Tech savvy: Skills for the digital economy
Report on experimental qualitative research
August 2019
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1. Introduction

1.1. Objective

The main objective of this primary research was to measure the level of youth digital skills in Kenya and, through qualitative interviews, obtain context surrounding the quality and utility of these digital skills for accessing economic opportunities.

1.2. Connection to larger research project

In the context of the larger Skills for the Digital Economy project, the use of qualitative research methods provided an important avenue to directly engage with young people and professionals to understand their skills and perceptions of work in the digital economy.

Data on the presence of digital skills in Africa is limited. In Kenya and other sub-Saharan African countries, the informal sector plays a key role in the labour force. This makes it challenging to accurately index important skills by analysing official labour statistics. Furthermore, the wide variety of ways to learn digital skills, combined with the variable quality of instruction and resources presented in these learning environments, means that measuring digital skills by assessing credentials is cumbersome and potentially futile.

By testing the digital skills of young people and combining these results with in-depth interviews, it was possible to get context-driven and detailed data on what skills young people actually have, the way that they attained these skills and how they apply their skills to create value in an increasingly digital economy. Furthermore, interviewing business owners and human resource managers provided invaluable context from the demand side of the labour-market to understand what skills are needed and where gaps reside.

1.3. Summary of this Report

Section 2 of this report outlines the research methodology used in the study. It describes the experimental design for the digital skills test, along with the normative profile which was used as a comparative baseline for participant performance. It also outlines the rationale and research design for the in-depth individual interview portion of the study.

Sections 3 to 5 discuss the findings from this research study. Section 3 outlines the main factors that influence the acquisition of digital skills. Section 4 explores and contextualises the findings of the digital skills test to understand the level of skills shown by participants. Section 5 discusses findings from interviews on how individuals apply their skills to access economic opportunities, along with the skills that are in demand from employers.

The qualitative research was conducted in March and April 2019 in Nairobi, Kenya. Participants were recruited by Unique Insights, and the study facilitators were Iske van den Berg of Corporate Research Consultancy and Melvin Mzembe from Unique Insights. The findings of this study were originally presented at Centri’s Expert Roundtable on Skills for the Digital Economy, which took place in Nairobi in May 2019.2

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2 For more information, go to: https://cenfri.org/news-and-events/expert-roundtable-discussion-on-youth-digital-skills/
2. Methodology

2.1. Selection of a digital skills assessment framework

In order to test the level of digital skills present in a sample of Kenyan youth, the researchers had to utilise a framework which would outline relevant digital skills and operational indicators for these skills. To develop this framework, the researchers used the European Commission’s *DigComp 2.0: Digital Competence Framework for Citizens*.

The DigComp 2.0 Framework outlines five competence areas of digital skills: information and data literacy, communication and collaboration, digital content creation, safety and problem solving. For each competence area, the DigComp 2.0 lists several competences that are the main tasks in a given competence area. The framework is listed in Table 1.

<table>
<thead>
<tr>
<th>Competence Area</th>
<th>Competences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information and data literacy</td>
<td>• Browsing, searching and filtering data, information and digital content</td>
</tr>
<tr>
<td></td>
<td>• Evaluating data, information and digital content</td>
</tr>
<tr>
<td></td>
<td>• Managing data, information and digital content</td>
</tr>
<tr>
<td>Communication and collaboration</td>
<td>• Interacting through digital technologies</td>
</tr>
<tr>
<td></td>
<td>• Sharing through digital technologies</td>
</tr>
<tr>
<td></td>
<td>• Engaging in citizenship through digital technologies</td>
</tr>
<tr>
<td></td>
<td>• Collaborating through digital technologies</td>
</tr>
<tr>
<td></td>
<td>• Netiquette</td>
</tr>
<tr>
<td></td>
<td>• Managing digital identity</td>
</tr>
<tr>
<td>Digital content creation</td>
<td>• Developing digital content</td>
</tr>
<tr>
<td></td>
<td>• Integrating and re-elaborating digital content</td>
</tr>
<tr>
<td></td>
<td>• Copyright and licences</td>
</tr>
<tr>
<td></td>
<td>• Programming</td>
</tr>
<tr>
<td>Safety</td>
<td>• Protecting devices</td>
</tr>
<tr>
<td></td>
<td>• Protecting personal data and privacy</td>
</tr>
<tr>
<td></td>
<td>• Protecting health and well-being</td>
</tr>
<tr>
<td></td>
<td>• Protecting the environment</td>
</tr>
<tr>
<td>Problem solving</td>
<td>• Solving technical problems</td>
</tr>
<tr>
<td></td>
<td>• Identifying needs and technological responses</td>
</tr>
<tr>
<td></td>
<td>• Creatively using digital technologies</td>
</tr>
<tr>
<td></td>
<td>• Identifying digital competence gaps</td>
</tr>
</tbody>
</table>

Table 1: EU DigComp 2.0 framework competencies

These criteria served as the basis for the development of an indicator-based experimental design that was used to test an individual’s level of digital skills.

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*http://publications.jrc.ec.europa.eu/repository/bitstream/JRC101254/jrc101254_digcomp%202.0%20the%20digital%20competence%20framework%20for%20citizens%20update%20phase%201.pdf* A full breakdown of the framework is listed in the appendix
2.2. **Focus Group Research**

2.2.1. **Research Design**

2.2.1.1. Purpose for Research

The importance of pairing an experimental research design with the qualitative interviews was based on the assumption that individuals are not able to accurately self-report their own level of digital skills. This has been shown in research conducted in Austria and Switzerland, where the majority of respondents over-rated their skills when compared to their real abilities shown in a practical test. Similar studies of young people in India and Singapore also showed a lower, but still pronounced, incidence of young people over-rating their skills.

Researchers chose a task-based experiment in order to observe and record the digital skills of youth and professionals in a controlled and real-time environment. This task-based design enabled researchers to test the various competence areas outlined in an adapted DigComp 2.0 framework by presenting participants with challenges dependent on proficiency in those competence areas.

2.2.1.2. Methodology

i. **Normative Profile**

A normative profile was developed to set a minimum standard of skills that an individual would need in order to access entry-level economic opportunities in the digital economy. Because a literature review indicated that limited research in this regard has been conducted specifically for Africa, the DigComp 2.0 Framework was used as a baseline.

Keeping the competence areas of the DigComp 2.0, the normative profile outlined a number of indicators that acted as operational and observable activities which would show proficiency in a given competence area. These activities are laid out in Table 2.

<table>
<thead>
<tr>
<th>Competence Area</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data handling</td>
<td>1. Finding information about anything and everything: News, field of study, goods, products and/or services etc.</td>
</tr>
<tr>
<td></td>
<td>2. Finding information from public authority websites</td>
</tr>
<tr>
<td></td>
<td>3. Copying or moving of files or folders</td>
</tr>
<tr>
<td></td>
<td>4. Ability to take and store screenshots</td>
</tr>
<tr>
<td></td>
<td>5. Location sharing and ability to get directions</td>
</tr>
<tr>
<td></td>
<td>6. Ability to store information on the cloud</td>
</tr>
<tr>
<td>Digital interaction</td>
<td>7. Sending or receiving emails (e.g. using Outlook or Gmail)</td>
</tr>
<tr>
<td></td>
<td>8. Communicate using voice over internet protocol (Skype, WhatsApp etc.)</td>
</tr>
</tbody>
</table>

---

5 Ibid, p. 9
<table>
<thead>
<tr>
<th>Content creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Using copy and paste tools to duplicate or move information within a document</td>
</tr>
<tr>
<td>2. Using basic arithmetic formulae to add, subtract, multiply or divide figures in a spreadsheet (e.g. Excel or Google Sheets)</td>
</tr>
<tr>
<td>3. Creating electronic presentations with presentation software (e.g. PowerPoint or Google Slides)</td>
</tr>
<tr>
<td>4. Use images and sound (photos, sound clips or videos from the web or self-generated) in content creation</td>
</tr>
<tr>
<td>5. Ability to use a word processing platform (e.g. Word or Google Docs)</td>
</tr>
<tr>
<td>6. Ability to share ideas online (blogs or social media)</td>
</tr>
<tr>
<td>7. Connecting and installing new devices</td>
</tr>
<tr>
<td>8. Connect a device to a printer or Wi-Fi</td>
</tr>
<tr>
<td>9. Fix an app or program that does not respond</td>
</tr>
<tr>
<td>10. Make payment using a computer or a phone</td>
</tr>
<tr>
<td>11. Advertising goods or services using a computer or a phone</td>
</tr>
<tr>
<td>12. Ability to translate text to other languages using technology</td>
</tr>
<tr>
<td>13. Safely transact on e-commerce sites</td>
</tr>
<tr>
<td>14. Receive money without disclosing sensitive information</td>
</tr>
<tr>
<td>15. Practicing cloud account security measures (new or existing)</td>
</tr>
<tr>
<td>16. Taking potential virus countermeasures</td>
</tr>
<tr>
<td>17. Create passwords to protect files</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2: EU DigComp framework competency indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>The research team adjusted the DigComp 2.0 framework to suit the target market of Kenya. The most important adjustment made by the researchers was the increased emphasis that was placed on the ability to use smartphones since the majority of people in Kenya use mobile phones as their primary digital device and many do not have access to computers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ii. Sampling Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initially, the sampling of participants was focused on Kenyan youth aged between 18 and 34. There were no controls in the sampling methodology for occupation or socioeconomic status. However, after the research was conducted, the youth were grouped into three categories for the purpose of comparative analysis: students, employed and unemployed.</td>
</tr>
</tbody>
</table>

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In later stages, it was decided that some educators would also be tested. It was hypothesised by the researchers that an assessment of educators’ digital skills may provide some insights that could help to contextualise the level of digital skills in the youth population.

Finally, a final group consisting of Packages School educators and students was added to the research. Earlier research had shown that the “Packages Schools” were popular resources for young people looking to learn digital skills in Kenya. As such, a group of educators and students from one of these schools was added to the research to assess the level of digital skills in these groups.

In total, 13 focus groups made up of 63 people participated over the course of the research. During the research, a number of changes were made to the experiment structure to address certain challenges that arose. These changes are discussed in the research design section. Of the 63 participants, 29 were part of the earlier development phase, while the other 34 were part of the final phase of research. A full breakdown of participants, sorted by occupational and demographic characteristics, can be found in Table 3.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Breakdown of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development phase</td>
<td>Occupational breakdown:</td>
</tr>
<tr>
<td></td>
<td>• Students: 11</td>
</tr>
<tr>
<td></td>
<td>• Educators: 8</td>
</tr>
<tr>
<td></td>
<td>• Employed young adults: 8</td>
</tr>
<tr>
<td></td>
<td>• Unemployed young adults: 2</td>
</tr>
<tr>
<td></td>
<td>Demographic breakdown:</td>
</tr>
<tr>
<td></td>
<td>• Male – Higher socioeconomic bracket: 5</td>
</tr>
<tr>
<td></td>
<td>• Female – Higher socioeconomic bracket: 9</td>
</tr>
<tr>
<td></td>
<td>• Male – Lower socioeconomic bracket: 10</td>
</tr>
<tr>
<td></td>
<td>• Female – Lower socioeconomic bracket: 5</td>
</tr>
<tr>
<td></td>
<td><strong>Total: 29 respondents</strong></td>
</tr>
<tr>
<td>Final phase</td>
<td>Occupational breakdown:</td>
</tr>
<tr>
<td></td>
<td>• Students: 9</td>
</tr>
<tr>
<td></td>
<td>• Packages School students: 5</td>
</tr>
<tr>
<td></td>
<td>• Educators: 14</td>
</tr>
<tr>
<td></td>
<td>• Employed young adults: 6</td>
</tr>
<tr>
<td></td>
<td>Demographic breakdown:</td>
</tr>
<tr>
<td></td>
<td>• Male – Higher socioeconomic bracket: 18</td>
</tr>
<tr>
<td></td>
<td>• Female – Higher socioeconomic bracket: 2</td>
</tr>
<tr>
<td></td>
<td>• Male – Lower socioeconomic bracket: 3</td>
</tr>
<tr>
<td></td>
<td>• Female – Lower socioeconomic bracket: 11</td>
</tr>
<tr>
<td></td>
<td><strong>Total: 34 respondents</strong></td>
</tr>
</tbody>
</table>

Table 3: Experimental group composition

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8 Packages schools are popular courses designed to teach young people how to use computers and computer programs. A longer description of these programs can be found in Section 3.
iii. Research design for digital skills test

Respondents were recruited based on the condition that they owned or had regular access to a smartphone. One consequence of this decision was that it was unlikely that young people from the lowest socio-economic bracket would be captured in this study. This was considered a necessary trade-off as researchers wanted to recruit participants who would have some familiarity with the technology used in the study. Participants were recruited and underwent initial screening interviews via voice over internet protocol (VoIP) calls. They were asked basic questions about their digital usage, level of education and perceptions of their own skills. They were also tasked with sharing their location via digital platforms so the researchers could confirm the location.

Participants were provided with laptops and more advanced smartphones at the test site to give each individual an equal technological toolset for the test. Most participants used these phones instead of their own. Laptops were necessary, as some tasks depended on the use of laptops rather than smartphones. Respondents often used the laptops in combination with their phones.

The experiment was conducted in a group setting, but tasks were to be completed on an individual basis. After an introductory warm-up discussion, each group was given the tasks to be performed, but each person was expected to complete the challenge on their own. This research methodology was chosen in order to maximise the number of people who could be tested; the total length of the test, discussion and follow-up questionnaire was close to five hours per session. The group experiments were conducted in a private home in Kilimanthrouhi, in a relaxed, non-intimidating atmosphere.

The list of tasks to be completed was given a time limit. The tasks chosen were designed to present participants with a range of challenges that would test their proficiency across all five of the DigComp 2.0 competence areas. The main activities were as follows:

1. Participants had to use a cell phone to download an online food delivery app and order a pizza to the experiment location.

2. Participants had to research and plan a daytrip in Nairobi for German tourists. They were tasked with creating documentation for this trip and sending it to the research facilitators. This included:
   - Writing a letter to invite the tourists using a word processor; creating a presentation that explains the activities; calculating costs of the activities using a spreadsheet or table
   - Using their digital skills to add more complex information, such as the price of the activities in Euros, pictures, links to websites, directions, weather forecasts, and translated text (English to German)
   - Aggregating the files in a .zip folder and emailing it to a specified email

3. If time remained, participants had to conduct simple computer safety tasks such as scanning for viruses and encrypting files.

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9 Phones provided were Samsung Galaxy S4 and Samsung Galaxy S6 models.

10 Laptops used in test were HP/Dell i5 Notebooks (1.80GHz, 4GB RAM, 500 GB HDD).
4. Finally, participants performed a numeracy test in order to assess the extent to which numeracy skills were an important foundational skill for the digital skills assessed in the experiment.11

Participants were given 40 minutes to order the pizza, and a total of 90 minutes to complete activities 2 and 3 over the course of two sessions divided by a break. The numeracy test was conducted after the digital skills assessments and had no time limit. A full breakdown of the structure of the experiment is contained within the appendix.

iv. Assessment criteria and scoring sheet for digital skills test

Performance in the experiment was based on a weighted scoring sheet. After the experiment was finished, each participant was asked a series of questions to determine the extent to which they completed the necessary tasks, along with the complexity and proficiency with which they completed these tasks. The responses were tracked electronically with the assistance of researchers. Responses were also checked for accuracy by the researchers in order to ensure that participants accurately reported their completion of the activities. This was done by evaluating the content created by the participants after the questionnaire was completed. Each evaluation question was mapped onto one of the five competence areas of the DigComp 2.0 Framework and was weighted on a scale of 1 to 5. A higher number represented a more complex task. For example, using the internet to find information on daytrip activities in Kenya would reward the participant with 2 points, whereas using formulas on Microsoft Excel to calculate the cost of the trip would reward the participant with 5 points. The total number of points in each category as a percentage of the total can be seen in Table 4.

<table>
<thead>
<tr>
<th>Adjusted competence area</th>
<th>% of total points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling information</td>
<td>26%</td>
</tr>
<tr>
<td>Digital interaction</td>
<td>12%</td>
</tr>
<tr>
<td>Content creation</td>
<td>18%</td>
</tr>
<tr>
<td>Problem solving</td>
<td>20%</td>
</tr>
<tr>
<td>Safety</td>
<td>24%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Table 4: Distribution of points across the five EU DigComp areas*

For each participant, the overall points achieved from completing evaluation tasks was divided by the total available points for completing all activities, providing a final score shown as a weighted percentage. This final weighted score was used as a measure for the level of digital skills as recognised by the DigComp 2.0 framework. A score of 80% or higher was considered sufficient indication that a participant had the necessary skills to access economic opportunities in the digital economy.

The full evaluation sheet with all questions and categorisations is listed in the appendix.

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11 The numeracy test was the Level 2 numeracy test developed by the National Income Dynamics Study (NIDS) at the University of Cape Town. This test assessed one’s ability to compute mental math (adding, subtracting, multiplying, dividing), interpret mathematical data in charts and graphs, and solve geometric problems. The test can be found at: [http://www.nids.uct.ac.za/documents/wave-1-documents-and-questionnaires/numeracy-tests/91-english-numeracy-test](http://www.nids.uct.ac.za/documents/wave-1-documents-and-questionnaires/numeracy-tests/91-english-numeracy-test)
v. Research design for focus group interviews

Researchers also conducted in-depth interviews to gather contextual information on digital skills in the current economic environment. While the experiment helped to determine the level of digital skills present in the participant pool, it was not designed to provide information on other relevant skills, such as soft skills. Furthermore, the digital skills experiment did not provide information on how participants gained their skills or how they applied them in everyday life for productive purposes. By interviewing participants on how they learned their digital skills and the ways in which they apply them, qualitative interviews provided researchers with a contextual lens to analyse the test scores through. This information is important to determine which factors enabled strong digital skill development, common methods of applying them for productive use and the challenges faced by individuals trying to improve their skills. See Table 5 for the discussion guides for interviewing test groups.

<table>
<thead>
<tr>
<th>Interview group</th>
<th>Discussion topics</th>
</tr>
</thead>
</table>
| Youth           | • How they learned their digital skills  
                  • Ways they apply these digital skills and aspirational usage of skills  
                  • Perceptions about the gaps in their skills and how they may address them  
                  • Barriers that limit their ability to acquire new skills  
                  • Perceptions of career and business opportunities relevant to their skillsets  
                  • Perceptions on the value of digital skills training |
| Educators       | • How they learned their digital skills  
                  • Perceptions on youth digital skills and the importance of youth digital skills  
                  • Perceptions of their own digital skills and how they may fill potential skill gaps  
                  • Perceptions of the importance of digital skills for their careers  
                  • Their role in teaching digital skills and their perceptions on optimal strategies for teaching these skills |

Table 5: Discussion guide summary

2.2.1.3. Challenges faced and adjustments made during research design

Since no similar study had been conducted in Kenya, it was predicted that adjustments to the evaluation sheet may be required to take the Kenyan context into account. After the members of the research team were able to facilitate several experimental groups and observe the reactions of participants, some changes were made to the experimental design. Major changes were related to the following challenges.

1. Changing indicators and the inclusion of new indicators

Improvement of the effectiveness of evaluation criteria. There were several instances where certain tasks or evaluation criteria were adapted to more effectively measure the desired competency and reduce participant confusion. For example, early respondents were hesitant during the digital payment assessment, wherein they were given USD10 in their M-Pesa12 account and asked to buy something on Jumia13. These respondents did not see the value in the exercise and stated that they did not want to waste the money online.

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12 M-Pesa is a mobile-phone based money transfer.
13 Jumia is an e-commerce platform.
buying a random item. The exercise was adapted to give participants more rigid instructions; in future tests, they were given the money via M-Pesa and told to order pizza through a food ordering app. Another example involved removing the differentiation between Google software and Microsoft Office software when evaluating participant use of spreadsheets and word processors; respondents would answer in the affirmative to both criteria when asked if they had used a particular program. Assessing the use of a particular type of program, rather than which brand of program was used, was viewed as more important in later assessments.

Additional indicators added to enhance measurement. New indicators were added to the assessment in order to add complexity to the test and differentiate between levels of skill in certain situations. For example, an indicator was added to assess if participants used formulas on Excel to calculate costs, rather than calculating figures elsewhere and manually entering numerical values. This allowed the researchers to better understand the level of skill with which a participant could use Excel. Another example involved adding an indicator for connecting the test computer to a power source; many participants let their computer’s battery run out during the test and did not know how to get the computer back on. Researchers saw this as an important indicator for familiarity with computers and added it to the test.

2. Changing of category weights

Adjustment of weights according to observed difficulty of activity. Some indicators were given a higher weighting after re-evaluating the level of difficulty of the indicator relative to other tasks. Examples included constructing tables in word documents and PowerPoint presentations, as well as taking and incorporating screenshots into presentations. These tasks were only performed by a few of the higher scoring participants, and so their weighting in the challenge was changed to reflect the level of skill that was shown to be needed during the initial tests.

In total, 7 of the 13 groups were tested under these adapted conditions. These groups were a part of the final phase of the research. The six preceding groups were therefore classified as taking part in the test during the development phase.

These examples stress the importance of making experimental tasks relevant and context sensitive for participants to minimise errors and increase relevancy for the participants.

2.2.2. Individual in-depth interviews

2.2.2.1. Purpose for research and methodology

The researchers interviewed small business owners, digital start-up entrepreneurs and human resources managers in Kenya. The purpose of interviewing professionals was to assess the current demand for digital skills in the Kenyan economy and to evaluate the perceptions and attitudes of these professionals. Individuals were asked questions based on a discussion guide which highlighted key questions for assessing important contextual factors. A unique discussion guide (see Table 6) was drafted for each occupational group to take advantage of their personal experiences.
<table>
<thead>
<tr>
<th>Interview group</th>
<th>Discussion topics</th>
</tr>
</thead>
</table>
| HR managers              | • Which skills young people need to become employable, including digital skills  
• Perceptions on the current supply of digital skills in the market and future market needs  
• Perceptions on the quality of youth skills, including digital skills, and any gaps they observe  
• How employees acquire and develop their skills  
• Perceptions of policy and institutional choices that could improve the supply of needed skills |
| Small business owners    | • Information about their business and their industry  
• How digital skills factor into daily operations  
• Where they learned digital skills and how they upskill  
• What digital skills they wish they had, how they would acquire them, and how they think it would benefit them  
• The goals and aspirations they have for themselves and their business  
• Perceptions on the value of formal digital skills training and education |
| Digital start-up         | • How they acquired their digital skills  
• How digital skills impact their business  
• Perceptions of their own skills and any gaps they would like to address  
• Perceptions on the quality of youth digital skills and any important gaps that they observe  
• Suggestions on what skills young people should try to achieve, and how they should try to attain them  
• Views on the future of work and emerging market trends |
| entrepreneurs            |                                                                                                                                                    |

Table 6: Summary of the interview discussion guide
3. Findings: How digital skills are acquired

3.1. Avenues for acquiring digital skills

Qualitative interviews with young people, educators and professionals in Kenya showed that people learn their digital skills through many different avenues. Assessing how individuals learned their digital skills was an important aspect of the qualitative research, as it allowed researchers to understand and contextualise key variables in the learning process.

By understanding the differences in learning methods between people with high and low digital skills proficiency, the researchers sought to identify key drivers of learning that promoted successful digital skill development. This evidence would be beneficial for policy makers and private sector actors aiming to target improvements in digital skills training in a particular market context.

This section outlines the major avenues for acquiring digital skills that were reported by interviewees and evaluates the effectiveness of these methods based on the self-reported experiences of these individuals. It also looks at cross-cutting contextual factors that were key drivers of learning across different learning environments.

3.1.1. Formal school education

In Kenya, computer training courses are compulsory for secondary school learners in Form 1 and 2.\textsuperscript{14} In later years, learners can choose to take computer studies in Form 3 and 4 as one of their electives instead of courses such as agriculture, business studies or religious studies.\textsuperscript{15} Since 81% of young people in Kenya complete lower secondary school, it would appear likely that most young people have had exposure to some form of digital skills training due to this requirement.\textsuperscript{16}

However, the interviews revealed that the quality of digital skills training in Kenyan schools is highly variable. Respondents from the focus groups said that they were taught only theory in Forms 1 and 2. This was confirmed by the educators who were interviewed. In these interviews, educators described theory as a focus on computer hardware and its functions rather than practical usage of computers. Students are tested on computer knowledge through written exams. There is no curriculum requirement that students should be evaluated using computers.

\textsuperscript{14} Form 1 and Form 2 are the first two years of secondary school in Kenya. Children in Form 1 and 2 are typically 14 and 15 years old respectively.

\textsuperscript{15} These classes were provided as examples by the students in focus groups.

\textsuperscript{16} \url{https://data.worldbank.org/indicator/SE.SEC.CMPT.LO.ZS?locations=KE}
Many respondents’ first experience of an actual computer was when they were taken on a tour to view the computer in the headmaster’s office.

Many digital start-up entrepreneurs had a negative outlook on the skill development of Kenyan youth progressing through the formal education system. The digital-start-ups said that the youth in Kenya are taught in a parrot-like fashion; all that is expected of them is to repeat the theory, not to apply it. They do not have the drive to put in extra energy to succeed.

Our system of education is the problem... Focusing on memorising, taking an exam, you know; memorise... put everything you memorised on the paper; and I give you a grade as opposed to teaching skills...

– Female, 23, App development, Digital start-up

I would overhaul the system: after basic computer literacy, I would teach people how to conduct themselves online, and how to think of themselves as a brand, how to communicate effectively on a digital space so even if they are talking to an employer they present themselves in a good manner.

– Female, 26, Artist, Digital start-up

Variability in the quality of educators’ digital skills presented another obstacle which could negatively impact digital skills education in schools. The results of the digital skills experiment are discussed in Section 4. However, high variability in educator scores showed that there is a wide gap in the digital skill proficiency of educators in Kenya. Furthermore, many educators who performed poorly on application-based questions stated that the focus on theory in the curriculum made application-based learning less important for students and themselves. Research has shown that educator quality is a major determinant of student success17; the findings of this report would suggest that a similar trend may be present regarding digital skills instruction in schools.

Limited access to resources in schools also leads to poor outcomes regarding digital skills training. Respondents who went to public schools in rural areas without electricity had no opportunity to see how a computer works during their schooling. Furthermore, educators

17 https://www.researchgate.net/publication/311941746_Quality_and_Productivity_of_Teachers_in_Selected_Public_Schools_in_Kenya, p. 113-114
interviewed discussed the fact that private schools have traditionally had far greater access to ICT in quantities that were superior for digital skills training:

“\[ ... in public [schools] there is a difference because in public schools there are many students and the school doesn’t invest much in the computers [...], you just do basic. You just teach them like ‘this is a mouse’ [...], in public [schools] they don’t care because the teachers say that the parents do not know so much about it. \]

– Male, Educator

Despite these issues, tertiary education involving ICT and digital skills was a prominent learning factor for high scoring educators and digital start-up entrepreneurs. While not a sufficient condition for success, several educators who scored highly in the digital skills experiment, as well as many digital start-up entrepreneurs, had a university degree or similar tertiary qualification in ICT or a digital-related field. An educator scored highest on the digital skills test with an 89%. This individual had been introduced to computers as a part of his tertiary education.

However, education was not a guarantee of digital skills, as the following profile illustrates:

**Profile 1: Kevin**

One educator, Kevin, had a master’s degree in science. He had been teaching ICT for secondary school learners for more than 25 years. He scored only 61% in the challenge. He only used Word because he was not comfortable using PowerPoint or Excel. He could not even download an app to order a pizza or complete the final questionnaire on his own.

When reflecting on his performance on the digital skills test, he was satisfied:

“This was a good exercise. I wish I could give some of this to my students. I can see that my skills are good, I must just practice more.”

3.1.1. A note on private schools

Qualitative interviews also showed that private schools did not necessarily provide greater digital skills training than public schools. In some cases, learners from good private schools had the opportunity to personally work on computers in Forms 1 and 2. Other schools used computer-based learning from pre-primary onwards. However, researchers also visited a private school in an informal settlement in Nairobi that did not contain a single computer, despite charging KSh7000 per term for each of the 173 secondary learners. The headmaster reported that he went to a local cyber-café if he required a computer to complete any administrative tasks.

In some instances, private school educators were similarly dismissive about needing to improve their digital skills. Only some of the private school educators teaching Forms 3 and 4
said it was essential to remain top of their game, because the learners in their schools ask questions on complex issues on a regular basis.

3.1.2. Packages schools

Attending a “packages school” was reported as a common method for digital skills training by interviewees. Many of the respondents from the youth focus groups said that they attended a packages school after completing secondary school. Packages schools are a type of digital training provider that operates outside of formal educational institutions. “Packages” refer to specific software or tasks being taught. The most commonly taught packages are Microsoft Office programs, like Word, Excel and PowerPoint. Other computer related topics that were taught include using the internet, email and scanning and printing documents.

Packages schools are largely focused on training students who want to learn the necessary digital skills to attain employment. Many organisations specify in their job advertisements that applicants should have “basic computer skills”. A certificate from a packages school is in many instances considered sufficient proof of such skills.

Packages schools were also seen as convenient for students, as they are strategically run during breaks in the school year. Packages schools typically offer the courses as a three-month course, taking place between the end of the secondary school year and the beginning of the tertiary academic year. In most instances, classes run five days a week for two hours each day.

The structure and associated costs of packages schools vary considerably. The price to enrol in a packages school ranged from KSh3,000 to KSh10,000. Some respondents said that three learners were allocated to each computer, while in most instances it was two learners per computer. Very few respondents attended a packages school where they had a computer to themselves. Class sizes also ranged widely, from less than 10 people per class to around 40 per class. In most cases, only one instructor was present. This suggests that, like with formal education, the quality of education in packages schools varied widely depending on the quality of instruction and available resources.

Despite this variability, both students and educators saw packages schools as an important resource for learning digital skills. Many respondents said that it is part of the “culture” of Kenya for school leavers to attend a packages course after graduation. Furthermore, educators stated that the International Computer Driving Licence (ICDL), a popular online packages school, was a widely recognised qualification.

3.1.3. Self-teaching

Self-teaching of digital skills was defined as the individual pursuit and consumption of digital skills training resources (i.e. instructional videos, wikis, “tinkering”) without an instructor led curriculum. Because of the vast wealth of information present on the internet, self-teaching can become a major factor for upskilling in the digital age. Reflections on self-teaching featured prominently in interviews with digital start-ups and some small businesses.

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18 These figures were self-reported by focus group participants.
19 More information can be found at: http://icdlafrica.org/about-icdl
None of the digital start-up entrepreneurs interviewed believed that they (or others) had to undergo formal training to achieve digital skills. Much of their own learning was through self-teaching methods on the internet. Many were extremely confident in these methods, and some stated that they believed that it is possible to learn anything on YouTube:

“\nThe information on the internet is vast [...] It’s even better than the school syllabus.\n”

– Male, Digital start-up

Digital start-up entrepreneurs treated learning as an iterative and consistent process. Many of them expanded their business as new opportunities presented themselves. In order to be able to optimise new opportunities, they upskilled themselves in whatever was required:

“\nIt’s constant school. The moment you stop learning, you become insignificant.\n”

– Female, Digital start-up

“\nWhenever I face a challenge in that I do not understand something, I lock myself up and read books, internet, anything; until I understand it. Twice I have done serious self-schooling. Each time there is something on the system that needs adjustment and if I don’t know how to do it, I go underground and teach myself and practice until I find a solution.\n”

– Male, Digital start-up

Despite this confidence in self-teaching, many digital start-up entrepreneurs had some form of tertiary education. This may suggest that self-learning is easier for those who have underlying foundational skills on which to build their digital skills. Further research into the importance of university education for start-up success would be important for understanding if this correlation is a key factor in the larger Kenyan context.

The few educators who actively tried to improve their skills did it online. These educators reported that they used YouTube videos to learn new skills and would sometimes find online guides and tutorials on websites like W3Schools.

Some youth actively used self-teaching methods to improve their skills, however, this was dependent on access to computers and stable internet connections. Youth group participants who relied heavily on self-teaching typically showed strong soft-skill development as well, particularly in personal ambition and goal setting.

George is an inspiring example of the practice of self-teaching.
Profile 2: George

George started out his life as a child in Kibera, the biggest slum south of the Sahara. Today he is a graphic designer with an impressive list of clients. George has no tertiary qualifications; everything he knows is self-taught from the internet.

He saw a computer for the first time towards the end of high school and was immediately intrigued. Whenever there was money to spare, he went to the cybercafé to explore. He had a combination of curiosity and tenacity that drove him to learn everything about computers.

The first two years after school he helped his mother selling goods. He then got a job as a delivery man in a travel agency. This agency had computers; during lunchtime he would sneak in and explore the computers. After a while, his interest in computers became an open secret in the office and he could ask his colleagues for help and information.

His next important work experience was at a printer where the owner was a graphic designer. George was fascinated by the possibilities of designing on a computer. Whenever there was an opportunity to try his hand on computer, he used it. He also watched YouTube tutorials on graphic design and in 2015 he was ready to register his own graphic design business, called Garo Designs. When the power button on his laptop stopped working, he found a way to switch the computer on by lifting his keyboard using a sharp tool and making a connection to “jump-start” the computer. He found it embarrassing that his computer was so out of date – but the challenges did not stop him from doing his work. He wanted to buy an Apple, because most of the tutors on YouTube recommended the brand. However, even a refurbished Apple would cost KES80,000, which he did not have. Eventually he managed to buy an Apple MacBook in 2018.

George gives back to the community, most importantly as a tutor and mentor to other aspirant graphic designers. He has compiled a list of useful YouTube training videos that he shares with them. He is also available to help them with advice and practical assistance. George’s experience proves that a combination of curiosity and tenacity can pay off if it is combined with access to a computer and the internet; formal training would be a bonus, not a necessity.

3.1.3.1. Peer groups self-training

Some digital start-up entrepreneurs reported communicating with other similar-minded peers on online platforms in order to learn new skills. These platforms were considered important to broaden their horizons, learn about new focus areas and acquire life skills. One graphic design entrepreneur used Slack21 to talk to other professionals and share information on industry questions.

Furthermore, some of the small business owners interviewed relied mainly on family, friends and younger employees to assist them on how to use digital devices and tools to optimise their businesses. One restaurant owner learned from her children how to process payments for large supply shipments using M-Pesa. Another business owner, a designer, stated that while he had learned his graphic design skills mainly through self-teaching, absorbing new information from younger employees was a major asset for acquiring knowledge. Most relied on family and friends and playing around with the phone to obtain their skills.

3.1.4. On-the-job training

Many of the small business owners who embraced technology trained their staff to use specific equipment according to their job specifications. One business owner had four young

21 Slack is a mobile app where users can create groups for project collaboration and communication. [https://slack.com/intl/en-za/features](https://slack.com/intl/en-za/features)
employees in his auto-mechanic shop who were trained in the technical aspects of the business. This included processing client invoices through QuickBooks, a software tool for creating and recording invoices.

Some employed interviewees stated that they learned their digital skills from experience at their job. Normally, the skills that people learned were related directly to their role. For example, one waitress had experience with Excel, as she used this to prepare expenses sheets for the restaurant where she worked; however, her knowledge was relegated to simple features that were necessary for her daily work. Another individual learned how to use computers to play videos while working at a small make-shift cinema shop. Again, his use of computers was limited to the very basic tasks that he had to perform on a daily basis. Others learned their skills by taking advantage of workplace ICT, rather than specific instruction related to their role.

Some digital start-ups and HR managers reported that on-the-job training was often necessary because there were no applicants who had the right skills:

“The CV says they’re experts in computers, but it is only theory. Practical knowledge is not there. So, you have to train them. As long as the person has potential … that’s all that matters.”

– Male, Digital start-up

Barak, a dress designer, is an example of an entrepreneur who embraced technology, invested in equipment and trains his employees how to use these optimally.

Profile 3: Barak

Barak has been a dress designer since 2004, selling his garments at a market in Nairobi. He designs and stitches the garments himself and has two girls to help with the finishing touches. He learned the craft from his father. After working in a garment factory he managed to save enough money to buy his own sewing machines. Every machine he bought afterwards was from the profits he made.

Barak uses mostly African fabrics, sourcing them from Kenya, as well as Tanzania, Uganda, Senegal and Ghana. Depending on the origin of the fabric, there is a noticeable quality difference. Because he is afraid of travelling with a lot of money, he transfers his outstanding bills through Western Union or MoneyGram. M-Pesa is also useful for him because now people can be held accountable and he can trust them to pay off their dresses in instalments. The regular cash flow has improved his business.

When it comes to making his designs, he says the inspiration is just in him. He learned to utilise a computer as his tool to design, so he can be more efficient and adjust previous designs instead of starting from scratch every time. All his skills are self-taught, he never went to school for it; Barak didn’t even know computers existed until he saw one at the factory. He managed to buy his own five years after he started his business.

He only allows his employees to use the computers once he has trained them extensively.
4. Findings: skills assessment for experiment groups

4.1. Results and key findings

4.1.1. General findings

Overall, the average score across all experiment participants was 55%, meaning that participants on average exhibited slightly over half of the digital skills needed to be proficient according to the normative framework benchmark of 80%.

Content creation and problem solving were the competence areas where respondents ranked the highest. However, the problem-solving and content creation tasks were very basic. Examples of content creation tasks included use of word processors and PowerPoint to create documents. Examples of problem-solving tasks included connecting the laptop to Wi-Fi and successfully placing an order for the pizza using a phone app.

Safety and digital interaction were the lowest scoring competence areas. Examples of safety tasks included scanning a file for viruses and password protected files and examples of digital interaction tasks included successfully sending the documents over email and sending links via email.

Participants performed best at simple activities that centred on basic device knowledge and program functions: 94% of participants were able to use a word processor to write their invitation letter, 88% were able to save files to a USB, 82% used the internet to get information on their activity and 76% were able to connect their laptop to the Wi-Fi without assistance.
However, participants struggled with tasks that introduced more advanced technical knowledge or program features: 65% of participants used Excel or Google sheets to calculate trip costs but only 38% used formulas to do so, 56% were able to scan their laptop for viruses, 41% were able to construct a table to present information in their letter or presentation and only 6% could password protect a .zip file.

These findings suggest that the people tested have some basic consumer and productive skills, but that more advanced skills are still absent for most of the group, even though they have access to “productive” devices like smartphones. It is therefore highly likely that the people tested in this study have the skills to be active consumers of digital content, but that they lack many of the more developed skills to be productive and creative users of technology to generate economic opportunities.

Finally, many of the youth who performed the test showed a preference for smartphones, only switching to laptops when they were unable to perform tasks on their phone. For example, some participants used their phones to find information for their presentations. They would then connect their phone to the laptop in order to add pictures and other content to their computer, rather than finding the content using their computer. This showed that these individuals had a greater familiarity with using their smartphones relative to laptops for certain tasks. However, this reliance on their phones meant that they also added extra steps to the tasks, complicating the process. Furthermore, even though some youth were more comfortable using their phones, they were forced to use a laptop when confronted with more complicated tasks, such as designing a PowerPoint presentation. This challenge represents the idea that, while smartphones are an important digital tool, they could not always be relied on for the more complex portions of the test (e.g. constructing a PowerPoint or calculating costs on a spreadsheet).

4.1.2. Findings across occupation groups

Educators had the highest score across all occupation groups, while packages school students ranked the lowest. None of the groups averaged over 80%, meaning that no occupation group averaged a score high enough to show proficiency in entry level digital skills.

![Average test score by occupation group](image)
Across all occupation groups, safety was the lowest scoring category; however, students, employed youth and packages school students all scored significantly lower than educators on safety. Most safety tasks involved knowledge of specific functions on a computer, such as password protecting files or scanning the computer for viruses. Overall, the educators showed better knowledge on how to perform these tasks, suggesting a greater familiarity with computers than the youth who took the test.

Surprisingly, students and employed youth also performed much worse than educators on handling information, digital interaction and content creation tasks, despite their self-reported high usage of social media. This runs contrary to the idea that young people are “digital natives” who perform well with technology because they have been raised with it. While it is important to note that the youth in this study do not have congruent experiences and access to technology, and that these experiences are limited due to their socioeconomic background, they did all have their own smartphones. Furthermore, many HR managers believed that this phone ownership was an indicator that youth were much better at digital skills. The findings of the test show that youth do not necessarily have better digital skills than older generations because they grew up with a closer proximity to technology.

It was cause for concern that students, who theoretically should be able to apply their skills to solve problems, showed limited ability to do this. There were exceptions, like a brilliant third-year female law student who scored 73% or a first-year male journalism student who scored 83%.

Overall the students’ consumer digital skills were often very basic, as the following profile illustrates:

**Profile 4: Sam**

Sam, a second-year economics student from an informal settlement considered himself “very comfortable with all gadgets and electronic appliances” when questioned during the recruiting phase. His digital skills score of 32% after completing the Tech-Savvy Challenge shows a different picture. He was not able to comply with most of the tasks given. He only managed to produce a short letter in MS Word that had no photos, budget or other requirements included. Furthermore, he did not manage to save the file correctly on an USB Drive.

### 4.1.3. Findings across gender and socioeconomic categories

Men from the higher socioeconomic bracket had the highest score of all demographic groups. This demographic group also performed much better than the women from a similar socio-economic background.

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Women from the lower socioeconomic bracket had the lowest score. Men in this bracket had a worse score than their higher socioeconomic status peers, but still performed higher than women in a higher socioeconomic bracket on average. While socioeconomic status had a large impact on one’s digital skills, this impact was more pronounced for women. The results showing that men in lower socioeconomic brackets had better digital skills than women in higher socioeconomic brackets suggests that women are far more disadvantaged across the board than men when it comes to learning digital skills.

Women performed worst in safety, especially women from low a socioeconomic background. Similar to the distinction between youth and educators, a low safety score may indicate a limited knowledge in terms of the advanced features and operations that can be performed on a computer. This finding additionally points to the need for a more advanced study to investigate the gendered digital skills gap.

Furthermore, the gap between men and women of the same socio-economic bracket was the largest in the problem-solving category for both higher and lower brackets. While most respondents were able to perform simpler problem-solving tasks, such as connecting to Wi-Fi and plugging in the computer, only 56% were able to perform the hardest problem-solving task, which was using a food delivery app on their smartphone to order a pizza. This was surprising, as all participants had smartphones of their own. This would suggest that, while participants had some familiarity with using smartphones, their ability to solve problems and perform more complicated tasks may have been limited. The ability to complete this task had a large influence on participants’ problem-solving score and was a large differentiator between male and female participant scores. Digital skills assessments based around problem solving tasks may yield greater clarity in the types of complex, multi-step tasks that are most challenging for both men and women.

4.1.4. Numeracy test

Results from the numeracy test showed that digital skills and numeracy were not correlated. This finding contradicted the research team’s initial perception that mathematical proficiency is a necessary foundational skill required for basic digital skills. It is important to note that this test was focused on basic digital skills for entry-level economic opportunities
and not on advanced developer skills such as coding. Further research on the correlation between numeracy and these more advanced skills is still needed.

4.2. Skills assessment and contextual factors for each group

4.2.1. Educators

The majority of educators scored below the threshold of 80%. However, educators did on average show superior digital skills when compared to students. Furthermore, while the average educator score was 70%, there was a wide variance in the levels of skill between educators. While some score above 75%, many others scored below 65% or even 50%.

It is also worth noting that all educators who scored 80% or above were men from higher socioeconomic backgrounds. Male educators averaged higher than female educators in both the development and final phases of the experiment. Further research should be conducted to determine the cause of this skills gap between male and female educators. It should be noted that most female educators reported learning their digital skills through certificate or diploma programmes, while most male educators reported a university degree as a major credential.

Most male educators surveyed were secondary school educators, while the female educators taught primary school. A more representative sample will be able to determine the extent to which this gendered skills gap is present amongst educators in similar positions. Unequal access to training opportunities may lead to a skills gap for educators but further research will be needed to discover other factors contributing to this skills gap. The following profiles illustrate these distinctions.

Rosemary performed well below the average of educators even though she was a department head at a private primary school:

**Profile 5: Rosemary**

Rosemary teaches ICT to students aged 10 to 14. She earned her ICT certification through the International Computer Drivers Licence (ICDL), a popular online packages school in Kenya. Before the challenge she described herself as “very confident working with computers”. She also reported that her school sent her to several training courses in order to improve her digital skills. Despite this, she scored a 48% during the development phase of the test and scored below 40% in the problem solving and safety competence areas. Her presentation consisted of an introductory letter where she explained (inappropriate) ice-breaker games. She also created two Excel files; one for cost per person, then she took these figures and manually copied the individual figures to find the group cost. She was able to store her work on a flash drive. When her computer gave her a warning of low power (because she did not plug it in initially), she tried to fit the power cable connection to the earphone socket. When it did not fit properly, she held it in place with one hand and typed with the other. When the computer ran out of power, she called the moderator to assist, saying that there was all of a sudden something wrong with her computer.

After the challenge she remained satisfied with her abilities. She stated that she would like to practice more in order to improve her skills.
Mervyn, a teacher at a public school, achieved the highest score of all participants in the study:

**Profile 6: Mervyn**

Mervyn teaches ICT to secondary school learners. He did not grow up owning a device but was introduced to computers in college and now owns his own laptop. In the Tech-savy Challenge, Mervyn created a comprehensive presentation: he planned a day at a tea farm, wrote a structured letter, a detailed itinerary and created a substantial PowerPoint presentation including general facts about Kenya with pictures and links. He laid out a detailed budget and converted it to US Dollars. In his remaining time, he performed a virus scan on his computer. He was the winner of his group and his digital skill score came out at 89%.

Overall the educators showed limited initiative to improve their skills. After the educators had completed the challenge, the researchers asked them about how they viewed their skills. Even though most educators did not meet the criteria of the normative profile, most stated that they only needed to practice more in order to improve their skills. They did not think that they needed to learn new skills or abilities in order to improve. Many educators also stated that, even though they teach students digital skills, they seldom practice these skills outside of the class setting.

### 4.2.1. Packages school instructors and students

During qualitative interviews with various business owners, the researchers were introduced to one packages school instructor who had been trained and funded as part of the Pascha initiative in 2007. Two trainers and five students from the school (who have already done courses applicable to the challenge) were invited to be part of an experimental group. These students were differentiated in the analysis from the rest of the student group, as they were younger than the rest of the student group (16 to 17 years old) and came from an extremely low-income area of Nairobi which had affected their access to digital technology.

The instructors and current students of the packages school performed poorly on the digital skills assessment. After completing the experiment, the digital scores of the two instructors were 49% and 56%; the scores of the students were 10%, 11%, 12%, 16% and 5%. These scores were well below the averages for both students and educators. Regardless, the scores reinforce the idea that the effectiveness of packages schools for teaching digital skills is highly variable and, in part, dependent on the quality of instruction.

### 4.2.2. Students

As a group, an average score of 59% placed students well below the normative baseline of 80%. Of the five competence areas, they performed poorest in safety (36%) and digital interaction (44%), despite high self-reported usage of social media. Students performed best in content creation (81%) and problem solving (86%). OECD research has stressed that computer and internet safety should be an important aspect of digital skills training in formal education settings as parents often do not have the knowledge to properly educate their

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23 Pasha Centres are ICT hubs, established to address the ICT disparities between urban and rural populations in Kenya in 2007. These digital villages were the government’s effort to ensure digital inclusion to all citizens, especially those from marginalised communities. The government did this by taking online services to those living in marginalised areas in order to improve their quality of life.
children on safe internet usage. Further research on the extent to which computer safety is or is not taught in schools would be beneficial for understanding this low safety score.

A distinct finding of the research was that female students performed far worse in the challenge than male students. Only two students scored above an 80% on the digital skills test, and both were men from higher socioeconomic backgrounds. These findings mirror the gendered skills gap found in the educator group. Further research into the educational opportunities provided to male and female learners in schools, along with differences in accessibility of technology for male and female learners, would be valuable for determining the cause of these findings.

Many students, especially female students, showed a limited interest or knowledge on how to improve their digital skills. Even if they struggled to do most of the tasks in the challenge, many students believed that they only required some additional practice to adequately improve their current skills.

Profile 7: Sarah

Sarah has a BA degree in Business Administration but needs write an exam to get the government required certification for her degree. When questioned as to why she had not started on the certification, she said “It is a bit intense, you have to focus, it is harder than degrees or diplomas... ... it is in my mind to do the course... ... but I know that, when I have completed it, they will still say they cannot employ me because I don’t have 5 years’ experience.” After the challenge, she declared that she realised that she “has the correct digital skills” – yet she scored 47%.

When asked about potential productive use of digital skills, she explained that a friend of hers does CVs for people on her phone and submits the application on behalf of the candidates. She thought this was excellent productive use of digital skills. She could not think of any other potential productive use – and neither could the rest of the group. She said her future plans are to start her own consultancy, get married and have two children.

The following profile illustrates this attitude:

Some of the youth had access to digital devices but used it exclusively for entertainment and social media. The never even contemplate to use these for productive purposes. The profile of Anne illustrates this attitude:

Profile 8: Anne

Anne is in her 20s and currently unemployed. She had basic computer skills training and had her own laptop and smartphone. She used her devices mainly for entertainment. She takes a USB to a shop where they load complete seasons of international series onto it; she then plugs the USB into her computer and watches the shows.

During the TechSavvy challenge, she could not load her presentation onto a USB. When asked about her familiarity with USBs, she said “I don’t need to know how to load it, the shop does it for me. I only need to know where to put it into my laptop.”

24 OECD, p. 16 https://read.oecd-ilibrary.org/education/students-computers-and-learning_9789264239555-en#page1
She did not consider the possibility that her digital skills and devices could potentially be used productively.

Males, on the other hand, typically found the challenge interesting, an opportunity to evaluate their skills, as is evident from the following quotes:

“I did a presentation on places I have never been to – I thank Google for that. I could see that I have skills[,] but I would like to learn more…. I can do it by myself, by exploring and putting myself up for the challenges.”

– Male higher socio-economic group, completed degree in Economics and science

“My mother bought me a smartphone after I finished school in 2015. Nobody taught me how to use the phone, I studied the manuals…. I did not always used my phone to capacity. But, as time went by, I learned more from friends and by Googling. You can just find out on YouTube…. My skills on hardware is [sic] OK but I need to improve my software skills. I will check on YouTube, there are sites like Grammarly that can check if the grammar on my documents are [sic] OK. There are many training sites that are for free, I think it is something that I would like to consider.”

– Male, lower socio-economic group; studying economics and statistics; scored 85% in the challenge

Students who did have stronger digital skills showed soft skill development. While strong soft skills, such as problem-solving and goal-oriented thinking, are not sufficient inputs for successfully learning digital skills, it was a common trend found by the researchers that students who had above average digital skills were ambitious and determined to learn digital skills as a means to improve their qualifications.
The detailed profile of Alfayo illustrates the value of soft skills and resilience to succeed:

**Profile 9: Alfayo**

Alfayo was the first to complete the challenge to download an app and order a pizza. He was soft-spoken during the discussion but made his opinions heard. He was a third-year student in Development Studies and had clearly thought carefully about development of less privileged countries and people. But most of all his presentation was different to any of the others and he presented it with flair.

Alfayo said that, when he got to the venue, he immediately realised that the others were probably better than him on computers, therefore he would have to do something special to make his presentation stand out and decided to use humour as a differentiator. This was a great success – he was the winner of the challenge.

Alfayo’s life story illustrates what perseverance and resilience means. It also is a showcase of how charity organisations in Kenya can make a difference in a disadvantaged individual’s life. Alfayo was supported by Compassion, a UK organisation. Their model requires that a child in need is identified at 3 years of age and supported until the age of 22.

Alfayo started his life in a rural area of western Kenya. His father was a subsistence farmer. His mother, the main income earner (as a money lender), passed away of complications from childbirth. A paternal uncle offered to take care of Alfayo and took him to Nairobi at the age of five.

After a turbulent period in Nairobi that included living on the street for several months, Alfayo returned to his father and attended a boarding secondary school. Initially he struggled with his schoolwork but after a while he was first in the class, a position he maintained throughout his high school career.

After much hardship and often hunger, Alfayo finished Form 4. He then asked his uncle to sponsor him for a computer packages school in Nairobi. Alfayo made the most of the opportunity and used every minute available on the computer by actively practicing. This was his first ever exposure to computers.

In his final Form 4 exam, he got 4% lower than the mark required for automatic acceptance to university and he had to apply for a place. Because he could not afford the fees for the degree programme, Alfayo decided to apply for a less costly diploma course. The application had to be done online. He borrowed KES1,500 from his brother for the application but, due to his limited experience with computers, he accidentally applied for a degree!

A few days later he heard that he was accepted for the degree course and needed to pay KES30,000 immediately. He asked for a few months’ extension to start his studies and used the time to try and source the money. He assisted at the church with any odd jobs – but the token payment he received was often only enough for food or transport. However, they did give him access to the computer at the church, where he continued to practice and learn new skills.

Most university assignments had to be downloaded from online, which proved to be a real challenge for Alfayo: he had at most KES100 per day for food and transport and there was simply no money left to spend at a cyber-café or the computer lab at the university. However, he made a cost-effective plan: he had a hand me down smartphone with a cracked screen onto which he downloaded an app on which he could type his assignments. He would then quickly edit his work at the cyber-café and submit it.
Some students who showed determination to learn skills encountered logistical challenges that obstructed their goals. Few had the resilience that Alfayo (in the preceding profile) demonstrated to overcome their challenges. Many students aspired to learn skills such as graphic design, using spreadsheets or digital marketing; however, they were unsure or not confident about how to achieve these goals. This reinforces the qualitative findings on the learning of digital skills which stressed the importance of technological accessibility. Digital skills require access to expensive technologies and services, such as mobile data and electricity. While ambition and curiosity may be important factors for one’s interest in acquiring new digital skills, that ambition becomes wasted when people cannot access the necessary technology.

4.2.3. Employed

Employed participants averaged 55%, well below the 80% normative baseline. Similar to students and educators, men had a higher digital skill score than women, with men from higher socioeconomic backgrounds having the highest skills of all employed interviewees.

In some instances, employed individuals showed proficiency in harder tasks that were associated with their job, even if they could not complete simpler tasks. One waitress was able to calculate expenses in an Excel sheet, as this was a common task that she used at the restaurant where she worked. However, she was unable to create a PowerPoint, could not find Microsoft Word, and did not know how to move files to a USB drive. When asked about her skills, she stated that:

“I don’t really need to use things like Microsoft PowerPoint. I don’t really need to use it, so I use what I need. I’m straight to the point[,] what I want is what I require.”

– Female, Employed
5. Findings: Applying digital skills for employment and enterprise

Another purpose of this study was to understand how people applied their digital skills to create economic value, and to determine if the current supply of digital skills is sufficient for the demands of the digital economy. Participants in the study were asked about how they used their digital skills in daily life to gain employment and maintain an income. Researchers wanted to understand what skills were commonly used in economic activities and what skills people thought that they would need to be successful in the future.

Researchers interviewed HR managers, digital start-up entrepreneurs and small business owners to understand the extent to which digital skills are necessary for their daily operations. With this knowledge, researchers could see the extent to which the skills of those tested in the study would be sufficient for filling future vacancies in various sectors of the Kenyan economy. Researchers were also able to find out how these professionals viewed the skill levels of young people entering the workforce, and how they typically determine the skill level of potential employees.

5.1. Digital skills and recruitment in the formal sector – interviews with HR managers

The HR managers interviewed did not seem to grasp the challenges of the future digital economy. They did not have the insights of digital start-up entrepreneurs on the future challenges, specifically in terms of “soft skills”. Job interviews and on-the-job training was focused on the current needs of the firm and these managers did not seem to contemplate the potential impacts of the digital economy on the future of work. They focussed on technical skills and not on soft skills and competencies (like critical thinking, creativity, complex problem solving and emotional intelligence) required for the future.

HR managers were also overly optimistic about the level of digital skills present in new members of the workforce. Since computer classes are mandatory in Form 1 and Form 2, HR managers believed that young people graduating from secondary school would have sufficient basic skills needed to contribute to the formal economy. Many also pointed to the popularity of packages schools as a likely indicator that most youth would have the necessary digital skills. Often, HR managers projected the experiences of youth who had undergone extensive education, such as tertiary education, to the general youth population. An example of this attitude is shown below:

“
So generally, if the youth do get into the formal institutions, then one way or another, they are obliged to use some form of online system; including just a basic registration for their courses is often happening online.

– Female, HR manager

This contradicts the findings of the experiment, which showed that most students who attended secondary school and packages schools have less than adequate digital skills. This suggests that there are some graduates who are able to meet the requirements demanded from recruiters but that many of the youth included as participants in this study would be unlikely to qualify for these positions. It is possible that the students who tested below our 80% benchmark would have trouble applying for and gaining positions in these companies.

Conversely, HR managers were quite critical of the soft skills of new entrants to the workforce:

“Those are soft skills which are very poor for people that are coming from school. [...] It is very important to learn soft skills from school; problem-solving skills, teamwork skills, communication skills and also time issue skills, like time management [...] these skills are totally being ignored and nobody cares about them.”

– Male, HR manager

“ [...] the youth should be redirected to be more creative using technology [...] Their curiosity, from my experience, is a bit low. [...] What I have noticed here in Nairobi is that the majority of youth that I have met are holding a computer in their hands through the smartphone. All they need is to do is to be redirected to learn or to be encouraged to use this computer for their benefit over and above using it for games.”

– Female, HR manager

Gaining formal employment is often predicated on having basic digital skills. Many HR managers stated that they advertise vacancies electronically, and that applications for an opening are accepted online. HR managers also stated that this is usually considered a sign that the person applying has a basic understanding of digital skills. Some HR managers stated that their organisations give a practical computer test as part of the interview process. However, some HR managers conceded that most new hires would need some on-the-job training to have the necessary skills for the job. This suggests that most successful applicants would have most of the necessary foundational skills and digital skills to get a position at that company.

25 The assumption of many managers was that if someone could create and submit an application electronically, then they had proven a proficiency in digital skills.
5.2. Using digital skills for economic gain: Experiences and perceptions of students and other professionals

5.2.1. Small businesses

While understanding the perceptions of HR managers in formal enterprises was important, the size of the informal sector in Kenya and the prevalence of SMEs necessitated engagement with informal and formal SME owners to discover how digital skills factor into their business operations. As of 2015, 83% of all workers in Kenya work in the informal sector; this figure had also grown from 81% in 2009. It is almost certain that the vast majority of young people entering the workforce in the short- to medium-term will not be hired in the formal sector. As such, an evaluation of digital skills needed for work and accessing economic opportunities must include an evaluation of both informal and formal small businesses in Kenya.

Some small businesses used digital tools in a limited capacity for their daily operations. In many instances, M-Pesa was used for payments. Many used social media for “soft-sell” marketing. Many clerical tasks, such as online form filling, customer consultations and employee recruitment were also performed digitally. Most of these tasks were consumer skills or low-level productive skills, centred on inputting data or text into basic programs to track information and communicate online.

However, other small businesses embraced technology as the following example of Isaac, the owner of a car maintenance workshop, illustrates:

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**Profile 10: Isaac**

Isaac is a proprietor and director of a motor vehicle repair and maintenance workshop: they repair cars, sell parts and provide regular maintenance. The business has existed for 10 years. Before following his life-long passion for cars, Isaac was an HR manager.

This entrepreneur thinks that, in this day and age, going digital is mandatory and that paper has become obsolete. His entire business depends on computer systems. For the administration especially, they rely on software called QuickBooks. It keeps their customer relations in check, a database of who they did business with and how to get a hold of them. QuickBooks is also used for billing clients. Unless a customer specifically requests a printed copy, their bills are sent via email or WhatsApp. The software also reminds Isaac to pay their bills to their suppliers, rent and salaries.

Overall, the software helps them keep an overview of their cash flow, financial stability, loss and due payments. From Isaac’s experience, basic computer skills and a bit of interest are all that are needed to master the business software. “Most systems these days are very user-friendly,” he adds.

Isaac has strong views on the failure of the formal educational system to equip potential employees. “People can acquire those basic computer skills from several colleges, especially in the city; they are easy to find. Most of it is simple training, MS Office, nothing advanced. Students complete school and certificates but come out with no skills or practical knowledge. In the corporate world they cannot offer what is required. When someone has taken a course on paper but on the job they know nothing, they are unemployable.”

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Usage of smartphones was a predominant feature for small businesses who used digital tools. Many respondents found their smartphones sufficient for their requirements, including processing payments or communicating with customers and vendors. However, some small businesses utilised laptops to perform tasks like creating invoices or emailing potential clients.

Overall, the male respondents who attended the groups were more entrepreneurial than the women:

- Examples of male entrepreneurs: graphic designer (three respondents), water vendor (selling water and doing plumbing work); having a bakery, making gift bags, writing research papers for clients and a sound engineer. One worked at an NGO and three tutored children in digital skills – which is cause for concern, because their own digital skill scores were mediocre: 57%, 50% and 52%.

- Examples of female entrepreneurs: selling second-hand clothes; small shop selling M-Pesa, swimming coach, photographer. Two worked for NGOs.

While there were some businesses that made very minimal use of technology, they often did have at least some base-line exposure or usage of digital skills. This was often in the form of M-Pesa as it is an extremely common digital payments system in Kenya. One restaurant owner utilised digital skills only to pay for large product shipments. She used M-Pesa for these purchases, but her children helped her to process the payment. Even though she did not think digital skills were important for her business, she did use them for this one aspect of her operations.

5.2.2. Students and employed youth

While most students reported using social media and other apps on their phones, they made limited use of their devices for productive purposes outside of schoolwork. Focus group interviews with students revealed that most students were not using their phones or computers for major, if any, employment opportunities. While students had familiarity with these devices, recreational usage was the primary function.

Some employed youth did use their digital skills consistently for productive purposes, either at their job or through their own ventures. These skills were usually consumer or productive skills, including the use of social media for digital marketing purposes, Microsoft Office for word processing and spreadsheet management, processing of mobile payments and graphic design. There were also multiple digital skills tutors who were interviewed; however, all of them scored below 60% on the digital skills test.
The following profile illustrated how an entrepreneur used social media and graphic design to achieve self-employment

Profile 11: James

James lives in an informal settlement and produces gift bags. He wanted to be able to do the printing on the bags himself, therefore he also works as an apprentice at a printing company. In order to do the designs for his gift bags himself rather than outsourcing it, he was paying someone to teach him graphic design. He runs his whole business from his phone: he uses apps for design and printing and Google and YouTube to stay abreast of developments: “I need more skills because the whole world is advancing, I cannot stay stagnant, I must advance my technology level…. I am thinking of doing a course in IT in the shortest possible time so that in 5 years I am capable of running my business…. I will take a degree or a diploma so that I can advance.”

Figure 1 Sample of James’ gift bag products

Some small businesses realised that digital technology can give them a competitive edge. Abraham, who has a small car maintenance business, realised he needed to upskill to be able to submit tenders for big projects. Since he has done that and was awarded tenders, he has also upgraded his machinery.
Profile 12: Abraham

Abraham does car maintenance and repairs. For many years before he opened his own workshop, he worked at a workshop belonging to a friend, who was qualified as a mechanical engineer. He learnt most of what he knows from this friend.

He was introduced to computers by the Kenya Revenue Authority: he was one of the business owners who were trained on how to submit tax returns. After this first exposure to computers, he realised the potential value of digital skills and took a few lessons at a computer school that offered night classes.

His believes that his business would not have been where it is in terms of progress if he had not acquired basic computer skills. This is particularly relevant when submitting tenders for work. He won the tender for long-term service contracts with government departments, Canadian International Development Agency, Lutheran World Foundation and Siemens Kenya.

All four departments within his workshop (electrical, panel beating, upholstery and spray painting) require some form of machine operation skill. Abraham said that the machinery at the workshop does not directly require computer knowledge to operate. However, computer skill would give the operator some level of confidence and perhaps less fear of the machines. The workers, including the four interns at the workshop, receive in-house training on how to use the electronic equipment and programs.
Most employed youth who participated in the study were informally employed or self-employed. Only two participants, one who worked in finance and one who was an assistant librarian, were formally employed by a formal enterprise.

Many of those who were informally or self-employed utilised digital tools as part of their daily jobs. Many of the youths interviewed use apps extensively to assist them with their work. A range of apps were used for business: making and receiving payments, sending files or PDFs, finding locations, learning how to do things on YouTube. Examples used are: Xender (to share files), WSP (to write and view documents, Adobe (PDF), antivirus, CamScanner, AirBnB (to find affordable accommodation when travelling for business), Kopo-Kopo (business ledger) and I-Track (to track vehicles). This was an important discovery, as it reinforced the idea that informal employment does not necessarily mean that the job is simple or unsophisticated. Digital tools will likely become increasingly important in both formal and informal industries, meaning that youth employed in the informal sector will also benefit from having strong digital skills.

However, entrepreneurs also used more basic productive and consumer skills to make their daily business operations easier. Interviewees frequently reported the use of M-Pesa and digital payments for business transactions. Using email and social media to engage with clients and suppliers via email and social media was also common.

One entrepreneur realised that the future is digital, even for houseworker – and she created a business around this need:

**Profile 13: Candice**

Candice has had a recruitment and staff placement business for over 10 years. She recruits employees according to clients’ specifications. Most of the people she places are housekeepers and home-based care staff; the rest are jobs like typists, receptionists, shop- and cyber-assistants. On the side, she runs a cyber-cafe as well, mainly doing photocopies, to improve her cash flow.

In the beginning of her business she received simple requests like “finding a house girl”. But with technology, the clients became more sophisticated. Houseworkers need to fill specific criteria that went beyond the usual requirements. For example, a houseworker who takes care of children as part of her job needs to be able to have certain digital skills:

- Understand simple computer games and MS Paint
- Use electronic devices correctly and safely

Therefore, Candice needs to make sure everyone she recruits is thoroughly checked and trained. Before she places someone with a client, she conducts a background check through a KRA PIN (a digital platform by the government, providing data from an e-citizen programme, which provides all information, from criminal records to their parents’ names). After a potential recruit has been cleared, she trains them in “life skills” – which includes digital skills.

### 5.2.3. Digital start-up entrepreneurs

Digital start-up entrepreneurs displayed a wide range of digital skills that they use to run their businesses and create value for clients. The skills used by digital start-up entrepreneurs ranged from digital marketing, to graphic design, to IT systems management. Many digital start-ups utilised e-leadership skills. E-leadership skills represent an individual’s ability to
create business models that utilise new or existing digital technologies as the central core of their business. One digital start-up operating in the insurance sector represented the principle of e-leadership:

**Profile 14: Peter**

Peter started an online company that developed digital systems for insurance companies. While he had a degree in computer science, he stressed that a skillset in programming and a passion to learn were the most vital requirements for success. Seeing that insurance coverage in Kenya is very low, he believed that helping companies digitise their policies could increase uptake and drive sales. He manages a team of programmers and developers who work with insurance to integrate digital systems into their business models.

Digital start-up entrepreneurs stressed that consistent and iterative learning is important for staying up-to-date with the necessary skills for the digital economy.

The productive and e-leadership skills typical of digital start-up entrepreneurs are well illustrated in the profile of Shaun, a digital marketer:

**Profile: Shaun**

Shaun is a 23-year old digital marketer. He was fortunate to have been exposed to technology from an early age; his primary school had computers. He knows how lucky he was, most Kenyan public schools are not equipped with computers. “Most schools leave you with not much practical knowledge and a fair bit of student debt.”

Once he was on campus, he went out and explored, learning tech skills from fellow students and exploring online. His interest in online marketing was sparked when a university lecturer introduced him to the Google Online Marketing Challenge (GOMC). He founded a small team and took up challenges that he considered relevant to the Kenyan market, to the point where he was given a small budget by Google. This helped him improve his skills and take initiative in his first job. He ventured out to take on creative jobs on a part-time basis and through referrals he managed to go into business on his own in 2018.

Shaun thinks the landscape in Kenya is different to other countries, shops don’t use digital marketing as they are small and do not have websites. “It’s not executable at the moment but we are getting there,” he said. However, digital advertising is becoming increasingly important in Kenya, “[e]specially with apps. It’s hard to navigate around ads. You are forced to be exposed to ads when you download an app, the only way around it is to not use the app.”

Small and medium enterprises are keen to work with Shaun. They see their competitors and other businesses growing an online presence and want something similar, “Being active on social media is one thing, but advertising on Google is the extra step that is often needed.” Shaun’s objective is to provide his clients with a personalised brand, targeting the business’ audience. Unlike working for corporate clients, his close relationship with SMEs allows him to cater for their needs and implement changes quickly, monitoring the effects almost instantly.

Shaun thinks having a knack for marketing is the most important skill in his line of business, “You can pick up working with computers as you go, but if one is not able to market a product, marketing it online won’t come easy either.”

“Interest, curiosity and a thirst for knowledge are the drivers to success. To make an ad that hits the spot you have to write content that speaks to the audience and a graphic designer who
brings that content to life. You need to put in some brain and muscle and add something to make it unique.” To execute his ideas, Shaun taught himself graphic design.

For the future, he plans to develop his skills further. Amongst other skills, he wants to learn programming, “It’s not easy. It takes a lot of effort. It is like learning a new language. Programming basically involves talking to machines,” he said.
6. Conclusion

6.1. Summary of key findings

Overall, the vast majority of individuals tested in this study did not have sufficient digital skills to meet the requirements of the normative profile. This suggests a widespread deficit in the quality of digital skills of youth and educators in Kenya. This finding calls into question the quality of digital skills training in formal education and packages schools in Kenya. Since most young people in Kenya pass through primary and some secondary education, poor digital skills training in school creates a wasted opportunity to introduce these skills on a large scale to Kenyan youth.

A consistent pattern in the quantitative assessment was that women had lower digital skills than men. This gap was pronounced further when socioeconomic context was considered. This gap suggests that there is an inequitable distribution of digital skills in Kenya. Further research should attempt to understand the factors that may cause this divide (access to schooling, preferential treatment, access to tech at home and at school, courses chosen by men and women) and look into the equity of digital skills training in the workplace and in school.

While many businesses and youth reported commonly using smartphones, the digital skills test and interviews showed that personal computers are important for performing more complicated tasks. Even though smartphones can be used to search for information on the internet or digitally market products on social media, the creation of PowerPoint presentations and more complicated graphic designs necessitates the use of a computer. More ICT-intensive businesses, such as digital start-ups and formal enterprises, also used computers more extensively for their day-to-day operations. This would suggest that young people must be able to use computers in addition to their phones if they want to perform more complex digital tasks to generate economic opportunities. It is important to add that more advanced developer skills, such as coding and programming, were not a part of the digital skills test. These skills are much more reliant on the use of personal computers, rather than smartphones, and show the importance of computer-based digital skills for work in the digital economy.

Tertiary education was a large factor for those who scored highest. Educators who performed best on the experiment had a tertiary education and often had degrees in ICT or other digitally based majors. This could suggest that those with stronger foundational skills have less challenges with upskilling their digital skills. However, it may also be the case that the content of the university education was directly responsible for the proficiency in digital skills. Research targeted at directly comparing university graduates from different fields of study with individuals from other educational backgrounds may provide greater clarity on the impact that university education has on digital skills development.

Soft skills were seen as an important factor for successful digital skill development and application but were limited by one’s access to resources through which they could pursue their goals. Access to computers, the internet, and even electricity in some schools remain foundational challenges for young people who want to improve their digital skills.
these are large-scale infrastructural challenges, they will remain important in the long run for ensuring uptake of technology on a national scale.

Access to important resources is a valuable condition for strong digital skills training. Students who did not have electrified schools were unable to work on computers and classes with no or minimal computers do not have the technological resources needed to facilitate practical computer usage in the classroom. Improving infrastructure and access to technology will give students more opportunities to interact with ICT and acquire digital skills.

Businesses in both the formal and informal sector are adopting digital technologies to improve daily activities. Most of these activities utilised consumer and productive skills. Examples of common activities included processing digital payments, using social media and email to communicate with clients and employees, utilising Microsoft Office to create documents and track invoices, and using applications like QuickBooks to manage business operations. Low scores on the digital skills test show that youth in Kenya are largely lacking the skills to perform these tasks in a safe and consistent basis. This also suggests that many of the current avenues for learning digital skills are inaccessible or inadequate for imparting these skills.

6.2. Utility of the digital skills test

Moving forward, the digital skills test developed for this study can be used to gather more data on the level of digital skills in Kenya and other countries. Adapted from the EU DigComp 2.0 competence areas, the digital skills test provides a set of key indicators that measure proficiency in a variety of digital skills. These indicators provide researchers with a strong practical foundation from which they can design various experiments which may be applicable for a variety of age groups and cultural contexts.

Furthermore, the weighting of questions based on difficulty presents a superior assessment of skill levels than the non-differentiated weighting of tasks from the DigComp 2.0 Framework. In the DigComp 2.0, proficiency is based on the number of tasks that an individual can complete from a given competence area; completion of one task is considered “basic” proficiency, whereas completion of two tasks is considered “advanced”. This methodology does not consider that some tasks are more difficult than others and, therefore, require a greater amount of skill to complete. The digital skills test takes this factor into account, improving upon the groundwork laid by the DigComp 2.0.

6.3. Opportunities for future research

Further research could help to expand on the findings contained within this report.

First, research into the underlying causes of the gendered digital skills gap found in this study can aid policy makers and skills providers in promoting equitable digital skill development going forward. Interventions to improve digital skills in a given context will require this information to ensure that programmes do not further entrench unequal opportunities.

Second, the digital skills test can be expanded to other areas in Kenya and utilise a more representative sample. This would increase the generalisability of findings to the Kenyan context as a whole, which would increase the applicability of the research for larger scale policy considerations. This test can also be used in other countries to determine if the experiences of individuals in Kenya mirror those of neighbouring countries.
Finally, generating improved datasets on job vacancies and labour gaps in Kenya would improve recommendations on which digital skills will be the most important for the future of work in Kenya. Knowledge of current and future labour demands will enable researchers to evaluate digital skills tests with a goal of assessing the extent to which youth possess the skills needed to fill these vacancies. This would increase the utility of the digital skills test for educational and training policy.
## Appendix 1: Methodology

### Digital competency experimental test

<table>
<thead>
<tr>
<th>Type of digital skill</th>
<th>Evaluation question</th>
<th>Weight (final)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Handling information</strong></td>
<td>Did you use the internet to get information about your activity?</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Did you download any pictures during the exercise?</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Did you take any screenshots (on the laptop or your phone) for the exercise?</td>
<td>3</td>
</tr>
<tr>
<td>(Category weight = 20%)</td>
<td>Did you store your documents on an online storage platform like Google Drive, Dropbox or One Drive?</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Did you have a TABLE of information in your presentation or invitation letter?</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Did you use FORMULAS in your Excel or Google Sheets Costing?</td>
<td>5</td>
</tr>
<tr>
<td><strong>Digital interaction</strong></td>
<td>Did you ask help of family members or friends during the exercise?</td>
<td>2</td>
</tr>
<tr>
<td>(Category weight = 12%)</td>
<td>Did you send the documents to the e-mail address supplied?</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Did you send a link of the documents in your online storage to the e-mail address supplied?</td>
<td>5</td>
</tr>
<tr>
<td><strong>Content creation</strong></td>
<td>Did you use MS Word or Google Docs for your Invitation Letter?</td>
<td>2</td>
</tr>
<tr>
<td>(Category weight = 18%)</td>
<td>Did you use MS Excel or Google Sheets for your Costing?</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Did you use MS PowerPoint or Google Slides for your Presentation?</td>
<td>3</td>
</tr>
<tr>
<td><strong>Problem solving</strong></td>
<td>Did you COPY and PASTE anything during the exercise?</td>
<td>2</td>
</tr>
<tr>
<td>(Category weight = 26%)</td>
<td>Did you change any words to bold or italics, or change the colour of the words in any of your documents?</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Did you have more than one picture in your presentation?</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Were you able to turn on the laptop and log-on?</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Did you plug in your computer to the power before it went off?</td>
<td>1</td>
</tr>
<tr>
<td>Question</td>
<td>Score</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Did you load a new app of software during this exercise?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Were you able to connect to the Wi-Fi with your smartphone?</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Did you create a new Google account for this exercise?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Did you save your files onto the USB without help?</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Were you able to connect to the Wi-Fi with the laptop?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Were you able to place an order for the pizza online?</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Did you use the internet to find out to do the tasks like zip file, save to a cloud, translate greeting, scan for viruses?</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Did you translate the greeting in your invitation letter?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Did you scan the LAPTOP for viruses?</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Category weight = 18%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did you check your FILES for viruses?</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Did you create a PASSWORD protected ZIP file?</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Did you save your documents in a ZIP file?</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
Tech-Savvy challenges

Challenge 1: Recruiting phase

- Communicate via WhatsApp
- Communicate via VoIP (WhatsApp)
- Drop a pin (some respondents)

Challenge 2: Order a pizza

Respondents asked to order the food. They have to do it online, using their phones. If they feel that their phones are not up to the task, they can use phones the researchers provided (Samsung S4 and S6).

Respondents were encouraged to download an app and place the order (choosing the option “payment on delivery”).

A time cap of 40 minutes was set for the exercise. Respondents had to do the task on their own, not ask assistance from group members or the researchers.

Challenge 3: Help Germans to have fun in Nairobi!

Imagine you can help a group of 10 young and funky Germans to have one great day in Nairobi!

These Germans are between the ages of 20 and 25. They are flying to Nairobi next week Monday and will have Tuesday free before they leave for Masai Mara on Wednesday.

You will know what activity in Nairobi they will enjoy. You must plan a whole day with one main activity for this group. You must also remember to give them something to eat and drink. You must also work out how much the day will cost.

You may use any of the following during the exercise:

- You may search for any information on the internet
- You may contact anybody who might help you to complete the challenge
- You may use the laptop or your phone, whatever you prefer

There will be two sessions for you to complete the challenge. These first session will be 60 minutes; the second session will be 30 minutes.

Researchers show an example of a presentation, letter and spreadsheet that was done by another respondent as an example of expectation. (Note: use Fabrice’s work, it is complete yet not intimidating. Tell respondents that this has been done on a phone only. Emphasis again: they can use their phones or computer provided by the researchers.)
Session 1

In the first session, which will be 60 minutes, you must do the following:

- Write a SHORT personal letter to invite the group to spend the day with you. The letter must also explain why you are suggesting the activity.
- Prepare a presentation that must include the following:
  - Information on your activity and a time schedule for the day
  - Include pictures, photos or videos about the activity
- Calculate the costs for the day on a spreadsheet or table. Include costs for the activity, meals, tips and transport. Show how you calculated the cost per person and for the group.

If you have time left and want to make your work even better, you can do any or all of the following:

- Translate the greeting into German.
- Give the weather forecast for next week Tuesday and suggestions on how they should dress.
- Give links to good websites about your activity.
- Give directions from the airport to the meeting point.
- Find out what the current exchange rate is and calculate costs in Kenyan Shilling and in Euro.
- Use formulas so that the Germans can get an updated cost if the group size should change.
- Include a table with additional information:
  - Links to websites with more info on Kenya
  - Link to your blog/personal website
  - Link to your social media profiles

AFTER 60 MINUTES THIS PART OF THE EXERCISE WILL BE FINISHED.
Session 2

In the second session, which will be 30 minutes, you must do the following:

- create a folder and put all your documents in this folder. You must do your presentation from this folder.
- e-mail all the documents as attachments to crc.assistance@gmail.com

If you have time and want to make your work even better, you can do any or all the following:

- Scan your laptop for viruses. Save a screenshot in your folder as proof.
- Scan your files for viruses (HouseCall from Trend Micro is a free option for PCs. AVG Anti-virus will work for smartphones). Save a screenshot in your folder as proof.
- Zip all your files
- If you have a .zip file: save you files in a password protected ZIP file and send an e-mail link to this to crc.assistance@gmail.com
- Copy to USB flash drive/memory stick
- Save a back-up of all your documents on a cloud, for instance on Google Drive and send an e-mail link to this to crc.assistance@gmail.com

AFTER 30 MINUTES THIS PART OF THE EXERCISE WILL BE FINISHED.

Challenge 4: present result to rest of the team

Challenge 5: Complete numeric literacy test level 2