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## Synergy through Making: Co-designing with Educational Stakeholders in Northeastern Nigeria

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# Synergy through Making: Co-designing with Educational Stakeholders in Northeastern Nigeria

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**Abstract:** Nigerian educational statistics reflect a country in crisis. Several factors drive this trend: early marriages; poorly-trained and underpaid teachers; and extensive armed conflicts. This paper describes a collaboration between three universities on a [removed for peer review] grant-funded project to intervene in this crisis. Focusing on the educational system in two states, the project aims to improve educational materials and teaching strategies in 200 schools. Our research team employs a co-design methodology informed by the “co-creation” work of Dr. Elizabeth Sanders and Pieter Jan Stappers (2008), Dr. Allison Druin’s (1999, 2002, 2005) work on “cooperative inquiry,” and by Martens, Rinnert, and Andersen’s (2018)’s work on child-centered design. The participants provided the research team with personal perspectives through the creation of personas. This paper presents the results, and how we interpreted and analyzed the study. Our goal was to better understand the educational needs, community and people of Adamawa and Gombe states.

**Keywords:** co-design; ethics; global communities; global education; inclusion; participatory action research; personas; and social justice

## 1. Introduction

The importance of education to societies, as it contributes to economic development and increases the standard of living of citizens, is highlighted in the literature (Odia & Omofonmwan, 2007; Teaching-Jobs.org, 2017). As Benjamin Franklin said, “An investment in education pays the best,” education is supposed to impart societal values and equip students with skills necessary to function in the world of work. Attainment of education is considered a powerful tool by which economically and socially marginalized adults and children can lift themselves out of poverty and participate fully as citizens (Norad, 2019). Research and impact studies demonstrate that participating in education has a positive effect on people’s employability, income levels, and occupation (Carnoy, 2000; Blondard et al., 2002 as cited in



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Schuller, 2004a, p.3). Therefore, individuals who are denied access to education can become stagnant, ignorant, and frozen in time (Mackey, 2013); and this situation affects the quality of life of a society. Since education plays such an important role in society, the Universal Declaration of Human Rights (UDHR) in 1948, recognized that: “Every individual, irrespective of race, gender, nationality, ethnic or social origin, religion or political preference, age or disability, is entitled to a free elementary education” (Norwegian Agency for Development Cooperation [Norad], 2019 para #2). In addition to access to education, the UDHR expects the education provided to be of quality: “... Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms. It shall promote understanding, tolerance and friendship among ... racial or religious groups. ...” (see, Article 26). However, despite the declaration, issues of access to basic education and quality of education for many students remain a challenge for several countries, particularly those in developing nations.

### *1.1 Problem Statement: Crisis in Nigeria*

Education in Nigeria faces enormous challenges. Acknowledging the different problems in the north and south of Nigeria, BBC Minute (2019) identifies five main challenges that affect education in Nigeria overall: i) overcrowded, dilapidated, and ill-equipped schools; ii) parents who can't afford to put their children in school;<sup>1</sup> iii) teachers who are often untrained and chronically underpaid; iv) negative attitudes towards 'western'-style education, and v) education systems in need of capital. Thus, millions of children find themselves outside the school system (Norad, 2019). It is estimated that 10.5 million children are not being educated in Nigeria (BBC Minute, 2019).

Commenting on the educational challenges in Nigeria, the Norad (2019) report noted:

The education sector in the north-east has been severely affected by the conflict with Boko Haram. Both students and teachers have been killed and schools destroyed. The result is large numbers of refugees and several hundred thousand children [are] outside the school system (see, Education, para # 1).

With an estimated 1200 schools destroyed, and many of them yet to be rebuilt, this situation creates an enormous challenge on existing educational resources. Fortunately, there are several efforts aimed at addressing some of the challenges facing the educational sector in Nigeria. USAID awarded three universities: American University of Nigeria (AUN), Kent State University (KSU), and Columbia University's Center for Sustainable Development (CSD), a grant to intervene and provide solutions to educational challenges facing public primary schools in Northeastern states. The ensuing Strengthening Education in Northeast Nigeria (SENSE) Activity is a 3-year project that aims to develop teaching and learning materials for primary schools in Nigeria's Gombe and Adamawa states to improve educational outcomes for 200,000 primary school children.

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1 Parents cannot afford to send their children to school for a variety of reasons. Some need children to help at home, and others cannot afford basic expenses of paying for uniforms and books--both of which are required expenses.

The SENSE activity is a collaboration between a Nigerian university and two US universities. Two of the partner institutions were foreign to Nigerian culture but well versed in mathematics and literacy education, along with gender, socio-emotional learning, and psychosocial support. Because the team is collaborating to develop teaching and learning materials for states in a region where Western education is not widely accepted, collaboration with local stakeholders was required. As cultural outsiders tasked with developing educational materials for a country with which we had limited familiarity, we wanted to reduce the imposition of western ideas on Nigeria's education. As our goal was to produce materials that would be culturally appropriate, relevant, and useful, the research team sought strategies that would bring local educational stakeholders into the design process to make sure their voices were recognized and properly considered (Mchunu & Moodley, 2019). Subsequently, we chose to adopt a methodology that incorporated local educational stakeholders into the design process.

This paper describes the nature of the collaborative partnership in developing numeracy and literacy teaching and learning materials, and reports on findings from a co-design activity with educational stakeholders in one of the afflicted states in northeastern Nigeria. The focus was to learn more about the experiences of teachers in Northeast Nigeria, what resources and materials they had access to, what they viewed as challenges affecting education in their communities, what they desired to see in their schools, and more.

## **2. Literature Review**

### *2.1 Including the Stakeholders*

Our interdisciplinary team, composed of scholars from the design, education, and information fields, wanted to ensure we included local voices in both the research design as well as the final products. Historically, the idea of including stakeholders in design started with participatory design in Scandinavia in the 1970s as a way of integrating technological developments with very strong unions (Spinozzi, 2005; Sanders & Stappers, 2008). "This early Scandinavian work was motivated by a Marxist commitment to democratically empowering workers and fostering democracy into the workplace," (Spinozzi, 2005, p. 164). While our team was tasked with creating tools for education rather than for commerce, emphasizing stakeholder involvement empowers end-users, such as teachers, and provides them with the agency for co-developing the educational materials they would subsequently use in the classroom.

According to Heslop, Cranwell, and Burton (2019), engaging stakeholders in the development of educational material and services creates a more responsive, integrated service that better meets the needs of the community of practice. Furthermore, the engagement and participation of stakeholders in the development of educational programs and learning materials can boost confidence and motivation levels and help to foster accountability (Matuk, Gerard, Lim-Breitbart & Linn, 2016).

## ***2.2 Co-Design, Collaborative Design, Cooperative Inquiry, and Design Thinking***

Co-design is a form of participatory action research that fundamentally involves a team working collaboratively to develop practical service improvements and to enhance skills and knowledge in people and organizations by exploring and sharing subjective experiences of stakeholders (Donetto, Pierri, Tsianakas & Robert, 2015). Co-design provides a collaborative way of collecting information and creating knowledge.

“When we think of knowledge, we often think of explicit forms of knowledge: things that are written down, defined, categorized, systematized, or quantified. But to understand knowledge-making in participatory design we have to understand that much knowledge tends to be tacit. Tacit knowledge is implicit rather than explicit, holistic rather than bounded and systematized; it is what people know without being able to articulate” (Spinuzzi, 2005, p.165).

The co-design research process uses a combination of making activities along with observations and artifacts developed with users to provide feedback that is reflective of their needs and desires.

“Since users’ tacit knowledge is highly valued, participatory design focuses on exploring that tacit knowledge and taking it into account when building new systems. This task is accomplished with a strong political or ethical orientation: users’ knowledge is described so that it can be used to design new tools and workflows that empower the users” (Spinuzzi, 2005, p.166).

The practice of co-design has been used in business and marketing for some time and has empowered users, resulting in financial gains, and successful marketing strategies with the design of new products (Sanders & Stappers, 2008, p.8). Co-design may provide the same for educators and students, as a means of empowering those in the classroom to determine and shape learning materials.

Researchers Sanders and Stappers (2008) wrote: “co-designing threatens the existing power structures by requiring that control be relinquished and given to potential customers, consumers or end-users” (p.9). If we swap out the words “customers, consumers and end-users” with “educational stakeholders,” (including teachers, students, parents, and other community members vested in education), the statement still rings true. In many societies, educational systems operate under an authoritative, top-down structure, one that tends to not reflect on teachers’ recommendations, or their needs and desires for student experiences.

## ***2.3 Teachers and School-Based Management Committees***

The co-design activity aimed to gather as much in-depth understanding as possible from stakeholders, particularly teachers and School-Based Management Committee (SBMC) members, about the state of education in their communities. SBMC’s are established to increase community participation in school management. SBMC members include stakeholders from schools and the local community, including (but not limited to) headteachers, parents, local religious leaders, local government officials, students, and

alumni (Ogundele & Adelabu, 2009). In a place where western education is met with suspicion, as it is in northeastern Nigeria, SBMC members serve an important role in ensuring that materials will be adopted and advocating for their use. For the co-design activities, we met with teachers and SBMC members in Northeastern Nigeria during fall 2019 and worked together to develop a comprehensive understanding of the Nigerian education system. Using personas, a design thinking strategy, paired with co-design methodology, the team worked with Northeastern Nigerians to develop teacher personas to aid in curricular and materials development. The personas provided us with information about the issues and challenges faced by teachers in the region, which in turn will shape future co-design with Nigerian colleagues of relevant and appropriate instructional materials.

## *2.4 Design Thinking and the Use of Personas*

Design thinking is a methodology popularized by companies like IDEO, Stanford's d.School and many business schools around the world. It echoes the traditional design process and research by focusing on user-centered problem solving. "It encourages organizations to focus on the people they're creating for, which leads to better products, services, and internal processes." (Ideo, 2019) Design thinking focuses on understanding the user and the problem holistically, a strategy that can approach undefined "fuzzy" problems and find appropriate solutions that speak directly to the users needs and values. According to Dam & Teo ("Stages," n.d.), design thinking begins with empathy by learning about and understanding the user. One of the key concepts behind design thinking is to understand and empathize with the user. The process avoids assumptions and focuses on collecting information and data. "Don't assume you know what someone thinks or feels. Gathering information about your target consumer is a critical piece of the design thinking approach" (Ideo, 2019). "Target consumers," in this case, are the teachers in Northeastern Nigeria. In order to learn as much as possible about these teachers, the research team worked with teams of educational stakeholders (teachers and SBMC members) to create personas of teachers in Northeast Nigeria.

Personas act as a visual for a design team to use while designing tools—in our case, educational tools for use in Northeast Nigeria.

"Personas are fictional characters, which you create based upon your research in order to represent the different user types that might use your service, product, site, or brand in a similar way. Creating personas will help you to understand your users' needs, experiences, behaviours and goals. Creating personas can help you step out of yourself. It can help you to recognise that different people have different needs and expectations, and it can also help you to identify with the user you're designing for" (Dam & Teo, Persona, n.d.).

Personas are generally inexpensive to create, but they are very valuable in unifying the research team and helping them to imagine a specific user while creating an innovative product ("Personas," 2013). Typically three to four personas are created and include information that is both generic and specific. For instance, it may give the user's name, gender, and age, but also their values, expectations, and motivations. It may also list their

challenges and obstacles in their life. If the research team is focused on design thinking, and therefore problem-solving, they may use personas to define the problems they intend to answer.

There are several types of Personas. For this project we focused on a type called fictional personas. “The fictional persona does not emerge from user research (unlike the other personas) but it emerges from the experience of the UX design team. It requires the team to make assumptions based upon past interactions with the user base and products, to deliver a picture of what, perhaps, typical users look like” (Dam & Teo, Persona, n.d., para. 11 ). As Dam & Teo point out, these types of personas can be flawed if the research team has minimal experience with the user group. Because we also had limited experience with teachers in Northeastern Nigeria, we sought local help in developing personas, turning to our Nigerian colleagues for help. Rather than having them focus on their individual, lived experiences, the purpose of fictional personas was to encourage the Nigerians to work together and create collective personas that portrayed their common experiences, allowing us to gain broader insight into the shared experiences of teachers in Northeast Nigeria. By creating fictional personas we were providing a confidential way for our Nigerian colleagues to share their collective experiences. This made the activity more of a storytelling experience, and less about personal stories.

The goal of the teacher personas was to build a valid, reflective, and accurate representation of the Nigerian teacher, one that was based on collective knowledge of Nigerians in order to provide context for the research team and to inform the design of the educational materials that would be created over the next two years of the grant. We wanted to understand their “workflow and work procedures, routines, teamwork, and other aspects of [their] work” (Spinuzzi, 2005, pp.167). These personas also served as a way to understand the classroom situation and the students. This aspect was particularly important because we were limited in the number and variety of Nigerian schools that we could visit because of safety, cost, and time.

### **3. Methodology**

As a part of our broader co-design strategy in the project, we held co-design sessions with educational stakeholders in Northeastern Nigeria who were asked to create personas with the objective of answering the following overarching and sub-research questions:

How can using personas in co-design studies with educational stakeholders inform the development of educational materials for Nigerian schools?

1. How do educational stakeholders portray the experiences of being a teacher in Northeast Nigeria?
2. How do educational stakeholders portray the environment and resources that exist in Northeastern Nigerian schools?
3. How do educational stakeholders portray the experiences of the students in their schools?



### 3.1 Co-Design Persona Sessions

Co-design sessions took place in November 2019, at AUN in Yola, Nigeria. The co-design participants included teachers and SBMC members, who had traveled from within Adamawa and Gombe states, and had been recruited by colleagues from the local university. The approximately 50 people in attendance were organized into eight groups of men and women, with between six to eight people per group. The session plan was authored by a design researcher who has a focus in interaction design and a literacy expert and had approval from KSU's Institutional Review Board. The co-design session was implemented by four researchers from the partner institutions. Together they provided information, supplies, directions, and fielded questions as they arose. The room was large and had long tables where the groups could easily collaborate with each other and on the poster.



*Figures 1,2 Workshop participants working on personas of Nigerian teachers. Participants were initially organized into groups of men and women, but many chose to re-organize themselves into single-sex groups.*



*Figures 3-5 Researchers walked around answering questions. Workshop participants worked in groups to create teacher personas, discussing the values and needs of the typical Nigerian teacher. They used local newspapers and art supplies to create visuals.*

Each group was provided with the following prompts at the start of the 45-minute session:

**01 Welcome:** The session began by welcoming the teachers and educational managers from the Northern states. We informed them of our goals and mission and explained why we needed their help.

**02 Prompt:** We asked the group to create personas of “the Nigerian Teacher.” Working in small groups, participants were asked to answer the following questions:

- Describe your educational work space using text, sketches, and diagrams
- What things or objects do you use to teach your class?

- What books or textbooks do you use for literacy and math education?
- Where do you teach (describe the space)?
- What resources do you need most?
- Do you use any technology or extra resources at home to prepare for class?
- What languages are spoken in your classroom?
- What is the English ability of the students (if any)?
- How do you assess your students' understanding?

**03 Persona:** Using paper, markers, and notes, participants were asked to create a poster of a fictional “Nigerian teacher,” based on the reality they know. We asked them to define this persona by explaining this “teacher’s” interests, values, challenges and needs. We encouraged them to express their ideas in whatever way was easiest: by drawing, writing, using notes, pens, pencils, and markers. Local staff at the host site provided newspapers, photos, and graphics for use in posters and collages. The materials were limited to what would be readily found in Northeast Nigeria.

**04 Present the Persona:** As a team, please present your persona to the group. The presentation should be around two to five minutes in length.

Participants worked independently while researchers walked around, answered questions, and offered feedback. The activity took time to get started, as this was a new experience for the groups, and many participants did not understand what was expected of them. After 30 minutes the groups had moved from quietly talking amongst themselves, to loudly making posters. At the end of the session the groups presented their finished personas. The presentations were recorded for later review and analysis.





*Figures 6-8 Workshop participants presented their personas as teams. They explained the images they selected and how they were relevant to the persona.*

## **4. Data Analysis**

The dataset that emerged from the persona activity consisted of two parts: 1) the personas and 2) the videos of the groups presenting their personas. The personas were considered the primary dataset. Because each group created two posters, there were sixteen posters in the persona dataset. These posters contained existing images from newspapers, hand-drawn images, and text. The videos of the groups describing their personas were used as a secondary dataset, mainly to provide additional detail and insight into the groups' depiction and intent. A video was taken of each group resulting in a dataset of eight videos.

Due to the multimodal nature of the dataset, we analyzed the personas looking at both the content of the persona as well as the visual aspects of the persona. The goal of coding the content of the personas was to understand the message stakeholders were trying to convey and understand more about their lives and experiences as a teacher, in the classroom, and interacting with their students. Given the multimodal nature of the personas, we used a multi-phase coding strategy where the goal was consensus rather than intercoder reliability. The first coding phase consisted of holistic coding methods (Saldana, 2016) to help identify

broader topics to guide the second coding phase. Three researchers engaged in detailed, in-depth discussions while looking through the personas to identify broad themes that were present throughout a majority of the personas. The broad themes that emerged from these discussions were teacher aspirations, challenges teachers face, challenges and improvisation with resources and the environment, hopes for students, and challenges faced by students.

In the second coding phase, two researchers took the broad themes and completed a thorough coding of each persona, identifying detailed, discrete chunks of data in each persona that fit under each theme. The videos of the groups presenting their personas were used as supplementary data to provide insight into each group's intent and the message they were trying to convey. Each chunk of data coded under each theme was described in a spreadsheet so that the researchers could view all instances of where and how that theme emerged in the personas. A cycle of descriptive coding (Saldana, 2016) was then applied to all of the data that was organized under each broad theme and frequency counts were done for each code.

During the second coding phase, the two researchers also coded the visual aspects of the personas. The goal of coding the visual aspects of the personas was to understand how the participants were trying to convey their experiences. To do this, researchers coded where the personas included the following: existing newspaper images, hand-drawn images, existing newspaper text, simple handwritten labels, short handwritten descriptions, long handwritten descriptions. These codes were analyzed using frequency counts.

## 5. Results

The data collected during the persona creation provides insight into the three sub-research questions guiding the study:

1. How do educational stakeholders portray the experiences of being a teacher in Northeast Nigeria?
2. How do educational stakeholders portray the environment and resources that exist in Northeastern Nigerian schools?
3. How do educational stakeholders portray the experiences of the students in their schools?

### 5.1 Teacher Experiences

All of the personas provided insight into teachers' experiences in Northeast Nigeria, which was expected given the prompt. While the personas portrayed a variety of experiences, most of them fit into the overarching categories of "challenges" or "aspirations." All of the groups portrayed a variety of significant challenges that teachers face in Northeast Nigeria, and five of the groups depicted aspirations or hopes for teachers' experiences. The data from the personas suggest that the teachers face a variety of challenges in their daily roles. Lack of pay and promotion was portrayed as the most significant challenge. The groups also depicted

lack of instructional materials and conducive learning environments as substantial challenges in teachers' experiences, but those responses have been consolidated under research question two. Lack of support in their teaching role and lack of professional development were two other challenges that were communicated in the personas.

*Table 1 Challenges that were communicated in the personas.*

| <b>Challenges</b>                | <b>Percentage of Total Challenges Teachers Face (N=16)</b> |
|----------------------------------|--|
| Lack of professional development | 11%  |
| Lack of pay and promotion        | 56%  |
| Lack of support                  | 33%  |

While it is apparent that Northeast Nigerian teachers face substantial challenges, they also have aspirations for improving their teaching experiences. The groups indicated that teachers want to be active, competent teachers and they want their students to be successful. For the teachers to be successful, they felt that they need to have their basic needs met and they need resources and support from their schools, communities, and governments.

*Table 2 Aspirations communicated in the personas.*

| <b>Aspirations</b>  | <b>Percentage of Total Aspirations Teachers Have (N=10)</b> |
|---|---|
| Desire to be an active, competent teacher                         | 40%   |
| Support for education and schools from government and communities | 30%   |
| Teachers' basic needs are met                                     | 20%   |
| Students are successful   | 10%   |

## **5.2 Environments and Resources**

The personas also provided insight into how the groups perceive the environments and resources that exist in the Northeast Nigerian classroom. The personas conveyed considerable challenges around the classroom environments and resources. Seven of the groups included challenges around classroom environments in their personas, while six groups included challenges around instructional materials and resources in their personas.

Table 3 Challenges in the Classroom Environment

| Challenges                               | Percentage of Total Challenges with Classroom Environments (N=19) |
|--|---|
| Inadequate or damaged facilities         | 50%   |
| Classroom furniture and arrangement      | 25%   |
| Lack of a conducive learning environment | 25%   |

With the classroom environments, the personas predominantly focused on the facilities, highlighting damage (such as missing roofs) to the buildings and classrooms as a result of flooding or other disasters. They also touched on inadequate classroom environments due things like overcrowding and lack of desks and chairs. Finally, some talked about the assortment of challenges in the environment more broadly as a general lack of a conducive learning environment. For the education resources, some groups referred to a general lack of educational tools and materials, but other groups identified specific types of resources that were lacking in the classrooms. Of the specific materials, writing materials were mentioned most frequently, followed by textbooks and technology.

Table 4 Challenges with Classroom Materials

| Challenges                              | Percentage of Total Challenges with Classroom Environments (N=19) |
|---|---|
| Lack of technology                      | 14%   |
| Lack of textbooks                       | 21%   |
| Lack of other reading materials         | 7%  |
| Lack of writing materials               | 29%   |
| Lack of educational tools and materials | 29%   |

While the groups mostly focused on challenges in the classroom environments and resources, a few incorporated references to teachers being resourceful and working with what they had. One group depicted a teacher holding class under a tree as a way of dealing with challenges in the classroom environment. Others described using leaves and sticks in the classroom as manipulatives and measurement devices. This suggests that the teachers are resilient and resourceful in finding ways to continue instruction regardless of the challenges they face with the classroom environment and lack of resources.

### 5.3 Student Experiences

Through the personas, the groups also provided insight into how they perceive students' experiences in Northeast Nigeria. For the most part, the personas depicted students' barriers to success in school. Perceptions of students' experiences were fairly evenly distributed. First, a majority focused on students' basic needs and showed that when their needs are not met, their ability to learn is compromised. In addition, a few of the groups touched on how

students with too many chores at home and an overall lack of support from their families can also interfere with students' success in learning. Finally, student personas brought up the dearth of resources and adverse school environments.

*Table 5      Barriers students Face*

| <b>Barriers</b>  | <b>Percentage of Total Barriers Students Face</b> |
|--|---|
| Lack of support outside of school  | 13%   |
| Distressed emotional state   | 20%   |
| Hunger   | 13%   |
| Poor health and hygiene  | 20%   |
| Responsibilities outside of school   | 13%   |
| Struggles in learning due to lack of resources and adverse school environments | 20%   |

#### *5.4 Personas, Co-design, and Educational Materials for Nigerian Schools*

The findings discussed under research questions one, two, and three also offer insight into the overarching research question guiding the study: How can using personas in co-design studies with Nigerian teachers inform the development of educational materials for Nigerian schools? Overall the personas have provided our research team with important insight into the overall educational experience in Northeast Nigeria that will inform the development of educational materials created in the grant.

The personas have already informed specific decisions that we are making about the educational materials. While we had not originally planned to have textbooks or workbooks as a part of our materials, we recently adjusted the materials plan to incorporate literacy and numeracy workbooks. This change was justified in the personas with the emphasis on lack of textbooks. Furthermore, we had planned to incorporate fewer but more advanced tablets in the materials package, but the emphasis on lack of writing materials has led us to consider incorporating a greater number of e-writers as a replacement for more advanced tablets. Even though we are considering limiting the amount of tablets, we still plan to include some tablets, and will include a writing-focused app to help children learn letter writing and letter sounds in a digital platform that integrates video and feedback.

Finally, to meet the teachers' desire for professional development, we are exploring the possibilities of creating scripts for instructional videos that can be recorded and used by Nigerian teachers for professional development. Ultimately, the personas have already begun to inform our development of the educational materials for schools in Northeast Nigeria, and we anticipate that they will continue to do so as we move forward in the grant.

#### *5.5 Limitations*

The findings presented here provide valuable insight into the perceptions of educational



experiences in Northeast Nigeria. However, there are limitations to this data that need to be considered. The participants were from two states in Northeast Nigeria, and therefore the experiences described here may not apply to all of Northeast Nigeria. In addition, the limited amounts of newspapers and existing images that were provided may have restricted the participants' ability to fully communicate their perceptions in the personas.

## 6. Conclusion

The use of co-design methodology and design thinking helped the research team to pinpoint and understand the most significant challenges faced by Northeastern Nigerian teachers. And while these challenges, including building government support for funding for schools and significant improvements to infrastructure, are overwhelming and far beyond the scope of our grant, the team was astonished at the resiliency and positive outlook demonstrated by the teachers. Despite low or late pay, a lack of the most basic educational resources, and poor facilities, these teachers return to work day-after-day.

The results have informed our planning of educational materials that will be delivered to classrooms in Gombe and Adamawa states in 2020. As this grant moves forward we plan to use co-design and design thinking strategies with the Nigerian teachers again. The activity was insightful and provided user-defined data. While our study was qualitative and small scale, it provided much information about teachers in an area known for a decade of civil unrest and terrorism. The co-design sessions allowed us to gather information and communicate with Nigerian educational stakeholders in an informal and creative manner. The personas provided them with a data-rich artifact, which allowed them to present a narrative about issues faced by teachers in the region to the research team.

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