If I were a digital application, I would be ChatGPT: Student perspectives on digital technology in Togo

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Figure 1: Workshop setting

Abstract

Rural West African communities, particularly in Togo, are disproportionately affected by the impacts of climate change despite their minimal contribution to it. The ability to adapt to this change is dependent on access to information and resilient agricultural practices. The development of appropriate information and communication technology (ICT) solutions for subsistence farmers requires thorough contextual understanding. This qualitative study investigates Togolese university students' perspectives on digital technologies. The study also explores the potential of these students to serve as a bridge to rural subsistence farmers in the process of co-creating digital technologies. As a part of the study, a two-day workshop was conducted, with a focus on co-creating knowledge using do-it-yourself (DIY) ICT for climate change adaptation in rural land management. The following question was posed to participants: 'If you were a technical or digital application, what would it be, and why?' The analysis of the student responses offers insights into their perspectives on digital technologies and their potential applications for addressing climate challenges. This research contributes a methodological approach to understanding insider (emic) viewpoints from an outsider (etic) perspective to inform the development of sustainable ICT applications in rural sub-Saharan West Africa.

CCS Concepts

• **Human-centered computing → Contextual design**.

Keywords

Participatory Design, Cross-Cultural Perspectives, Digital Perspectives, Cultural Context, Intercultural Communication

1 Introduction

The impacts of climate change are one of the most significant challenges confronting the global community at present [47]. In West African sub-Saharan regions such as Togo, rural populations, who have contributed least to the anthropogenic increase in climate change, are suffering the most from its effects [3, 15, 38].[1] Due to climate change, there has been an increase in extreme weather events, including rain and drought [38, 48]. As a result, crop pests and soil degradation, which have a detrimental effect on rural economies, are becoming a growing concern. These effects are difficult to predict. The ability to access affordable, reliable information, such as meteorological data and resilient production methods, could empower individuals to predict weather events, control pests, and restore soil fertility. The significance of local, indigenous, and traditional knowledge in this context is paramount, as these forms of knowledge are deeply entrenched in local practices and embody centuries of agricultural expertise [4, 9].

The Togolese Republic is situated on the horizontal slope of the West African coast. It borders on the Gulf of Guinea, with a surface area of around 56,600 km² [28]. The country is elongated in shape, measuring over 600 km from north to south, and ranges from 50 to 150 km in width. Its borders are delineated to the north by Burkina Faso, to the south by the Atlantic Ocean, to the east by Benin, and to the west by Ghana. The central Kara region is accessible via a six-hour journey by car along the south-north highway, departing from the capital, Lomé. The official language in Togo is French. As in all West African countries, the national borders do not correspond to the ethnic groupings [27]. The region in central Togo around the village of Kara is considered by the Kabiyè people as their homeland. The Kabiyè represent over one million people out of a total Togolese population of approximately 7.5 million. The Kabiyè's land is mountainous and mainly used for agriculture [16, 29].

The objective of this study is to explore a methodological approach to investigating Togolese university students' perspectives on digital technology. While these students are not rural subsistence farmers themselves, they possess an insider's viewpoint, an emic perspective on subsistence farming communities [35]. These students often come from these communities themselves and help

with agricultural work in the communities of their families during the semester breaks. This emic perspective held by the students serves as a crucial bridge to our outsider, etic perspective. The students can be viewed as a crucial interface between the rural communities and the university knowledge system, which is primarily Western-centred [24, 26]. Our hypothesis is that the students also have an emic view on digital technology.

Guided by the overarching research objective of devising novel methods for knowledge exchange concerning the impacts of climate change, our research endeavour commenced with an initial contextual analysis, conducted in a workshop format. The co-creation of DIY ICTs is intended to facilitate alternative methods of knowledge exchange and accessibility for subsistence farmers, thereby enabling them to adapt their land management approach to the impacts of climate change.

The methodological approach described in this paper was used during a two-day workshop that launched the research project.[2] The workshop's framework is embedded in the contextual analysis. The objective of the workshop was twofold: firstly, to establish empathy with and understanding of the participants' perspectives on digital technology, and secondly, to iteratively leverage this information as a foundation for further co-creative project planning. The intention was to stimulate the students' interest in DIY technologies and co-creative methodologies.

This paper analyses the students' perspectives on digital technology, focusing on their responses to the open-ended question, 'If you were a technical or digital application, what would it be, and why?' This question was posed in the context of a two-day workshop with the theme of 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions'. We present the participants' responses and analyse the insights they provide for our broader research agenda, specifically addressing the following research questions:

- Does this methodological approach hold potential for bridging emic and etic perspectives, thus facilitating the initiation of a meaningful co-creation process?
- What unforeseen conclusions or insights might be drawn from this particular methodological approach?
- How can the insights gained from this exercise inform the design and development of relevant and appropriate DIY ICT solutions for rural communities in Togo?

2 Background and related work

The significance of a design practice that respects cultural differences and cultivates intercultural understanding is becoming increasingly apparent. As Aquino et al. [4, p. 167] argue, 'Technology and design are not value-neutral: people's values shape the design process and the outcomes; particular technologies may privilege or undermine the values of participants; and design work involves trade-offs among competing values'. This quote provides essential context for the methodological approach pursued in this study. With this quote in mind, the following section presents a

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[1] According to the Notre Dame-Global Adaption Index (ND-GAIN), Togo ranks 138th out of 187 countries most vulnerable to the effects of climate change, measured in terms of infrastructure, human habitat and water [13, 37].

[2] The full accompanying workbook can be found in the appendix.

detailed overview of relevant research situated within the intersecting domains of decolonising human-computer interaction (HCI) and participatory design (PD). This overview examines how these fields address issues of power, representation, and cultural sensitivity in the design of technology, particularly within cross-cultural contexts.

2.1 Decolonising HCI

The advent of affordable smartphones, the expansion of mobile data coverage, and advancements in mobile financial services have precipitated a transformation in the digital landscape of West Africa [12]. Nevertheless, the majority of technologies are developed outside of the African continent and are laterexported for use on the continent [34, 42]. A further critique is that technology-based knowledge is predominantly produced in and around Western research hubs [18]. Perceptions of how decolonised HCI can be designed and developed differ in detailed approaches [32]. However, what unites them is the need to emphasise the incorporation of local knowledge, to reflect the positions of all individuals involved, and to entrust greater responsibility for the design of local technologies to local researchers. Challenges linked to passive stances in the development of digital transformation are discussed in several studies on decolonising HCI in Africa [5, 46]. As Emeana et al. [19] describe in their literature review on m-Agri services, designing with the users in mind and addressing the specific context and culture of the users, is a strategy that has been shown to improve the sustainability of these applications. Failure to understand the context during development often results in the underutilisation of such applications. Nkwo et al. [36] also report that consideration of the context is essential, as various social, cultural, and physical challenges during implementation and utilisation are not taken into account during project conceptualisation and design. Although HCI has gained traction on the African continent, insider perspectives are still frequently lacking [17, 36]. Through the decolonisation of HCI practices, attempts are being made to challenge this hegemony and instil a focus on local values and perspectives [4, 7]. The funding and outcomes of HCI research are predominantly sourced from Western countries, a practice that has been the subject of criticism [33, 44]. In response, researchers have adopted methodological approaches with the aim of disrupting the prevailing power relations [7, 8, 18]. Research that addresses these issues by rethinking and adapting approaches such as participatory design to understand the challenges, paradoxes, and perspectives of non-Western users and empower marginalised voices in technology development is becoming increasingly prominent [20, 32].

2.2 Participatory Design in Cross-Cultural Contexts

Participatory design is an approach that involves stakeholders in the development process of products and services. The aim of this approach is to achieve a deeper contextual understanding of the subject matter, thereby improving design outcomes [10, 39, 40]. The process of designing an artefact is a process that incorporates exploratory and participatory activities in an iterative framework. These activities are adapted to the particular context of the topic at

various stages of the design process [11]. The fundamental principle of participatory design is the iterative integration of the user's perspective into the application development process. This is typically achieved by implementing methodological approaches that facilitate the adoption of an emic perspective and subsequent reflection on it from an etic standpoint [31, 35]. The more the emic perspective is embraced, the more user-friendly and user-centred the application will be. Various methodological lessons address the challenges and opportunities entailed in this approach. For instance, several researchers have reflected on the use of co-design in community-based projects: Till et al. discuss community-based co-design in South Africa [43], while Itenge et al. describe the co-design of a mixed reality escape room narrative with Namibian learners [30]. Fröbel et al. discuss co-creation workshops for developing local community networks in Togo [21]. These studies apply varied methodologies that reflect the different contexts in which they are set.

2.2.1 Contextual Analysis. A commonly used method to explore the context of a given theme or topic is cultural probes [22]. Wyche et al. describe this approach as 'well-suited for exploring [...] new design opportunities', as was shown in their research in Bungoma, Kenya [49]. 'Sentence Completion as a User Experience Research Method' is introduced by Schmidt et al. [41]. Their method can be flexibly implemented and can also be combined with other participatory design methods. The diary method is premised on comprehending the lived reality of the participants, with the diaries being structured to facilitate uninhibited reflection. These diaries can be completed using pen and paper, with the option of including photographs, audio recordings, and other media to supplement or substitute as deemed necessary. The duration of use depends on the situation, ranging from a few hours to several days or weeks [50]. Another example is the Story Completion Method, where a fictional character is introduced and the participants are tasked with completing the story. Through this process, much of participants' understanding and ideas can be revealed [14, 23]. Moreover, transmutation is a prevalent element within numerous storytelling traditions, with a notable presence in African cultures [6, 25].

3 Explanation of the approach

3.1 Our Stances

The research team comprises seven permanent members: three local experts from Lomé, Togo; two Togolese professors; and two European researchers. The three team members from Lomé have considerable experience in the development of DIY ICT. The team consists of a female entrepreneur who is actively engaged in the field of ICT development, a leader of the Togolese maker movement, and a knowledgeable programmer who is anchored in local and international networks for developers. All Togolese team members are deeply rooted in their communities as well as various Togo-based entrepreneurial and ICT networks. The two university professors specialise in the fields of agriculture and land management, and one of them has particular expertise in the adaptation of these to the impacts of climate change. Furthermore, the team consists of two female European researchers. One of these researchers has lived in Togo for more than five years and is rooted in the

international development community. The other researcher has visited Togo repeatedly and works in the field of HCI, exploring human-technology interactions in various contexts, including the area of ICT through a participative design approach. The European researchers undertake at least one annual visit to Togo, typically ranging from two to four weeks, in pursuit of research endeavours. Despite becoming acquainted with the cultural context, the European researchers acknowledge that their understanding of the local contexts of a given theme or topic is always going to be different due to socio-cultural conditioning. The inherent power asymmetries in any North-South cooperation are acknowledged and recognised by the team. The European researchers are responsible for the final academic writing, while the local Togolese experts are the main implementers of project-related tasks. The concepts, ideas, and approaches are developed collectively, and the team is transparent about the possible biases that arise from this division of roles.

4 Method

4.1 Workshop Design and Implementation

The two-day workshop, held in July 2023, focused on the theme of 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions'. The workshop was designed for students at a public university in the Kara region in Togo and provided a platform for knowledge exchange and hands-on activities. These activities were intended to explore the potential of DIY technologies for addressing climate change challenges in rural communities. The workshop also served as a foundation or a broader, long-term future collaboration with these students. The objective of the workshop was to engage participants in hands-on activities and discussions related to climate change and digital solutions, with the aim of fostering their interest and motivating them to participate in our ongoing research. Six interactive stations were designed and facilitated by the research team, with each team member responsible for one station. These stations focused on different aspects of DIY technology and climate change adaptation, with the content being tailored to leverage the specific expertise of each team member and contribute to the overall workshop experience. The workshop concept and organisation were planned collaboratively through several video calls held in advance. The setup was such that each participant moved sequentially through each station over the cource of the two days. The titles, topics, and duration of the individual stations are presented in Table 1. The specific activities that were conducted are described in the workshop booklet (see Appendix). The booklet provides a comprehensive description in French, accompanied by illustrative materials, delineating the expectations and objectives at each station. The participants were also invited to share their thoughts on the matter by providing answers to specific questions.

4.2 The Participants

The participants were invited by the professors of the Togolese university. The professors used email, instant messenger, and physical posters at the university's campus to distribute via an online questionnaire containing a QR code that participants could use to register distributed via email, instant messenger, and physical posters. One hundred and nineteen students (n=119; f=23; m=79; n-x=17; age=18-38) expressed interest in participating. Following

the expression of interest, all students were invited to attend the opening event and the two-day workshop. Ultimately, 69 of these 119 students completed the two-day workshop. The students represented a diverse range of academic disciplines, encompassing various fields, including management, horticulture, modern literature, law, and economics. The gender distribution of the interested students was 66% male and 19% female. Approximately 6% did not specify their gender in the questionnaire. All participants gave us permission to use and publish the results and photos for the scientific evaluation.

4.3 Workshop Setting

The workshop was held in a ground-level barrack located on the university's southern campus (see Figure 2).[3] The university provided a space comprising a large room, three smaller rooms, an office for the laboratory director, an air-conditioned lecture room, and a non-air-conditioned lecture room. This barrack area is usually used as a fab lab, a fabrication laboratory [45], which offers digital manufacturing technology such as 3D printers, soldering stations, and CNC milling machines.

Figure 2: A participant fills in the workbook.

4.4 Workshop Procedure

The following text provides a detailed description of the workshop's procedure. The workshop took place from 10 a.m. to 4 p.m. on both days at the venue previously described. The participants were greeted upon arrival and provided with a workbook and a bag of water. The station that participants started at was determined by the level of activity at the specific site. The number of people present at any given station ranged from six to ten. On the first day, participants made their own arrangements for lunch. On the second day of the study, all participants were provided with a sandwich at

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[3]The subsequent video provides a further impression of the workshop: https://youtu.be/FkimbVTDt2E, Last accessed: July 3rd, 2025.

Station	Title	Topic	Duration [min]
	Information about you	Demographics and two questions (What digital technical skills do you have?; If you were a technical or digital application, what would it be and why?)	2-20
1	Soldering	Learn how to solder an LED light in a region of your choice on the map of Togo	60
2	Introduction to the magic of code	Explore the basics of programming using Python on the Raspberry Pi.	60
3	Measuring with sensors	View measurements from a DIY weather kit (ESP32 & BME280) via a WLAN connection to a smartphone	60
4	How to turn research results into gold	Co-create a more effective exchange of knowledge on climate change	30
5	Climate change and you	Get a basic understanding of climate-smart farming and views on the subject	30
6	How to make your voice heard: Policy brief and fact sheet	Become familiar with standard tools, policy briefs, and technical fact sheets, for promoting the results of research in the political sphere	30
	Notes	What did you find most interesting? What would you like to know more about?	2-10

Table 1: Overview of the workshop stations and topics that were part of the two-day workshop (see accompanying workbook with further details in Appendix).

13:00. The decision to provide the participants with an analogue workbook rather than a digital one was motivated by two factors. Firstly, there was uncertainty regarding the number of participants who owned a smartphone. Secondly, there was a desire to include everyone who wanted to participate, regardless of their technical means. Furthermore, the objective was to provide participants with an accompanying workshop diary containing a compendium of knowledge that they could take home after the workshop in order to leave them with persistent knowledge and tangible takeaways. The workbook is based on the diary approach outlined in Section 2.2. Participants were invited to take notes, reflect on their experiences, and articulate their ideas. Upon completion of each station, at which point participants answered several station-specific questions, they obtained a signature from the station's responsible person. Participants who completed all stations were eligible to join the team as a student worker, a prospect that may have directly motivated the students. The entire workshop was conducted in French, the official language of Togo.

4.5 Formulation of the Question 'If you were a technical or digital application, what would it be and why?'

The objective of this study is to analyse, interpret, and evaluate the responses to a specific question in the 'Information about you' section of the workbook (see Table 1). The overarching objective of the question, 'If you were a technical or digital application, what would it be, and why?' (French: *Si vous étiez une application technique ou digitale, quelle serait-elle et pourquoi?*) was to elicit insights from the participants regarding their perception of digital technology. When posing the question 'If you were a [subject], what would you be, and why?', [subject] can be substituted for animals, professions,

objects, and so forth to ask about certain traits, qualities, or knowledge. As previously stated in Section 2.2, this approach is associated with the Story Completion and Sentence Completion methods, as well as the culturally anchored form of transmutation in narratives. Participants were provided with an initial stimulus to facilitate the sharing of experiences and knowledge [14]. The responses were influenced by the main topic of the workshop, which in this case was 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions', as well as the specific sub-subjects of the stations (see Table 1). Furthermore, the participants' responses appeared to be influenced by when during the workshop they answered the question: for example, at the beginning, in the middle, or towards the end. The content of the stations and the order in which participants visited them also appeared to influence the answers, as did the inspiration derived from the responses of other participants. Furthermore, the participants were under no obligation to disclose any information, and as a result were not compelled to respond to all the questions posed in the workshop booklet.

5 Analysis

The evaluation process involved the analysis of 69 participant workbooks (n=69; m=23; f=8; n-x=31; age=18-38). Following a visit to each station, the person responsible for the station took photos of the corresponding page and the 'Information about you' page. Subsequently, the photographed responses were transcribed in written form. In addition, an attempt was made to use suitable AI; however, this endeavour proved unsuccessful. The data, demographic information, and answers, were digitised in this form and then converted into a tabular format. The age range of 18 to 38 years can be considered as a valid metric, as it is derived from the data of the students registered for the workshop (see Section 4.2). As almost half of the

participants in the two-day workshop did not state their age or gender, further discussion of the details in this regard is not possible. The participants were all enrolled students at the university, and therefore it can be assumed that they had an educational level of A-levels or higher. A total of 60 participants (response rate 87%) replied to the question 'If you were a technical or digital application, what would it be, and why?'. The responses were analysed using the empirical method of content analysis. Consequently, content was identified and clustered. This approach enabled the identification of the relevant topics of the digital and technical applications. The analysis categorises the technical and digital applications according to their function and thematic group. It is important to note that a total of three responses were classified in two distinct categories. The analysis revealed an overlap between the category 'AI Applications' and the categories 'Knowledge and Information' and 'Communication and Collaboration'. Below. each category is introduced with one or two quotations, a quantification, the associated applications, and a characterisation (see Figure 3). Direct quotations have been enclosed in quotation marks and translated from the source language, French. Our selection and interpretation of the participants' responses is limited by different emic and etic points of view. However, as previously stated, it is assumed that participants possess a comparable emic perspective on digital technologies in both everyday and research applications. Moreover, the method is restricted insofar as it did not involve the participants in collaborative review and discussion of the response selection and interpretations.

5.1 Categorisation of Responses

The categorisation was done based on the content analysis. This finding aligns with the logical and empirical framework established for the present research study. The categories are 'Knowledge and Information', 'AI Applications', 'Communication and Collaboration', 'Specialised Software', 'Climate Services', 'Office Applications', 'Hardware', 'Other', and, finally, 'No Response'. For other areas of research, a different categorisation may be appropriate. The responses were further categorised according to the context provided by the participants. For instance, *Google*[4] was contextualised by one participant as being for 'in-depth searches', which corresponds to the category 'Knowledge and Information', and by another person as 'connected to the whole world', which corresponds to the category 'Communication and Collaboration'. The categorisation of the data may be viewed as biased due to the lens of the present study, the researchers' personal interests, and the participants' background experiences. The following sections are introduced by quoted responses from the participants in each category, with the aim of introducing to each category.

The pie chart in Figure 3 presents the percentage of responses per category out of the total number of responses in descending order. The subsequent analysis will systematically explore the data, beginning from the category with the fewest responses and progressing to the category with the most responses.

5.1.1 No Response. The 'No Response' category is included in the pie chart for the purpose of completeness. As previously mentioned,

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[4]In what follows, proper names of specific software applications are given in italics.

respondents were not required to answer the question. Therefore, it can reasonably be deduced that 9 respondents (13%) did not respond.

5.1.2 Other.

> A digital application, because today everything is done digitally. (*Une application digitale parce que ajd tt passe par la digitalisation.*)

A solitary response was allocated to the 'Other' category. This response pertains to a digital application in general, with the assertion that currently all activities are conducted digitally, thereby indicating a digitalisation of everyday life. There was no indication of the applicability of this response to any of the other categories. Despite this, it would still have been possible to designate the category as 'General'.

5.1.3 Hardware.

> A computer, since it has a lot of capacity; in short, it's a world reduced to a window. (*Un ordinateur, puisqu'il a bcp de capacité, bref, c'est un monde réduit à une fenêtre.*)

> Radio - informing the local population. (*Radio - informer la population locale.*)

Three answers were identified as corresponding to this category, representing 4.5% of the total responses. One participant would be a 'computer because it has a lot of capacity. In short, it is a world reduced to a window'. The computer is thus seen as access to the world or the knowledge of the world condensed in a small device. Another technical application mentioned was the radio, which could be used as a medium to 'inform the local population'. This hardware is also regarded as a device for accessing information. A drone was also mentioned here because it provides the possibility to 'observe the evolution of things from a distance'. It is noteworthy that only a small proportion of the participants perceived themselves as hardware, although some form of hardware is required for any kind of interaction with the digital world.

5.1.4 Office Applications.

> *Word*, this application allows us to write down our ideas digitally. (*Word, cette application nous permet de rédiger numériquement nos idées.*)

> *Microsoft Office*: the basis of transmission; digital and virtual. (*Microsoft Office: c'est la base de la transmision; numèrique et virtuel.*)

This category includes office applications, as indicated by the 9% of participants who expressed a preference for different types of such software. As illustrated by the above quotation, these applications encompasses the entire *Microsoft Office Suite* or specific components such as *Word* and *Excel*. Notably, one participant provided an answer that exclusively included *Excel*, though they did not provide an explanation for this choice. However, this response can be left as is, as it does not necessitate further justification. Two participants also mentioned the software *Canva*, a software application for creating visual content, justifying their answers by making reference to the 'world of creation' and 'designing logos and flyers'.
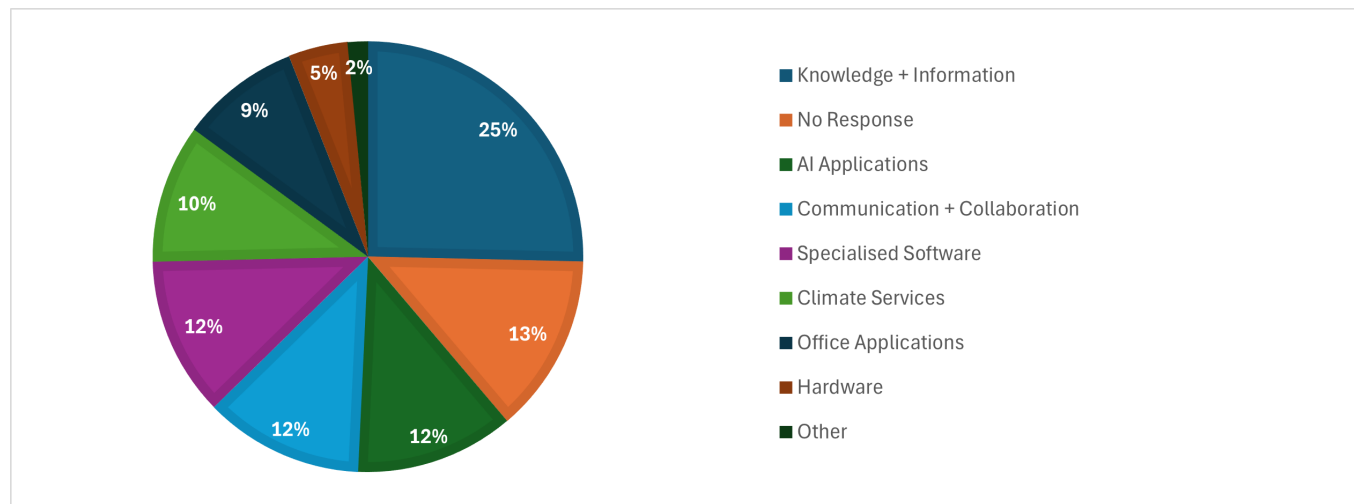
5.1.5 Climate Services.

Figure 3: Presentation of the categories in descending percentage order in a pie chart.

The application must be one that will help in the field of climatology. To solve the problem of the irregularity of rainfall, the application has to be [connected] to *Google* or *Telegram*. (*L'application doit être une application que va aider dans la domaine de la climatologie. Pour regler le problème des inegularité des pluie et d'application allait être Google ou Telegram.*)

Python, to set up codes to help control climate shocks. (*Python, pour mettre en place des codes pour aider le contrôle des chocs climatiques.*)

Given that the central theme of the workshop was 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions', the fact that seven participants (10%) interpreted the question in this sense, thinking of possible applications in this area, is particularly encouraging with respect to this methodological approach. Participants posed ideas for meteorological, climatological, or even agricultural applications as a result of this question. The quote illustrates the idea of an application that 'solve[s] the problem of the irregularity of rainfall'. Applications that measure rainfall or 'enable rainfall to be predicted and calculated accurately' were mentioned frequently. Awareness of climate change is evident, as demonstrated by the participants' desire to use digital applications to make predictions in the agricultural sector. The programming language *Python* was also mentioned in this category, as it is intended 'to set up codes to help control climate shocks'. This response is congruent with Station 2 (see Table 1), which presented an 'introduction to the magic of code' using *Python*. The influence of Station 3, entitled 'Measuring with sensors', is also evident in this category. The participants at this station measured temperature, humidity and air pressure, important parameters for making weather forecasts. This influence is reflected, for example, in the following response: 'It's a meteorological application because it helps you predict and calculate rainfall'.

5.1.6 Specialised Software.

I would have loved to be an econometric software such as *STATA* because with that I could make regressions for the economy of a country. (*J'aurais aime être un logiciel econométrique tel que STATA car avec ca je pourrai faire des regressions pour l'économie d'un pays.*)

KoboCollect to find solutions to climate change. (*KoboCollect pour trouver des solutions aux changements climatiques.*)

The 'Specialised Software' (12 %) category comprises specialist software applications such as *STATA*, a statistical software application, and *KoboCollect*, a survey software application. Participants perceive the allure of these applications in terms of '[finding] solutions to climate change', 'implementing models to obtain results', and the aforementioned quotation 'mak[ing] regressions for the economy of a country'. The responses indicate the extent to which the participants recognise the potential of such software programmes to facilitate econometric predictions with the aim of improving their country's economic situation, as well as mitigating the impacts of climate change. These responses also reflect a direct connection to the thematic focus of the workshop.

5.1.7 Artificial Intelligence (AI).

ChatGPT, because today's world has evolved and we need many different approaches to solutions, and *ChatGPT* provides this solution. (*ChatGPT parce que aujourd'hui les monde a évolué et on doit avoir beaucoup d'approches de solutions et du coup ChatGPT donne cette solution.*)

It would be artificial intelligence because it has a lot of information in a lot of areas. (*Ce serait l'intelligence artificielle parce qu'elle possede plusieurs informations dans plusieurs domaines.*)

A total of eight participants (12%) expressed their level of fascination with AI in general and with the use of *ChatGPT*,[5] a chatbot that uses large language models. *ChatGPT* was released a mere eight months prior to this workshop, which coincided with the early days of the hype around the product. Notably, the enthusiasm among the students appears to be comparable to that observed in other regions worldwide. Students' answers were motivated by 'approaches to solutions' and 'providing this solution'. Other participants gave similar answers, indicating that they wanted to be *ChatGPT* because of its ability to 'offer general solutions' or 'because it has a large database for dealing with recent realities'. The provision of a broad source of knowledge and the optimisation of the efficiency of everyday task performance were also significant components of the responses in this category. In summary, the appeal of AI lies in its ability to deliver solutions, provide access to data, and facilitate evaluation. This category encompasses elements that intersect with other categories. Nonetheless, we sought to accentuate the students' perceptions of AI, as these responses were particularly noteworthy.

5.1.8 Communication and Collaboration.

Facebook allows you to reach a large target audience. (*Facebook permet de toucher une forte cible.*)

Linkedin, because it is a professional network for sharing experience. (*Linkedin, car c'est un réseau professionnel de partage d'expérience.*)

This category comprises all applications designed for communication and collaboration between individuals, including social networks, instant messaging services, and the conventional email system. A total of eight respondents (12%) cited applications that fall into this category, including *Google*, which is intended to 'be connected to the whole world', and email, for 'making exchanges'. It is noteworthy that *Facebook*, a social media platform, was described as allowing people to 'reach a large target audience'. The application falls within the 'Communication and Collaboration' category, yet it also exhibits characteristics that fall outside of this classification, belonging rather to the subsequent category 'Knowledge and Information'. Depending on the application context, a single application can serve multiple purposes. In addition, *WhatsApp*, an instant messaging service, was mentioned, 'as the application allows information to be transmitted remotely'. Furthermore, specific email programmes and email in general were mentioned, as through them people would 'be well informed about other's daily lives at home and work around the world'.

5.1.9 Knowledge and Information.

Duolingo to enable me to speak several languages and a good proposal for (anonymised) project: include producers in the project to facilitate transmission. (*Duolingo pour me permettre plusieurs langues et bien proposition pour projet (anonymiser): fair intégrer les producteurs dans le projet afin de faciliter la transmission.*)

Google Scholar, because that's where you'll find lots of research on scientific studies on the topics you're

interested in. (*Google Scholar, parceque c'est l… qu'on trouve plein des recherches sur les études scientifiques sur les thèmes.*)

The 'Knowledge and Information' category was the most popular, with 17 responses, representing 25% of the total. Among the participants, there was a significant level of curiosity and a notable demand for information. The category encompasses tools such as *Google Scholar*, a search engine specialising in academic literature, the Google search engine itself, and also the aforementioned social media platform *Facebook*. Participants further noted the applications *Duolingo*, a language learning platform, and *YouTube*, a social media and video sharing platform, as effective tools for knowledge acquisition and information retrieval. As highlighted in the quotation regarding *Duolingo*, multilingualism is of considerable significance, with the assertion that 'speaking different languages includes producers in the project to facilitate transmission' being regarded as a highly significant piece of evidence. The accessibility of knowledge and information is, of course, of immense importance, especially for students, as studying implies the acquisition of knowledge. Several applications mentioned, such as *Google Scholar*, are not significantly different from those used by the European researchers during their time at university and for academic research.

To summarise, it can be posited that the participants' perspective on digital technologies is not significantly divergent from that of our research team. The use of 'Specialised Software' is contingent on the field of study. The substantial number of responses in the 'Knowledge and Information' category is not unexpected, as the aspiration to excel in intelligence is common. The direct relation in numerous categories to the theme 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions' is highly pertinent and will be addressed again in the subsequent section of the paper.

6 Results and Discussion

What is the intended implication of wishing to be a technical or digital application? Does this aspiration signify a wish to possess the capabilities of the application itself, akin to posing the hypothetical question, 'If you were to possess a superpower, which would it be?' Or does it merely reflect a fascination with the application? Alternatively, does it represent a preference for interacting with the application, regular use thereof, or merely a global hype surrounding several applications? The ensuing discussion aims to explore this matter more deeply.

The empirical methodological approach adopted in this research entailed posing the question, 'If you were a technical or digital application, what would it be, and why?' to students in Togo during a two-day workshop on 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions'. The objective of this approach was to gain insight into their points of view on digital technology. This question prompted a reflection process that was both creative and insightful, and which served to introduce the participants to the accompanying workshop booklet in an alternative manner.

This component was significant in facilitating comprehension of the participants' perspectives on digital technology. It made it possible to identify which aspects they perceived to be important,

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[5]ChatGPT (GPT version 3.5) was released on November 30, 2022. (https://openai.com/index/chatgpt/, Last access: February 6, 2025)

as well as to build bridges to ICT in the context of climate change. These aspects are, in conclusion, relevant to the development of DIY ICT. It is hypothesised that the approach adopted is of interest in the identification of commonalities and challenges encountered by research teams across borders. To illustrate this point, we may consider the instances of decolonial paradoxes, such as those identified by Lazem et al. [32], which are not always recognised. However, these issues can be addressed through methodological approaches of a more concrete nature, facilitating more transparent discussion within research teams. As an entry point, we intended to contribute by addressing the following questions: Does this methodological approach hold potential for bridging emic and etic perspectives, thus facilitating the initiation of a meaningful co-creation process? What unforeseen conclusions or insights might be drawn from this particular methodological approach? How can the insights gained from this exercise inform the design and development of relevant and appropriate DIY ICT solutions for rural communities in Togo?

6.1 Emic and Etic Viewpoint

The participants presented their emic, insider's point of view regarding perspectives on digital technology. As previously stated, the participants also possess an emic perspective on sub-Saharan West African agricultural communities and the need for adaptation to climate change. The previous summary of our observations and perspective is again an etic, outsider's, or researcher's viewpoint. However, this point of view also overlaps considerably with the research team's perspective on digital technology, suggesting the presence of a shared perspective. This is a realistic prospect for the future co-creation of applications related to adapting agriculture to the impacts of climate change.

In the context of the co-creation of ICT applications for subsistence farmers, an attempt should be made to understand their emic viewpoint to the greatest possible extent through methodological approaches and as far as the framework conditions of the research allow, even though an etic viewpoint will invariably be employed. The use of participatory design methodologies in the context of DIY ICT is encouraged, with the objective of involving users in the development of applications. This engagement can be further strengthened by incorporating users in the evaluation and conceptualisation of future workshops, which holds considerable potential in this regard.

6.2 Climate Service Applications

It is evident that the outcomes from this particular category have been of significant use in facilitating the progression of our research efforts. The results obtained surpassed our initial expectations, offering valuable insights that have contributed to the advancement of our scientific knowledge. The participants furthermore established a connection between digital technologies and agriculture. The need to adapt agricultural practices to the challenges posed by climate change was emphasised by the quotations "there the development starts" and "adapting agriculture to climate change". The various ideas for rainfall forecasting are also being taken up for further research, which demonstrates that in this topic area, subsistence farmers can be assisted in building resilience to the impacts of climate change. The use of the *Python* programming

language for the purpose of mitigating the impact of climate shocks has yielded a highly satisfactory outcome, thereby demonstrating the efficacy of our approach in fostering creative thinking within the domain of digital technology development.

6.3 Importance of Multilingualism

The quote regarding *DuoLingo* quote from Section 5.1.9 demonstrated the significance of languages in the development of ICT, emphasising that proficiency in a language facilitates access to its associated knowledge. In this context, multilingualism is a particularly salient issue [1, 2, 8]. It is important to note that the official languages of the majority of African countries are colonial languages. The languages in which African wisdom is expressed are the local languages. One of the most significant conclusions of this research is that this fact should be a central aspects in co-creation of digital technology. After all, it is reasonable to question whether individuals would use a technology presented in a language in which they are not proficient. The use of digital technology to establish linguistic bridges will also be fundamental to our future progress. The development of digital technologies in local languages such as Kabiyè has the potential to empower local communities by granting them greater autonomy in the realm of information and knowledge.

6.4 Digital Technologies in the Context of Decolonising HCI

When analysing the technologies described by the participants in their responses, one aspect stood out that should not go unmentioned. As highlighted in Section 2.1, most of the technologies are used, but not developed, in Africa [12, 32]. The digital technologies the participants mentioned by name by were all developed outside of Africa. *Word, Excel*, and other Office products were mentioned several times. These applications were developed by *Microsoft*, based in Redmond, Washington, United States of America (USA).[6] The headquarter of *Google*, which also includes *Youtube*, is located in California, USA.[7] *Facebook* and *WhatsApp*, which are part of the *Meta Group*, are also headquartered in California, USA.[8] *ChatGPT* is a product of *OpenAI*, which is also headquartered in California, USA.[9] The success of the application would not have been possible without the assistance of Africans, specifically Kenyan clickworkers.[10] In this particular instance, the involvement of Africans must be interpreted as representing a neo-colonial structure rather than a form of co-development.

Several of the the other applications mentioned, such as *STATA* (USA),[11] *X* (formerly *Twitter*; USA),[12] MyAI by *Snap* (USA),[13] and *Duolingo* (USA),[14] are all non-African digital technologies. *KoboToolbox* seems to be one of the exceptions here, as its mission is to

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[6]https://news.microsoft.com/facts-about-microsoft, Last Access: February 4, 2025.
[7]https://about.google/company-info/locations, Last Access: February 4, 2025.
[8]https://about.meta.com/media-gallery/offices-around-the-world/facebook-hq-aerial-view, Last Access: February 4, 2025.
[9].https://www.clay.com/dossier/openai-headquarters-office-locations, Last Access: February 4, 2025.
[10]https://time.com/6247678/openai-chatgpt-kenya-workers/, Last Access: February 4, 2025.
[11]https://www.stata.com/company/contact/, Last Access: February 4, 2025.
[12]https://about.x.com/en/who-we-are/our-company, Last Access: February 4, 2025.
[13]https://www.snap.com/, Last Access: February 4, 2025.
[14]https://www.duolingo.com/imprint, Last Access: February 4, 2025.

'empower nonprofit organisations across the globe with innovative data collection tools for creating positive change and [providing] nonprofits free access to their technology, enabling organisations around the world to make a data-driven impact in local communities'. Nonetheless, the company's headquarters is in the USA.[15] *Canva*, which is headquatered in Sydney, Australia, acknowledges 'the deep connections of Aboriginal and Torres Strait Islander communities to Country'.[16] The *Python Software Foundation* is also based in the USA.[17] However, the company's approach is open source, meaning that the *Python* programming language is accessible to anyone in the world, who can then use it and contribute to the global community. Another potential explanation for the fact that only international applications were listed by the participants is that the workshop was conducted in French, the official language of Togo. It is important to note that this could have limited the application information provided by the participants. It is possible that, consciously or unconsciously, they only listed multilingual applications.

In the process of decolonising HCI, it appears to be time for digital technologies to be developed **in** Africa **for** Africa and the world. This is the only way that technology can truly represent global approaches and not just reflect Western approaches. More open-source approaches and free software environments should be encouraged so that everyone has the opportunity to use digital technologies of all kinds.

Finally, we would like to discuss some points that were raised regarding the timing of the participants' questioning during the workshop. Retrospectivly, it would have been preferable, in terms of research perspectives, if participants had answered the question after completing all the stations. It may be supposed that more participants would have contributed additional ideas for concrete digital solutions in the context of the workshop 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions'. The question could also have been asked in a more specific manner, for example, 'If you were a climate tech application, what would it be, and why?' Alternatively, the question could have been posed as, 'If you had a superpower to reduce the impacts of climate change or strengthen agriculture, what would it be?' These are all perspectives that we would like to take with us and iteratively improve on future research.

7 Conclusion and Future Work

This research analysed participants' perspectives on digital technologies, specifically focusing on DIY ICT and its potential role in supporting the agricultural sector's adaption to climate change. This research is part of a longer process of building relationships and co-creation between various actors, communities, and institutions. The aim of this process is to co-develop ICT that empower subsistence farmers in western sub-Saharan Africa to adapt their agriculture to the effects of climate change. Initially, we did not anticipate the emergence of these ideas for climate service applications of various kinds and approaches. Nevertheless, we are aware that our approach reflects a specific population, Kara University

students in this specific region, which limits the generalisability of the study and the socio-cultural context. Conclusions can only be drawn in relation to a specific group of students at the university in the Kara region, though it is also important to note that the findings cannot be assumed to be generalisable to all students of this university. The results of this research are contingent upon the specific workshop setting and the thematic focus of the workshop. The focus on climate change itself influenced the participants' answers, as is evident from the responses. However, we are delighted that our question stimulated these thought-provoking impulses, reflections, and ideas. The responses to the aforementioned question further demonstrated that the thematic contributions of our two-day workshop on 'Adapting Land Management in Rural Regions to Climate Change through Digital Solutions' had a significant impact on the participants, thereby empowering us to explore further methodological formats in the domain of participatory design in the future.

In conclusion, the following question is posed for reflection: 'If you were a digital or technical application in the context of climate change adaptation, what would it be, and why?' We invite the readers of this paper to reflect on what the answer tells them about their perspective and viewpoint. In subsequent phases of the research, a group of approximately 10 students who participated in the workshop will be selected to collaborate on conceptualising and facilitating co-creation workshops within rural communities. In this manner, the objective is to develop a step-by-step approach to the creation of DIY ICT, with the aim of preserving African wisdom and combining it with open approaches to technology.

Acknowledgments

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Clemencia Siro, Wangari Kimotho, Onyekachi Ogbu, Chinedu Mbonu, Chiamaka Chukwuneke, Samuel Fanijo, Jessica Ojo, Oyinkansola Awosan, Tadesse Kebede, Toadoum Sari Sakayo, Pamela Nyatsine, Freedmore Sidume, Oreen Yousuf, Mardiyyah Oduwole, Kanda Tshinu, Ussen Kimanuka, Thina Diko, Siyanda Nxakama, Sinodos Nigusse, Abdulmejid Johar, Shafie Mohamed, Fuad Mire Hassan, Moges Ahmed Mehamed, Evrard Ngabire, Jules Jules, Ivan Ssenkungu, and Pontus Stenetorp. 2023. MasakhaNEWS: News Topic Classification for African languages. In *Proceedings of the 13th International Joint Conference on Natural Language Processing and the 3rd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics (Volume 1: Long Papers)*, Vol. 1. Association for Computational Linguistics, Stroudsburg, PA, USA, 144–159. https://doi.org/10.18653/v1/2023.ijcnlp-main.10

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A   Appendix: Workshop Booklet

ATELIER PRATIQUE
Cahier d'activité

27 et 28 juillet 2023 entre 10h et 16h à l'Université de Kara

UNIVERSITE DE KARA

dfki Design Research eXplorations

With funding from the:

Federal Ministry of Research, Technology and Space

FKZ 01LL2202A

Minodu

Informations sur vous

Nom _____

Age _____

Genre _____

Contact _____
(bien écrire une adresse mail ou téléphone pour pouvoir recevoir votre certificat de participation)

Village/ ville d'origine _____

Préfecture _____

Filière à l'UK _____

Avez-vous un smartphone à disposition? _____

Quelle compétences techniques digitales avez-vous (par example Word, langue de programmation…)?
_____

Si vous étiez une application technique ou digitale, quelle serait-elle et pourquoi?
_____

_____

Aperçu des stations

4   5

signature

Vous apprennez à faire la soudure électronique d'une lumière LED dans une région de votre choix sur la carte du Togo.

Il ne s'agit pas seulement de souder, il s'agit aussi de partager et d'apprendre plus sur notre pays le Togo, ses régions, ce qui peut être valorisé sur chaque région et ses cultures. L'idée est de susciter la curiosité et l'intérêt pour nos régions et contribuer également à créer de la cohésion dans un pays riche culturellement.

Veuillez nommer les éléments sur la photo!
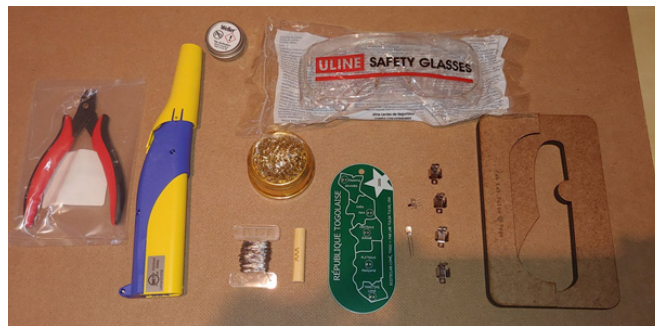
Questions et notes

Qu'est-ce qu'il y a eu de nouveau pour vous? Qu'est-ce que vous pensez?

_____

_____

Quelle région du Togo avez-vous choisie pour vos LED et pourquoi?

_____

_____

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STATION 2:
Introduction à la magie du code

Responsable: Séti AFANOU

Explorer les bases de la programmation en utilisant Python sur le Raspberry Pi.

Cet atelier d'initiation vous offre l'opportunité de vous plonger dans le monde passionnant de la programmation Python en utilisant le Raspberry Pi. Vous explorez les bases de la programmation tout en découvrant les fonctionnalités incroyables de ce petit ordinateur.

Cest quoi un Raspberry Pi?

Le Raspberry Pi est un ordinateur de la taille d'une carte bancaire qui se branche sur un écran d'ordinateur ou TV, et utilise un clavier et une souris standard.

Questions et notes

Qu'est-ce qu'il y a eu de nouveau pour vous? Qu'est-ce que vous pensez?

_____

Dans un monde de ressources et de compétences illimités, que feriez-vous avec le Raspberry Pi?

_____

Des Ports GPIO: Ports d' Entrée-sortie à usage général (pour connecter vos capteurs, LED, moteurs et autres)

Bluetooth intégré 4.1 wifi

Port de connexion DSI pour écran/écran tactile

Lecteur de carte micro SD (de sous)

Micro USB power

Port HDMI (pour branchement d'écran moniteur)

Port de branchement de module camera

Prise audio et vidéo

4 accès USB

Port Ethernet
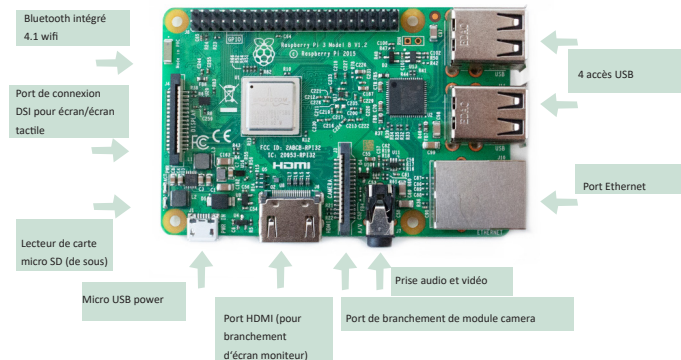
8

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STATION 3:
Mesurer avec des détecteurs

Responsable: Friederike Fröbel

Vous utilisez un kit méteo DIY.

Celui-ci se compose de:
- un microcontrôleur (esp32)
- une powerbank
- un capteur connecté (BME 280)

Une connexion WLAN permet de relier le smartphone ou l'ordinateur au kit DIY. Vous vous rendez à l'extérieur ensemble pour mésurer avec le kit.

Sur le smartphone, vous voyez ce qui est mésuré et comment les paramètres changent.

Questions en avance

Quelle est la signification des trois symboles suivants selon vous?

_____

_____

_____

Questions et notes

Qu'est-ce qu'il y a eu de nouveau pour vous? Qu'est-ce que vous pensez?
_____
_____

Veuillez indiquer jusqu'à trois utilisations pour une station météo
_____
_____
_____

Quelles sont les données environnementales que vous aimeriez mésurer chez vous au village ou à l'université? Pourquoi?
_____
_____
_____
_____

Quels sont les capteurs que vous considérez comme les plus importants dans le domaine de l'agriculture? Citez au moins 3 capteurs.
_____
_____

Il y a une station météo qui produit du son. Quelle est la signification de ce son pour vous ? Où utiliseriez-vous une telle station météo?
_____
_____

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STATION 4:
Comment transformer les résultats de recherche en or

Responsable: Carina Lange

Plongez-vous dans l'univers du projet Minodu: comment pouvons-nous co-créer un échange plus efficace du savoir autour du changement climatique? Quel rôle pouvez-vous y jouer? Ce n'est pas une description simple du projet mais une immersion active qui vous attend!

Que pourriez-vous faire pour aider à faire connaître une étude dans vote village?
_____

Que pourriez-vous faire pour faire connaître une bonne pratique de votre village dans la communauté scientifique (internationale)?
_____
_____

Visualisez vos idées, dessinez, écrivez, parlez-nous!

une étude récente

étude: effet de la poudre de neem sur les ravageurs des cultures maraîchers

UNIVERSITE DE KARA

Questions et notes

Qu'est-ce qu'il y a eu de nouveau pour vous? Qu'est-ce que vous pensez? Quelles autres idées avez-vous pour le projet Minodu? *N'hésitez pas à les dessiner en bas*
_____

Votre communauté

La communauté scientifique internationale

Vous

DFKI
Un institut de recherche européen

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STATION 5:
Le changement climatique et vous

Responsable: Akoua AWOUDJA

À cette station vous avez l'occasion de comprendre de façon basique l'agriculture intelligente face au climat et de donner votre avis sur le sujet.

La station met également une lumière sur le rôle de la femme dans l'agriculture et quelques femmes exerçant dans ce secteur en Afrique. Nous sommes curieux de savoir ce qui se passe dans votre communauté!

Questions et notes

Vidéo 1
Que pensez-vous de la vidéo que vous venez de regarder?

_____

Avez-vous déjà entendu parler du concept d'agriculture intelligente?

_____

Partagez avec nous votre expérience sur le sujet

_____

_____

Vidéo 2
Quel rôle les femmes jouent-elle dans votre communauté? Ont-elles besoin d'un appui spécial? Si oui, lequel?

_____

_____

_____

STATION 6:
Comment se faire entendre:
Policy brief et fiche technique

Responsable: Mikémina PILO et François BOKOBANA

Vous vous familiarisez avec les outils standards de valorisation des résultats de la récherche envers la sphère politique. Vous êtes ensuite soumis à une séance pratique d'élaboration de policy briefs et de fiches techniques.

Questions en avance

Veuillez citer trois domaines dans lesquels un policy brief est demandée!

_____

_____

_____

Veuillez citer trois domaines dans lesquels une fiche technique est demandée!

_____

_____

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Questions et notes

Qu'est-ce qu'il y a eu de nouveau pour vous ? Qu'est-ce que vous pensez ?

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Qu'est-ce qui est le plus facile pour vous dans la préparation d'un policy brief ?

_____

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Qu'est-ce qui est le plus facile pour vous dans la préparation d'une fiche technique ?

_____

_____

Si un robot vous assistait dans la préparation d'un policy brief ou d'une fiche technique, quelles tâches le robot devrait-il faire ?

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Informations sur le projet

Le projet Minodu vise à créer des réseaux communautaires locaux et évolutifs pour une gestion durable des terres dans les communautés rurales grâce aux supports et applications numériques. Il s'agit ainsi de réduire l'écart entre les résultats scientifiques disponibles et les solutions concrètes adoptées au niveau communautaire pour une gestion durable des terres.

Nous pensons que vous, en tant que jeunes universitaires, jouez un rôle décisif dans cet égard. Vous pouvez faire une différence et nouer le pont entre vos villages et le monde académique.

Le projet Minodu est un projet commun d'un institut de recherche allemand (DFKI GmbH), de l'Université de Kara et d'experts togolais dans les domaines de la culture des makers, du développement de logiciels et de l'entrepreneuriat.

Dans le cadre de la promotion du développement local, l'Université de Kara, à travers l'Institut Supérieur des Métiers de l'Agriculture (ISMA) et le Laboratoire de Recherche en Sciences Economique et de Gestion (LaRSEG), en collaboration avec le Centre de Recherche Allemand sur l'Intelligence Artificielle (DFKI GmbH) bénéficie d'un financement du ministère fédéral allemand de la Recherche, de la Technologie et de l'Espace (BMFTR) pour l'implémentation du projet de la gestion durable des terres en Afrique Subsaharienne.

Notes

Qu'est-ce que vous avez trouvé le plus intéressant ?

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_____

Sur quoi aimeriez-vous savoir plus ?

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