LEARNING AND WORKING WITH SMARTPHONES IN THE INFORMAL SECTOR

NEW FINDINGS AND RECOMMENDATIONS FOR ACTION ON DIGITALISATION IN APPRENTICESHIPS IN SUB-SAHARAN AFRICA

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ABBREVIATIONS

A4AI	Alliance for Affordable Internet
ALISON	Advance Learning Interactive Systems Online
BMZ	German Federal Ministry for Economic Cooperation and Development
COL	Commonwealth of Learning
CSR	Corporate social responsibility
CTVET	Commission for Technical and Vocational Education and Training
DigComp	Digital Competence Framework for Citizens
DTC	Digital Transformation Centre
GDP	Gross domestic product
GFA	GFA Consulting Group GmbH
GNAG	Ghana National Association of Garages
GNTDA	Ghana National Tailors and Dressmakers Association
GSDI	Ghana Skills Development Initiative
IFC	International Finance Corporation
iit	Institute for Innovation and Technology
ICT	Information and communications technology
ILO	International Labour Organization
IMF	International Monetary Fund
ITU	International Telecommunication Union
KfW	KfW development bank
KNFJKA	Kenya National Federation of Jua Kali Associations
KTTC	Kenya Technical Teachers College
MCP	master craftsperson
MFPAI	Ministère Sénégalais de la Formation Professionnelle, de l'Apprentissage et de l'Insertion
MoHEST	Kenyan Ministry of Higher Education, Science and Technology
MSMEs	Micro, small and medium-sized enterprises
OER	Open educational resources
PEJA	Projet employabilité des jeunes par l'apprentissage non formel (project on youth employability through non-formal education)
RIAT	Ramogi Institute of Advanced Technology
SKYE	Skills Development for Youth Employment
ToT	Training of trainers
UIS	United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

0 EXECUTIVE SUMMARY

Mobile phones have changed everyday life in Africa. Internet-enabled devices, smartphones and even simpler technologies, such as feature phones[1], have opened up new sources of knowledge and channels of communication for people who still have no access to laptops and computers. The rapidly growing share of the population that uses the internet and the spread of smartphones in developing countries would suggest that such technologies can play an important role in autonomous learning and the acquisition of vocational skills.

This study examines the effects of digitalisation on traditional forms of vocational training in the informal sector in sub-Saharan Africa. By taking stock of the current situation in three countries – Ghana, Kenya and Senegal – it attempts to draw conclusions and make recommendations for action for international cooperation in the field of vocational training.

Ghana, Kenya and Senegal are among the countries of sub-Saharan Africa that have seen a high uptake of smartphone use within their populations. Like other countries in the region, their informal sectors provide the largest number of jobs and contributes decisively to young people's vocational training. However, reflecting the diversity of the region, the three countries display striking differences in how vocational training is organised in the informal sector, whereby young peo-

ple traditionally learn a trade as an apprentice under the guidance of a master craftsperson. This explorative study is based on case studies, which entailed conducting qualitative interviews in mid to late 2022 with a total of 102 master craftspeople and 142 apprentices in three occupations: **electrician, hairdresser and tailor/dressmaker**. In addition, fifteen interviews were conducted with experts. The occupations were selected because they differ in terms of sector (skilled crafts/manufacturing; individual service provision; technical), gender (female/male-dominated occupations) and prerequisites with respect to previous schooling.

The study was shaped by three primary research questions:

- How are mobile phones, smartphones and other internet-enabled devices (e.g. computers and tablets) used in practice in jobs in the informal sector, and what demand for skills does this create on the part of learners?

- How are these devices used for learning and teaching purposes in the informal sector?

- How are these devices used in projects/programmes to modernise informal apprenticeships?

SMARTPHONES ARE USED IN DIVERSE WAYS IN DAY-TO-DAY WORK IN THE INFORMAL SECTOR

Master craftspeople and advanced apprentices use smartphones, other mobile phones and, to a lesser extent, laptops in their everyday work. This means they develop and use digital skills that younger apprentices can likewise gradually acquire. Of the individuals surveyed for this study, 86 per cent of the mastercraftspeople and 77 per cent of the apprentices owned a smartphone. An analysis of activities carried out using smartphones and other digital devices revealed new skill sets now required for the three occupations. These

findings also indicate a potential for development, as limited digital competences and financial barriers often restrict the use of these technologies.

Nine areas of activity were identified that cut across the occupations:

1. **Direct customer communication** is made much easier by the use of mobile phones, even the simplest

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models, and has therefore become an everyday aspect of all three occupations in all three countries. Everywhere, WhatsApp is the instant messaging app of choice. It is used to make appointments and place orders, for example. Even people unable to read or write save time by sharing information using voice messages and pictures, and in that way are also able to expand their customer base beyond the local context.

2. The entrepreneurs surveyed mainly carry out **marketing** through direct communication with customers using WhatsApp and other social media, such as Instagram, Facebook, TikTok, Twitter, WhatsApp Business and Pinterest. For example, to reach potential clients, hairdressers and tailors/dressmakers post the latest hairstyles or models as WhatsApp statuses, although the level of professionalism of this marketing varies considerably. In Kenya, some master craftspeople use professional web designers and influencers, while the least digitally savvy respondents depend on word-of-mouth, and recommendations by existing customers on social media and WhatsApp.

3. **Social commerce**, the use of social media to sell goods and services, is already widespread in the three African countries in the study. It is becoming increasingly important compared to traditional online marketplaces. Through the use of social media such as WhatsApp, Facebook and Instagram, businesses can pursue digital marketing, communicate with customers and process payments with mobile money services, without the need for any specialist skills. By contrast, the use of online marketplaces is less common and is often hindered by a lack of knowledge about suitable platforms. In Kenya alone, isolated examples were seen of tailors and dressmakers using the Jumia and Jiji platforms.

4. With respect to **payments**, in all three countries extensive use is made of both smartphones and non-internet-capable mobile phones. Mobile money services provided by telecoms companies allow registered users to deposit cash into an account linked to a phone number and enable

those funds in turn to be used for payments and purchases. Master craftspeople use these payment methods in their daily life and working context, often as a substitute for a bank account and as a way to manage savings or monitor transactions.

5. Smartphones are used for **organising work and for management purposes,** for instance to communicate timesheets and assignments using WhatsApp, or to take notes. Electricians use smartphones extensively to coordinate work on different construction sites. In addition, master craftspeople use mobile phones and smartphones to communicate with apprentices. Some set up WhatsApp groups for their workshops, others prefer to pass on instructions through a more experienced apprentice or always communicate directly with each individual. In Senegal, several masters reported that it is sometimes easier to use digital communication to prevent or resolve conflicts with apprentices than face-to-face interactions, where emotions are more evident and can lead to an escalation.

6. Hairdressers and tailors/dressmakers use their smartphones to **monitor the market**, keeping up with the latest fashions and adapting their services and products to meet customers' wishes. They mainly use Instagram, Facebook, Pinterest, YouTube and TikTok for this. Electricians also use their smartphones to keep abreast of news and market prices, and to find new tenders. Some master craftspeople go beyond mere market observation by contributing to forums with product ratings and comments.

7. Smartphones are used for **networking with other entrepreneurs**. Communities of practice develop using WhatsApp groups and Facebook, a process in Ghana and Senegal that often is encouraged by local trade associations. These networks serve various purposes, such as reciprocal exchanges of advice and assistance, buying and selling of spare parts, further training, passing on assignments,

and friendly interactions. Generally speaking, apprentices only participate in such networks after they have completed their training, although before that some are active in other networks of trainees.

8. Master craftspeople use smartphones and, in some cases, also laptops to pursue their own **training**. A significant aspect of this, for all three occupations, is the fact that video tutorials are freely available, most commonly found on YouTube. The respondents said they do not use paid e-learning content provided by educational institutions. One electrician in Senegal likewise said he takes advantage of free webinars offered by solar technology manufacturers. The electricians surveyed often use the internet to obtain information and components from manufacturers, while hairdressers and tailors/dressmakers follow fashion trends and learn new techniques from video tutorials. Language requirements were often cited as an impediment to online searches for relevant products and services. Putting the techniques described in such videos into practice requires some technical understanding for the viewer to assess the quality of the demonstration and, where necessary, to supplement any missing information and adapt it to specific conditions. As such, video tutorials are often just one component in a broader strategy that also includes exchanges with others on social media or in face-to-face discussions. This use of digital devices is similar to the pattern practised by apprentices, which is described in greater detail. It is particularly significant because master craftspeople who have pursued their own further training in this way are then better placed to support their own apprentices when they use digital media to learn.

9. Digital devices such as smartphones and laptops are used for **occupationally specific purposes** in all three of the jobs examined here – tailor/dressmaker, hairdresser and electrician. Tailors and dressmakers, for example, use note-taking and spreadsheet software to record customers' measurements, while hairdressers play music and

present photo galleries on their smartphones. Electricians use the internet and special apps to research the technical properties of devices and the parameters of electrical installations, or even, as in one particular case, to develop lighting concepts.

The widespread and diverse use of digital devices in the work context clearly shows a growing need for digital skills in the informal sector, either of a general nature, for example to find relevant information, or specific to the job at hand, for example for marketing or to solve technical problems. To some extent, apprentices develop these skills on the job, just as they acquire other occupational knowledge and skills under the guidance of their masters. One special **use of digital devices by apprentices is their application for learning purposes**.

APPRENTICES ARE DEVELOPING NEW LEARNING STRATEGIES WITH SMARTPHONES

Apprentices use smartphones and less commonly also laptops when learning their occupation. The surveys revealed six different learning strategies that involve these digital technologies. The strategies are seen in different forms in all three occupations and in all three countries.

1. **The internet as a source of inspiration**: Apprentices in the informal sector surf the internet to view pictures and videos on social media, and gain insights into the latest developments and trends in their respective trade. In so doing, they also set themselves new learning goals. This strategy is most evident in the creative trades, among the hairdressers, tailors and dressmakers, but can also be seen to some extent among electricians. In the creative fields, digital content is largely replacing printed media like magazines and catalogues as a source of inspiration. Similarly, some people with lower literacy skills also access the internet. After friends and acquaintances have entered the first search terms, the algorithms of YouTube or Instagram, for example, suggest new content.

2. **Step-by-step videos to find solutions and learn new techniques**: This strategy is widely used for the learning of new technical skills in all three occupations in the study. Apprentices use smartphones to find video tutorials on YouTube, sometimes also on TikTok, Instagram and Pinterest. This is often triggered by the need to perform a less familiar task or the wish to achieve something new. Apprentices also use videos as an aid to understand otherwise unclear explanations or processes. The more technically demanding the technique they need to learn, the more important is the master craftsperson's supporting role in the strategy. By sharing advice on how to find and judge content, they promote apprentices' efforts to learn things for themselves. Moreover, their assistance is often crucial in helping apprentices put the things they have seen into practice correctly, for example giving them feedback on their results and helping them comprehend and talk about what they have learned.

3. **Internet research to find information**: Apprentices use the internet, especially Google, to answer questions that arise from their daily work or to satisfy their curiosity. This learning strategy is common to all three occupations examined here but was mentioned particularly frequently by electricians. The approach is used most commonly to answer specific technical questions when no one with experience is available to ask in person, or if explanations are not understood. Some apprentices, meanwhile, look for information even when there is no immediate need, simply from curiosity or a desire to expand their horizons and learn about tools or procedures that are not used in their place of training.

4. **Exchange with the specialist occupational community**: Apprentices use messaging services, above all WhatsApp and Facebook, to form networks beyond the circle of their own workshops and to share occupational know-how and experiences. This learning strategy is common to all three occupations in the study, although differences occur depending on the country and the access opportunities. Groups set up by trade associations are often reserved for experienced apprentices or master craftspeople. Apprentices who have participated in formal vocational training are often active in alumni groups, where teachers sometimes also share material or answer questions. Such groups can be used to find answers to technical questions, but beyond this they also help newcomers to find their feet in the job and in the community of practice.
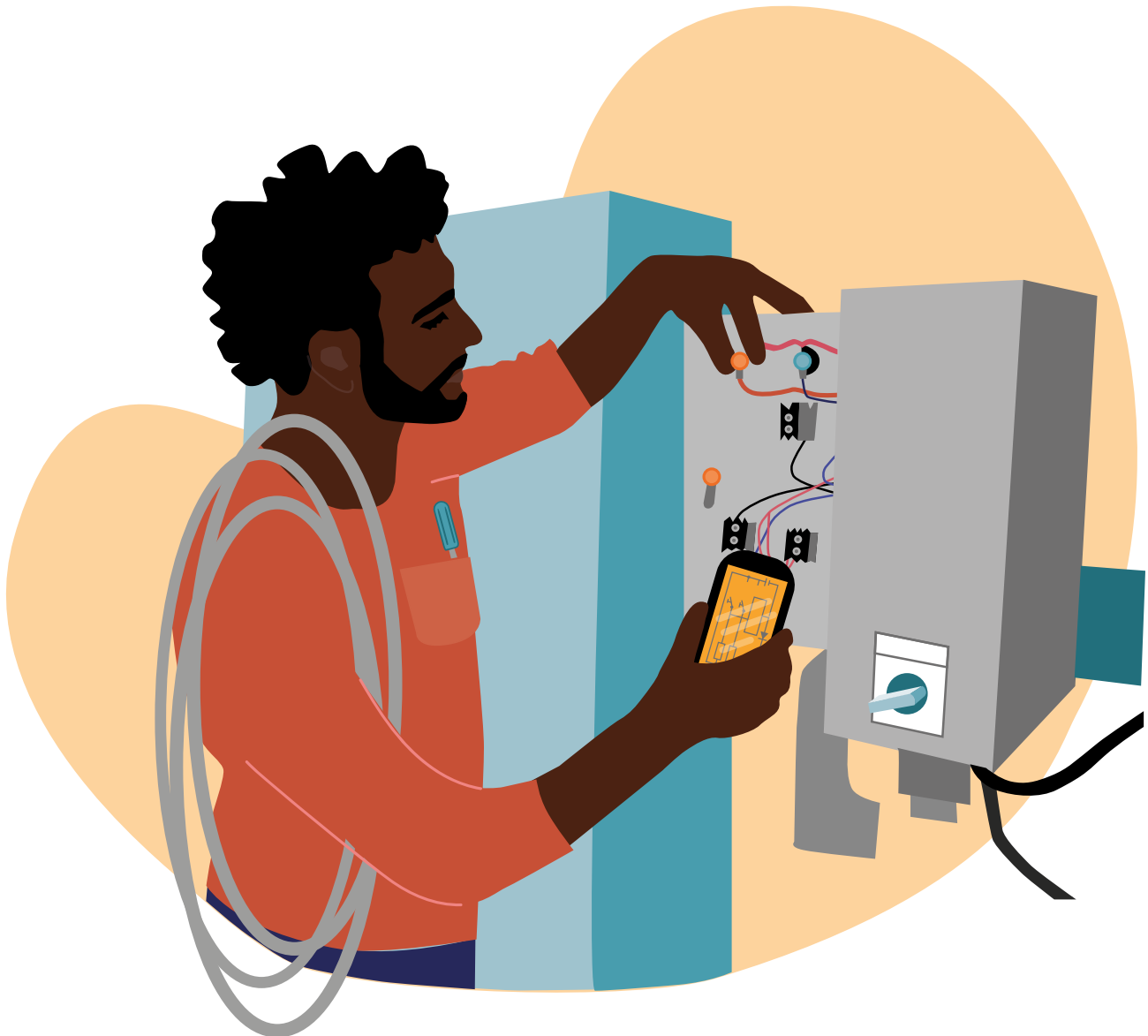
5. **Note-taking and recording** is a learning strategy whereby people use digital devices, especially smartphones, to note down new information or capture it in videos or images as an aide-memoire. However, only a small minority of the respondents use this approach. Examples were seen in all three occupations, but somewhat more often among the electricians. The notes app and the camera function are used to create videos, photos and written records, and save them for personal use. According to the respondents, whether or not they record information or work processes depends largely on the complexity of the material. This decision can also be influenced by the learning culture and educational level of the respective apprentices and the place of training.

6. **Use of e-learning activities on learning platforms:** Some of the apprentices surveyed use online courses, learning materials and certification opportunities to enhance their knowledge and skills. However, this is not very common as a learning strategy. In the context of this study, it was mainly observed among the electricians and tailors/dressmakers. For the most part, smartphones are used to access these learning platforms. The Jemshah e-learning platform and Jemshah

YouTube channel were mentioned, as well as Cisco and ALISON (Advance Learning Interactive Systems Online). The content on these platforms consists mainly of video tutorials and texts, as well as interactive multiple-choice questions, which usually take a few hours to complete. As a rule, learners need to register for a course before they gain access to the materials. The biggest obstacle to the use of learning platforms, besides their possible cost, is the lack of awareness about them among apprentices, the hurdles associated with registration and the lack of platforms that explicitly serve the needs of this target group.

The six learning strategies identified here show that digitalisation is opening up new sources of knowledge for apprentices, which go beyond the analogue offers otherwise available. Furthermore, the new communication tools have expanded the possibilities for interaction and networking that apprentices use to share experiences and find their feet in their new jobs. In all three occupations and all three countries addressed by the study, the apprentices and master craftspeople surveyed are exploiting the new learning and teaching opportunities offered by digital devices, in intensive and varied ways. At the same time, the study repeatedly demonstrates limitations to learning arising from various individual factors and contextual circumstances, suggesting that specific potential benefits for learning in the informal sector offered by digital devices, especially smartphones, are far from exhausted.

THE POTENTIAL OF DIGITAL DEVICES IS NOT BEING FULLY EXPLOITED IN APPRENTICESHIPS IN THE INFORMAL SECTOR

The use of digital devices by apprentices for learning purposes varies in both its extent and its success, mainly because of the following challenges:

- **Access to the internet:** Around 77 per cent of the apprentices surveyed owned a smartphone, and around four per cent owned a laptop, computer or tablet. The smartphone is therefore by far the most commonly used technological tool for digital learning strategies in the informal sector. Often apprentices who do not own a smartphone have access to other people's devices, either in the

workshop or privately. Apprentices and master craftspeople have developed many different social practices to avoid marginalising those who do not own a smartphone or cannot afford to download the required volume of data. Nevertheless, in very many cases the costs of owning a smartphone and of mobile data remain a limiting factor for learning.

- **Availability and quality of digital learning opportunities**: Apprentices find many resources online that they use to expand their knowledge and skills. However, almost without exception

these resources can be characterised as learning on demand: short, practice-oriented, and designed to answer specific questions, they are neither curriculum-based nor certifiable. Above all, that means step-by-step videos which are found on YouTube and often shared through social media. These low-threshold learning products that offer flexible access hold many advantages, but they also present challenges in terms of their quality and findability. Moreover, they are not well suited to systematic skills development. Learning platforms, meanwhile, play a much less important role for the respondents, as they generally do not offer content suited to the target group and they are not widely known.

- **Apprentices' digital skills and digital learning competence:** A lack of digital skills and of general learning competences restricts the learning strategies of many of the apprentices surveyed. According to the master craftspeople, the apprentices often need support to carry out effective research and to recognise relevant learning materials. However, the masters themselves are not usually well placed to offer the necessary support in more than a rudimentary way. In some cases, where the master craftspeople were digitally literate and possessed appropriate skills for online learning, they were still limited in their ability to impart these skills to their apprentices because the latter lacked basic literacy. Major shortfalls in school education therefore present a significant barrier to the use of digital devices during apprenticeships.

- **The key role of master craftspeople:** Learning with digital media will not replace other learning strategies in the foreseeable future, but is more likely to complement traditional strategies. Master craftspeople play a key role in this, for instance by helping their apprentices to find and assess relevant learning content, interpret information and classify it correctly, and put into practice the things they have seen or read; they also open doors for the apprentices to relevant social groups in the digital space. In a more fundamental way, they can encourage and facilitate digital learning by being open-minded about the use of smartphones in the first place and responding to initiatives and questions that the apprentices bring from their digital

explorations. If, on the other hand, they remain very sceptical about digitalisation, this can have an inhibiting effect. These findings therefore show that any approaches to promote digital learning as part of apprenticeships in the informal sector cannot succeed without the involvement of the master craftspeople.

Vocational education and training is a priority area for German development cooperation in all three of the countries in the study, where the majority of young people carry out their vocational training in the informal sector. The digital transformation and the promotion of digital skills is a core area of work for the German Federal Ministry for Economic Cooperation and Development (BMZ). Despite this, neither the programmes and projects of German development cooperation nor those of other donor organisations or government agencies identified in this study have yet focused explicitly on using smartphones in learning and teaching for informal workers and learners. Efforts to impart digital skills focus rather on smartphone use in working contexts, for example for digital marketing, whereas smartphones and other devices such as laptops or simpler mobile phones are not specifically used as learning tools. It is only in Senegal that digital approaches are being developed, using the Boîte à Innovations and e-jang platforms, to support learning by target groups in the informal sector.

To sum up, especially with respect to the role of master craftspeople, it can be said that digitalisation has diverse disruptive effects, including for apprenticeships in the informal sector. In a situation where countries are making formal post-primary education more accessible, for instance by abolishing school fees and expanding formal vocational education and training provision, and where, at the same time, smartphones are leading young people to new sources of knowledge, master craftspeople must address the question of how to maintain the appeal of the training they offer. Efforts to engage with this question present an important lever for improving the quality of apprenticeships in the informal sector. At the same time, however, there is a dearth of experience regarding effective ways in which state-run programmes and those supported by development cooperation can exploit the potential of digitalisation to improve apprenticeships effectively in the informal sector.

RECOMMENDATIONS FOR ACTION

The analyses carried out in this study provide the basis for determining the following starting points for practical application and recommendations for action:

1. **Make access to the internet easier:** Access to internet-enabled devices and to data is a precondition for people to share in the benefits of digitalisation. If the provision of devices or (inexpensive) data packages is included as a component of support activities, their specific design should consider not only the needs of individuals, but also those of the training enterprise as a social unit. This will enable the promotion of collective teaching and learning processes, while ensuring the devices can be used both for learning and for work. Learning activities should always be designed in such a way that they require as little data as possible. Other approaches to minimising internet costs, such as using free ('zero-rated') websites, can also be considered, provided it is possible to guarantee long-term access to them.

2. **Prepare the ground for good quality learning activities:** For the kind of learning that addresses specific problems and needs, while being both flexible and limited to a set duration, the problem is not so much a shortage of online resources but a lack of skills to find and recognise them. Moreover, apprentices might also find it attractive to pursue more rigorously structured and perhaps certifiable training courses (including micro-credentials [2]). At the time of this study, little use is made of more formal online courses, typically linked to learning platforms, or they are used solely by apprentices who also learn at a formal TVET institution prior to or alongside their training in the informal sector. In order to reach the target group of learners in the informal sector, it would be a good idea initially to utilise the platforms and services known to them, such as

YouTube and Facebook. Linking different types of training course as well as different platforms and social media would ultimately pave the way for apprentices in the informal sector to find openings for training, advice and certification that complement the practical training with their master craftsperson.

3. **Mainstream digital skills for teaching and learning:** In the countries covered by the study there are still no support activities for apprentices and master craftspeople to develop their digital teaching and learning skills, although such skills are key to using digital devices for training. Since smartphones are already ubiquitous as learning media in the three countries examined here, it would be advisable to bear them in mind and integrate them into all training activities for apprentices and master craftspeople in the informal sector, and then use them for follow-up activities. In the case of master craftspeople, digital learning should above all be integrated as one aspect of the training they provide to apprentices. For apprentices, 'how-to' style learning nuggets could also be developed that address different facets of learning competence, such as internet research and critical approaches to online resources.

4. **Integrate master craftspeople into training courses for apprentices:** A recurring message voiced both by the experts interviewed and by the master craftspeople was that the latter should always be involved in courses for apprentices. On the one hand, this would facilitate training providers' access to the apprentices. On the other hand, master craftspeople are most likely to give their support if they themselves have a direct benefit from their apprentices' participation in such courses, for example through activities of their own, tailored to their needs. Various activities are conceivable,

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[2]   Micro-credentials, also called 'badges' or 'digital badges', are small digital awards or certificates issued by educational institutions, companies or other organisations to recognise specific skills, knowledge or achievements. Unlike traditional qualifications, micro-credentials are more specific, focusing on one particular area of knowledge or skill. They can be earned online then presented on social networks and in CVs. Micro-credentials have gained in significance in recent years as they offer a means of encouraging continuous learning and development.

for instance: courses on using digital media in the occupation (including the question of how to transfer those skills to the apprentices); workshops to train trainers, with a focus on digital media; and exchange formats for sharing and discussing digital courses. These formats (e.g. WhatsApp groups) could also be attached to existing networks, for example those organised by the trade associations or chambers of skilled crafts[3].

5. **Pursue a participatory and academically supported approach entailing co-creation and user-centred design for training courses:** Due to the scarcity of research and the fact that there is little experience and no well-founded evaluations in this area, it is advisable to involve representatives of the target group as much as possible when developing approaches to promote digital skills in apprenticeships.

6. **Use all the benefits of social media to broaden the reach of training courses:** Many apprentices and master craftspeople are guided or inspired to a large extent by social media such as WhatsApp, Instagram or Pinterest when they explore the digital world. The full potential of social media should therefore be used to ensure the wider uptake of offers that are linked to learning platforms but which are not yet available through the preferred services like YouTube or Instagram.
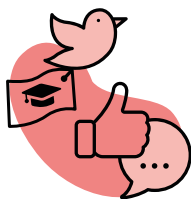
This study confirms the assumption that low-threshold digitalisation has great potential to transform both work and training in the informal sector. In order that these changes have a positive impact on the living and working conditions of the target group, while avoiding new dynamics of marginalisation, the focus on digital skills for teaching and learning is becoming increasingly important. Master craftspeople and apprentices alike exhibit a great need for development, and they have a strong interest in related support activities. Finally, in developing such approaches, it is important to remember that representatives of the target group should be closely involved in the processes, and that both development and implementation should, as far as possible, be underpinned by appropriate studies and evaluations. The present study, which is exploratory in nature, offers some initial suggestions and entry points for this, but it is no substitute for a more in-depth examination of the context and the needs in specific occupations and locations.

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[3]   For more information about this, please refer to the main part of the study. In Senegal, the chambers of skilled crafts play a very important role, addressing enterprises in the informal sector and receiving support from them in turn. They cover all the skilled trades, whereas the trade associations that also exist are specific to individual occupations. There are no comparable chambers of skilled crafts in Ghana or Kenya.

1   DESCRIPTION OF THE PROBLEM AND THE OBJECTIVES OF THE STUDY

Technological change is having a growing impact on societies in sub-Saharan Africa. Besides the sensational forecasts predicting, for example, '230 million digital jobs in sub-Saharan Africa by 2030' (International Finance Corporation, IFC, 2019, p.10), the rapid growth in the number of internet users, from nine per cent of the population in 2010 to 30 per cent in 2020, shows that digitalisation has become the reality in people's everyday lives (data from the International Telecommunication Union, ITU, 2022). In some countries, such as Nigeria, more than half of the population buys services or products online, while mobile money transfers account for almost 25 per cent of gross domestic product in sub-Saharan Africa (International Monetary Fund, IMF, 2020, p.36). In Kenya, for example, 79 per cent of people over the age of 15 use mobile money (Demirgüç-Kunt et al., 2021). New technologies are also having an impact on the world of work, including the informal sector, which in many countries of the region provides up to 90 per cent of jobs. New devices, especially feature phones[4] and smartphones, are being introduced into the work process, for example to support money transfers, marketing or customer communication (see Berrou et al., 2020). Directly related to these technologies, new areas of work are emerging (e.g. mobile phone repairer), as well as new ways of organising work (e.g. the gig economy) and even new industries (e.g. business process outsourcing). The requirements for skills are also changing accordingly, across all sectors and occupations (cf. GIZ, 2020).

New technologies call for new technical know-how and skills. At the same time, the importance of key competences (soft skills) such as communication, cooperation and learning skills is also growing. Meanwhile, new communication technologies also require basic literacy skills as well as digital competences of varying complexity (cf. GIZ, 2020). In sub-Saharan Africa, up to 90 per cent of young people acquire their vocational skills in the informal sector, often through informal apprenticeships (International Labour Organization,

ILO, 2012, p.11; see Info Box 1). Despite this fact, the impacts of digitalisation on vocational education and training in the informal sector have not yet been adequately researched. The prevalence of smartphones in developing countries and their use for viewing educational content (video tutorials, graphics, audios and texts) highlight the potential significance of this technology for self-managed learning.

Information about this remains scanty, however, and offers too few tangible entry points to exploit the potential of existing solutions or for the development of context-sensitive approaches that would support learning processes in the informal sector (cf. UNESCO, 2014). Studies that rely solely on literature reviews run the risk of underestimating current developments. As recently as 2020, for example, in a literature review examining lifelong learning in the informal sector, Palmer (2020) concludes that 'new ICTs[5] (internet-connected computers, smart-phones) are not yet prevalent in large parts of the informal economies' and that, 'in low-income countries, the radio, (non-smart) mobile phones, and television are likely to remain the most widespread forms of ICT until the cost of both internet-enabled devices and data packages reduces' (Palmer, 2020, p.34). In another systematic literature review on technical and vocational education and training (TVET) in sub-Saharan Africa, Haßler et al. (2019) conclude that informal apprenticeships are 'underappreciated by and find too little inclusion in TVET policy. It is proposed that these approaches be better adapted to future needs by focusing more closely on technology-related, ICT-based approaches that also enable vocational distance learning.' However, an empirical basis for the development of such approaches is still largely lacking.

This is the starting point for the present explorative study, which, in its first section, presents insights into the actual uses of digital technologies, especially smartphones, and the acquisition of relevant skills in informal apprenticeships. Building on this, and based on

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[4]   Feature phones are mobile phones that have less capability than smartphones but still offer more functions than just making phone calls. For example, they have a simple web browser that can be used by means of a graphical interface.

[5]   Information and communications technology (ICT)

how usage has evolved in practice, the study then presents appropriate solutions and approaches for future development cooperation projects and elaborates specific entry points for the improvement of informal apprenticeships or similar forms of learning and work.

In order to identify entry points to **make effective use of the potential offered by digital media, especially smartphones, for modernising informal apprenticeships and for learning in the informal sector**, the study therefore concentrates on the following three areas:

- **Uses of smartphones and digital skills in the informal sector:** How are smartphones and other internet-enabled devices used in practice in jobs in the informal sector, and what demand for skills does this create on the part of learners?

- **Uses of smartphones for learning purposes:** How are smartphones used for learning and teaching purposes in the informal sector?

- **Uses of smartphones in projects/programmes to modernise informal apprenticeships:** How are smartphones used in projects/programmes to modernise informal apprenticeships?

Following a brief description of the approach (Part 2) and a description of apprenticeships in the three countries addressed by the study, Ghana, Kenya and Senegal (Part 3), empirical results in the three areas listed above are then presented (Parts 4-6). After a summary discussion of the results (Part 7), recommendations for action and additional questions are formulated (Part 8).

Figure 1: Street view in an exclusive residential district of Accra

Info box 1: Definition of informal apprenticeship

The concept of informal apprenticeships in sub-Saharan Africa refers to the system for learning a skilled craft or a vocational skill through practical training with an enterprise in the informal sector. This form of training is common in many sub-Saharan African countries.

In traditional vocational training, young people work as apprentices with an experienced expert known as the master craftsperson (MCP), to learn a specific occupation or skill. The apprenticeship might last from a few months to several years, depending on the traditions prevailing in each country, the complexity of the occupation in question and the apprentice's ability to learn.

Such apprenticeships are often the most common way of learning a trade or a skill in the informal sector. This has become particularly well established in skilled crafts, like construction, carpentry and tailoring, though they are also seen in modern occupations such as electrician, solar installer or mobile phone repairer. It is often the only affordable form of vocational training available to young people from low-income families. Depending on the country, an apprenticeship fee is paid for this training. Once they are capable of contributing productively to their enterprise, however, more advanced apprentices usually receive some pocket money, a commission or another form of financial recognition. An informal apprenticeship is an important path to employment. In some countries it is also popular among the graduates of vocational training schools who fail to find a job with a company in the formal sector.

Typically, this form of vocational training is subject to little or no state regulation and it does not adhere to any recognised standards. This can lead to exploitation due to long-term relationships of dependency, or the quality of training might be inadequate, with a lack of basic theoretical knowledge. This in turn can limit opportunities for advancement. Nevertheless, because of its importance for the training of a considerable number of young people, it continues to prompt interest on the part of individual governments and the international donor community alike. Many pilot projects have already shown that measures to improve informal apprenticeships can have positive effects, both for the apprentices and for the companies in the informal sector.

Source: Hofmann et al. (2022)

Info box 2: Definition of the informal sector

In its definition of the **informal sector** at the 15th International Conference of Labour Statisticians (ILO, 1993) ILO characterised it based on the following three features:

- The informal sector may be broadly characterised as consisting of units engaged in the production of goods or services with the primary objective of generating employment and incomes to the persons concerned. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production, and on a small scale. Labour relations – where they exist – are based mostly on casual employment, kinship or social relations rather than contractual arrangements with formal guarantees.

- Production units of the informal sector have the characteristic features of household enterprises. The owners have to raise the necessary finance at their own risk. Expenditure for production is often indistinguishable from household expenditure.

- Activities performed by production units of the informal sector are not necessarily performed with the deliberate intention of evading the payment of taxes or social security contributions, or infringing labour or other legislations or administrative provisions. Accordingly, the concept should be distinguished from the concept of activities in the hidden or underground economy.

Besides workers in the informal sector, the definition of **informal employment** also includes all other workers whose employment relationships are insufficiently or not at all regulated by labour law and offer no social protection. This typically includes those who work in informal employment relationships for employers in the formal sector.

The term **informal economy** is usually used as a broad term encompassing 'all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements' (ILO, 2002, p.53).

Source: GIZ (2019)

2 APPROACH

The present study was conducted using qualitative social research methods, based on case studies. Case studies make it possible to understand learning processes in relation to the (social, cultural and material) context in which they take place. To obtain sound findings that also have relevance beyond the individual cases, the case studies were selected according to certain criteria. Using a 'most-different approach', with an array of cases as wide as possible, allows light to be shed on the object of the study from different perspectives and in its various manifestations. Comparability between cases (a 'most-similar approach') makes it easier to identify regularities. For the present study, both approaches were combined:

- **Most-different:** Three occupations were studied in each of three countries that differ from each other in many aspects. The distinguishing criteria between the occupations were the sector (skilled crafts/manufacturing; individual service provision; technical), gender (female and male-dominated occupations) and the prerequisites for previous schooling (literacy and numeracy skills). Regarding countries, it was important to include countries whose education systems differ greatly due to their colonial history, and to include East and West African countries. Surveys were conducted in the respective capitals and in one or two medium-sized cities of each country.

- **Most-similar:** The three occupations needed to be the subject of informal apprenticeships, widely occurring and easily comparable across national borders. They also had to feature a potential for innovation or a need for qualifications that provide incentives for (formal and informal) further training. It was necessary that each of the countries was characterised by a similarly high uptake of mobile phones. For all the occupations, the use of digital technologies (especially the smartphone) in the work context needed to have been previously documented. Economic dynamism and political stability in all three countries would increase the chances of observing innovative practices in the informal sector.

In the light of these considerations, the following occupations were selected:

- **Electrician:** technical occupation; male-dominated; characterised by technical innovation, for instance in the field of photovoltaics; challenging in terms of acquiring new skills; widely occurring and easily comparable across countries. The surveys revealed that the umbrella term 'electrician' covers a wide range of activities in all three countries – from building services, through repairing household appliances, generators or laptops, to the installation of solar panels. Although most of the master craftspeople interviewed specialise in one or more areas of activity, this is not often reflected in the job title.

- **Tailor/dressmaker:** traditional skilled craft pursued by both women and men, with potential for innovation and creativity, for example in marketing, supply chains and product design. For the surveys, some master craftspeople were questioned who offer bespoke tailoring, some who undertake larger orders to standardised specifications, for example for school uniforms, and others who mainly work in the field of alterations.

- **Hairdresser**: individual service provision; female-dominated; potential for innovation and creativity, for example related to marketing and customer contact. Of the survey respondents, some specialised purely in hairdressing, while others also offered make-up, cosmetics and massages. Barbers and men's hairdressers were also interviewed.

The research on the three fields of occupation described above was conducted in three countries:

- **Ghana:** Informal apprenticeships are widespread in Ghana, where they are characterised by well-documented features such as the defining role of trade associations, apprenticeship fees and other informal institutions. Reform efforts in recent years indicate a strong political will to modernise the vocational education and training system, which follows the Anglo-Saxon template, including informal apprenticeships, for example, by recognising informally acquired skills and by forming sector skills councils. Surveys were conducted in the capital Accra and in the city of Tamale (370,000 inhabitants) in the north of the country.

- **Kenya:** Kenya's business structure is characterised by micro, small and medium-sized enterprises (MSMEs), the majority of which are active in the informal sector. In Kenya they are also referred to as the jua kali sector, 'jua kali' being the Kiswahili term for the hot sun under which most MSMEs operate. The sector provides employment for 83 per cent of the working population. In the jua kali sector, an informal approach is also taken to knowledge transfer. Informal apprenticeships are common, but unlike the other two countries, informal sector associations are either not involved, or are involved only to a very limited extent. Surveys were conducted in the three most populous regions of the country: in the capital Nairobi (4.4 million inhabitants), and in Mombasa and Kisumu (1.2 million and 323,000 inhabitants respectively).

- **Senegal**: Informal apprenticeships are widespread in Senegal. The system differs from apprenticeships in Ghana in that it is oriented more towards family structures and less influenced by informal sector institutions (Huyghe Mauro et al., 1999). A number of different programmes aim to link informal apprenticeships to the TVET system influenced by the French model, for example by offering training courses and by recognising skills acquired infor-

mally. Surveys were conducted in the capital Dakar (1.1 million inhabitants) and in Thiès (318,000 inhabitants). In Dakar, most of the interviews were held in Guédiawaye département, a satellite town of the Dakar metropolitan region, where there is little industry but the highest population density in the country.

Data collection entailed the following qualitative methods:

- **Expert interviews** with representatives of education authorities, non-governmental organisations, trade associations and international organisations, as well as academics: these interviews primarily served to answer questions regarding the use of smartphones in projects/programmes to modernise informal apprenticeships. Additionally, they provided contextual information on the latest developments in such apprenticeships. Between four and seven expert interviews took place in each country.

- **Semi-structured group interviews** with apprentices and master craftspeople: using semi-structured interview guidelines, apprentices and masters were questioned about their use of digital technologies, especially smartphones, and their digital skills. The interviews with master craftspeople took place in workshop spaces, while with a few exceptions the interviews with apprentices took place in the enterprises. This meant the questions could be linked to specific work situations and objects, which supported the verbalisation of implicit knowledge (e.g. about skills). In all, 102 master craftspeople and 142 apprentices were interviewed.

- **Observation and photographic documentation:** Learning and working situations were documented and recorded photographically, according to observation guidelines.

Access to the respondents (field access) was facilitated by local experts, who were also involved in conducting the surveys. In Ghana and Senegal, the contacts to master craftspeople were mainly provided by associations of informal enterprises, while in Kenya they were arranged by the local expert, who drew upon a network of community organisations.

Thanks to the intensive preparatory discussions among the local experts, it was possible to address a wide range of enterprises, from micro-enterprises in slum areas to successful small businesses with several employees. These included digitally literate master craftspeople as well as others with very little or no access to digital media and mobile data. The apprentices surveyed also showed great diversity in terms of school background, age and digital skills. Among the 102 master craftspeople and 142 apprentices interviewed, 46 and 83 respectively were women.

Figure 2: Group interview with apprentices in their working context, a hairdressing salon in Dakar

The decision, for practical research reasons, to approach the master craftspeople first and so make contact with apprentices, presents the risk of a somewhat one-sided view of teaching and learning practice. Master craftspeople who agreed to be interviewed were open-minded and interested in the topic of apprenticeship. It can therefore be assumed that the teaching and learning practices observed were rather more complex and perhaps also more carefully considered than in many other workplaces. This should be taken into account when assessing the results, as should the exploratory nature of the study, which does not imply that the surveys were representative.

Interviews were conducted in English or French, with some recourse to local languages as an aid; records were kept in these languages, partly verbatim and partly in summary form. A qualitative content analysis was applied to the data collected. To this end, excerpts from interview transcripts, photos and, in some cases, audio clips were classified thematically according to categories aligned with the various key questions of the study. The analysis and interpretation of the data was guided by a broad-based concept of learning, including also experiential learning that occurs unconsciously on the part of the learners. Special attention was likewise paid to social interactions, the importance of which for learning in informal apprenticeships has been demonstrated by previous research. The description of the observed and derived digital skills draws on UNESCO's Global Framework of Reference on Digital Literacy Skills (2018; see detailed presentation in Annex 1). This model builds on the European Commission's Digital Competence Framework for Citizens (DigComp 2.0), while adding two more areas of competence – firstly, the basic operation of devices and software and secondly occupationally specific digital skills (cf. Vuorikari et al., 2016). The model has the advantage of taking into consideration particularities of the context of developing countries (see Table 1).

Table 1: Global Framework of Reference on Digital Literacy Skills

Competence areas	Competences
0. Devices and software operations**	• Physical operations of digital devices** • Software operations in digital devices**
1. Information and data literacy	• Browsing, searching and filtering data, information and digital content • Evaluating data, information and digital content • Managing data, information and digital content
2. Communication and collaboration	• Interacting through digital technologies • Sharing through digital technologies • Engaging in citizenship through digital technologies • Collaborating through digital technologies • Netiquette • Managing digital identity
3. Digital content creation	• Developing digital content • Integrating and re-elaborating digital content • Copyright and licences • Programming
4. Safety	• Protecting devices • Protecting personal data and privacy • Protecting health and well-being • Protecting the environment
5. Problem-solving	• Solving technical problems • Identifying needs and technological responses • Creatively using digital technologies • Identifying digital competence gaps • Computational thinking **[6]
6. Career-related competences**	• Operating specialised digital technologies for a particular field** • Interpreting and manipulating data, information and digital content for a particular field**

**   Newly added competence areas and competences, not in the European Commission's DigComp 2.0
     Source: UNESCO (2018, p.23

[6]   Following Aho (2012), computational thinking is understood here as 'the totality of thought processes that are used to model problems and proce-
     dures used to solve them in such a way that algorithmic processing becomes possible.' (Eickelmann & Vahrenhold & Labusch, 2019 p.367)
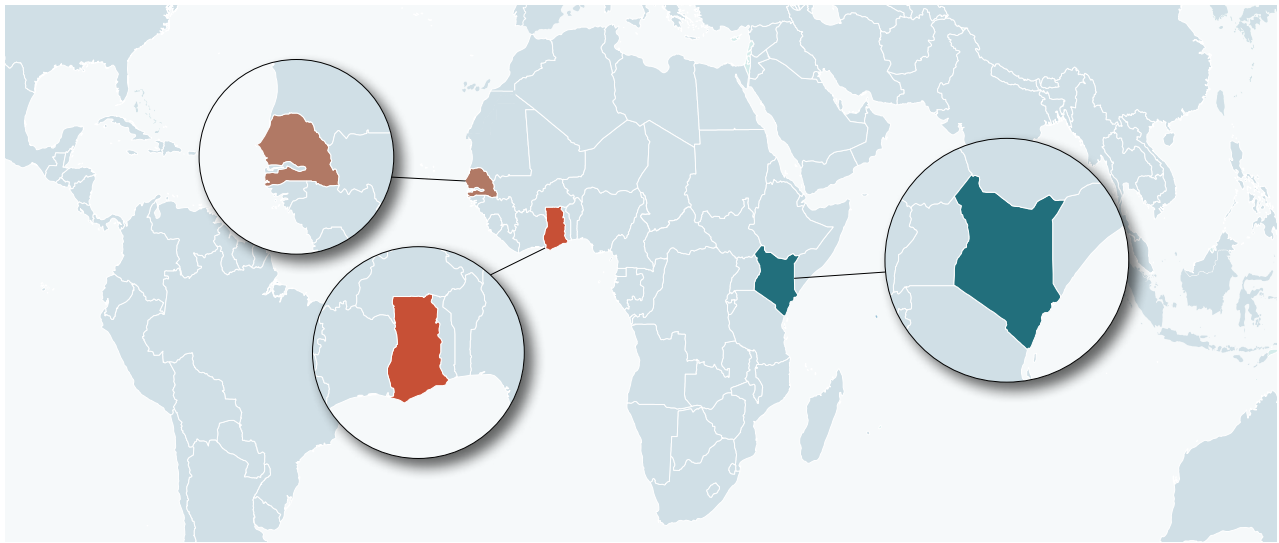
3   MAIN FEATURES OF VOCATIONAL TRAINING IN THE INFORMAL SECTOR IN GHANA, KENYA AND SENEGAL

Apprenticeships in the informal sector are a widely used means of acquiring vocational skills for young people in developing countries. They are not regulated by law, but rather embedded in the norms and practices of the local community. For this reason their features differ from country to country. Here, Ghana, Kenya and Senegal represent three very different forms of apprenticeship (cf. Charmes and Ourdin 1994). Apart from the differences, however, which are described in greater detail below, similarities also exist between these forms in terms of the teaching and learning processes. It is the underlying practices and learning strategies where digitalisation is raising questions and generating pressure for change.

3.1 GHANA: THE 'COASTAL' TRAINING MODEL

Ghana has a population of almost 32 million and since 2010 has belonged to the group of lower middle-income countries. The average per capita income in 2021 was around USD 2,445, with a quarter of the population living in extreme poverty, i.e. on less than USD 2.15 a day. Since 2021, after the economic slump caused by the coronavirus pandemic, Ghana has once again been achieving growth, most recently at a rate of 5.4 per cent. However, at the time of the surveys in August 2022, high year-on-year inflation exceeding 30 per cent was having a severe effect on people (World Bank, 2022a).

In terms of digitalisation, Ghana is one of the most dynamic countries in its income group in the region (IMF, 2020, p.33). Across the country, 94 per cent of the population has potential access to mobile data using 2G or 3G. In urban centres the figure is over 99 per cent, and 88 per cent could even use 4G[7].

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[7]   2G, 3G and 4G refer to generations of standards for cellular mobile telephony, which define the transmission speed and capacity for mobile data connections.

- 2G enables the transmission of voice and text messages.
- 3G offers a higher data transmission speed, enabling mobile broadband internet use.
- 4G offers still higher transmission speeds and enables better quality of transmission for data, voice and videos.

Individuals using the Internet (% of population)
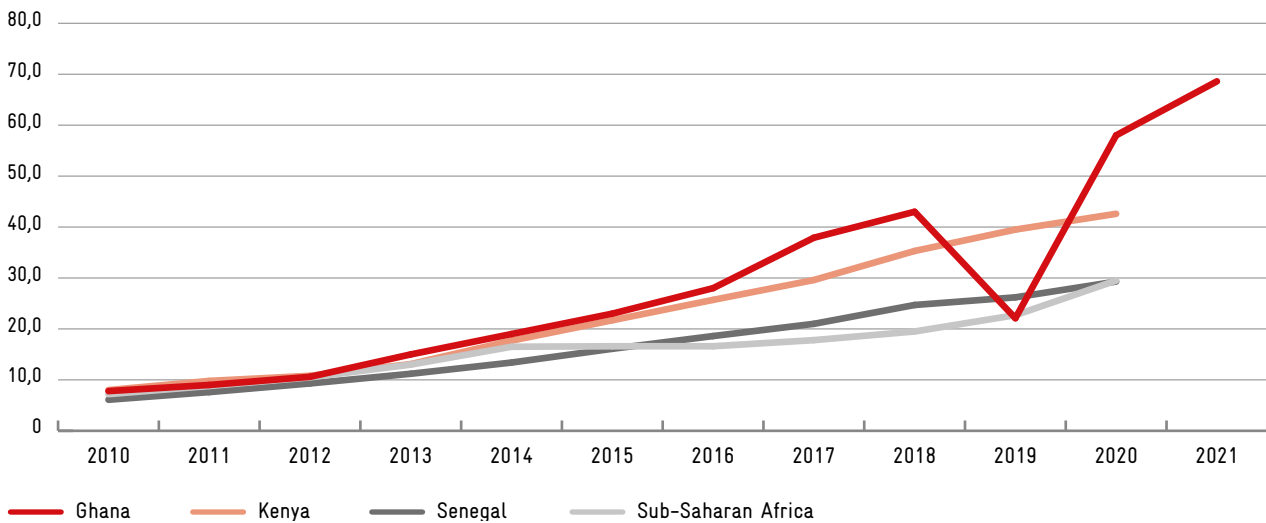
Figure 3: Proportion of the total population who use the internet (in per cent)
N.B : Internet users are people who have used the internet in the last three months (regardless of location). The internet can be used on computers, mobile phones, personal digital assistants, gaming devices, digital televisions, etc. Source: Own chart, International Telecommunication Union (ITU), World Telecommunication/ICT Indicators Database (2022)

Recently, the number of internet users has been growing steadily, reaching around 58 per cent of the population in 2020, compared to 43 and 36 per cent respectively in Senegal and Kenya (ITU data, 2020).

Most people access the internet using mobile phones, with Ghana counting 130 mobile phone subscriptions per 100 inhabitants (ITU Data, 2020). The main barriers to its wider use are a lack of skills (including illiteracy), as well as the prices of mobile devices and mobile data, despite these costs being relatively low by international comparison. In 2021, two gigabytes (GB) of mobile data in Ghana cost the equivalent of just over two per cent of the average monthly income. This is far below the average for all countries in sub-Saharan Africa, which was 5.12 per cent in the same year. As such, Ghana is one of the few countries in the region whose data prices match the target set for 2025

ICT price basket as percentage of monthly GNI per capita (2021)
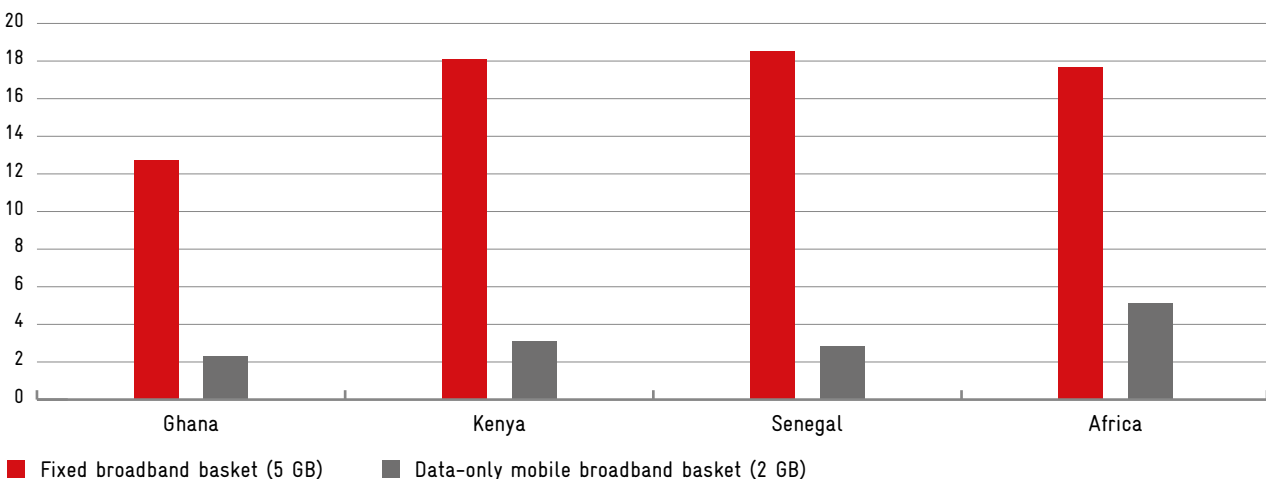
Figure 4: Internet prices compared to average incomes
Source: Own chart. ITU data (2021)

by the United Nations (UN) Broadband Commission on Sustainable Development (see Figure 4, and World Bank, 2021, p. 84ff and ITU data, 2021).

Almost nine out of ten employees in Ghana work in the informal sector, for instance without employment contracts or social security (Baah-Boateng & Vianek, 2020). Despite this large number of employees, the informal sector only generates about one third of the gross domestic product (GDP) (Ocran, 2018, p.23). Focusing on the risks associated with informal employment, such as low incomes, precariousness, poor working conditions and low prospects for advancement, fails to reflect the heterogeneity of the informal sector or its important role in poverty reduction. Alongside the large proportion of employees estimated to live from hand to mouth, who work in the informal sector only by necessity, there are also successful entrepreneurs whose business relationships sometimes extend into the formal economy (cf. Adom, 2016). For example, among the hairdressers interviewed in Accra, big differences were seen between the owner of an (informal) hairdressing and beauty school with an affiliated beauty salon, and a hairdresser who offers her services

with three apprentices in a container on the roadside. While the former makes targeted investments to expand her company, employs several people for her business operations and engages intensively in digital marketing, the latter works all day herself in contact with customers and strives to maintain her business despite the pressures of competition and after-effects of the pandemic. To better reflect this diversity in the informal sector, Fields (2005) distinguishes between an 'upper-tier' that is growth-oriented and a 'lower-tier' more focused on survival, although the boundaries are of course fluid (cf. Grimm & Korringa & Lay, 2012). For this study, the respondents in Ghana came from enterprises in both tiers.

That there is a correlation in Ghana between lower (vocational) education and employment in the informal sector has been empirically proven (Koto, 2015, p.102). At the same time, however, a great diversity can be seen in informal workers' educational backgrounds and CVs. Overall, the literacy rate in Ghana is 79 per cent, and among 15- to 24-year-olds it is as high as 92 per cent (UIS data, 2018). In a representative survey of entrepreneurs in the informal sector

Figure 5: Electrician's workshop in Accra. From left to right: junior apprentice (apprentice who has started a second apprenticeship), master, chief apprentice

conducted in 2013, 83 per cent of the respondents had attended primary and/or junior high school, while only four per cent had a university education (Koto, 2015, p.97). With the abolition of fees for general upper secondary schooling in 2017/18, the number of young people who still attend secondary school after ninth grade and the completion of their basic education has increased sharply, rising from 51 to 67 per cent between 2016 and 2020 (UIS data, 2020). Overall, however, only 2.7 per cent of students attend a vocational school (UIS data, 2019). This means the informal sector is particularly important for the training of school leavers. Studies show that training in the informal sector, with simultaneous access to physical capital, supports a significant increase in the earnings of self-employed people, even if it has no effect on employees (cf. Teal, 2006). An estimated 80 to 90 per cent of vocational training in Ghana's urban centres takes place through apprenticeships in the informal sector. Among the apprentices interviewed in Accra and Tamale, 38 per cent had completed senior high school while only five per cent had received no primary education or had dropped out. Two of the 61 apprentices interviewed already had a vocational qualification, and four were studying parallel to their training. In the electrical companies surveyed, there were also apprentices who already had work experience but who wanted to head in a different direction or learn an additional occupation.

Informal apprenticeships (called informal apprenticeship training in Ghana) are not regulated by the state, but are organised on the basis of social norms and traditions. Trade associations of informal entrepreneurs play a role in this by acting as mediators in cases of dispute and by promoting and implementing their own or third-party further training courses for apprentices and master craftspeople, for the certification of acquired skills or for the transition to self-employment. There is no fixed curriculum nor any established standards for the aptness of training institutions or training staff, so the knowledge and skills taught vary greatly depending on the master craftsperson. The duration of the vocational training, which is also not regulated, ranges from two to six years. The master craftsperson's own reputation and their need for the cheap labour that apprentices represent are important mechanisms regulating the quality of the training:

'If you find someone agreeing to be your apprentice, then you are a master craftsperson. It's just the reputation which regulates a little bit: if your training is not good, then apprentices will drop or just not come.'

(Electrician, Accra)

In the workshops visited, the apprentices and master craftspeople alike were able to describe the content and progression of the apprenticeship, from the simplest tasks to the more complex. In the case of tailors and dressmakers, the unwritten curriculum manifests itself in a self-made portfolio into which the apprentice attaches sewing samples. As such, it is not solely customers' orders that influence what knowledge and skills are taught, but also the locally prevailing occupational profile. In each of the three occupations studied here, the master craftspeople interviewed endeavoured to offer a wide range of products and services; accordingly, the training was wide-ranging. The majority of the electricians questioned had completed the wiring in buildings, while also repairing television sets and other household appliances. Others specialised in repairing laptops. Such differences could not be inferred from the title 'electrician'. Many hairdressers also offered massages, make-up or cosmetic treatments.

Knowledge and skills are acquired largely through observation and imitation, with junior apprentices also learning from the older senior apprentices. In some cases, apprentices remain with a company long enough to represent the master craftsperson to the customers, to work independently on orders and to instruct the other apprentices. Although they are considered skilled workers, they have neither an employment contract nor a regular wage. They are called chief apprentices and differ from former apprentices whom the masters occasionally call in to work on larger orders (a practice known as 'work and pay').

Apprentices and their families usually contribute to the financing of their training by paying an apprenticeship fee. Empirical studies, mainly focusing on female car mechanics, describe a financing system whereby apprentices pay for their training once at the beginning of their training and again at the end, either with

money or in kind, such as food or drinks. The level of these fees differs primarily according to the occupation and the location. Apprentices sometimes receive pocket money, but there is no entitlement to this and the amount can be influenced, for instance, by how the business develops. In some cases, the fees can be waived if apprentices agree to stay on with the company for a certain period of time without a fixed wage (cf. Afoblikame, 2018). The current study also revealed different practices with regard to the financing of tools and materials. Whereas in one tailoring workshop the apprentices have to buy their own mechanical sewing machine and bring it with them, in another they can use the available electric machines. Similarly, some apprentices interviewed were permitted to use cheap fabrics or care products in their workshop or salon for learning purposes, while others had to buy these for themselves. In general, the cost of such materials was cited several times as a major burden, while for apprentices without a sewing machine, for example, it was possible to begin their apprenticeship anyway and borrow a machine in the workshop for an initial period.

At the end of their training, apprentices receive a letter ('certificate') from the master craftspeople. For some occupations, they also have the option of sitting an external, state-recognised examination to obtain certification of the skills they have acquired. Among the (former) apprentices interviewed in Accra, some had already taken examinations at levels 1 or 2 of the national qualification framework, thereby obtaining National Proficiency I or II certificates, while others were preparing for these examinations, autonomously and with the help of their masters. The respondents viewed such certificates as an advantage, above all when it comes to working for other companies. However, the overwhelming majority of the apprentices interviewed aspire in the medium or long term to self-employment in the informal sector, so not all of them seek certification. They see themselves as well prepared in terms of job-related skills, but in some cases they would like additional training in business management (bookkeeping, pricing, entrepreneurship skills, business skills, financial skills, digital marketing).

The contribution of the informal sector to training for young people and their transition into employment is recognised by the government. While there is little verified data on the topic, it is also mentioned in the TVET report of the Commission for Technical and Vocational Education and Training (CTVET), which was published for the first time in 2022 (CTVET, 2022). Beginning in the mid-1990s, various programmes have been implemented to modernise the system, including the Ghana Skills Development Initiative (GSDI), co-financed by Germany, which has been developing standards for training in various occupations since 2012. Moreover, at the time of this report, various training programmes for apprentices and master craftspeople were being run in Accra and two other regions of the country as part of the Ghana TVET Voucher project, supported by KfW in cooperation with trade associations. In the surveys in Tamale and Accra, most of the master craftspeople interviewed had taken part in at least one day-long training course, and some in Accra were also active as trainers in the programme through their work for a trade association or had even participated in the development of training standards in earlier phases of GSDI. So far, neither digitalisation nor the teaching of related skills for workers, master craftspeople and apprentices in the informal sector have played any significant role in these two programmes. In contrast, the eSkills4Girls initiative provides informal sector entrepreneurs with basic skills for using smartphones at work (see section 6.2).

3.2 KENYA: ON-THE-JOB LEARNING IN THE INFORMAL SECTOR

This East African country is home to 55.8 million people. The population is strongly concentrated along the shore of Lake Victoria in the west, where the port city of Kisumu is a commercial centre, in the capital Nairobi, and in the south-east along the coast of the Indian Ocean, with Mombasa as the second largest and most important port city in East Africa. The official languages are Kiswahili and English. Among Kenyans over the age of 15, the literacy rate is 81.5 per cent. The population is very youthful, with half of the people younger than 20 and nearly 40 per cent even under 15 (World Bank, 2022b). With 800,000 young people entering the labour market each year, education and the acquisition of vocational skills are key to harnessing the potential of this young population for the country's development.

Kenya has a two-tier education system consisting of primary and secondary schooling. Primary education is free and compulsory for children between the ages of 6 and 13. Secondary education is likewise free. According to the World Bank, some 5.3 per cent of the overall Kenyan budget was committed to the education system in 2018. Despite this spending being above the regional average, the education system is still unable to meet the needs of the country's growing population (see Mathenge, 2022). The shortage of teachers is acute, with the result that many schools have to cope with a teacher-to-pupil ratio of 1:50 or more. Despite the promise of free education, more than 60 per cent of all expenditure on education in Kenya is made by households sending their children to schools in the public sector (UNESCO, 2021, p.24), and only 25 per cent of children ever complete primary schooling (UNESCO, 2022, p.35).

Kenya is the economic, financial and transport hub of East Africa. Since 2014 it has been counted as a lower-middle-income country, with a per capita

Figure 6: A dressmaker and her apprentices in one of the workshops visited in Mombasa

income of USD 4,200 in 2020. In 2021, the services sector contributed the biggest part of the country's annual GDP – around 54 per cent. This was followed by agriculture at 22 per cent, although more than 54 per cent of the working population is engaged in agriculture. Industry, on the other hand, contributes only 17 per cent of GDP (World Bank, 2022b). Despite a growing entrepreneurial middle class and steady economic growth, it is estimated that unemployment and underemployment affect nearly 40 per cent of the labour force. The COVID-19 pandemic had a significant impact on the country's economy, leading to a temporary decline in GDP, with falling export earnings and increases in unemployment and poverty (see Were & Ngoka, 2022). In 2022, 17 per cent of the Kenyan population lived in extreme poverty. However, this was a significant improvement on 2015, when 36.1 per cent still lived on less than USD 2.15 per day. The great majority of people affected by poverty, around 87 per cent, live in rural areas (World Bank, 2022b).

On the African continent, Kenya holds a leading position in terms of access to digital infrastructure. According to ITU, in 2021 around 94 per cent of the population lived in an area with at least 4G mobile network coverage, and in 2019, 47 per cent owned a smartphone. In 2021 there were 54 active mobile broadband subscriptions per 100 inhabitants (ITU 2022a). Some 79 per cent of people over the age of 15 use mobile money (Demirgüç-Kunt et al., 2021). The best known mobile financial service is Safaricom's M-PESA, which operates well beyond Kenya's borders and counts 11 billion transactions per year (ITU, 2022b).

As in most countries of the region, the cost of mobile data presents a major challenge for digitalisation in Kenya.

Kenya's business structure is characterised by micro, small and medium-sized enterprises (MSMEs), the majority of which operate in the informal sector, with activities outside the formal economic and regulatory system. Nevertheless, they contribute significantly to job creation, income generation and economic

growth. Known collectively as the jua kali sector, they provide employment for 83 per cent of the working population. However, the wages paid are often well below the 2020 legal minimum for Kenyan cities of KES 13,572 (approx. EUR 100[8]). According to an ILO study (2021), estimated monthly wages paid by micro and small enterprises amounted to KES 3,525 (EUR 26) and KES 4,975 (EUR 37) respectively.

Skills training in the jua kali sector follows a non-formal approach. In Kenya, more people learn occupational skills through training in the informal sector than at all the formal training institutions combined (Ferej, 2012). This kind of training offers a cost-effective and flexible way for people with no school qualifications to acquire vocational skills (cf. UNESCO, 2012). The trainees can use the tools at their workplace so there is no need to finance special training equipment (ILO, 2012). However, depending on the workshop, the apprentices must pay a monthly training fee to the master craftsperson and must cover the cost of practice materials, as they are rarely able to practise during assignments for customers (cf. Apunda et al., 2017). Most of the master craftspeople included in the survey for this study stated that they do not charge fees. If fees are charged, however, they are used to pay for training materials, among other things. The majority of master craftspeople who do charge a fee claimed that they share this income with their employees or commissioned staff to compensate them for their support in the training.

> *'All my workers are paid on commission – if the students pay me – I share that with my workers, and they help me to teach them. Students pay KES 2,000-2,500 per month [approx. EUR 15-18], but in turn, I provide them with materials and equipment.'*
> **(Tailor, Mombasa)**

The apprenticeship usually lasts from eight to 18 months, depending on the progress made by the individual trainee. That is influenced, among other things, by the limited access to tools. Apprentices receive their

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[8]   KES = Kenyan shilling; exchange rate on 30 January 2023: EUR 1 = KES 135.67

training in line with the locally arising demand and are introduced to 'business culture' (Apunda et al., 2017), but they do not acquire the relevant underlying theoretical knowledge (cf. Haan, 2006). However, the survey for this study also revealed shorter training periods, whereby the transition from apprentice to (auxiliary) employee is fluid, and there are no clear criteria for the completion of the training as there is also no examination and certification (cf. Apunda et al., 2017). Many of the respondents reported that, after having learned a certain task, e.g. sewing in zips, they would perform this activity in exchange for a commission of up to 20 per cent, whereas they would continue to learn other tasks without earning until they had also mastered those skills.

Informal apprenticeships are widespread, but unlike in Ghana or Senegal, the umbrella organisation, the Kenya National Federation of Jua Kali Associations (KNFJKA) and its members[9] play little or no role in regulating or modernising the training. In general, the informal sector is much less organised than in the other two countries. According to an ILO study, 66 per cent of the owners of informal enterprises do not belong to organisations such as trade associations, chambers of commerce or other forms of business association (ILO, 2021, p.4).

The 1990s and early 2000s saw a number of donor-funded projects to upgrade the skills of master craftspeople, but these ended as soon as the donor funding ran out (Apunda et al., 2017, p.347). None of the master craftspeople interviewed in this study had undergone training as part of such a project. Overall, the vast majority of interviewees in Kenya have had no contact with state-run training programmes in the informal sector. Only one of the individuals, the head of a small private vocational school, named by KNFJKA had received training in educational methods a few weeks before the interview. This was organised by the Commonwealth of Learning and the Kenya Technical Teachers College.

The formal education sector exhibits significant quality gaps and places a strong emphasis on theoretical knowledge, without much reference to practical applications (see Kenyan Ministry of Higher Education, Science and Technology, MoHEST, 2014; Apunda et al., 2017; Arias, 2019). In a study on the digital equipment available in formal vocational training institutions and their suitability for the future of work, one of the most important findings was that these institutions rely on trainers who possess academic qualifications but lack practical experience in the industry (Odondi & Arisa & Wangari, 2022). They often have insufficient training to operate the devices or to teach the apprentices practical skills. They also lack the digital skills needed in the marketplace. As a result, many vocational school students from the formal education system turn to enterprises in the informal sector to gain the practical experience they lack. A significant number of the apprentices interviewed for this study had recently graduated from, or were still enrolled in, a formal vocational school. The observed range of apprentices' educational backgrounds was accordingly wide. Thus on the one hand, the informal sector provides a chance for young people who have done badly at school or dropped out early and who therefore lack the entry requirements for vocational training in the formal system, or for those who cannot afford such training. On the other hand, young people can also be found in the informal sector who are gathering practical experience alongside vocational school or even college-level studies.

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[9] A total of 673 trade associations are organised in the Federation, grouped into 18 sub-sectors (KNFJKA data, 2022).

3.3 SENEGAL: THE 'SAHELIAN' TRAINING MODEL

Senegal has 16.7 million inhabitants, a quarter of whom live in the Dakar metropolitan area. Like Ghana, Senegal belongs to the group of lower-middle-income countries (USD 1,430 per capita in 2020). According to the most recent surveys, before the pandemic, 9.3 per cent of the population lived in extreme poverty, with less than USD 2.15 per day (World Bank Data, 2020). In 2020, severe lockdowns and restrictions on interactions led to a 29 per cent average decline in monthly incomes for the residents of Dakar and its neighbouring regions. As a result, extreme poverty sky-rocketed, reaching 23 per cent for periods. Although the economy has recovered since, the pandemic appears to have intensified social inequalities for the long term (cf. Diallo & Sylla, 2022).

The industrial sector plays a relatively minor role in the labour market. Around 30 per cent of the workforce is employed in agriculture and 57 per cent in the service sector. Nine out of ten workers are employed informally and the informal sector encompasses 85.5 per cent of non-agricultural enterprises, including individual entrepreneurs. Its contribution to GDP is estimated at 41 per cent. Given the shortage of jobs in the formal economy, the informal sector plays an important part in providing employment for the approximately 100,000 young people who pass out of the education system each year (ILO, 2020a, p.5).

At 43 per cent, the proportion of the population using the internet in Senegal is higher than the average for countries of sub-Saharan Africa (30 per cent). For every hundred inhabitants, there are 114 mobile phone contracts (ITU data, 2020). A survey of 500 companies in the informal sector in 2020 demonstrated the great significance of digital technologies in everyday work. Nine out of ten respondents used a mobile phone, just under 20 per cent a smartphone, and around ten per cent a computer. Overall, women used digital technology less than men, except for younger women (under 30), who used smartphones and computers more often than young men (27.4 compared to 26.9 per cent, and 13.1 compared to 11.4 per cent). The use of digital technologies by entrepreneurs, for example for money transactions, communication with customers or accounting, has a positive effect on their turnover and on the number of employees (cf. Atiyas & Dutz, 2021). However, various barriers make it difficult for some sections of the population to access the internet. These include the language barrier, a lack of electricity in rural areas and the cost of mobile data. More than half of the people who can read and write in French use the internet, whereas only 19 per cent of those who cannot speak French or who are illiterate do so (Cruz & Dutz & Rodríguez-Castelán, 2021, p.47).

Despite considerable progress in some areas, comparatively low school enrolment rates still have an adverse impact on the overall educational level of the population. In 2020, a quarter of children of primary school age did not go to school, and only half of those of the appropriate age attended secondary school. In addition to structural weaknesses in the education system, another reason for this is the low acceptance of state schools among some population groups, who prefer to send their children to Koranic schools (daaras), for example, although these do not provide them with the basic skills prescribed in the state curriculum (UNESCO, 2022). Only 69 per cent of 15- to 24-year-olds and 52 per cent of all adults can read and write in French (UIS Data, 2017).

A significant proportion of young people who have not completed school education go on to do an informal apprenticeship. According to the latest available estimates, there are around 600,000 apprentices in the informal sector (Gaye, 2019, p.231). Government programmes to modernise apprenticeship training in the past led to the certification of only a few hundred apprentices. The Projet employabilité des jeunes par l'apprentissage non formel (PEJA), which has been running since 2019, is the first with an objective to train 32,000 young people in the informal sector. External examinations or the recognition of informally acquired learning outcomes are offered as part of certain projects, but the overwhelming majority of apprentices do not take up this offer. With respect to apprenticeships, chambers of skilled crafts and trade associations only act as multipliers in the implementation

of state or donor-funded vocational training programmes for the informal sector. Decree No. 8127 of 29 December 1953 legally regulates apprenticeship contracts in terms of their form and content, but these rules are not enforced. Most apprenticeships take place outside of any state intervention (ILO, 2020b).

Apprenticeships in urban centres and in modern occupations are influenced by the kind of informal apprenticeships that still persists in some older occupations. However, they generally differ from the latter for being increasingly open and diverse. Traditionally, apprentices are entrusted by their parents to a master craftsperson who in turn accepts an educational assignment that goes beyond just vocational training. Family relations or friendships play a key role, as the training relationship is established only verbally. No apprenticeship fees are paid, and the duration of the training is not defined in advance (cf. Fall, 2002; Gaye, 2019). Almost all of the apprentices interviewed said that the contact had come through their parents. The almost family-like relationships that arise between apprentice and master are underscored by statements such as this:

> *'You are a mother before you are an entrepreneur, that's why you teach your daughters, your sisters.'*
> **(Tailor, Dakar)**

In all the occupations, the master craftspeople interviewed reported a change in the training relationship. It has become more difficult, they said, to find apprentices who are happy to accept the traditional conditions. Young people have more opportunities to pursue training in the formal system, and failing that, rather than take an unpaid apprenticeship, would prefer to have an unskilled but paid job, such as driving a motorbike taxi. The masters therefore feel obliged to shorten the duration of the apprenticeships, to give apprentices more pocket money, to reduce the working hours, or even manage without apprentices altogether and hire unskilled labour instead. While the majority of respondents among the apprentices surveyed had indeed dropped out of primary education, or had attended a Koranic school that did not qualify them to take up vocational training in the formal system, there were nevertheless some cases that point

Figure 7: One of the master hairdressers in the survey, in front of her hairdressing salon in Thiès

to a diversification of the apprentices' profiles. These included young people pursuing their apprenticeship part-time parallel to school, students or graduates of formal vocational training programmes wishing to gain practical experience, and a former housewife who needed to learn a trade after her divorce.

In the group interviews, the master craftspeople often distinguished between apprentices who come to them through relationships and those who come of their own accord because they want to learn that specific

occupation. One master tailor, for instance, explained that he actually had too many apprentices (eight in total, including four children under the age of 15), because relatives and friends kept approaching him and asking him to take on their children when they dropped out of school. He takes them in because of his sense of obligation, although at first they are not much help in the workshop:

> *'Often, I have to educate apprentices who are entrusted to me through relationships, before I can get them interested in the job.'*
> (Tailor, Dakar)

The wages paid to an apprentice and the duration of the training are both entirely at the discretion of the master craftsperson. Over several years, apprentices who prove themselves on the job can grow into the role of a 'compagnon' (journeyman or journeywoman), which means they act as fully fledged workers and also provide instruction to younger apprentices. In the interviews, they were often referred to by master craftspeople as their 'right hand'. However, such workers do not have contracts of employment and do not always receive regular wages; rather they receive a commission for the assignments they complete or, in some cases, a fixed share of the turnover achieved. Even if they have already spent more than ten years in the workshop, many still refer to themselves as apprentices as an expression of the respect they have for their master craftspeople. If the masters deem it appropriate, the apprentices who do not stay with them as journeymen or -women are released into self-employment ('libérer'). Traditionally this 'liberation' involves a ceremony, which also includes prayers and a celebration. The masters often support the move into self-employment with gifts, for example of tools, or by passing on orders and recommendations. If apprentices become self-employed on their own initiative and against the will of their master craftsperson, this can easily lead to disputes. Various conflicting interests have to be reconciled: on the one hand, the master's interest in compensation for their investment in an apprentice's training through the use of their labour; on the other hand, the young person's urge to become self-employed quickly and earn their

own income. This is compounded by the reputational pressures and social behavioural norms that position adults as authority figures vis-à-vis the youth. The testimony of one dressmaker in Thiès makes clear how the use of new technologies is also challenging traditional patterns:

> *'As master craftspeople we've spent nine or even ten years in training, which meant we could learn everything. But today, a mother will buy a sewing machine for her child after three years. The child starts skipping work because she's sewing at home and in the end she breaks off the apprenticeship and carries on learning things with a mobile phone – which is limited because she can't get all the information on a phone and doesn't have the experience. That's why we try to teach the apprentices the trade in three or four years, then the master craftspeople release the apprentices.'*
> (Dressmaker, Thiès)

The training is not based on fixed standards or curricula. Rather, it varies according to the master craftsperson and depending on the apprentice's interests, motivation and previous education. For example, one electrician reported that he could only share some of his skills with his current apprentice, who could not write or read. One trainee woman tailor and dressmaker said she prefers to focus on men's clothes and for that reason works mainly on such assignments, whereas a male apprentice said he is learning everything, except for the traditional method of embroidering women's clothes, which he leaves to his female colleagues. In general, apprenticeships start with the simplest tasks, such as ironing for tailors and dressmakers, and braids on the back of the head for hairdressers. In the workshops visited for the study, business management skills, such as price calculation, are either not taught or they are reserved for the journeymen/-women. The range of services or products offered in the enterprises surveyed was somewhat narrower than in Ghana, especially in the case of electricians, among whom greater distinc-

tion is made between electrical work in residential buildings and in industrial buildings, and for repairing appliances. The hairdressers interviewed in Dakar had hired trained tailors and dressmakers to compensate for the pandemic-related restrictions. However, this 'multi-service strategy' (stratégie multi-service), as they call it themselves, has no impact on the training.

The master craftspeople and the more experienced apprentices or journeymen and -women do not restrict their teaching merely to demonstrating techniques and giving feedback on apprentices' attempts to replicate them (cf. Gaye, 2019). In the cases studied, other teaching strategies were also seen, such as asking 'stupid questions' to get the apprentice to describe and

justify their actions, and setting specific tasks to gain regular insights into the apprentice's progress. Electricians in Thiès said they send some of their apprentices to special training in solar installations with the chamber of skilled crafts. Some of the tailors and dressmakers interviewed in Dakar had also registered a number of their apprentices for the state project on youth employment through informal apprenticeships (Projet d'employabilité des jeunes par l'apprentissage non-formel, PEJA), through which they participate in structured training courses. Nevertheless, the vast majority of respondents in Senegal had had no contact with government programmes for education and training in the informal sector.

3.4 THE MAIN FEATURES OF LEARNING PROCESSES IN THE INFORMAL SECTOR

In all three countries the use of smartphones for learning purposes in the informal sector is adapted to a learning culture in which apprentices find their feet in a community of practice. This process leads them from a position as an outsider, in which they largely play an observing role alongside experienced colleagues, to an expert position, in which they themselves are capable of doing the job, while gaining further practical vocational experience through interactions with others. In one case study in the automotive sector in Senegal, this process was described as follows (the individual phases can also be transferred to other occupations, and they repeatedly became apparent in the interviews conducted in all three countries for the present study):

- Introduction to the occupation: socialisation by doing small helping tasks

- Initiation into the occupation: apprentices familiarise themselves with the tools and learn about the different elements of the car

- Participation: apprentices start contributing to repair work

- Gaining autonomy: apprentices carry out smaller tasks independently, such as installing/dismantling items, simple repairs, finishing

- Assuming responsibility: apprentices take responsibility for identifying problems and performing increasingly complex repairs

According to this scheme, apprentices take on increasingly complex tasks in the course of their training and there is a progression from operational to strategic tasks. Towards the end this might also include conducting negotiations with customers. The transition between the phases is implicit and fluid and depends on the learning progress made by the individual apprentices, not on the duration of their training (cf. Gaye, 2019). The different phases also manifest themselves in the different categories of apprentice or, as in Ghana, through their designations (junior, senior, chief apprentice). This is also partly true in Senegal: les petits, les grands, les compagnons/le bras droit du patron ou de la patronne (the little ones, the big ones, the journeymen/women, the boss's right-hand man/woman). In Kenya, by contrast, due to the shorter,

often unstructured training that focuses on a limited range of tasks, such a division into phases is not immediately evident.

Although learning and teaching take place in the work context and as such are also subject to the constraints of production, both empirical studies and the present research show that master craftspeople consciously control the learning processes (cf. Gaye, 2019 and Jaarsma et al., 2011). Besides assigning tasks that match apprentices' learning levels, they support the apprentices with explanations or question-and-answer games to make actions comprehensible to them and to convey specific interventions. Some of the master craftspeople interviewed also said that they regularly organise learning periods during which they teach underlying knowledge and skills.

From the apprentices' point of view, different forms of learning can be observed, which are more or less conscious and controlled. On the one hand, learning already occurs in the form of socialisation, contributing to the unconscious acquisition of values, behaviours and attitudes; on the other, self-managed intentional learning takes place when trainees actively ask questions, for example, or request that things be shown to them. This form of learning is crucially important. Without it, apprentices who remain passive risk going unnoticed or being called upon only to perform unskilled tasks. In the work context, certain things are often learned incidentally which can only later be recognised and denoted as learning.

The trainees apply these forms of learning using different learning strategies. The following strategies

are frequently cited in the literature and were also observed in the surveys in all three countries:

- Learning by doing and by completing exercises, for example when apprentices cut each other's hair and do their make-up, or when they practise certain styles and seam stitches using fabric scraps

- Learning by watching experienced colleagues

- Mentoring and coaching by experienced colleagues or the master craftsperson

- Learning by asking questions and discussing things, although in some contexts discussions are more likely to occur between apprentices than with the master craftsperson

- Learning by working on problems or customer assignments, which entails apprentices actively seeking tasks themselves and looking for solutions to problems that arise.

In the informal sector learning generally occurs through experience and practical activity. It is embedded in work situations and is characterised by the importance of interactions between the apprentices and the master craftsperson, and among the apprentices themselves. In this context, according to older studies, such media as books, radio, television and magazines played only a very subordinate role (cf. Huyghe Mauro et al., 1999). Against this background, digital media represent a new source of knowledge and inspiration whose potential and limitations for learning in the informal sector have not yet been described in the literature.

Info box 3: Informal, non-formal and formal learning in informal apprenticeships

Regarding the distinction between informal, non-formal and formal learning, informal apprenticeships are defined as 'a non-formal training in an informal business environment with informal forms of transfer and acquisition.' (Gaye, 2019, p. 52). The aim of the master craftspeople to encourage their apprentices to learn, as well as social and societal recognition, are characteristic features of non-formal education that also apply to apprenticeships in the informal sector. They are tied to an implicit curriculum and a learning process that is largely incidental and self-managed, which can be better understood as a form of socialisation. This type of informal learning mainly derives from having to cope with specific situations and solving problems (Dehnbostel, 2015)

4 WORKING WITH SMARTPHONES IN THE INFORMAL SECTOR

Although no academic findings yet exist regarding the use of digital devices such as feature phones, smartphones and laptops for learning purposes in informal apprenticeships, the ways in which smartphones, mobile phones and computers are used in the daily work of informal enterprises has been studied several times (cf. Berrou et al., 2020; Koopman & Kubuga, 2022; Pankomera & van Greunen, 2018). It was possible to further differentiate and supplement these findings for the three occupations studied here, thereby providing an indication of the new skills that apprentices need to acquire because of digitalisation.

4.1 PREVALENCE AND USE OF SMARTPHONES AMONG THE MASTER CRAFTSPEOPLE AND APPRENTICES SURVEYED

On average, the digital devices (mobile phones, feature phones, smartphones and laptops) available to the master craftspeople and apprentices interviewed for this study roughly matched the results of other empirical studies in the informal sector in the countries in question. In 2018, surveys in Dakar showed a usage rate of 98 per cent for mobile phones and 63 per cent for smartphones (Berrou et al., 2020). According to a survey of 154 entrepreneurs in Tamale and Savelugu, Ghana, over 85 per cent used a smartphone (Koopman & Kubuga, 2022, p.15). In the present study, some 86 per cent of the master craftspeople and 77 per cent of the apprentices interviewed possessed a smartphone (see Figures 8 to 10). In Senegal and Ghana, all the master craftspeople surveyed owned a smartphone, whereas in Kenya more apprentices (88 per cent) had a smartphone than masters (73 per cent).

Smartphone distribution in Ghana

	Smartphone ownership	Access to smartphone in family	Feature phone	No access to smartphone
Tamale: master craftspeople	100%	0%	0%	0%
Accra: master craftspeople	100%	0%	0%	0%
Tamale: apprentices	46%	0%	25%	29%
Accra: apprentices	91%	3%	0%	7%

Figure 8: Smartphone and feature phone distribution among master craftspeople and apprentices interviewed in Ghana
Source: Own chart. Qualitative survey of 61 apprentices and 19 master craftspeople, August 2022

Smartphone distribution in Kenya

	Smartphone ownership	Access to smartphone in family	Feature phone
■ Mombasa : master craftspeople	91%	0%	0%
■ Nairobi : master craftspeople	71%	0%	29%
■ Kisumu : master craftspeople	94%	0%	6%
■ Kisumu : apprentices	100%	0%	0%
■ Mombasa : apprentices	64%	29%	0%
■ Nairobi : apprentices	100%	0%	0%

Figure 9: Smartphone and feature phone distribution among master craftspeople and apprentices interviewed in Kenya
Source: Own chart. Qualitative survey of 40 apprentices and 52 master craftspeople, October 2022

Smartphone distribution in Senegal

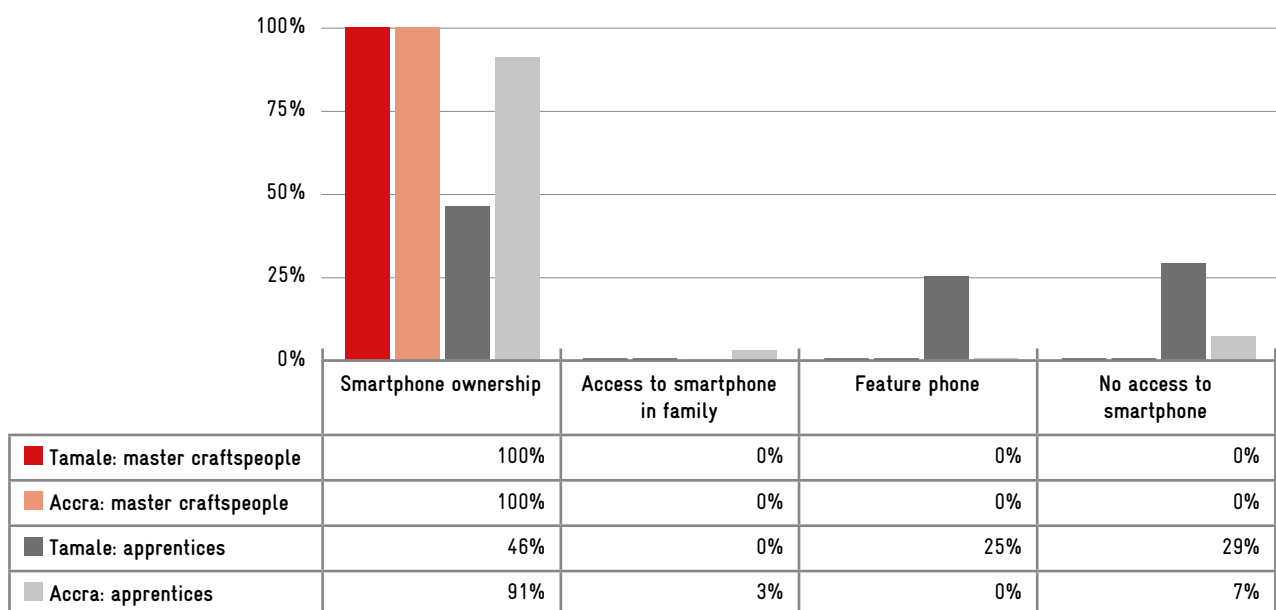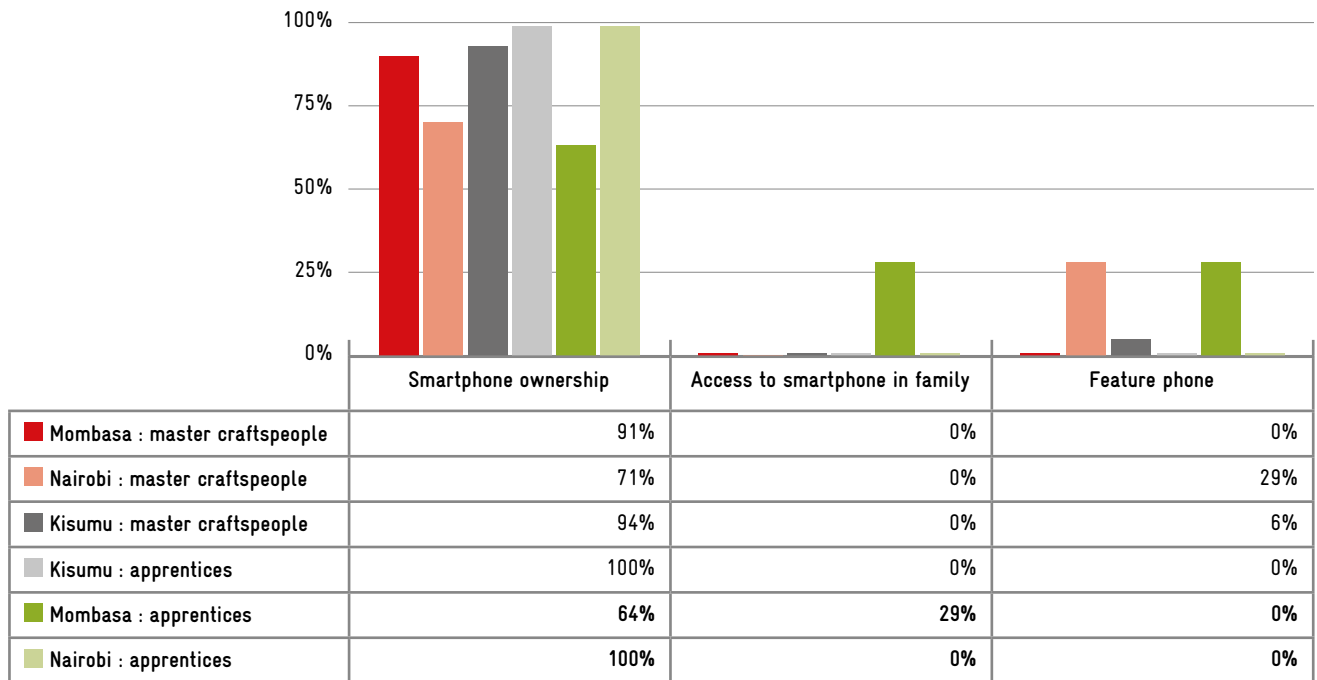|	Smartphone ownership	Access to smartphone in family	Feature phone	No access to smartphone	Laptop/tablet ownership
■ Thiès : master craftspeople	100%	0%	0%	0%	6%
■ Dakar : master craftspeople	100%	0%	0%	0%	0%
■ Thiès : apprentices	86%	5%	10%	0%	5%
■ Dakar : apprentices	65%	24%	6%	6%	0%
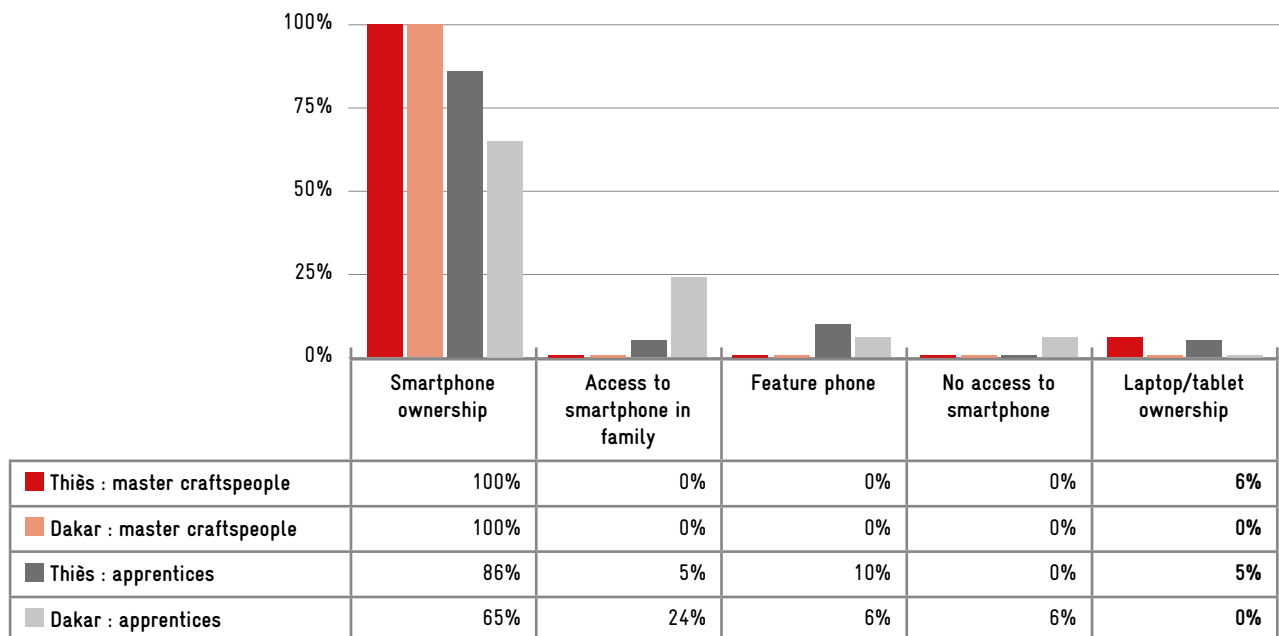
Figure 10: Smartphone and feature phone distribution among master craftspeople and apprentices interviewed in Senegal
Source: Own chart. Qualitative survey of 41 apprentices and 31 master craftspeople, October 2022

Based on the surveys in the three countries, the tasks carried out with the help of smartphones, other mobile phones and laptops can be grouped into nine areas of activities for all the occupations (see overview in Table 2). For each of these areas of activity, digital competences were listed that at least some of the respondents already possessed. These competences can be assigned to the different competence areas of the Global Framework of Reference on Digital Literacy Skills (UNESCO, 2018). A more detailed analysis

would be possible using the Framework of Reference, and UNESCO also offers a procedure, with its competency mapping method, that can be used to design training courses, for example (see example in Info Box 4).

The use strategies, which are described in detail below, refer primarily to practices reported by the master craftspeople or observed locally. Often, however, these do not differ fundamentally from those adopted by the apprentices, especially those who are more advanced.

Table 2: Overview of strategies for smartphone use when working in the informal sector, and the digital competences required for this

Use strategies	Brief description	Digital competences required (by area)*
Communicating with customers and suppliers	Mobile phones are used to communicate with customers and suppliers, to make appointments and place orders. Among respondents in all three countries, WhatsApp is the preferred communication app. It is used to send pictures, for instance of desired hairstyles, clothing styles or equipment to be repaired (e.g. for a cost estimate). To use this channel for consulting and sales talks requires special occupational skills, particularly in the tailoring/dressmaking and hairdressing trades.	0 (Devices and software operations) 1 (Information and data literacy) 2 (Communication and collaboration) 6 (Career-related competences)
Marketing	Many of the respondents mainly carry out marketing through direct communication with customers, using WhatsApp and other social media such as Instagram, Facebook, TikTok, Twitter, WhatsApp Business and Pinterest. However, the degree of professionalism of this marketing varies: some master craftspeople employ professional web designers and influencers; others rely on word-of-mouth and customers who post photos of their products.	0 (Devices and software operations) 2 (Communication and collaboration) 3 (Digital content creation) 4 (Safety)
Buying and selling online: e-commerce and social commerce	Social commerce – the use of social media to sell goods and services – is already widespread in the three African countries in the study. Through the use of social media platforms such as WhatsApp, Facebook and Instagram, businesses can pursue digital marketing, communicate with customers and process payments with mobile money services, without the need for any specialist skills. By contrast, the use of online marketplaces is less widespread and often hindered by a perception of high costs or lack of knowledge about suitable platforms.	0 (Devices and software operations) 2 (Communication and collaboration) 3 (Digital content creation) 4 (Safety)
Payments, bookkeeping and accounting	Extensive use is made of both smartphones and non-internet-capable mobile phones for payments in all three countries. Mobile money services allow registered users to make payments and purchases using their mobile phones. Master craftspeople use these payment methods in their daily lives and working context, often as a substitute for a bank account and as a way to manage savings or monitor transactions. Some respondents who possess a computer use Excel for traditional bookkeeping.	0 (Devices and software operations) 1 (Information and data literacy)

*   The required competences for the observed strategies are summarised here according to the competence areas of the Global Framework of Reference on Digital Literacy Skills (UNESCO, 2018)

Organising work and management	Smartphones are used for organising work, through the communication of timesheets and assignments using WhatsApp. Electricians use smartphones extensively to coordinate work on different construction sites. Respondents also described using smartphones to communicate with apprentices: some master craftspeople set up WhatsApp groups for their workshop, some communicate through a more experienced apprentice, and others communicate directly with each apprentice.	0 (Devices and software operations) 2 (Communication and collaboration) Partly: 1 (Information and data literacy)
Observing the market	Hairdressers and tailors/dressmakers use their smartphones to monitor the market, keeping up with the latest fashions and adapting their services and products. Instagram, Facebook, Pinterest, YouTube and TikTok are the main tools used for this. Some electricians also use their smartphones to keep abreast of new developments and market prices, or to search for offers of work.	0 (Devices and software operations) 1 (Information and data literacy)
Networking with other entrepreneurs	Smartphones are used for networking within the community of practice, mainly on WhatsApp and sometimes Facebook. These networks serve various purposes, such as reciprocal exchanges of advice and assistance, buying and selling of spare parts, further training, passing on assignments, and friendly interactions. As a rule, apprentices only take part in such networks after they have completed their training.	0 (Devices and software operations) 2 (Communication and collaboration) 3 (Digital content creation)
Further training	The internet is an important resource for master craftspeople to extend their own training or to solve problems at work. Video tutorials on YouTube play a significant role, but the internet is also used by electricians to research new instruments and components, or by hairdressers and tailors/dressmakers to follow fashion trends. Language requirements can present a hurdle, and some basic technical know-how is needed to transfer techniques and methods into practice. Video tutorials are often just one component of a broader learning strategy, which also includes interacting with others.	0 (Devices and software operations) 1 (Information and data literacy)
Using digital devices for occupationally specific purposes	Digital devices such as smartphones and laptops are used for occupationally specific purposes in all three of the jobs examined here. Tailors and dressmakers, for example, use note-taking and spreadsheet software to record customers' measurements, while hairdressers play music and present photo galleries on their smartphones. Electricians use the internet and special apps to research the technical properties of devices and the parameters of electrical installations.	1 (Information and data literacy) 3 (Digital content creation) 6 (Career-related competences)

The used strategies, which are described in detail below, refer primarily to practices reported by the master craftspeople or observed locally. Often, however, these do not differ fundamentally from those adopted by the apprentices, especially those who are more advanced.

4.2 DIRECT CUSTOMER COMMUNICATION

All those questioned for the study use mobile phones or smartphones to communicate with customers or suppliers. This saves a lot of time and makes it possible, for certain professions, to expand the customer base beyond the local context and even abroad.

Many of the respondents use a different device for telephone calls than for accessing the internet, and some use dual-SIM phones so they can exploit the better tariff terms offered in each case. In all three countries, the communication app of choice among the respondents is WhatsApp. This confirms the prevalence of that service in sub-Saharan Africa, as documented elsewhere (cf. FiDA, 2020). In isolated cases, WeChat was also mentioned for supplier relations with China, as was Facebook. With very few exceptions, emails played no role among the respondents. Communication most commonly entails voice messages, often in the local languages, so that writing and reading skills are not required. Pictures are also sent, for example of desired hairstyles, clothing fashions or appliances in need of repair.

> *'Phones have made it quite easy to collaborate. A customer can ask for a job to be done at their house – we will ask for pictures to accustom ourselves to the task and to be able to make a quote based on the pictures.'*
> **(Electrician, Mombasa)**

By sending pictures, tailors and dressmakers can also serve customers abroad. By saving chat histories, users have the possibility to store information about past orders or, in the case of tailors and dressmakers, the measurements of their customers. One tailor in Dakar reported that he uses the phone to advise customers living at a distance on how to take their own measurements to send to him.

In order to communicate with customers and suppliers, basic technical skills are needed to use a mobile phone or smartphone as well as the communication app (competence area 0 in the Global Framework of Reference on Digital Literacy Skills). Basic skills for storing and filtering contact data and retrieving relevant information are also required (competence area 1). On the other hand, greater demands are made in the area of communication, with job-specific needs for tailors and dressmakers engaged in customer advice and sales talks (competence areas 2 and 6). For example, a dressmaker in Mombasa (Kenya) cited the need to teach apprentices how to conduct consultations online :

> *'Our learners must learn how to navigate the digital conversation they must have with customers, between what they wish to have and show us on their phone and the body shape.'*
> **(Dressmaker, Mombasa)**

Making sales calls on the phone requires more skill because customers cannot gain an impression of the goods for themselves:

> *'If the masters have to teach their apprentices anything, it's how to communicate with customers on the phone, because they have to sell products that the customers haven't seen yet.'*
> **(Tailor, Thiès)**

Among the apprentices interviewed, many of the older ones stated that they already had their own clients and communicated with them using a smartphone or mobile phone. Some were also authorised to take calls and give advice in the absence of the master craftsperson. Their statements regarding the forms of communication used did not differ from those of their masters. Unlike the masters, they did not express an awareness of the specific characteristics of communication using digital media.

Info box 4: Mapping digital competences for communication with customers and suppliers using social media, taking the example of tailors and dressmakers.

Based on the general descriptions of competences in the Global Framework of Reference on Digital Literacy Skills, in 2018 UNESCO developed a methodology for documenting competence requirements and deriving competence development needs from 'use cases'. Shown below are the digital competences exhibited by the most digitally literate of the tailors and dressmakers questioned for the study. This draws on the results of the interviews and observations, and takes the example of smartphone use for communication with customers and suppliers. **To illustrate a 'best practice' case, competences of different individuals from the three countries have been aggregated**.

Use case: Communicating directly with customers and suppliers	
Occupation	Tailor/dressmaker
Digital technology	Smartphone with internet access
Software application	WhatsApp, Facebook, phone function and SMS

Competence area	Competences	Observed performance level (best practice)
0. Devices and software operations	• Physical operations of digital devices • Software operations in digital devices	The person can charge and switch on their smartphone. They can insert a SIM card and top up their mobile data credit. They can take photos with the camera. The person can adjust the smartphone settings and check internet connectivity.
1. Information and data literacy	• Browsing, searching and filtering data, information and digital content • Evaluating data, information and digital content • Managing data, information and digital content	The person can search for WhatsApp, WhatsApp Business or Facebook and download the application. The person can receive messages and view the status of their contacts. The person can enter, edit and delete contact details. The person can use the search function to retrieve saved messages. The person can save or delete SMS and other files, while taking into account the storage capacity of their device.
2. Communication and collaboration	• Interacting through digital technologies • Sharing through digital technologies • Engaging in citizenship through digital technologies • Collaborating through digital technologies • Netiquette • Managing digital identity	The person can record voice messages, compose and send messages, take and send pictures/videos, and share links. They can make calls and video calls. The person can conduct sales talks on the telephone. The person can manage their own digital identity and customise their profile.

3. Digital content creation	• Developing digital content • Integrating and re-elaborating digital content • Copyright and licences • Programming	The person can edit images. The person can design their profile or Facebook page to be informative and engaging.
4. Safety	• Protecting devices • Protecting personal data and privacy • Protecting health and well-being • Protecting the environment	The person can log in with a password. The person makes conscious decisions regarding which communication channel to use to transmit confidential information (e.g. customer measurements, delivery addresses).
5. Problem-solving	• Solving technical problems • Identifying needs and technological responses • Creatively using digital technologies • Identifying digital competence gaps • Computational thinking	The person is capable of choosing appropriate communication channels to suit customer needs. The person is able to support customers in solving communication problems.
6. Career-related competences	• Operating specialised digital technologies for a particular field • Interpreting and manipulating data, information and digital content for a particular field.	The person is able to evaluate pictures sent by customers and suppliers and, if necessary, can pose expert questions to ascertain details that are not visible. The person is capable of using video or voice calls to help their clients take measurements.

4.3 MARKETING

For many of the entrepreneurs surveyed, direct communication with customers forms the basis of their marketing activities. Posting pictures and short videos on their WhatsApp status was frequently mentioned as a marketing activity. In the basic function setup, the pictures and videos can be viewed there by the saved contacts for 24 hours. One hairdresser in Nairobi reported that she regularly posts photos of her hairstyles and make-up jobs to a WhatsApp group that includes all her clients – about 80 people. Instagram, Facebook, TikTok, Twitter, WhatsApp Business and Pinterest are all used to reach a wider customer base, usually by way of a smartphone.

Widely diverging levels of professionalism were seen with respect to marketing. The most impressive instances of professional marketing were seen in Kenya, where one hairdresser, for example, uses a website with an integrated appointments calendar.

Figure 11: Photo corner for customers in a hairdressing salon in Thiès

In his view, websites generate a special degree of trust on the part of customers, 'especially the whites' (hairdresser, Kisumu). In Kenya, influencers and social marketers are sometimes paid to increase social media presence. More often, however, the respondents post their own photos to social media sites, and they encourage customers to post photos and write recommendations as well. Many of the beauty salons visited had a decorative photo corner, where the name of the salon was displayed, and a ringlight was positioned with a stand for mobile phone (see figure 11).

Different competence areas are relevant for carrying out digital marketing activities. While most of the respondents are able to use at least the basic functions of the communication apps, and some try to increase the number of followers they have by copying successful influencers to make their own pages more attractive, other respondents said they already had difficulties just using the apps (competence area 0).

Some respondents showed an awareness of data protection issues and stated that they explicitly ask clients for permission before sharing their pictures on social media. However, observations made during the survey revealed a different awareness of data protection than in Europe, with no clear lines drawn between private and public content in many cases (competence area 4). With respect to content creation and the editing of images and videos (competence area 3), as well as the communication with target groups (competence area 2), some respondents could point to assistance received from external service providers or to courses they had completed themselves. However, master craftspeople and apprentices alike voiced the need for targeted training in this area, with the latter regretting that their apprenticeships did not include such teaching systematically.

4.4 BUYING AND SELLING ONLINE: E-COMMERCE AND SOCIAL COMMERCE

Social media platforms that allow entrepreneurs to gain customers outside their local market create a basis for business that is conducted exclusively online.

Using social media to sell goods and services (social commerce or s-commerce) is already a widespread practice in Africa, one whose importance is also increasing compared to established forms of online commerce on market platforms (cf. Mureithi, 2021; Partnership for Finance in a Digital Africa, 2019). The use of social media like WhatsApp, Facebook and Instagram, combined with mobile money services, makes it possible to pursue digital marketing, hold talks with customers and complete payment transactions. This does not require any special know-how beyond that required for everyday social media use.

The situation is somewhat different when it comes to using online market platforms (e-commerce), the operators of which handle the purchase process. In Kenya, some respondents reported using the Jumia and Jiji[10] platforms. Although many respondents in Ghana and Senegal also expressed an interest in e-commerce, they do not yet have any experience of it. The main barrier mentioned was (perceived) high costs, or the fact that no suitable platforms are known:

> *'There is no platform where tailors and dressmakers can publish their goods and their prices. It is the big tailoring shops that have websites where they offer their goods.'*
> **(Tailor, Thiès)**

In fact, commercial platforms are available in the countries studied, offering a wide range of products and services, such as Jumia and Jiji. Some even offer free training for sellers, for example on how to set up their online shop. In addition, the Ghana National Tailors & Dressmakers Association (GNTDA) shows

how informal sector organisations themselves can provide a suitable platform for their members. In August 2022, GNTDA established its own online platform[11]. Interested tailors and dressmakers can benefit from training activities that support them in marketing on the platform. At the time of the survey in Accra, in early August 2022, the tailors and dressmakers interviewed were already aware of this initiative and there was great interest, but the platform had not yet been officially launched.

While very few of the respondents offer their products or services on marketing platforms, some of those in Kenya said that they themselves purchase products on the internet. At the same time, however, the discussions made it clear that one barrier to online business is the lack of trust people have in the quality, reliability and physical reality of the seller, 'because what you see online is not what you get' (hairdresser, Mombasa). In contrast to this, one electrician who regularly uses marketing platforms to buy and sell items was able to share examples of his strategies for safeguarding against counterfeit products:

> *'Chinese suppliers give parameters, so from there you will know if the product is original or not.'*
> **(Electrician, Mombasa)**

A lack of knowledge about the possibilities and technical requirements, as well as uncertainty regarding potential risks, are also cited in the literature as significant barriers to the use of online platforms by enterprises in the informal sector (cf. Pankomera & van Greunen, 2019).

In all areas of the Global Framework of Reference on Digital Literacy Skills there are competence requirements relevant to the online marketing of products and services, although the requirements for

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[10] Jumia and Jiji are online marketplaces in Africa. They provide a platform where users can buy and sell goods and services. They cover diverse products and services, such as electronics, fashion, cars, real estate, travel and much more besides. The platforms also offer payment and shipping solutions to facilitate trade.

[11] GNTDA GAR Online Mall: https://www.gntdagar.com/

e-commerce differ more strongly from everyday skills than for social commerce. Many respondents expressed an interest in e-commerce. However, the relevant skills are not widely seen in the enterprises surveyed, which means they are not taught to the apprentices as part of their in-company training.

4.5 PAYMENTS, BOOKKEEPING AND ACCOUNTING

Mobile phones are used extensively for payments in all three countries surveyed. Mobile money services are provided by telecommunications companies. They attract a wide array of customers with lower fees and requirements (GSM Association 2022). Mobile money services allow registered users to deposit cash into the virtual account linked to the phone number and to use these funds for payments and purchases, including peer-to-peer payments, using a simple mobile phone. Increasingly, they also offer access to financial products such as micro-loans and savings accounts. At 94 per cent and 61.6 per cent respectively, Kenya and Ghana are among the African countries with the widest uptake of mobile money by their population, but mobile money providers are also ubiquitous in Senegal (BCG, 2020, Demirgüç-Kunt et al., 2021 and Bank of Ghana, 2021). In all three countries, master craftspeople and their apprentices alike use this form of payment in their daily lives and at work. For many people, an account with a mobile money service replaces a bank account, and it offers them a chance to manage their savings or to get an overview of transactions.

Developers have already created apps that combine mobile money services and accounting functions for the target group of entrepreneurs in the informal sector. One example is Leja, created by the French-Kenyan company Asilimia, which has over 50,000 users. Among the respondents, however, such apps were either not known or not used. Instead, the majority of respondents claimed only to record their incomes and expenses on paper. In a number of exceptions, master craftspeople who possess a laptop or tablet use

Figure 12: Workplace of the master tailor in a tailoring studio in Accra. The laptop is used for basic bookkeeping and for watching step-by-step video tutorials

Excel spreadsheets. In Ghana, for example, one tailor in Accra reported that he had been given ready-made Excel spreadsheets as part of a training course for entrepreneurs, which he continues to use. However, neither he nor the other participants in that focus group discussion share such knowledge with their apprentices as part of their training.

People who cannot read or write can still use mobile money services, as long as they know how to use the basic functions of their mobile phone (competence area 0). A higher level of competence is needed, on the other hand, for the digitalisation of bookkeeping, assuming there is no access to special apps developed specifically for the target groups. In Tanzania, for example, an app was developed for street vendors that

can be used on a feature phone by people without literacy skills, which allows the users to keep track of income and expenses and to calculate a minimum selling price (Mramba, 2018). In the present study, Excel software was used on laptops or tablets for bookkeeping. Besides the ability to read and write, this requires greater software operating and data management skills (competence areas 0 and 1). Here too – as with marketing, for instance – job-related knowledge is essential for using or adapting the software. Especially among the apprentices, it was evident that they have not acquired adequate know-how in this field, either at school or during their training, and that there is a wish for supplementary training in financial literacy.

4.6 ORGANISING WORK AND MANAGEMENT

Smartphones are used for organising work by writing and distributing schedules using WhatsApp, for example, or listing current orders in the notes app. Such usage was seen to be particularly intensive among electricians, who employ additional workers on a daily or weekly basis and send them directly to the construction sites. Phones can be used to coordinate parallel activities at different sites.

In addition, master craftspeople frequently mentioned using smartphones to communicate with their apprentices, and it was sometimes discussed heatedly. Some masters set up WhatsApp groups for their company to exchange information, for instance about attendances and absences or upcoming tasks; some communicate with the chief apprentice, who passes on the information; and others contact each apprentice individually. Apart from the number of apprentices involved, personal preference seems to be a factor here. In Senegal, attention was drawn to the special role that a digital form of communication can perform in identifying or resolving problems and potential cases of dispute. A WhatsApp group allows a master craftsperson to address problems or misconduct in a general way, without directly exposing a person.

'It is important to create a WhatsApp group with your apprentices. There are apprentices who don't say anything at the workplace and are shy. At home, they express themselves freely in the group. Once everyone is at home on their own, they say what they think about the work processes in the studio. We *can exchange information through the WhatsApp group. The group also makes it possible to clarify problems, share information, so I recommend everyone to set up such groups for their workshop. And if we don't have enough time, we just hold our workshop meetings via WhatsApp. If there is a problem, we can write the message to the group without naming a culprit, and the people concerned recognise each other – for example, I can find a solution with one of the apprentices who has a higher social status than me [he is older and married to two women] and whom I would not criticise face to face.'*
(Hairdresser, Thiès)

Conversely, apprentices could also use this approach to address problems or formulate criticism, without fear of an immediate and emotional reaction from the master craftsperson.

Skills requirements can be identified with regard to the forms of use observed in the study, especially in relation to communication with digital devices (competence area 2). Even though this was not expressed explicitly, it would seem that social skills are particularly important when using social media for the management of employees.

4.7 OBSERVING THE MARKET

Smartphones play a key role in everyday work when it comes to monitoring the market. All the hairdressers and tailors/dressmakers with access to a smartphone said that they use it to keep abreast of new trends and to adapt the services and products they offer. This is all the more important because customers themselves are increasingly bringing patterns and styles with them from the internet and want the same thing. The most commonly used apps are Instagram, Facebook, Pinterest, YouTube and TikTok, whereby the rate of use of the various apps also depends on the data resources they require. For example, some people tend to use YouTube at night and/or at home to save on mobile data costs. While tailors/dressmakers and hairdressers are mainly looking for the latest fashions, electricians get information about new products and market prices; if their company is already well positioned, they sometimes look specifically for work offers. Many different examples of market monitoring strategies were given during the interviews. Some seem to be common in local circles, while others are more individual, as can be seen from the following two quotations:

'I follow trade fairs that are shared live on Instagram to improve myself, (…). I especially watch the people who have a lot of followers to understand what makes them successful and to improve myself.' **(Hairdresser, Thiès)**

'We search for "latest style" on YouTube. If it is a new style, and we don't know about it – we just search for new styles until we find the right one. The manufacturers have agents going to our shops, we receive free new products. The manufacturers demonstrate to us how to make new styles with their new products. We follow Angels, Darling, and other manufacturers on Instagram. We follow Influencers from Ghana and Nigeria for lines and braiding because they are very

trendy and look very beautiful. For weaves, we follow Kenyan celebrities because most of them are brand ambassadors like Caroline Mutoko, Diana Marua, Kate Actress, Jackie Matubia, etc.' [Spokesperson for all master craftspeople questioned in a focus group] **(Hairdressers, Nairobi)**

These quotations show that people develop various search strategies (competence area 1) when using digital media to observe the market. It is remarkable that even if they possess very rudimentary literacy skills and face language barriers, respondents are able to find images and videos on the internet that are relevant to them. With simple search terms like 'make-up' and 'hairstyle', they navigate from one result to another and exploit the learning capacity of the algorithms that suggest new content to them. Hairdressers and tailors/dressmakers in particular keep up to date through additional interaction with others and by sharing content on social media. Clicking on links shared through WhatsApp also serves to hone algorithm responses on YouTube, regardless of literacy levels.

4.8 NETWORKING WITH OTHER ENTREPRENEURS

In all occupations in all three countries studied, smartphones are used to network with other entrepreneurs, most frequently on WhatsApp, sometimes using Facebook. However, while such digital networking across a community of practice was described as very intensive in Ghana and Senegal, and was often linked to institutions such as trade associations, this was less common in Kenya.

Networking in the community of practice fulfils various functions:

- Sharing advice and mutual assistance with job-related questions or to solve technical problems

- Swapping or buying/selling of spare parts, and lending out tools, especially among electricians

- Training, for example posting short video tutorials at the initiative of trade associations; sharing information about training courses

- Passing on assignments or recruiting additional workers to cope with short-term bottlenecks

- Self-organisation and sharing of information

- Friendly interactions

To partake passively in such networks requires only a basic knowledge of how the relevant app works (competence area 0), whereas more active participation, for example uploading information, requires additional skills to create and communicate digital content (competence areas 2 and 3). As a rule, apprentices do not join such networks until they have completed their training. Until then, however, they are usually active in other networks if they have a smartphone.

4.9 FURTHER TRAINING

Finally, the internet is an important resource for master craftspeople to supplement their training and solve problems in their daily work. For example, the opening up of markets means that electricians need to find information about new devices or components before they can carry out repairs. For hairdressers and tailors/dressmakers, the internet provides the means of meeting the needs of customers, who also go online for information. A significant aspect of this, for all three occupations, is the availability of video tutorials, most commonly found on YouTube. This also entails watching videos in foreign languages, using the automatically translated subtitles to understand the spoken content, or simply watching the video images. One electrician in Thiès, Senegal, also said he takes advantage of free webinars offered by manufacturers. He uses a laptop to do so and has subscribed to their newsletters. Hairdressers in Dakar mentioned online training courses that were available on Zoom during

the lockdown, which they would have liked to take part in. However, as they did not have a computer and were unfamiliar with the software, they had missed the opportunity. Besides the technical equipment, language barriers are often also cited as an obstacle to finding relevant offers. Some of the respondents have devised effective strategies to overcome such language barriers by developing alternative approaches to searching and using translation tools:

'The smartphone is so important – I google the model number, e.g. of a TV, and search for broken screens, so I find possible solutions. I use the phone to repair any electronic that I feel is beyond me. Mostly I watch videos made in Japanese and use Google Translate and

subtitles to read and watch videos. I also share the link to that specific solution with friends and colleagues through individual messages.'
(Electrician, Mombasa)

Putting the techniques described in such videos into practice requires some technical know-how, so the viewer can assess the quality of the demonstration and, where necessary, supplement any missing information and adapt it to specific conditions. As such, video tutorials are often just one component in a broader strategy that also includes exchanges with others, for example, be it on social media or in face-to-face discussions. Hairdressers in Dakar, who expressed their own wishes for training, emphasised the importance of direct interactions. In Kenya too, some hairdressers voiced their preference for analogue learning rather than digital:

'If it is a new technique that doesn't require a new product, you ask around who already

knows – e.g. someone who knows a Nigerian here in Kenya – and then you go there to learn from this person – not necessarily overt, but covertly as a customer and to look how they are actualizing it – then you do it yourself afterwards.'
(Hairdresser, Nairobi)

Using a smartphone for further training entails competences from the area of information and data literacy (competence area 1) in particular. Moreover, isolated examples show that it is such competences as the ability to identify skills gaps and to find solutions to problems like language barriers (competence area 5) that allow people to use the internet even more effectively as a learning resource. Building up the capacity of master craftspeople to train themselves using a smartphone is highly relevant for their own role as trainers, in both a technical sense, for imparting the latest know-how, and an educational sense, for supporting apprentices in their own learning processes.

4.10 JOB-SPECIFIC USES OF SMARTPHONES

Over and above the strategies pursued in all occupations in the informal sector for using smartphones for work purposes, a number of occupationally specific strategies were also identified. Numerous master tailors and dressmakers use the note-taking app on their smartphones to gather customers' measurements, while others, who own a laptop, use Excel for this purpose. In either case, by using a template they can avoid forgetting any measurements and ensure the documentation is complete. In hairdressing, smartphones are used to play music and entertain clients, for example. In both these occupations, photo galleries are used for presenting styles to customers and providing them with advice. Printed materials, such as fashion charts, magazines and photos, no longer play a role, contrary to observations by Apunda et al. (2017, p.354) in their field studies in Kenya.

All of the electricians interviewed use the internet to research the technical characteristics of devices. Some of them even manage to find the results they need using an image search, if they do not know the designations. Some also use QR codes to access manufacturer information if these are displayed on devices. The calculator on the smartphone is often used for working out the requisite parameters of electrical installations. Besides this, some electricians also use occupationally specific apps. In Senegal, a number of the electricians interviewed had attended a course on installing solar panels offered by the chamber of skilled crafts. They reported using special apps such as Solar CT and SMA Energy. In Ghana, respondents talked about PSpice, software that can be used to simulate circuits, as well as colour code calculators for resistors, which can be installed as an

Various models are used to gauge the level of digitalisation of informal sector enterprises, based on the use of digital technologies. For instance, Koopman & Kubuga (2022) use the Digital Maturity Assessment Tool to assign enterprises to four levels of digital maturity, depending on the intensity of their use of digital technologies in different areas: sales & customer involvement; process, operations & infrastructure; strategy & organisation; people, skill & culture. In the case of Ghana, they classify most enterprises as level 2 ('digital observer'):

> *'The average digital maturity of the informal sector participants respondents is at level 2. What this means is that digital efforts have started. MSMEs have started especially within sales and customer involvement. Efforts are however ad-hoc and not necessarily planned. Digital skills are at a basic level, and so there is a need to improve them. Digital technologies are used, but often more at personal level than to improve business.'*
> **(Koopman & Kubuga, 2022, p.36).**

Figure 13: Tools for repairing electrical appliances in a workshop in Accra

app on a smartphone. One electrician in Senegal also mentioned using special apps to develop lighting concepts – this prompted a passionate discussion with the other, slightly older participants in the focus group, who viewed such tech-based approaches as over the top and superfluous if one is sufficiently well trained).

The competences required for occupationally specific uses of smartphones differ greatly, depending on the occupation, and are highest among electricians: in all three countries, electricians use the internet every day to research technical information about appliances and devices (competence area 1). Special apps are also necessary for the installation of solar panels (competence area 6). Among tailors/dressmakers and hairdressers, no examples were observed of the use of occupationally specific apps and software, although the requirements related to image processing are higher than for electricians (competence area 3).

This characterisation also largely corresponds to observations made in the context of this study. Overall, most of the entrepreneurs surveyed in all three countries were already committed to the path of digitalisation. All the same, individual cases of entrepreneurs being particularly digitally literate showed that digital technologies are used in different ways and with differing levels of intensity, with the same technical equipment. Social media fulfills a special role as a tool serving multiple purposes, underpinning the digitalisation of direct customer communications, as well as marketing and online sales, networking with the community, market observation, employee management and work organisation, and sometimes also further training. In first place and used by almost all respondents is WhatsApp (see Figure 14). This corresponds very closely to the results of a study of the informal sector in Nairobi, where WhatsApp was named as the most-used app for marketing, communication and training/inspiration, ahead of Facebook and far ahead of Instagram (FiDA, 2020).

Frequency of use of the apps and online services cited (masters and apprentices)

Legend:
- WhatsApp
- YouTube
- Facebook
- Google
- Instagram
- TikTok
- Pinterest
- Excel
- Jumia
- Jiji
- Electrodoc
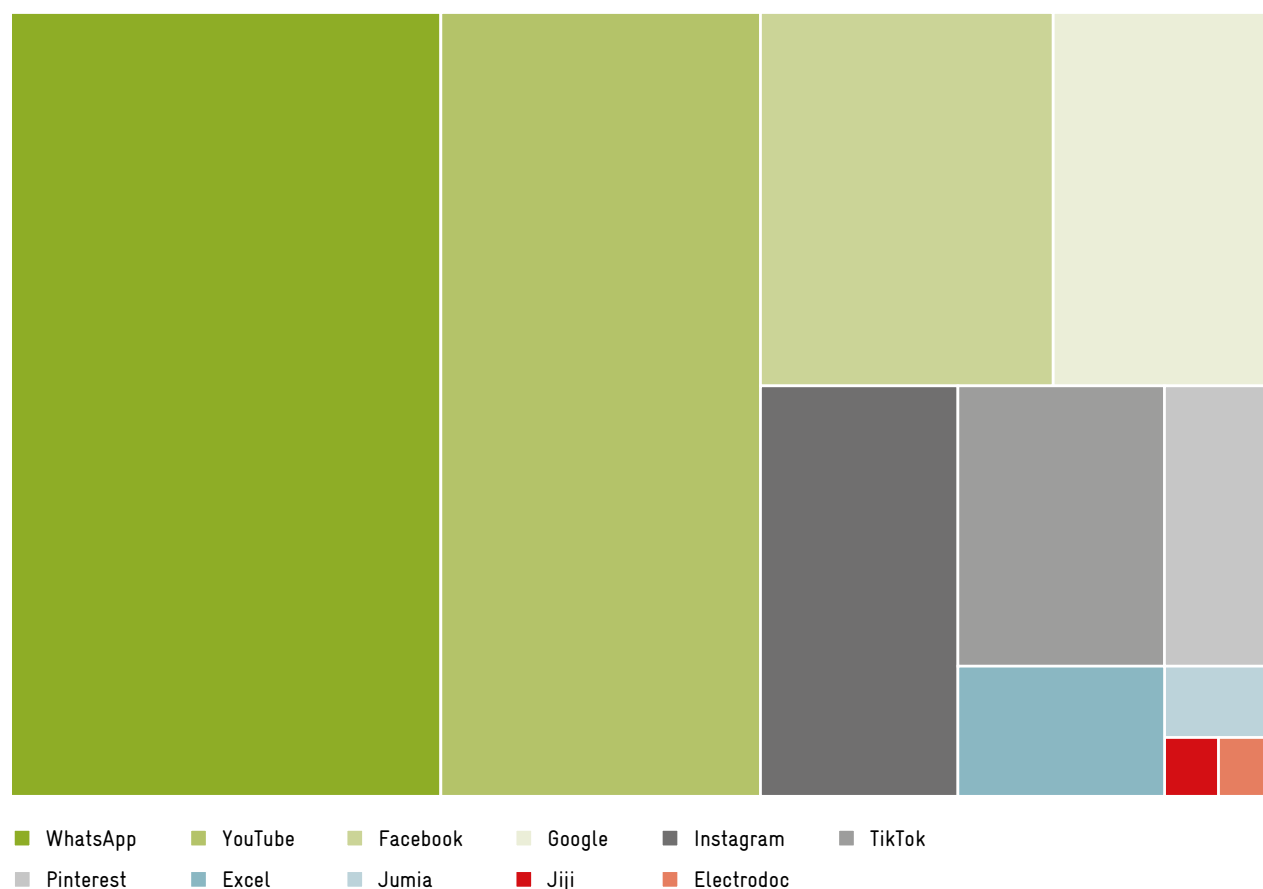
Figure 14: Apps and online services used by the respondents
N.B : The size of the blocks reflects the frequency of mentions, if there were more than three mentions. For example, Electrodoc and Jiji were each mentioned three times in the interview transcripts, while WhatsApp was mentioned 330 times.
Source: Own illustration, based on the interview transcripts from all three countries

According to a study of 500 entrepreneurs in the informal sector in Dakar, there is a correlation between the intensity of mobile phone or smartphone use and business performance. The biggest common factor is the use for communication with customers and suppliers (cf. Berrou et al., 2020). This would imply an income-generating potential of targeted support for the digitalisation of informal enterprises. At the same time, the present study also shows what digital compe-

tences can be taught by master craftspeople as part of the apprenticeship, and at which points external training activities can help develop the companies' working practices and the apprentices' skills. For a more detailed analysis, it would be appropriate to apply the mapping method developed on the basis of the Global Framework of Reference on Digital Literacy Skills in future studies (see Info Box 4).

5 LEARNING WITH SMARTPHONES IN APPRENTICESHIPS

The study of strategies for using smartphones and other digital devices for work in the informal sector shows that apprentices can observe, and perhaps practise for themselves, the diverse uses their master craftspeople make of smartphones in their daily work. In doing so, they develop and use digital competences to carry out work tasks. A special form of smartphone use that differs from this is their use for learning purposes. In contrast to a strategy that only addresses the use of smartphones in the work context, this is about acquiring knowledge and skills that should make it possible to solve certain tasks faster or better in the future. Acts of learning, such as searching for information or exchanging information and ideas with others, can be seen as part of a learning strategy. Based on the surveys conducted, six different learning strategies were identified in which apprentices use smartphones and sometimes laptops to acquire new skills and advance their learning process (see Table 3). These learning strategies are described in the following sections.

Table 3: Overview of learning strategies with smartphones in informal apprenticeships

Learning strategy	Brief description	Apps and websites used
The internet as a source of inspiration	Apprentices surf the internet and view pictures and videos on social media as part of a learning strategy, not just for entertainment. They use it, for example, to gain insights into the latest technologies in their skilled craft. In particular this can prompt them to set new learning goals and actively seek ways and means to acquire the knowledge and skills they want. Social media is sometimes also where they find new role models to inspire them in terms of their vocational and personal development.	Instagram, Pinterest, TikTok, Facebook, YouTube, Google search, Facebook reels and Google picture search
Step-by-step videos to find solutions and learn new techniques	Step-by-step videos guide trainees through a work process or a specific activity. As explained above, these videos are also often used by master craftspeople as part of strategies for solving problems that arise in their daily work. For apprentices, they are an important resource for learning new techniques.	YouTube, TikTok, Instagram, Pinterest, single-application apps such as Motor Rewinding
Internet research to find information	Beyond step-by-step videos and inspiring models, the internet also offers other important sources of information to help answer a wide range of questions. Accordingly, internet research is a widespread learning strategy, both for answering specific questions in work situations and for acquiring more advanced knowledge.	Google, Wikipedia
Exchange with the specialist occupational community	Apprentices are sometimes linked via messaging services to occupational networks with other apprentices and master craftspeople, where they can learn from the information being exchanged. These groups also fulfil a socialising function by involving apprentices in a community of practice.	WhatsApp, Facebook, LinkedIn

Keeping notes and records to remember what you have learned	Digital devices, especially smartphones, are also used for noting down new information and capturing it in videos or images as an aide-memoire.	Notes app, camera function
Use of e-learning activities on learning platforms	Learning platforms offer free and paid learning materials and online courses; some also provide opportunities for certification. In the present study, only a few examples were seen of people using such courses.	Jemshah e-learning platform & YouTube channel, Cisco, Alison

5.1 THE INTERNET AS A SOURCE OF INSPIRATION

> *'On Facebook, I take screenshots of beautiful pictures of natural hairstyles and then try them out on colleagues and friends.'*
> **(Apprentice hairdresser, Kisumu)**

The apprentices surveyed surf the internet and view pictures and videos on social media as part of a learning strategy, not just for entertainment. They use it, for example, to gain insights into the latest technologies in their skilled craft. In particular, this can prompt them to set new learning goals and actively seek ways and means to acquire the knowledge and skills they want. Social media is sometimes also where they find role models to inspire them in terms of their vocational and personal development.

UPTAKE OF THE STRATEGY IN THE OCCUPATIONS STUDIED

This approach is most evident in the creative trades, such as hairdressers and tailors/dressmakers, but can also be seen in isolated cases among electricians. While the former mainly look at patterns and styles, and gain insights into new trends, the latter are inspired to build new devices, such as speakers or inverters. Irrespective of the occupation, it was seen that social media and the internet are also used as a source of inspiration for personal development.

However, this learning strategy in the creative trades is not a substitute for traditional approaches, such as the attentive observation of people. At most it has replaced printed media, such as magazines or photos, which were not acknowledged by any of the interviewees as sources of inspiration, except as decoration (photos) or for clients to pass the time (magazines).

DEVICES USED

Smartphones

APPS AND WEBSITES USED

Instagram, Pinterest, TikTok, Facebook, YouTube, Google-search, Facebook reels[12] and Google Images.

LEARNING OBJECTIVES AND OUTCOMES

Insights into the latest technological developments for the respective skilled craft, generation of new learning objectives, inspiration for personal and vocational development. For hairdressing and tailoring/dressmaking, also knowledge of trends and styles, development of one's own taste and creation of a profile.

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[12]   *Reels* is Meta's answer to TikTok – short, edited videos that allow users to create 15 to 60-second films from multiple video clips and share them on Facebook and Instagram.
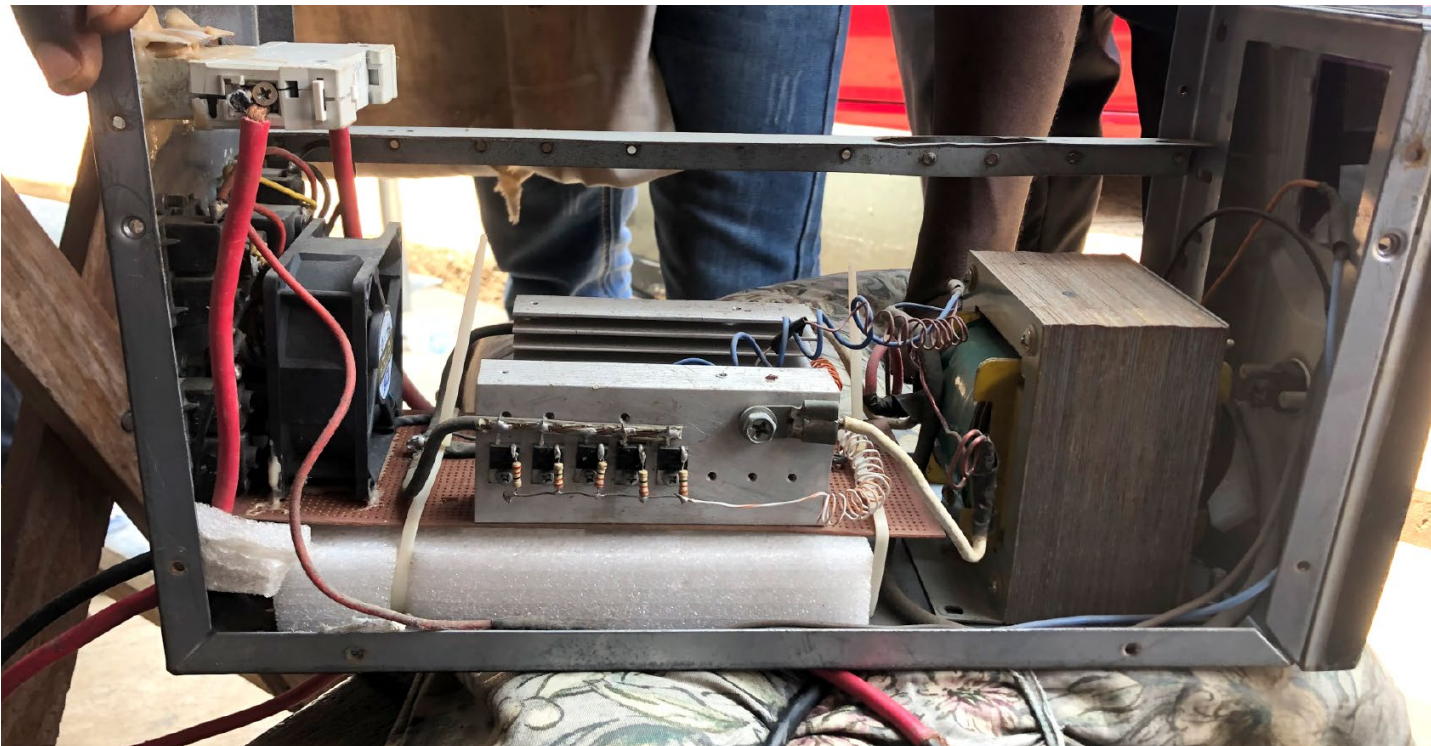
Figure 15: An inverter built by a master craftsman and his apprentices for a solar installation in Accra

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The images and videos that are posted, which the trainees mainly view on Instagram, Pinterest and Tiktok, are a mixture of influencers' visual self-expression coupled with product marketing and trend-setting, with local and global influences. Among tailors and dressmakers, for example, apprentices stated that they follow well-known international and local fashion designers or brands.

Besides patterns and styles to follow, some respondents also look to the internet for inspiration and good advice on their personal and professional development, for instance this apprentice electrician in Senegal:

> *'I use the platform Niak Dieriniou [enjoying the fruits of labour]. There are many tips given there on how to be successful in life, there are forums with testimonials from people who tell you how they succeeded.'*
> **(Apprentice electrician, Thiès)**

ACTS OF LEARNING

The apprentices interviewed for the survey take different approaches when looking for inspiration on the internet and in social media. Some enter the search terms 'newest styles', 'new trends', or simply 'coiffure' or 'maquillage', on Google or YouTube, without being more specific. One trainee hairdresser in Senegal, who can neither write nor read and does not speak French, explained how she follows Google and YouTube suggestions to find content that interests her:

> *'I see what YouTube suggests and make choices based on the images. I have a few tricks.'*
> **(Apprentice hairdresser, Thiès)**

In Kenya in particular, hairdressers followed major hair (extension) product manufacturers with their own social media channels, such as the company Angels Hair, to stay informed about the latest trends, products and hairstyles. However, the trainees are not only interested in finding inspiration for new trends or designs, but also want to 'see other processes, find other ways to achieve the same or similar results.' (Apprentice dressmaker, Mombasa)

The sophistication of the search process or the ability to articulate the process is often more advanced in respondents with higher educational backgrounds. One of the apprentices interviewed in Kenya, who prior to his apprenticeship had already completed a post-secondary training course[13] at the Ramogi Institute of Advanced Technology (RIAT), presented his approach, which changes according to his specific objective, as follows:

- **Trend scouting:** *'I am on Instagram and Pinterest to check out the newest designs.'*

- **Exploring a new design that he likes:** *'I search for a specific design on Pinterest, where I then find people who have already perfected that style.'*

- **Realising the design:** *'Subsequently I search for those people on Instagram to learn more about the specific style – and how to actualise it.'* [Picture gal-

Figure 16: A dressmaker who trained at a vocational school, now consolidating her practical skills in the informal sector, shows how she transforms pictures into sewing patterns, Nairobi
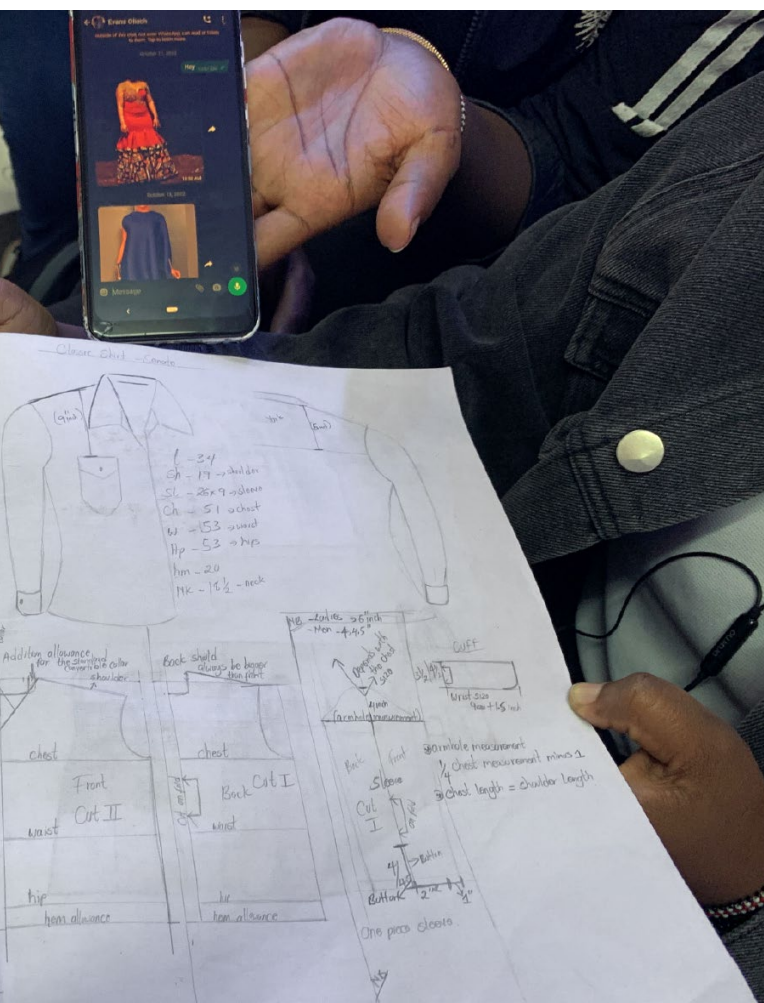
leries or short videos on Instagram or YouTube play an important part in resolving problems and learning new techniques through video tutorials]

- **Challenges and involvement of the master craftsperson:** *'If, for example, I don't know how to do the back – I ask my MCP.'* (Apprentice tailor, Nairobi)

Often apprentices will save pictures or videos that they particularly like, so they are available offline. They can then use these pictures for their work, for example to advise customers, but they can also use them as talking points for exchanging ideas with others.

Advanced apprentices often try to replicate the styles they like or use them to inspire their own creations.

They apply different learning strategies to master this process. Sometimes they try to do the download on their own, but many said that they seek help from other apprentices and the master craftsperson. Last but not least, they use their smartphones again to find more information or step-by-step instructions on the internet.

INTERACTION AND COOPERATION WITH OTHERS

The search for inspiration on the internet and social media gives rise to many different interactions. In particular, most apprentices said that they share their discoveries with other apprentices, friends and sometimes the master craftsperson. For example, they use WhatsApp to share screenshots of new designs, techniques, products and styles, or they show them directly on the screen to others in the workshop. Their discussions are not only about what they like and what they think about observed trends, they also talk about the quality of the craftsmanship and the possible replicability of styles or patterns. Tailors and dressmakers, for example, are often keen to work out how a garment has been sewn if it was only photographed from one perspective:

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[13] At level 5 of the Kenya National Qualifications Framework, whereby a bachelor's degree would be at level 6.

'We look at the picture together and discuss how to cut the piece of cloth and actualise the requested design.'
(Apprentice tailor, Mombasa)

PREREQUISITES AND CHALLENGES

Apart from the general challenges related to accessing digital content, such as the high cost of mobile data, the lack of a suitable device or a lack of digital skills, there are other more specific barriers that can inhibit apprentices from deploying this learning strategy effectively. Essentially, this learning strategy requires the skills to develop an efficient search strategy and to navigate through an abundance of offers. Considering the importance of exchanges with other people as part of this strategy, it is very important to maintain an open atmosphere and direct contacts, both with one's peers and with experienced colleagues. Finally, apprentices also need support to move from inspiration to implementation. Above all this includes assessing and interpreting the images with regard to their feasibility, as well as planning and implementing the separate work steps.

SUPPORT FROM THE MASTER CRAFTSPEOPLE

Master craftspeople can support the learning process by helping apprentices to overcome these challenges. Some masters encourage their apprentices to familiarise themselves with the latest trends in the ways described above, and often share the outcomes of their own research with them:

'At times when there are no customers there, I ask the apprentices to use their free time to do research and learn new things.'
(Hairdresser, Thiès)

Some of the master craftspeople interviewed also said that they help the apprentices to find interesting content.

The masters play an important role, above all in the discussions of the styles they find. They do so as they prepare the apprentices for situations in which customers arrive with images from the internet, which they want copied or adapted:

'We look at a picture on the internet and then we discuss with apprentices and colleagues how to transfer that into a piece of cloth. Especially as often the back is not there, so you have to figure out how to make it. That's because this is what happens every day: customers come with a picture and ask to make the same cloth for them.'
(Dressmaker, Accra)

For hairdressers it is often important to be able to judge the quality of the images found. In particular, filters applied to photos can create false impressions, it is not possible to transfer them to reality. Some masters see it as their task to warn the apprentices about this and to teach them to recognise such pitfalls:

'Sometimes it is difficult, especially for the learners, to understand when they see something on YouTube or Instagram, that there are often filters and they cannot replicate the same thing. So the learners learn to understand and ask madame when they see a particular style – by showing her the video or picture and then discuss how to transfer that into reality with the customers or your own face. They also learn to advise customers that they may not be able to replicate what they see in the picture, be it because of filters or because of facial or hair style not matching with the depicted style.'
(Hairdresser, Accra)

5.2 SOLVING PROBLEMS AND LEARNING NEW TECHNIQUES WITH VIDEO TUTORIALS

'We watch the videos from Nigeria and Ghana for the style – but for the step-by-step-videos, we watch the white ladies – they explain it better and include every step.'
(Apprentice dressmaker, Accra)

Step-by-step videos guide trainees through a work process or a specific activity. As explained above, these videos are also often used by master craftspeople as part of strategies for solving problems that arise in their daily work. For apprentices, they are an important resource for learning new techniques.

UPTAKE OF THE STRATEGY IN THE OCCUPATIONS STUDIED

This learning strategy is widely used in all three occupations in the study.

DEVICES USED

The apprentices mainly use smartphones, or laptops if they have them, as the screen is bigger.

APPS AND WEBSITES USED

The app used most often for this learning strategy is YouTube, but TikTok, Instagram and Pinterest are also used for picture galleries with step-by-step illustrations. Special apps dedicated to a single purpose are also used, especially by electricians. One example is the Motor Rewinding app, which provides step-by-step instructions on coil winding techniques for repairing electric motors.

LEARNING OBJECTIVES AND OUTCOMES

Step-by-step videos are used to acquire new technical skills. The reasons an apprentice might look for them can differ, often being prompted by an assignment for which they lack the necessary know-how,

or they might look online for the instructions to a pattern or style they like. The search for videos sometimes takes place when the master craftsperson is not available:

'At home I watch YouTube step-by-step videos, but when I am with the MCP [master craftsperson], I don't need YouTube as I can ask him.'
(Apprentice tailor, Nairobi)

This can also be a strategy for clarifying explanations or steps that an apprentice has not understood, or it can be used to learn something that is not taught by the master craftsperson, be it alternative approaches or knowledge in other fields that lie outside the apprentice's areas of competence. For example, an apprentice electrician reported that he was keen to pursue training in solar energy, but his master was not interested in the topic:

'I do research things, but more about solar energy because that's popular right now. Heaven knows, one day I'll have an opportunity to work in solar energy, but for now I am following my master in what he does.'
(Apprentice electrician, Dakar)

CONTENT

The videos present processes and techniques in comprehensible steps that are easily copied. Ideally, they also include advice on the necessary tools and materials. Some of the videos provide explanations; sometimes they include text and graphics to help with comprehension. The educational quality of the videos varies greatly. If the main focus is on marketing goals, for instance, they might not show all the steps required, and procedures shown do not always meet professional standards. Videos of the most diverse provenance were mentioned by the apprentices interviewed, and sometimes shown as examples on the smartphone. In Kenya, hairdressers often use videos

from manufacturers of certain products (e.g. Angels Hair) which explain the use of those products. In addition, they also cited classic 'do-it-yourself' (DIY) videos made by hobby DIY enthusiasts. Finally, videos are also viewed that are posted – especially on social media – by other small-scale entrepreneurs promoting their services by documenting their work. Some apprentices consciously make a distinction between the videos they watch for inspiration and those they seek in order to learn specific techniques, as is evident from the interview quoted above. Apprentice electricians in Ghana said that they mostly watch videos from the USA. Hairdressers, on the other hand, were more likely to mention locally produced videos for braiding techniques, but also foreign videos for making wigs.

ACTS OF LEARNING

How people search for relevant and well-made step-by-step videos varies depending on their learning objectives and motivation. One young woman who

had only been an apprentice for a few months and was therefore still mainly learning techniques for braiding, explained how she went about it:

> *'When my smartphone still worked, I used to use it for research too. Last Monday, I was looking at some braids I did for my little sister at home. I searched for "African braids" on YouTube. If I have a problem doing things, I ask the boss. Then I post photos of my results in my WhatsApp status.'*
> **(Apprentice hairdresser, Thiès)**

Such a non-specific search strategy is often inadequate for solving technical problems. The results are strongly influenced by the algorithms of the search engines and do not necessarily correspond to the learner's need. Apprentice electricians in particular require more detailed search strategies. They sometimes search specifically for solutions to problems, looking for vid-

Figure 17: A trainee dressmaker in Mombasa shows the bag she made for herself, copying a model seen on the internet using a video tutorial from Asia

eos with keyworded problem descriptions, signs and symptoms of the defective device.

Choosing a suitable set of instructions requires the capacity to assess their quality. Apprentices often need outside help for this and will ask older apprentices or the master craftsperson. However, sometimes they also have their own strategies to guide them. For example, they might compare different videos and see how much the approaches differ from each other. If the videos are not very good or the steps shown are too demanding for the apprentices, they usually seek help from their master:

> *'Some videos are easy to follow, others not. You don't always see all the steps. Sometimes we even laugh about it because they make it look difficult. The MCP often helps to explain though.'*
> **(Apprentice hairdresser, Accra)**

Some apprentices download videos or take pictures of them, so they can view them at their leisure or watch them again several times. This makes it easier for them to practise things, as they will not always succeed at the first attempt. Many apprentices said that, after successfully carrying out the steps in the videos, they still wanted some correction or feedback. For correction, they usually ask the master craftsperson. For confirmation and recognition, they often share photos of the results on social media.

INTERACTION AND COOPERATION WITH OTHERS

Using step-by-step videos to learn things in the way the interviewees described is rarely something they do on their own. On the contrary, exchanges and support from other people play a very important role in all stages of the learning strategy. For this reason, almost all apprentices said that they share the videos they find with other apprentices in their workshop and often also with the master craftsperson. In this way, they can search collectively for suitable content and assess its quality, while also benefiting from support in its implementation:

> *'I found a make-up video and showed it to the other apprentices. We practise on ourselves in the salon when we have time.'*
> **(Apprentice hairdresser, Thiès)**

PREREQUISITES AND CHALLENGES

Compared to other digital content, videos incur particularly high costs because of the large amount of data they require. This challenge was frequently mentioned as a barrier, especially in Ghana. To save costs, apprentices use time-limited offers, usually between midnight and 5:00 a.m. ('midnight bundles'), and then download as many videos as possible. However, this approach sometimes fails due to the limited storage capacity of the devices used. It also means that apprentices can only pursue their research at inconvenient times.

Other prerequisites for this learning strategy include, in particular, competences for finding and applying information (competence areas 1 and 5 in the Global Framework of Reference on Digital Literacy Skills). As one master craftsperson observed:

> *'Some of the trainees are school dropouts so they might not understand well using YouTube.'*
> **(Hairdresser, Nairobi, Kenya)**

A lack of basic literacy skills as well as language barriers also have a hindering effect. Many of the apprentices interviewed in Kenya and Senegal understand little or no English or French, so they cannot understand the explanations in the videos. Automatically generated subtitles on YouTube are often not available in local languages. This is not always seen as a problem, at least not if the images are self-explanatory. Nevertheless, the wish was expressed for there to be more step-by-step videos available in local languages.

Apart from these basic competences, other important prerequisites for understanding and following instructions found on the internet include occupational know-how and skills, knowledge of the technical vocabulary, discipline, and patience. Also helpful are a capacity to judge one's own competences and to seek support to manage the learning process:

> *'When learners are well-educated, they learn on the internet and bring their own questions. The problem is when learners want to skip the basics.'*
> **(Hairdresser, Accra)**

Finally, trainees often depend on the tools and materials in the workshop if they want to put into practice instructions in videos they have found. The excessive cost of materials can be a limiting factor in this respect, as can the attitude of a master craftsperson if they disapprove of the practice in question, when the apprentice has no possibility of trying it out elsewhere. Without the support or approval of their master craftspeople, apprentices sometimes do not dare to try out new things:

> *'I make discoveries on the internet, I see demonstrations on how to install R+3 up and down, but I'm afraid to apply it on the site so as not to cause any damage.'*
> **(Apprentice electrician, Dakar)**

SUPPORT FROM AND INVOLVEMENT OF MASTER CRAFTSPEOPLE

It is clear from the surveys that when apprentices use step-by-step videos to learn things, the master craftspeople have an important support function to fulfil. The more technically demanding the technique to be learned, the more important their role becomes.

As far as the master craftspeople interviewed were open to this learning strategy, they gave many examples of the active integration of step-by-step videos into their training practice. It became clear that they proceed in a differentiated way, basing the approach on the needs and situation of the individual apprentices, as well as on the questions they pose and their learning strategies. In Ghana and Kenya, some of the master craftspeople interviewed distinguished between two categories of apprentices. Those that are simultaneously enrolled in a vocational school, or who have completed it, are allowed to use videos for learning right from the start. The others are familiarised with the occupation first:

> *'There are two categories of trainees, the one from school who comes for attachment and the green one, starting from scratch. For the ones from school, you can start learning with YouTube videos but for the new ones, they start with theory and then practical.'*
> **(Master tailor, Nairobi)**

In Senegal, where some of the apprentices interviewed were still very young, the masters stressed their own mediation role. Some of them said they did not share the videos they found with the apprentices, but learned the techniques themselves and then passed them on without the help of a smartphone.

When master craftspeople think the apprentices are ready, they share step-by-step videos with them. In this case, they select the videos themselves, relieving the apprentices of the need to search and assess the quality. As in the following example, some respondents expect this process to increase the young people's motivation to learn:

> *'I download good videos and show them to my apprentices. Those who want try to imitate and I give feedback and correct. Videos are seen as very motivating, they get the attention of apprentices who sometimes prefer that than being told by us, the MCP!'*
> **(Master tailor, Accra)**

Sometimes master craftspeople directly challenge their apprentices to seek solutions to certain questions on the internet. If it is left to the apprentices to find good video tutorials, some masters still provide support for the search strategies and quality assessment, for example by pointing out the limitations of advertising videos. Many of the masters and apprentices interviewed also described how they watch the videos together, discuss the approaches they depict, and support the implementation.

> *'We watch videos on YouTube together with the apprentices and analyse the steps to make the transfer into practice. Usually, we sit together*

around a table and look together at the video I have downloaded, then discuss it and try out. We make 'play' and 'pause', the apprentices make the step, we play again, pause, do the next step etc. so that they can learn.'
(Dressmaker, Accra)

Some master craftspeople also see it as their role to protect their apprentices from the typical pitfalls of

learning with digital media. For example, they ask them to watch videos critically with regard to filters and other special effects, and to observe the sequence of steps carefully when putting them into practice. If master craftspeople do not actively assist the process of learning with step-by-step videos, they can still play a supportive role by giving feedback on the outcomes and helping apprentices to verbalise what they have learned, or simply by showing appreciation so that the apprentices feel validated in their self-managed learning strategy.

5.3 INTERNET RESEARCH TO FIND INFORMATION

'I use Google to look for components, taking a picture and then looking for similar images with Google Lens.'
(Apprentice electrician, Dakar)

Beyond step-by-step videos and inspiring models, the internet also offers other important sources of information to help answer a wide range of questions. Accordingly, internet research is a widespread learning strategy, both for answering specific questions in work situations and for acquiring more advanced knowledge.

UPTAKE OF THE STRATEGY IN THE OCCUPATIONS STUDIED

This learning strategy can be observed in all three occupations. However, it was cited particularly frequently by the interviewed electricians.

EQUIPMENT

Smartphones and, if available, laptops. The latter are preferred by electricians in particular because of the larger screen, which makes it easier to see details of complex circuit diagrams and illustrations of components.

APPS AND WEBSITES USED

Google, QR-code scanner, Wikipedia.

LEARNING OBJECTIVES AND OUTCOMES

Across all occupations, the internet is predominantly a source of information for specific technical questions when there is no experienced person available to ask, or if explanations are not understood. Apprentice electricians often search for information on the internet to help them cope with unfamiliar tasks or to obtain additional information about defective devices. For example, one apprentice explained how he looks for additional information when he feels insecure carrying out a task on a construction site:

'I go on Google and type in "install multiway switch". That way I can understand the master's instructions better on site. Sometimes we install two levels with multiway switches, and with Google I can follow the master's instructions better.'
(Apprentice electrician, Thiès)

Figure 18: An apprentice electrician shows how he uses photos to search for components on the internet, Accra.

Some apprentices look for additional information even when there is no immediate need, be it out of curiosity for a specific topic, to advance their vocational training, or to expand their horizons beyond their workshop. This way they can learn about tools or procedures that are not available or not used in their place of training. This was the case for an apprentice electrician interviewed who had completed three months of training as a solar installer and was highly motivated to build on what he had learned there and experienced on the construction sites. He said, for example:

> *'I received a photo of an inverter, so I immediately googled it to understand the device better. I took screenshots to help me remember later.'*
> **(Apprentice electrician, Thiès)**

CONTENT

Internet searches are used to access images and videos as well as text. Electricians are usually looking for circuit diagrams, operating instructions or product descriptions, while tailors and dressmakers search for sewing patterns and hairdressers for information on how to use products. Although some apprentices reported using their smartphone to read novels as e-books in their free time, there were no examples of them looking for or consulting written learning materials such as scripts and e-books.

ACTS OF LEARNING

When looking for information, apprentices usually first turn to their master craftspeople or older apprentices,

as one trainee electrician reported. Internet research thus tends to be more of a complementary step. Google is often used first; sometimes also Google Lens, as in the case of apprentice electricians trying to identify parts and find information about device components. Some apprentices also use other services, depending on what they are looking for:

> *'Yes, I use Google for research. I also use Wikipedia because it provides more details and also it allows you to save the work as a text image. And I use YouTube for illustrations, like freehand cutting of a specific part of a garment.'*
> **(Apprentice dressmaker, Nairobi)**

Only very few of the interviewees reflected on their own search strategies and were aware of their limitations. One exception was an upper secondary school student who is training to be a beautician during the summer holidays. She described how she works with different search terms and different sources of information to make sure she does not learn the wrong things. She said she had learned this approach at school.

Whenever information is sought to solve an immediate task, the internet research is usually followed by practical application. For this step, apprentices often require assistance from their master craftspeople, just as they do when following instructions from videos. This is about interpreting the information, assessing the appropriateness and feasibility of any solutions found, and carrying out the individual steps in the solution.

INTERACTION AND COOPERATION WITH OTHERS

Interactions among the apprentices themselves and between apprentices and master craftspeople can potentially take place at all stages of the learning strategy, from the formulation of a search question to a discussion of possible ways of transferring the know-how.

CHALLENGES

Especially when it comes to technical problems, some respondents said they quickly reach their limits when looking for information if, for example, they lack the technical vocabulary. If they do not get support, they become inhibited in their research, like this electrician apprentice who does not dare to ask his master directly for help:

> *Apprentice: 'I want my master to show me, I'd like to learn how to search like him.*
>
> *Interviewer: 'Have you ever asked him?'*
>
> *Apprentice: 'He's a bit complicated: He likes to share things, but we avoid asking questions. We feel embarrassed to ask where the master got his information.'*
>
> *Interviewer: 'So how do you do the research?'*
>
> *Apprentice: 'We have a go for ourselves and add to the information we find and that he gives us.'*
> **(Apprentice electrician, Thiès)**

Other challenges arise especially for apprentices who face language barriers, because technical content is not usually available in local languages. An insufficient command of written language also has a hindering effect. This might explain why, apart from searches for step-by-step videos, fewer cases were observed of apprentices looking for information on the internet. Those who did so were mainly electricians, a trade in which the apprentices have often completed more schooling.

SUPPORT FROM AND INVOLVEMENT OF MASTER CRAFTSPEOPLE

Master craftspeople can provide valuable support by encouraging apprentices to search for information on the internet and teaching them search strategies. Some masters send videos and links to their apprentices to prepare them for the practical training, in which case

they therefore search for and select the digital learning content themselves. Master craftspeople also provide support by answering questions that have arisen from the research. Some also create opportunities for content to be viewed and discussed together, so that apprentices who do not have their own internet-enabled devices can also benefit from the research. Some even go a step further and involve the appren-

tices closely when they do their own research and try out new techniques. One notable case was described by an apprentice who already has a vocational qualification in electricity and is expanding his practical skills in the informal sector. Working together with the master craftsperson, they searched for inspiring examples and plans to build a loudspeaker for themselves.

5.4 EXCHANGE WITH THE SPECIALIST TRADE COMMUNITY

'Apprentices and MCP are members in a WhatsApp Group for shops in electronics (a little bit TV repair). There they post questions – questions are posted on a daily basis, often with pictures and links, and with voice messages because they can do it in the dialect instead of typing in English. But junior apprentices rather ask their questions to seniors and to the MCP.'
(Electrician, Accra, Ghana)

Using messaging services, apprentices are sometimes linked to occupational networks with other apprentices and master craftspeople, where they can learn from the information being exchanged. These groups also fulfill a socialising function by involving apprentices in a community of practice.

UPTAKE OF THE STRATEGY IN THE OCCUPATIONS STUDIED

In all three occupations, cases were observed in which apprentices are connected with other apprentices and master craftspeople in WhatsApp groups or on Facebook. However, access to this community of practice is not open to all apprentices and there are also country-specific differences. As explained in the section on the uptake and use of smartphones, networks exist for all occupations, but they seem to be somewhat more widespread and institutionalised in Ghana and Senegal than in Kenya. Moreover, these groups are some-

times reserved for senior apprentices or journeymen and -women (compagnons), or even just for the master craftspeople. Besides this, many apprentices who have completed vocational training in a school context, whether in a recognised vocational training institution, a project or a training institute in the informal sector, are involved in networks with their fellow alumni. In a number of cases, there are also small groups that include the apprentices and sometimes also the master craftsperson of a single workshop. In addition, occupationally specific Facebook groups are another option for networking. These usually present no restrictions to access, and apprentices can join without a personal relationship to the members.

EQUIPMENT

Smartphones; feature phones, provided messenger services such as WhatsApp work on them.

APPS AND WEBSITES USED

Mainly WhatsApp, sometimes also Facebook, occasionally LinkedIn

LEARNING OBJECTIVES AND OUTCOMES

A form of technical training takes place within these groups when members ask and answer questions and share digital content. Nor should the occupational socialisation be overlooked that results from

participation. Values and etiquette are conveyed, as well as basic information on how the trade in question and the training are organised. When groups are initiated and managed by the apprentices themselves, self-organisation skills are added as a learning outcome.

CONTENT

The content shared in the groups is very diverse. Hairdressers and tailors/dressmakers often share new patterns, styles and videos, either for mutual inspiration or as advertising. Electricians, meanwhile, also answer technical questions. In groups initiated by TVET institutions, where teachers are sometimes also members, the participants distribute learning materials and pose and answer technical questions. Sometimes apprentices also use such groups to talk to other apprentices about problems at work or about career decisions, as the electrician in the following example describes. She is a member of a WhatsApp group for the graduates of the vocational training centre where she completed her training before taking up her apprenticeship in the informal sector:

> *'Today I know a lot about how to behave properly on a construction site, because I exchange ideas with my former classmates. I learn about good practices, behaviours and good manners. One of my classmates worked with a master for four years without receiving any money, then the master offered her a contract, which she hadn't expected. The lesson from this is that you shouldn't get fixated on the money, you have to be patient, it's hard … We share experiences and lots of advice.'*
> **(Apprentice electrician[14], Dakar)**

ACTS OF LEARNING

If the group was not initiated by schools or other institutions, as is often the case with such student groups,

the founding of a new group is itself already an important learning act, as much as it provides an opportunity to develop social skills and self-organisation. On a small scale, a first step might be for apprentices to create a self-administered apprentice group on WhatsApp for their own training enterprise and give themselves their own rules of access and communication. In Tamale, the apprentices have formed their own association and they exchange ideas both in person and online:

> *'We apprentices have an Association and a WhatsApp group. We share new things we have learnt or done among ourselves on the platform aside reminders to meetings.'*
> **(Apprentice hairdresser, Tamale)**

Participation in groups can be passive, or rather more active if members ask their own questions and share digital content.

Apprentices in Kenya, who do an internship in the informal sector in the course of their training at a vocational or technical college, reported using school WhatsApp groups to present their work to each other and share the latest trends. Similar examples were observed among electricians in Senegal. The apprentices received materials from their teachers through WhatsApp and were able to ask questions. These exchange formats continued to be used after the end of the course, for example by the alumni of the photovoltaic courses at the chamber of skilled crafts in Thiès.

INTERACTING WITH OTHERS

Interactions with other people are at the heart of this learning strategy. But although digital communication is the focus here, relational structures and communication within the workshop have an impact on people's participation in social media exchanges. For example, one trainee electrician reported that questions are first asked in person, and the younger apprentices turn to older ones before seeking help from the whole group.

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[14] This young woman completed an apprenticeship at a vocational training centre in 2020, and followed this with an informal apprenticeship working for a relative. At the time of the interview, she was a member of a WhatsApp group with her former classmates.

CHALLENGES

Gaining access to relevant groups can itself be a challenge for apprentices who are not well connected personally. Moreover, the quality of the content being shared dictates the effectiveness of this learning strategy. Sometimes, a significant problem can be the latent competition between members:

> *'When I ask Master and he doesn't know, […] we ask on WhatsApp in a group of electricians. But if you ask for help, usually they won't teach you but instead they will offer to send you the component or try to sell their service.'*
> **(Apprentice electrician, Accra)**

SUPPORT FROM AND INVOLVEMENT OF MASTER CRAFTSPEOPLE

Master craftspeople can mainly offer support and provide their apprentices with access to relevant groups if they themselves are well networked. If they are in a group with the apprentices, they can also share useful learning materials. One dressmaker in Ghana, for example, who offers training activities in the context of a trade association, described how she distributes small learning tasks to the course participants as well as her own apprentices, who all belong to the same WhatsApp group.

5.5 KEEPING NOTES AND RECORDS TO REMEMBER WHAT YOU HAVE LEARNED

> *'Sometimes I use my phone to take notes during the course if I have forgotten my notebook.'*
> **(Apprentice hairdresser, Accra)**

Digital devices, especially smartphones, are also used for noting down or recording new information as an aide-memoire.

UPTAKE OF THE STRATEGY IN THE OCCUPATIONS STUDIED

Only a small minority of respondents use smartphones to store and remember what they have learned. Examples were seen in all three occupations, but somewhat more often among the electricians.

EQUIPMENT

Smartphones

APPS AND WEBSITES USED

Notes app, camera function.

LEARNING OBJECTIVES AND OUTCOMES

While most of the apprentices interviewed frequently reported with pride that they are able to remember what they have learned, some use their smartphones to keep a record of recent discoveries so they can devote more time to them later:

> *'If we learn a new process or repair technique, we take a video so that we can do it again later.'*
> **(Apprentice electrician, Accra)**

However, the smartphone is only one of several possible tools for doing this; others include folders and notebooks.

CONTENT

Self-produced videos, photos and written records.

ACTS OF LEARNING

According to the respondents, whether or not they record information or work processes for future reference, either in writing or as images, depends largely on the complexity of the material.

The learning culture of each apprentice and each training enterprise could also have an influence on this decision. Apprentices with little school education were the ones most likely to refer to their good memory during the interviews. On the other hand, in the informal training centre for hairdressing and cosmetics visited in Accra, it was striking that several

apprentices said they take notes as well as pictures or videos, in order to review them at home.

However, it remained unclear from the interviews how far these notes, pictures and videos are actually used in quiet moments in order to recall information or processes.

It is common practice among apprentice tailors and dressmakers in Ghana to record the techniques they have learned in a portfolio. In the workshops visited, this takes the form of an A3-sized notebook they produce themselves, into which they paste small samples of specific stitches or doll-sized clothing items. At the end of their training, therefore, all the apprentices have in their possession a physical document in which they can look things up for themselves while also using it as a catalogue that they can show to customers or employers (see Figure 17). This practice was not observed in the other two countries.

Figure 19: Apprentices in a tailor's workshop show a portfolio of sewing samples, Accra

INTERACTION AND COOPERATION WITH OTHERS

No interactions with others were observed with regard to this learning strategy. It might be construed that the sharing of notes or pictures with other apprentices constitutes interaction and cooperation, but in the interviews no one described such cases.

CHALLENGES

One precondition for this learning strategy is the learning culture or the individual capacity for learning, which underpins decisions about what content is worth retaining. In addition to this, finding an effi-cient way to document and organise the information requires a degree of creativity and experience.

SUPPORT FROM AND INVOLVEMENT OF MASTER CRAFTSPEOPLE

In the course of the surveys, no examples emerged of support from master craftspeople for this learning strategy. Only one master craftsperson, at the informal training institute for beauticians in Accra which was visited for the study, stated that she created educational videos of her own. She shares these videos, which for example record how she carries out massages, with her trainees on WhatsApp. One of them reported that he uses these videos to practise at home.

5.6 USE OF E-LEARNING ACTIVITIES ON LEARNING PLATFORMS

> *'Our senior taught us to take advantage of the free fashion classes on Alison.com. They make it so easy.'*
> **(Apprentice dressmaker, Accra)**

Learning platforms offer free and paid learning materials and online courses; some also provide opportunities for certification. In the present study, only very few examples were seen of people using such courses.

UPTAKE OF THE STRATEGY IN THE OCCUPATIONS STUDIED

This learning strategy was observed among the electricians and the tailors/dressmakers.

EQUIPMENT

Smartphone and laptop.

APPS AND WEBSITES USED

Jemshah e-learning platform & YouTube channel, Cisco, Alison[15].

LEARNING OBJECTIVES AND OUTCOMES

In the examples identified, the learning platforms were used to acquire technical know-how, although they also offer courses on key competences and entrepreneurship.

CONTENT

Courses on the platforms mentioned above mainly consist of video tutorials, texts and multiple-choice questionnaires, but some of them also involve live webinars with presentations and subsequent discussion. Their duration is usually a few hours.

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[15] Alison claims to be one of the world's largest platforms for general education and vocational training. It is a for-profit social enterprise whose objective is to enable anyone to learn online free of charge, anywhere, at any time and on almost any subject. Participation is free, as is downloading the 'learner records', but fees are charged for an officially formatted certificate or diploma.

ACTS OF LEARNING

To complete a course, participants must usually register to gain access to the learning materials. Unlike the other strategies described here, the use of these learning platforms is distinguished by the fact that progress through the learning sequences follows a set pattern for the learner. Once the trainees have overcome the first hurdle and selected a course, they are then guided through the learning process and usually only need to plan their timetable.

INTERACTION AND COOPERATION WITH OTHERS

Forms of interaction with other learners as well as teaching staff can be part of these courses. It is also possible to pursue e-learning activities jointly with other apprentices. However, no examples of this were evident from the surveys.

CHALLENGES

The biggest barrier to apprentices pursuing courses on learning platforms is without doubt their lack of awareness of them, coupled with the fact that few such platforms are open to this target group, let alone explicitly designed for them. All of the respondents who had experience of such learning platforms had encountered them in the context of formal vocational training.

SUPPORT FROM AND INVOLVEMENT OF MASTER CRAFTSPEOPLE

Master craftspeople and experienced apprentices could perform an important role by drawing the attention of younger apprentices to the courses on learning platforms – assuming, of course, that they know about them themselves. In the interviews conducted, no master craftsperson was identified who had personal experience of learning platforms or knew of any appro-

priate platforms. Nevertheless, the masters demonstrated a palpable interest in educationally high-quality learning material, as shown by this excerpt from the interview with dressmakers in Mombasa:

> *Master dressmaker 1: 'The content of the tailoring book – it would be great if this would be available online.'*
>
> *Master dressmaker 2: 'There is a need to get a variety of books and learning materials for men, women, and kids' outfits.'*
>
> *Master dressmaker 3: 'There is a dressmaking assessment guideline by the National Industrial Training Board from 2011 – Grade III – which I use. But it does not have corresponding learning materials.' [Note: Most of the other master craftspeople do not know this guide.]*
> **(Dressmakers, Mombasa)**

When they discussed their wishes with respect to digital learning activities, the master craftspeople also mentioned e-learning materials. However, they also stressed the importance of linking learning with digital media to the training in the work context and workshops, including for the teaching of digital competences:

> *'For learning basic digital skills we need to have a workshop setting, then I could imagine accessing a learning platform for continuous/ further learning. But I feel there is a need to have physical onboarding and upskilling. If the content is good, I would be willing to invest in data bundles to access the content.'*
> **(Dressmaker, Mombasa)**

6 PROGRAMMES AND APPROACHES FOR THE USE OF SMARTPHONES IN APPRENTICESHIPS

As yet there are hardly any meaningful studies, in either the academic or the grey literature, describing and evaluating examples of projects or approaches that deploy smartphones for skills development in informal apprenticeships (cf. GIZ, 2020). The local surveys nevertheless revealed isolated projects intended for informal sector workers and for aspects of digitalisation in programmes to modernise informal apprenticeships. These are presented briefly in the following section,

without any claim to completeness or to a comprehensive evaluation. In the absence of a well-founded database and systematic analysis, these cannot yet be characterised as examples of good practice. They do, however, provide insights into current developments, as well as possible entry points for additional measures on the use of smartphones for learning purposes in the informal sector.

6.1 ASPECTS OF DIGITALISATION IN PROGRAMMES TO MODERNISE APPRENTICESHIPS

Research in all three countries has shown that the state takes little notice of the potential benefits of digitalisation for modernising informal apprenticeships. At the time of this report, Senegal alone is an exception, after the COVID-19 pandemic fuelled interest on the part of the authorities in e-learning solutions for apprentices in the informal sector. For example, the *Projet employabilité des jeunes par l'apprentissage non-formel* (PEJA) is gradually adding resources for apprentices to the **e-jang** learning platform, which was developed for formal vocational training (ILO, 2020b). PEJA, which receives World Bank funding for the period 2019 to 2024 and is being implemented by the *Ministère Sénégalais de la Formation Professionnelle, de l'Apprentissage et de l'Insertion* (MFPAI), aims to train 32,000 apprentices in 12 occupations and help at least 24,000 of them obtain a nationally recognised vocational qualification. The PEJA training takes place in-company, although the apprentices also have access to additional or supplementary training at designated facilities. The content can be loaded onto mini-servers to make it available to trainees even without internet access. At the time of this report, however, only a test window was available on the platform[16] and no timetable was

given for its further development during the expert interviews. Other questions that remain unanswered concern the translation into local languages. All the formal TVET content is offered in French, the language of instruction. However, the target group of apprentices in the informal sector rarely speaks French well enough to understand the technical content. As yet, the Moodle-based learning platform does not support local languages, not least Wolof, which is widely spoken in Senegal. For Senegal therefore, against the background of the findings of present study, the barriers to the learning content appear substantial.

A learning platform has already been deployed as part of the *Projet d'appui au développement et à l'intégration des apprentissages* (PADIA), which was implemented in Senegal from 2013 to 2018 with the support of Canadian development cooperation and resulted in the training of 1,142 young people. This solution, developed and operated by the Canadian company **Boîte à Innovations**, provided learning tools for PADIA participants, based on nationally recognised skills-based training standards. The learning materials were designed to complement the things learned in the

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[16] https://e-jang.sec.gouv.sn/ (accessed: 5 January 2023)

workplace. The training followed an individualised plan in a virtual space that bore the name of the training enterprise and which included access to forums for communication with other trainees as well as tutors. To provide access with as low a threshold as possible, the learning videos were developed in a variety of local languages and equipped with translation aids. There were also learning units that taught basic digital skills for using the system on laptops and smartphones. This platform still exists and is used as a paid service by other development cooperation projects outside Senegal. Since PADIA ended, however, the content is no longer available to trainees in Senegal due to a lack of funding.

Senegal's strategy to develop learning platforms to modernise informal apprenticeships has no equivalent in Ghana or Kenya. However, before an in-depth study has been undertaken into the effectiveness of such platforms, it would seem too early to consider transferring the approach. Some fundamental questions arise, especially regarding the following points:

- Accessibility: would it be possible, without recourse to donor-funded programmes, to ensure access to learning platforms for the many apprentices involved in traditional training in the informal sector with no ties to state structures? How could this target group be reached and shown how to use the existing learning resources?

- Inclusion: what barriers discourage the widespread use of the training courses and how can these be overcome? This refers not only to language barriers and illiteracy, but also to cultural and physical barriers, and to the cost of smartphones and mobile data.

- Quality and relevance of the courses: to what extent do the courses meet the needs of (future) informal employees and how can the compatibility of the training content with working practice be ensured? How can the approach be made sufficiently flexible to cope with the heterogeneity of the informal sector?

- Sustainability: what is the cost-benefit ratio of a learning platform and how might the long-term maintenance and further development of such services by local structures and with local funding be ensured?

6.2 STANDALONE INITIATIVES AND SUPRANATIONAL APPROACHES

In addition to the state-led reform efforts and the large-scale programmes for modernising informal apprenticeships in Senegal, both there and in the other two countries the study identified a number of projects and initiatives which, while not always explicitly or exclusively aimed at apprentices, are nevertheless open to them and to master craftspeople. They focus on the use of smartphones for the work process. The following list is by no means exhaustive.

In **Ghana** the eSkills4Girls project, supported by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the British Council, aims to teach digital competences to young girls and

women. Short training courses were developed to assist people employed in the informal sector to use their smartphones more effectively to develop their business. The course participants were recruited through the trade associations. Course contents included, for example, the use of mobile money, marketing on social media, photography and photo editing. The focus was on the immediate benefits for people's work rather than on long-term capacity building. The courses lasted for two days, with a follow-up phase when the participants were visited by the trainers. After a pilot phase (2018 to 2022) in which around 450 women and girls received training, the courses are now offered at digital transformation centres (DTCs) and innovation hubs countrywide. For example, a course has been developed for dressmakers which lasts an hour and a

half each week for a duration of five weeks. As well as imparting basic skills for accessing the internet and using social media for marketing purposes, this course has also introduced an app for customer relationship management (especially for storing customers' measurements) and a design app. Apprentices also took part in the first course, alongside master craftspeople. It became clear that apprentices who came alone often had no opportunity to put their new skills into practice in their training enterprise because their own master craftspeople were not interested. In this project, access to mobile data is a major challenge, especially in rural areas where the DTCs are not equipped with WiFi. The courses take place face-to-face and participants are given a free data package, but these are often exhausted before the end of the course.

In **Senegal** the grow academy is an example of a social enterprise that teaches digital skills for work to young women who have not completed school. The 18-month curriculum includes basic digital skills, for example for marketing and business management, as well as personal development activities and extensive practical placements with informal sector enterprises, especially in women's cooperatives. The first phase of the course is financed through scholarships, with support for the grow academy coming from Luxembourg development cooperation, among others. After that, course fees are charged, and participants receive assistance in establishing their own businesses. 60 per cent of the learning takes place in-company, while the remaining 40 per cent is dedicated to face-to-face courses and self-learning phases using a smartphone. Since the project has only just started running, at the time of this report no findings are yet available regarding the results and challenges of the approach.

In **Kenya** the Commonwealth of Learning (COL) and the Kenya Technical Teachers College (KTTC) are implementing one of the few projects in the country that cooperates with master craftspeople in the informal sector. The focus is on developing the masters' educational skills. Following

a training-of-trainers concept, an initial group of master craftspeople has received training, who in the next stage, each equipped with a Raspberry Pi[17], will then act as master trainers to improve the educational skills of other groups of master craftspeople in Nairobi. Although the course will be carried out in part using the Raspberry Pi, its content focuses entirely on analogue teaching skills – with no consideration given to the use of smartphones and digital media for teaching and learning purposes. Implementation of the project has only just begun, and at the time of the interview, only the first cohort of future master trainers had received their training. Consequently, no information is available about the results and challenges of this approach at the time of the report.

The approach taken by the GIZ project Promoting Self-Employment and Entrepreneurship among Young People in Kenya, which encourages development in Kenya's informal sector, focuses on entrepreneurship. Training is provided to mentors, who are then meant to support the formation of micro-enterprises: 'Priority is given more to the question of how to become a better entrepreneur rather than to the question of skills.' (GIZ, Kenya interview) This training is not digital, and there is no cooperation with the Digital Transformation Centre.

The lack of research and evaluation regarding the uses of digital technologies, especially smartphones, in informal apprenticeships seems to reflect a lack of commitment to this area on the part of national and international actors in the three countries studied. None of the programmes and projects considered in this study have yet addressed the use of digital media by master craftspeople and apprentices in the informal sector for learning and teaching purposes. Only in Senegal is the topic being addressed, with the Boîte à Innovations and e-Jang platforms. Although in all three countries an overwhelming majority of young people pursue their vocational training in the informal sector, none of the programmes considered here demonstrate a broad-based strategy.

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[17]   The Raspberry Pi is a small, inexpensive computer that maps a local network. This enables the use of a mobile phone, for example, to obtain local access to a learning management system or storage volume to view learning materials and videos.

7 DIGITALISATION AND INFORMAL APPRENTICESHIPS: PREREQUISITES FOR SUCCESS

As stated in section '3.4 The main features of learning processes in the informal sector', learning processes in informal apprenticeships are characterised by social interactions in the workshop and beyond. By adopting tasks appropriate to their learning level and by observing others while participating in the work process, the apprentices gradually grow into a community of practice. The acquisition of skills occurs primarily through practical actions, embedded in work situations, and is characterised by the importance of the apprentice/master relationship.

In the course of the surveys for the present study, numerous examples of learning strategies were found that are already described in the literature and are practised without the aid of smartphones, such as learning by observing experienced colleagues, learning by asking questions and discussing, or learning from problems or customer assignments. In this context, access to digital media serves to expand the learning strategies applied, using two channels. On the one hand they open up new sources of knowledge for the apprentices, beyond what would otherwise be available in analogue form. On the other, the new communication tools have expanded the possibilities for interaction and networking that apprentices use to share experiences and find their feet in their new jobs. In all three occupations and all three countries addressed by the study, the apprentices and master craftspeople surveyed are exploiting the new learning and teaching opportunities offered by smartphones, in intensive and varied ways. Based on a comparison of the six digital learning strategies and taking into account the approaches and programmes that have been identified, the following section presents the most important developments and driving factors related to the transformation of informal apprenticeships through digitalisation.

7.1 APPRENTICES' ACCESS TO THE INTERNET

In the current study, some 77 per cent of the apprentices surveyed owned a smartphone, and only around four per cent owned a laptop, computer or tablet. The smartphone is therefore by far the most commonly used technological tool for digital learning strategies in the informal sector. In most cases, apprentices who do not have their own devices can at least occasionally use other people's smartphones, be it family members, other apprentices or the master craftsperson. In Tamale, it was observed that apprentices who only use a basic mobile phone share the data packages provided as promotional gifts by their phone providers with other apprentices who own a smartphone. In return, they are then allowed to use the smartphones as well. Alternative access strategies like this have a mitigating effect on financial access barriers, as described here in Kenya:

'There is not much work and thus we are not making much money and we don't earn enough money to afford one [smartphone] – I have taken a loan for a smartphone, for which I pay 50 KES[18] back every day. The others call me with their Yam phones for help or use my phone for research when they have a problem. I spend KES 200 per day using Safaricom because it's fast. And the others support me in purchasing the data bundles.'
(Apprentice electrician, in a slum in Mombasa, Kenya)

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18 KES = Kenyan shilling; exchange rate on 30 January 2023: EUR 1 = KES 135.

However, limited access to smartphones also means that the ability to carry out spontaneous searches, note-taking and communication for learning purposes is also limited. Almost all of the master craftspeople interviewed agreed that not having a smartphone puts trainees at a disadvantage today. This hairdresser in Accra therefore actively approaches parents to convince them to allow their children to access the internet:

> *'Not every parent is happy to provide a smartphone to their children or only old phones so called "Yam Phones" – because they are worried about their children being exposed to not good content or [religious] believes. But I tell the parents that apprentices need the smartphone to learn – if they have none, they are marginalised. At least the apprentices should be allowed to use their parent's smartphones.'*
> **(Hairdresser, Accra)**

Like the cost of smartphones, the cost of mobile data also acts as a barrier to learning with these devices. In Kenya and Ghana, the respondents very often cited the cost of mobile data as the most significant barrier to learning with a smartphone. In Senegal, this seemed to be less of a problem because quite a number of workshops and households have WiFi access, at least in the two cities of Dakar and Thiès. WiFi networks are often used by several families or businesses, with the costs being shared. Some master craftspeople occasionally share mobile data with their apprentices or give them money to buy a data package. This alleviates the problem of the expensive internet access, but does not solve it.

Overall, the surveys showed that the cost of internet access is a significant barrier to learning and teaching with smartphones. At the same time, numerous examples demonstrate that apprentices and master craftspeople develop many different social practices to avoid marginalising those who do not own a smartphone or cannot afford mobile data.

7.2 AVAILABILITY AND QUALITY OF DIGITAL LEARNING OPPORTUNITIES

With respect to digital learning activities, it is generally possible to differentiate between those that respond to learners' isolated needs (learning on demand) and those that guide learners along structured learning paths to achieve predetermined learning goals (curriculum-based learning). On-demand learning utilises learning nuggets[19] that address specific problems; these can easily be shared on social media thanks to their short format. By contrast, curriculum-based learning is mostly offered by educational institutions using learning management platforms such as Moodle, with which learners first have to register.

The surveys show that apprentices in the informal sector find and exploit many resources on the internet to expand their knowledge and skills. However, almost exclusively they are using products and services that can be characterised as learning on demand. Above all, they turn to YouTube, where they can find countless step-by-step videos that they can use to address a wide range of learning objectives in virtually all occupations. These videos offer many advantages over curriculum-based courses linked to learning platforms: they are directly relevant to apprentices' questions and problems; they allow total flexibility in terms of time and location; and they allow learners to take control of their learning process and choose their own learning content, which increases their motivation and engagement. However, they also present certain challenges and disadvantages, such as the sometimes poor reliability and quality of the content, or a lack of relevance to apprentices' learning levels, or to their working and training contexts. While it is not a classic provider of open educational resources (OER), YouTube nevertheless hosts teaching and learning videos designed to a professional educational level, on relevant channels such as the e-learning provider Jemshah. Despite this, when evaluating the surveys, it is noticeable that only

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[19] A learning nugget is a self-contained mini-learning activity, usually no more than five minutes long. (Bailey et al., 2006)

a minority of respondents use professionally produced learning materials, whereas many often resort instead to promotional videos and DIY videos. They do not always recognise the deficient quality of the content, however, as judging it properly already requires a certain amount of experience and professional know-how. Furthermore, the choice of learning materials is even more limited if apprentices do not speak English or French.

On the other hand, learning platforms do not currently offer any alternatives for this target group. Insofar as they provide any learning products that are free and appropriate to the target group, only very few of the respondents are aware of them. Above all, however, it would seem difficult to reconcile the curriculum-based, pre-defined approach that underpins them with the diversity of apprentices' educational levels and learning circumstances. Moreover, the need for digital and general learning competences is also a hurdle here.

7.3 APPRENTICES' DIGITAL SKILLS AND COMPETENCE FOR DIGITAL LEARNING

For learning with smartphones to be effective, trainees must possess basic digital skills. In the interviews, some apprentices who had not completed primary education and can hardly read or write showed that they are still able to find pictures and videos on the internet and social media, which they use for inspiration. They are also very capable of participating in a community of practice using voice messages and exchanging ideas with other apprentices and master craftspeople. However, they are severely limited in their ability to find relevant answers to specific questions or to classify information correctly.

However, exploiting the potential of smartphones for learning more effectively usually requires digital skills and general learning competence of a significantly higher level than was observed among the apprentices in the survey. According to the master craftspeople, the apprentices often need support to carry out effective research and to recognise relevant learning materials. However, the masters themselves are not usually well placed to offer the necessary support in more than

a rudimentary way. Older apprentices, friends or other acquaintances might perform this role to some extent, but in most cases it was up to the apprentices themselves to acquire more than a minimum level of digital learning skills. Apprentices who have already gained digital skills at school or in formal vocational training are therefore clearly at an advantage. They were consistently the most capable of articulating and reflecting on their strategies for researching and assessing material.

In the few cases in which master craftspeople were digitally literate themselves and possessed appropriate skills for online learning, they were sometimes unable to apply those skills to the training of their apprentices because the latter lacked basic literacy. Although they are not based on a representative sample and therefore cannot claim to fully illustrate the situation in the three countries, the surveys nevertheless highlight the major shortcomings in terms of schooling that prevent apprentices in the informal sector from pursuing vocational training with the help of a smartphone.

7.4 THE KEY ROLE OF MASTER CRAFTSPEOPLE

Digital media open the way to new knowledge resources and have brought sustained changes to teaching and learning strategies, with a shift from a one-dimensional focus on the master craftsperson towards broader access to knowledge and the acquisition of

skills. However, learning processes are still characterised by intensive and diverse social interactions at the workplace, not least because practical experience and the development of manual dexterity come from practice and exercises. They remain an important aspect of

vocational training and cannot be replicated digitally. Access to new content opens up entirely new channels of inspiration and learning opportunities that complement a practical apprenticeship along traditional lines, without replacing it. The key role of master craftspeople is also a crucial factor in the success of digital learning strategies, as is evident from the detailed description of the six strategy types identified here. Above all, master craftspeople can help their apprentices to find and assess relevant learning content, interpret information and classify it correctly, and put into practice the things they have seen or read; they also open doors for the apprentices to relevant social groups in the digital space.

In a more fundamental way, master craftspeople also play a role as supporters and facilitators of digital learning, or as its obstructors, simply through their open-mindedness about the use of smartphones in the first place, and by responding to initiatives and questions that the apprentices bring from their digital explorations. A fundamental reason for differences between master craftspeople in this respect is the potentially distracting and disruptive effect of smartphones when they are used during working hours purely for entertainment rather than for working or learning. How these dangers are perceived and how their disruptive impacts are assessed differs greatly from case to case, as do the ways they are dealt with.

> *'If you have two learners, one without [a smartphone], one with — it is clear to all of them that the one with the smartphone will perform better after six months of training. The phone can also be a distraction, but we help them to focus and to use the phone for work purposes.'*
> **(Hairdresser, Nairobi)**

In Senegal, many respondents said they are only allowed to use their smartphones in specific places and/or at specific times. Often, research that is intended mainly to find inspiration should only be done during breaks, whereas a short search to find a solution to an acute problem or using the phone for work-related communication are allowed. So, especially when there is a lot to do, the research often takes place at home.

Rather than imposing rules and watching over apprentices' media consumption, and issuing warnings if necessary, some master craftspeople prefer to appeal to their sense of responsibility.

If the restrictions placed on smartphone use by the masters are only due to their concerns about the apprentices' concentration and time, they can still support their digital learning strategies. More problematic seem to be the cases in which master craftspeople feel threatened in their authority, with the result that apprentices do not dare approach them with questions or suggestions. These findings show that any approaches to promote digital learning as part of apprenticeships in the informal sector cannot succeed without the involvement of the master craftspeople.

To sum up it can be said that, overall, digitalisation is having diverse disruptive effects on apprenticeships in the informal sector, especially with regard to the role of master craftspeople. In a context where access to the formal education system continues to expand and smartphones offer young people access to new sources of knowledge, master craftspeople must address the question of how to sustain the attractiveness of their training. This question is at the same time an important lever for improving the quality of informal apprenticeships, as can be seen from this interview excerpt:

> *'Digital tools are a threat to those MCPs that do not learn to keep up to date, because apprentices can learn the very basic skills on YouTube and they will be aware of what they can get elsewhere. With free TVET, when it is implemented, young people will go to schools instead of doing an apprenticeship if the MCPs are not good, training is not certified etc. But for MCPs that are good, digitalisation is not a threat: it helps to teach better and develop their own skills.'*
> **(Dressmaker, Accra)**

8 ENTRY POINTS FOR WORKING PRACTICE AND RECOMMENDATIONS FOR ACTION

The preparatory literature research, the expert interviews and the survey of apprentices and master craftspeople in the informal sector in Ghana, Kenya and Senegal all show that learning with digital devices, especially smartphones, has already brought some far-reaching changes to informal apprenticeships. Positive developments include easier access to a wide range of new sources of knowledge as well as greater opportunities to communicate across the commu-

nity of practice. At the same time, new challenges are emerging that threaten some apprentices' ability to participate in training, for example those who are financially disadvantaged. Building on the analysis of these developments, the following section identifies entry points for efforts to better exploit the potential of digitalisation for vocational training in the informal sector.

8.1 MAKE ACCESS TO THE INTERNET AND TO SMARTPHONES EASIER

Access to internet-enabled devices and to data is a precondition for people to share in the benefits of digitalisation. If the provision of smartphones or (inexpensive) data packages is included as a component of support activities, their specific design should consider not only the needs of individuals, but also those of the training enterprise as a whole. Smartphones not only serve as an instrument for self-managed learning, they are increasingly also a work tool. In the workshops visited, diverse social practices were observed that regulate access to and the sharing of smartphones and laptops. While not using individual case studies to draw general conclusions about the informal training enterprises, the planning and design of support measures should nevertheless take local practices into account in order to achieve the greatest possible impact.

To minimise internet costs, learning activities could always be designed in such a way that they require as little data as possible.

Another possible approach is to use what are known as 'zero-rated websites.' These are websites that users can access free of charge without affecting the data volume. This means people can find learning materials and other useful information on the zero-rated website without paying for it. However, if such forms of subsidised access are launched by development cooperation organisations without any models for follow-up financing, it will be a challenge to ensure their long-term funding. If possible, therefore, cooperation should be established with mobile phone providers to enable free access to the websites, as well as maintenance and updating, in the context of corporate social responsibility (CSR) initiatives. One such example is Safaricom's free DigiFarm service and app, which provides farmers with access to and credit for agricultural inputs, as well as learning content, with no data costs incurred by Safaricom customers.

8.2 PREPARE THE GROUND FOR GOOD QUALITY LEARNING ACTIVITIES

The apprentices and master craftspeople interviewed for this study are already finding online resources relevant to them that enrich their practical and work-based learning in workplaces and on construction sites. As such, for the kind of learning that addresses specific problems and needs, while being both flexible and limited to a set duration, the challenge is not so much a shortage of online resources but a lack of skills to find, recognise and evaluate them. Moreover, apprentices might also find it attractive to pursue more rigorously structured and perhaps certifiable training courses. For example, at various points respondents mentioned the importance of certification for finding work as an employee (as opposed to an entrepreneur) in Ghana, or for securing public sector contracts in Kenya. At the current time, however, little use is made of more formal, curriculum-based online courses such as these, or they are used solely by apprentices who also learn at a formal vocational training institution prior to, or alongside their training in the informal sector.

One notable finding from this study is that very few learning platforms were known to the respondents. TooShare, Atingi and hub4africa.bayern were not named. This confirms the impression that these learn-ing platforms have not so far focused on apprentices as a target group, and that too little effort has been made to reach them with needs-based and low-threshold offers.

In order to reach apprentices in the informal sector with learning materials, it would be a good idea initially to utilise the platforms and services known to them, such as YouTube and Facebook. Moreover, to ensure that the learning resources are accessible and attractive to the intended target group, the language, graphic design and ratio of text to images should all be chosen accordingly. Short learning nuggets with immediate practical relevance could be tied to interactive activities, such as quizzes and competitions, and to exchange formats in social media, in order to draw the trainees' attention to more complex and structured courses, and to other support measures in areas such as careers, entrepreneurship, life skills, the recognition of prior learning and micro-credentials[20]. Linking different types of training course as well as different platforms and social media could ultimately pave the way for apprentices in the informal sector to find openings for training, advice and certification that complement the practical training with their master craftsperson.

8.3 MAINSTREAM DIGITAL SKILLS FOR TEACHING AND LEARNING

Digital skills with a focus on competences for digital teaching and learning are of the utmost importance for the effectiveness of digital learning strategies. The surveys made it clear that a great need for such skills persists among apprentices and master craftspeople alike. At the same time, no support activities were identified in this respect. In the three countries, ongoing programmes focus either on teaching digital skills for the work context (e.g. digital marketing with social media) or on teaching educational competences for master craftspeople, although digital aspects do not yet play a part in that. In the Commonwealth of Learning (COL) and Kenya Technical Teachers College (KTTC) project, smartphones are used for learning (Raspberry Pi). Here too, however, digital teaching and learning skills are not addressed.

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[20] Micro-credentials, also called 'badges' or 'digital badges', are small digital awards or certificates issued by educational institutions, companies or other organisations to recognise specific skills, knowledge or achievements. Unlike traditional qualifications, micro-credentials are more specific, focusing on one particular area of knowledge or a single skill. They can be earned online then presented on social networks and in CVs. Micro-credentials have gained in significance in recent years as they offer a means of encouraging continuous learning and development.

Since smartphones are already ubiquitous as learning tools in the three countries examined here, it would be advisable to bear them in mind and integrate them into all vocational training activities for apprentices and master craftspeople in the informal sector, and then use them for follow-up activities.

Among master craftspeople, it was observed that the better they themselves are able to use a smartphone as a learning and working tool, the better they are able to support their apprentices. If training activities focus on occupationally specific skills, then digital learning strategies should be demanded and supported. Training activities for trainers should include aspects of dig-

ital learning and teaching, even if they last for just a few hours, as is the case with the voucher programme in Ghana.

For apprentices, it is similarly important to promote digital learning competence at every opportunity. Independently of other training courses, smaller 'how to…' learning nuggets could also be developed that are entertaining and easily accessible, and which address different aspects of learning, such as internet searches, the critical use of online resources, saving and retrieving content, translating content or having it read aloud, etc.

8.4 INTEGRATE MASTER CRAFTSPEOPLE INTO TRAINING COURSES FOR APPRENTICES

A recurring message, voiced both by the experts interviewed and by the master craftspeople, was that the latter should always be involved in courses for apprentices. On the one hand, this would make it easier to gain access to the apprentices. On the other, it is more likely that the master craftspeople will give their support if they themselves have a direct benefit, for example through courses of their own. From the surveys it was clear that master craftspeople also have an important support role to play in digital learning strategies, especially when it comes to putting into practice things that have been learned. Without advice and direct feedback from experienced apprentices or master craftspeople, it is difficult to acquire the digital learning competence to assess newly found learning resources for their credibility and usefulness, or to find videos that are suitable for one's own learning level, without using a learning management system. On the contrary, a dismissive attitude on the masters' part can result in apprentices lacking opportunities to talk about things they have learned or to try out new things in the workplace.

On the basis of the surveys, it would seem generally advisable to offer the following activities to master craftspeople:

- Training and workshops on how to deploy digital media more effectively for the job (e.g. digital marketing, apps specific to the occupation, apps for accounting and banking). Such activities should also address the use of digital learning approaches for the self-managed further development of those skills, as well as how to transfer the skills to the apprentices.

- Training and workshops on how master craftspeople can use digital media for their own further training, as well as in their training activities. A mixture of practical exercises and reflection should strengthen the master craftspeople in their role as trainers and encourage them to deal constructively with the opportunities and challenges digital media present for young people. Such activities should take differences in literacy and language skills into account and should not exclude masters who have deficits in these areas.

- Exchange formats for sharing and discussing digital learning. Such formats (e.g. WhatsApp groups) could also be integrated into existing networks, for example those organised by trade associations or by the chambers of skilled crafts, if any exist in the informal sector.

It could be more effective to pursue one or more of these approaches, depending on the master craftsperson's level of digital literacy. Those who are not very digitally savvy could, for example, start with the first kind of training to increase their familiarity with smartphones, while the more advanced could immediately focus on educational aspects. Exchange formats, on the other hand, could be very open to allow participants to learn from each other, and possibly also reach master craftspeople who are sceptical about digitalisation. To keep the masters' income losses to a minimum, training measures should take the form of short interventions close to home or work, in a blended learning approach.

8.5 PURSUE A PARTICIPATORY AND ACADEMICALLY SUPPORTED APPROACH TO TRAINING COURSES

Due to the great scarcity of research and the fact that there is little experience and no well-founded evaluations in this area, it is advisable to involve representatives of the target group as much as possible when developing approaches to promote digital skills in apprenticeships. Separate academic research projects have shown that participatory approaches bring many benefits to the development of occupationally specific apps for the informal sector, such as for street vendors in Tanzania. They can lead to apps being developed which fit well with the users' everyday needs and which are easy for the target group to operate (Rumanyika et al., 2022). Accordingly, such co-creative and user-centred approaches should also be chosen for the design of courses and activities for apprentices and master craftspeople in the informal sector (cf. Bon, 2016, BMZ, 2019).

8.6 USE ALL THE BENEFITS OF SOCIAL MEDIA TO BROADEN THE REACH OF TRAINING COURSES
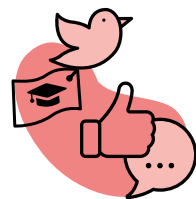
Many apprentices (and quite a few master craftspeople) are guided or inspired to a large extent by social media when they explore the digital world. They share videos and links in WhatsApp groups and statuses, while influencers draw attention to specific content. In the countries studied, this channel appears to hold the greatest potential for reaching a broad target group in the foreseeable future. The full potential of social media should therefore be used to ensure the wider uptake of offers that are linked to learning platforms but which are not available through the preferred services like YouTube or Instagram.

8.7 USE RESEARCH RESULTS AND GENERATE NEW FINDINGS

This study has shown that, when they use smartphones in their everyday work, apprentices in the informal sector develop digital competences for solving tasks and supporting their own learning. Smartphones are much more widely used than other devices such as laptops or tablets. Six different learning strategies were identified that are implemented with the help of a smartphone and which complement the learning strategies previously identified in informal apprenticeships. Comparing these digital learning strategies shows clearly that smartphones have a disruptive potential, bringing the role of master craftspeople into question in particular. On the one hand, they are no longer the sole source of knowledge and skills. On the other, however, they are still needed to support the apprentices as they implement their digital learning strategies.

The surveys in the three professions – tailors/dressmakers, electricians and hairdressers – show the great potential of digitalisation to change the way people work and learn in the informal sector. In order that these changes have a positive impact on the living and working conditions of the target group, while avoiding new dynamics of marginalisation, the focus on digital skills for teaching and learning is becoming increasingly important. Master craftspeople and apprentices alike exhibit a great need for development, and they have a strong interest in related support activities.

Expert interviews in the three countries confirmed that there is very little experience of such courses and activities yet. Nor did the literature research yield any new findings in this regard. Above all, there are no related evaluation reports or empirical studies. Accordingly, the present study offers possible initial entry points as well as recommendations for action in practice.

Recommendations to be stressed at this stage are that the development of new approaches and services should entail the close involvement of representatives of the target group, and that appropriate study and evaluation methods should be used to support the development process as well as implementation.

When evaluating this study to draw conclusions for practical application, readers should note that these are case studies. As such, its findings cannot simply be generalised without prior examination. Other sectors which are not considered here, such as agriculture, may have strong specificities. Furthermore, it should also be examined whether or not approaches and experiences already exist in Asia, Latin America or South Africa, which were not identified in the literature research, but which could provide interesting inputs for application in practice. Social scientific research can make relevant contributions in this respect.

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10 ANNEX

10.1 GLOBAL FRAMEWORK OF REFERENCE ON DIGITAL LITERACY SKILLS FOR SDG INDICATOR 4.4.2

Competence areas and competences	Description
0. Devices and software operations**	To identify and use hardware tools and technologies. To identify data, information and digital content needed to operate software tools and technologies.
0.1 Physical operations of digital devices**	To identify and use the functions and features of the hardware tools and technologies.
0.2 Software operations in digital devices**	To know and understand the data, information and/or digital content that are needed to operate software tools and technologies.
1. Information and data literacy	To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage and organise digital data, information and content.
1.1 Browsing, searching and filtering data, information and digital content	To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies.
1.2 Evaluating data, information and digital content	To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret and critically evaluate the data, information and digital content.
1.3 Managing data, information and digital content	To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.
2. Communication and collaboration	To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity and reputation.
2.1 Interacting through digital technologies	To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context.
2.2 Sharing through digital technologies	To share data, information and digital content with others through appropriate digital technologies. To act as an intermediary, to know about referencing and attribution practices.
2.3 Engaging in citizenship through digital technologies	To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies.
2.4 Collaborating through digital technologies	To use digital tools and technologies for collaborative processes and for co-construction and co-creation of resources and knowledge.
2.5 Netiquette	To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments.

Competence areas and competences	Description
2.6 Managing digital identity	To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.
3. Digital content creation	To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licenses are to be applied. To know how to give understandable instructions for a computer system.
3.1 Developing digital content	To create and edit digital content in different formats, to express oneself through digital means.
3.2 Integrating and re-elaborating digital content	To modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.
3.3 Copyright and licences	To understand how copyright and licences apply to data, information and digital content.
3.4 Programming	To plan and develop a sequence of understandable instructions for a computing system to solve a given problem or perform a specific task.
4. Safety	To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.
4.1 Protecting devices	To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy.
4.2 Protecting personal data and privacy	To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a 'Privacy policy' to inform how personal data is used.
4.3 Protecting health and well-being	To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion.
4.4 Protecting the environment	To be aware of the environmental impact of digital technologies and their use.
5. Problem-solving	To identify needs and problems and to resolve conceptual problems and problem situations in digital environments. To use digital tools to innovate processes and products. To keep up to date with the digital evolution.
5.1 Solving technical problems	To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).
5.2 Identifying needs and technological responses	To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility).

Competence areas and competences	Description
5.3 Creatively using digital technologies	To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.
5.4 Identifying digital competence gaps	To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution.
5.5 Computational thinking**	To process a computable problem into sequential and logical steps as a solution for human and computer systems.
6. Career-related competences**	To operate specialised digital technologies and to understand, analyse and evaluate specialised data, information and digital content for a particular field.
6.1 Operating specialised digital technologies for a particular field**	To identify and use specialised digital tools and technologies for a particular field.
6.2 Interpreting and manipulating data, information and digital content for a particular field**	To understand, analyse and evaluate specialised data, information and digital content for a particular field within a digital environment.

** Newly added competence areas and competences, not in the European Commission's DigComp 2.0.
Source: United Nations Educational, Scientific and Cultural Organization (UNESCO). (2018, p.88 ff). Global Framework of Reference on Digita¬¬l Literacy Skills (GFoRoDLS).

10.2 OVERVIEW OF THE MASTER CRAFTSPEOPLE AND APPRENTICES QUESTIONED

Country	City	Occupation	Total number of master crafts-people questioned	of whom women	Total number of apprentices questioned	of whom women
Ghana	Accra	Electricians	4	0	12	0
		Hairdressers	4	4	9	8
		Tailors/dressmakers	5	3	12	12
	Tamale	Electricians	2	0	1	0
		Hairdressers	2	2	6	2
		Tailors/dressmakers	2	0	21	19
	Total		**19**	**9**	**61**	**41**

Country	City	Occupation	Total number of master crafts-people questioned	of whom women	Total number of apprentices questioned	of whom women
Kenya	Mombasa	Electricians	7	0	5	0
		Hairdressers	7	5	4	2
		Tailors/ dressmakers	8	5	5	5
	Nairobi	Electricians	5	0	4	0
		Hairdressers	4	3	4	4
		Tailors/ dressmakers	5	2	5	2
	Kisumu	Electricians	6	0	5	0
		Hairdressers	5	4	4	4
		Tailors/ dressmakers	5	3	4	4
	Total		52	22	40	21
Senegal	Dakar	Electricians	5	0	5	1
		Hairdressers	5	5	8	8
		Tailors/ dressmakers	5	1	4	1
	Thiès	Electricians	5	1	8	0
		Hairdressers	6	5	9	9
		Tailors/ dressmakers	5	3	7	2
	Total		31	15	41	21
Overall total, all countries			102	46	142	83

10.3 QUESTIONNAIRE FOR MASTER CRAFTSPEOPLE

Duration: approx. 3 hours

Setting:

• Group discussion
• Give examples when asking the questions
• Ask for examples, concrete situations and as much detail as possible
• Encourage participants to react to what has been said by previous speakers in the group discussion.

FIRST: ROUND OF INTRODUCTION

• Name
• How long have you been in the trade?
• How many apprentices do you have?
• What electronic devices do you own?

1. HOW DO YOU USE THE MOBILE PHONE/ DIGITAL TOOLS FOR YOUR WORK?

a. What devices and apps do you use and for what purpose? (or if none: what prevents you from using them?)
b. How did you learn to use them? How do you solve problems when you don't know something?
c. Do you see potential for increased use of mobile phones/digital tools in your work?
d. Do you use social media in your work, and if yes for what purpose?
e. Are you going to use digital technologies more in the future?

2. HOW DO YOU USE THE MOBILE PHONE/ DIGITAL TOOLS FOR TEACHING YOUR APPRENTICES?

a. What digital devices (smartphones, laptops…) do you use in teaching and for what purpose? (or if none: what prevents you from using them?)
    i. if yes: what do you do with those who have no smartphone of their own?
b. How helpful are these tools for teaching?
c. How do you assess the quality of content found on the internet (e.g. videos)?
d. Would you like to use them more? What would be helpful for that?

3. TO WHAT EXTENT DO APPRENTICES USE MOBILE PHONES/DIGITAL TOOLS FOR LEARNING?

a. Do your apprentices have smartphones?
b. How do they use them for learning?
c. Do you observe changes in learning behaviour/approaches to unfamiliar tasks among trainees?
d. To what extent are the learners able to find and select good contents on the internet (e.g. videos that don't teach them wrong ways to do things…)?
e. In your view, to what extent do apprentices have digital skills?
f. Do apprentices without a smartphone suffer from disadvantages compared to the others?

CLOSING QUESTION:

Do digital tools / access to the internet change your role as a master craftsperson? Would apprentices be able to learn the trade by themselves, just with their smartphone and without your help?

10.4 QUESTIONNAIRE FOR APPRENTICES

INTRODUCTORY QUESTIONS:

- Name
- Educational background and previous activities if relevant
- Year of training
- Questions on motivation to choose the trade

ACCESS TO SMARTPHONE:

- Do you have access to a smartphone (yourself, or through friends/family)?
- Have you used your smartphone today? What apps did you use and what for?
- If apprentices don't have a smartphone: do you have a feature phone/simple mobile phone? Why not a smartphone (too expensive, parents don't allow…)? Do the others/MCP share theirs so you can make urgent calls or look on the internet…?
- How much do you spend on mobile data per day/week?

DO YOU USE A SMARTPHONE FOR LEARNING?

- How exactly? What apps do you use?
- Do you take pictures/videos or notes on the smartphone to remember something when someone teaches you?
- Videos: When was the last time that you watched a video on YouTube to learn something?
  - › How do you find videos? How do you know if they are good and teach you the right way to do something?
  - › Who makes the videos you are looking at? In what language are they?
  - › Do you share learning videos/pictures you appreciated with others?
- Are you aware of trade-specific and business apps (e.g. for bookkeeping…)?
- What do you do if you have a problem with an unfamiliar task? Whom do you ask or where do you look for help?
  - › Do you share the solution if you found it on the internet?

DOES THE MASTER USE SMARTPHONES OR A LAPTOP TO TEACH YOU?

- If you watch a video with your master, how is it: do you sit together and watch on his/her smartphone? Or does he/she share the link?
- How does your master use his/her smartphone for work (bookkeeping, communication with clients, specialized apps, digital marketing…)? Does he/she explain to you how to do this?
- To what extent is a smartphone also used to show/explain something to (younger) trainees?

DO YOU EXCHANGE INFORMATION ON WORK/TRAINING WITH OTHER TRAINEES VIA SOCIAL MEDIA?

- Do you have a group (WhatsApp) with other apprentices and your master? Other groups related to the trade?
- What do you use it for?
- When was the last time something was posted and what was it about?
- Do you post pictures of what you have created (a cloth, a new style…) and post it on social media? If yes then to what purpose?

POTENTIAL OF SMARTPHONES AND RELATION TO OTHER LEARNING MATERIALS:

- Are other digital devices used (questions as above)?
- Do you have access to a laptop? Do you feel comfortable using it? Do you know how to switch it on, type a letter, use Excel…?
- Are other (analogue) learning resources used (e.g. books, magazines…)?
- Limits of use: could smartphones be used more/differently for learning purposes and what speaks against such use (e.g. cost of data, lack of content…)?
- Could you learn the trade all by yourself, just on the internet and without a master?

EVALUATION OF TRAINING AND FUTURE PLANS:

- Are you applying for a recognized certificate at the end of the training? If yes, how do you prepare for it?
- What are your plans for the future in terms of learning and working?
- Are you learning things you think you will need for your future? What skills would you still like to learn?
- What are the biggest challenges to learning your trade?

USAGE BEHAVIOUR IN LEISURE TIME:

- What do you use a cell phone for in everyday life, what applications do you use?

QUESTIONS TO BE DERIVED FROM OBSERVATIONS:

- Questions about the use of digital devices, if available in the workshop.
- Questions related to tasks and work situations, e.g. 'How do you communicate with a customer who wants a new haircut about the style?', 'Do you take a photo of it when a garment has turned out particularly well for you?'

On behalf of

Federal Ministry
for Economic Cooperation
and Development