrastructural challenges, lack of digital hardware, and limited IT skills

The survey uncovered that infrastructural challenges (limited or no electricity and limited or no internet connectivity), lack of digital hardware, and limited IT skills are perceived as key barriers to utilizing e-learning tools in education for students in Forms 2-5, lower sixth and upper sixth in Southwest Cameroon. These findings echo previous research including Farinkia (2018), which also found that inadequate supplies of hardware, unreliable internet connectivity and electricity, and lack of training/support for teachers limited ICT usage in secondary schools in the Fako Division. To address, Farinkia (2018) recommended that schools foster partnerships “within the community to support the implementation of ICT policies” and that parents/guardians “work in partnership with the school to provide computers and related accessories”.<sup>14</sup>

Bediang et al. (2013) made the argument that the university students at FMBS were part of the internet generation, revealing a gap in ICT familiarity between them and the lecturers. Those students “were born when computers and Internet became available throughout the world whereas the lecturers [were] from a generation who witnessed the emergence of computers and Internet teaching.” Likewise, students now attending primary, secondary, and high schools belong to the digital era, defined by the increasingly interconnected nature of the world, the centrality of the internet to sharing information, and the necessity of digital access to building a sustainable future in the modern, global economy. Bediang et al. (2013) suggested that high levels of ICT at home could be attributed to the “fact that the participants consider the FMBS campus as a place of knowledge acquisition; the understanding and assimilating steps of this knowledge takes place in a more intimate and familiar environment” such as the home or a comfortable cybercafé. In the years since, especially in the light of a global pandemic which forced classroom learning into remote alternatives, the home has become the place to both acquire and assemble knowledge.

Without stable ICT infrastructure, learning at home is inherently limited. For children to exercise their right to education, ICT infrastructure must be improved upon in the region: students require access to digital hardware, stable electricity, and reliable internet to effectively from home. Schools, parents/guardians, and community organizations have a responsibility to support a child’s right to education and to present the challenges that infrastructural limitations present for education in this digital era, but government involvement is critical to bring about long term change the overall stabilization of ICT infrastructure in the region.

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<sup>14</sup> Ibid., 8

### **3.2 Students feel involved in the decision-making process regarding digital education, but less so that their opinions are reflected in final decisions made**

Another interesting finding of the research is that students felt included in the decision-making process regarding digital education but less so that their views were reflected in the final decisions made regarding e-learning. Imoh (2013) determined that it is “likely that the views children express are both a regurgitation of values instilled by adults and their own views based on experiences of rearing and being reared” and that children often have a more nuanced understanding of their situation than adults involved in the situation<sup>15</sup>. The findings in the research presented here suggest that there is a gap in understanding what children value and need with digital education. As the UN and UNICEF have tied digital access their right to education, children’s rights advocates and policy makers have a responsibility to understand this nuance in the creation of policies meant to support and aid children.

As noted above, the gap in understanding is that 73.85% of students felt included in decisions about digital education, but this percentage dropped to 62.17% who felt like decisions made reflected their views on the matter. Looking more deeply into the data, student perception of inclusion is highest in the youngest students: 94.44% of students in Form 2 and 79.71% in Form 3 felt included in decision making about digital education, as opposed to 67.59% - 73.56% for all other Forms. Further, Form 2 students were also the least likely to have heard about digital education prior to the COVID-19 pandemic (46.67%, compared to the average of 67.75%, and 14.37 percentage points lower than the next lowest reporting Form), and were most likely to indicate a lack of access to the internet at home (13.46%, where all other Forms had less than 5% of students reporting lack of access) and at school (21.15%, compared to all other Forms that reported less than 18%). Lastly, Form 2 students were also the least likely to feel like their views were reflected in the final decisions made (52.63%, compared to 60.78% - 67.14% for all other Forms). These findings suggest that those students least familiar with ICT and digital education felt most included in the decisions for e-learning but least likely to feel like their views were reflected in the final decisions made.

There may be a deeper gap in understanding what those youngest students need with regards to digital education, but our research is limited by the connection between Form and type of school to draw further conclusions based on a child’s age. The differences expressed above may be linked to student understanding of what participation in decision making is and that, as students have a better understanding

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<sup>15</sup> Twum-Danso Imoh, A. (2013). Children’s perceptions of physical punishment in Ghana and the implications for children’s rights. *Childhood*, 20(4), 472–486. <https://doi.org/10.1177/0907568212471404>



of the concept, they are less likely to feel included in the process. The findings presented here may be inflated based on a lack of clarity concerning what participation means in the context of digital education. Further research could illuminate what student understanding of participation is: is it participating in class with ICT, informally soliciting feedback, formally seeking to inform policy, or other methods of seeking to feel heard in the decisions impacting their lives?

### **3.3 Digital education is dissimilar, depending on the type of school a student attends**

The survey was able to differentiate perceptions of digital education based on the type of school, categorizing students as attending government, mission, and private school students. The findings suggest that, in general, government school students were most likely to have access to a desktop computer through their school but were also more likely to point to limitations in hardware as being a barrier to utilizing digital tools in education. Conversely, private school students were most likely to have access to a desktop computer at home, twice as likely as government students to point to financial limitations and IT skill limitations as being barriers to digital education. Private school students were also most likely to point to safety in learning and learning how to use digital tools as key benefits to e-learning. Lastly, mission students were the least likely to have internet access at school and were more likely to use a variety of digital hardware and to make use of computer training programs at home. Despite these findings, our study did have a close connection between Form and the type of school a student respondent attends. Further research is necessary to determine the full scope of how digital access differs based on the type of school, absent of this connection.

### **3.4 Female students face greater barriers to digital education and accessing e-learning tools than male students**

Female students were more likely than their male counterparts to have been unaware of e-learning prior to the COVID-19 pandemic and reported higher levels of exclusion from digital tools and decisions made about e-learning in education. Female students were also more likely to point to learning how to use computers and digital tools as being a key benefit to e-learning tools in education than their male counterparts. This study's findings align with those from Kringe et al. (2020) and suggest that female participation in ICT and STI (Science, Technology, and Innovation) is a complex social issue, that begins in early education. Kringe et al. (2020) found that women are underrepresented in STI professions and identified several factors that contributed to this decreased involvement including "parental pressure, gender role socialisation and stereotypes, interest patterns, perception motivation, societal beliefs and practices, socio-cultural practices, socio-economic conditions, school-environment

conditions and institutional policy practices.”<sup>16</sup> The authors recommended that STI programs be supported more at earlier levels of education (the study primarily focuses on STI enrollment in higher education), increase the number of female role models in STI fields through training and a governmental increase in “the quota of women in STI related fields during University recruitment” to reduce the gendered perception that technologically focused fields as male professions (Kringe et al. 2020). The authors further recommended that the government of Cameroon improves internet connectivity and power supply to improve the overall landscape of STI in the region.

Exclusion from ICT begins at an early age for female students in Southwest Cameroon, further inhibiting their progress with digital education in a region with unreliable internet connectivity and inequitable digital access. The research presented here suggests that there is an interest in young, female students to improve their digital literacy and engage more with ICT. Supporting and encouraging female student participation in ICT can help to bridge the technological gap realized as they mature and enter higher education programs.

## Recommendations

Even with increased hardware and teacher ICT training, without critical upgrades to infrastructure, digital access and implementation of e-learning tools in schools will continue to be limited in Southwest Cameroon. Nonprofit organizations and other community groups and associations can promote digital access as a human right and the use of e-learning tools in education by providing help hardware and IT training to school staff (teachers, especially), parents and guardians (to assist with remote learning), and to students (either in collaboration with schools or through after school programming). Government intervention, primarily with addressing infrastructural challenges and secondarily with ensuring access to digital hardware, is a necessity in improving digital education in Southwest Cameroon.

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<sup>16</sup> Kringe, T. R., Wiysahnyuy, L. F., Awah, T. M., & Nkuo-Akenji, T. (2020). Current statistics in Science, Technology and Innovation in higher education in Cameroon and the establishment of gender participation. *African Journal of Rural Development*, 5(3), 105–142.

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