

Field Testing Mobile Digital Storytelling Software in Rural Kenya

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ABSTRACT

We describe and reflect on a method we used to evaluate usability and give insights on situated use of a mobile digital storytelling prototype. We report on rich data we gained by implementing this method and argue that we were able to learn more about our prototype, users, their needs, and their context, than we would have through other evaluation methods. We look at the usability problems we uncovered and discuss how our flexibility in field-testing allowed us to observe unanticipated usage, from which we were able to motivate future design directions. Finally, we reflect on the importance of spending time in-situ during all stages of design, especially when designing across cultures.

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1. INTRODUCTION

Storytelling practices in rural African communities such as Adiedo, Kenya are localized by rich oral traditions [4]. In such places people like to tell stories and they do so in a variety of different ways (tales, song, dance, etc). Increasingly, people living in rural communities in Africa own or have access to mobile phones. So, informed by ethnography we built a mobile digital storytelling prototype tailored to the needs of rural, oral users [1]. We designed this prototype with a rural community in South Africa's Eastern Cape. We decided to field test the prototype in Adiedo, Kenya to assess its usability in-situ while also using our prototype to probe how rural, oral users might make use of mobile digital storytelling systems. Finally, we wanted to learn firsthand more about users, their stories, and their context in relation to our prototype, and see how this information could be leveraged to shape the design of future mobile digital storytelling systems.

We begin by introducing our prototype and providing some contextual information about the village in which we conducted our field test. We then outline key questions we had going into the field and elaborate on the method we used to conduct our field test, before discussing its results. We will conclude by reflecting on how one can test usability of systems in the field in a culture outside of one's own.

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1.1 Motivation and Background

The shift of storytelling into the digital medium and the increasing prevalence of mobile (feature) phones in rural communities can provide those communities with the means to create digital stories on their handsets. As our field work shows, the ability to create and share digital stories stands to benefit members of rural and often impoverished African communities.

Informed by ethnography and technology experiments involving storytelling, we implemented a method to involve users in a rural community in South Africa's Eastern Cape in the design of our mobile digital storytelling system. By using this method, we aimed to create a mobile digital storytelling prototype tailored to the needs of rural, oral users [4]. Details of our design process and the resulting prototype have been published elsewhere [1].

1.2 Village Context

We chose to field test our prototype in Adiedo, Kenya because of existing relations between us and the Adiedo community. Adiedo lies close to Lake Victoria in western Kenya, about 80km south of Kisumu. The adult literacy rate is 58%, compared to 87% in Nairobi, Kenya's capital. Villagers are from the Luo tribe, with subsistence farming being their main economic activity. There is no running water or sanitation, and people collect rain water from the tin roofs of their mud huts. Grid electricity is not available, so people charge their mobile phones (usually a basic Nokia 1100) at the cost of 10Ksh (about 10€) using elaborate combinations of solar panels and car batteries.

2. PROBING

Our existing relationships with the Adiedo community allowed us to focus all our time and energy on field testing our prototype. We spent a total of seven days in-situ and recruited as research assistant, and translator, a young man, who had completed secondary school a few years earlier. He was fluent in English and Dholuo, the mother-tongue of the Luo. The relationship with the research assistant became very important to our work, as he became essential to introducing the prototype to the community. Once we had familiarized him with the prototype, he could ask villagers to create digital stories, with his assistance. This allowed us to not only uncover usability problems by observing our prototype being used in different scenarios and contexts, but also allowed us to observe how his increasing familiarity with our prototype affected his use of it and his facilitation — providing us with additional insights. Finally, the social setting in which we conducted our fieldwork not only provided us with a rich data set, but also allowed us to observe storytelling in a more natural environment — helping us to better understand rural, oral users



Figure 1. a) recording audio, b) taking pictures, c) screenshot of the prototype, d) stitching audio and pictures together

and uncover relationships within the community and between the community and their stories. By leveraging these different perspectives gathered during a relatively short amount of time spent in-situ, we were able to learn more about users, our prototype, and how it could be used, than, say, usability tests would have revealed.

2.1 The Mobile Digital Storytelling Prototype

Our prototype, shown in Figure 1, was developed using Mobile Python. We chose to run it on older (2005) feature phones (Nokia S60 2nd Edition), as we hoped to show to our participants that such a system could become locally affordable in 1-2 years time.

Users can create stories in a variety of ways on our prototype. They can record audio first and later annotate it with pictures. Alternatively, they can select pictures first and then record a voice-over; or they can use a hybrid approach. At any time, they can add, move, or remove pictures and append or overwrite audio. All necessary functions can be accessed via a scrollable vertical toolbar of icons. We deliberately designed our system to allow for ambiguous, open-ended usage as we did not want to impose a certain storytelling style. This also allows participants to use our prototype in unexpected ways, from which we can gather valuable insights on users, their storytelling traditions, and future design directions.

2.2 Key Questions

The design of our prototype had emerged out of a long, ethnographically informed design process [1]. Going into Adiedo we felt confident about the overall design, so we set our primary goal to uncover usability problems and learn more about our prototype in relation to users and their storytelling traditions. We were interested to see how users might adopt different storytelling strategies and how our prototype would be able to depict these different practices.

2.3 Conducting the Field Test

The first step of our field test was to familiarize the research assistant with our prototype. We taught him how to create picture-first and audio-first stories. He then asked us what would happen if he had recorded a story, but did not have the right pictures. He gave us an example of a story about a beggar; asking us what if he did not have a picture of a beggar at hand. We encouraged him to answer his own question, and looked at the example story we had created on the prototype. He saw that the 'add picture' and 'record audio' icons were always visible and answered that he could add

pictures or audio later. We also emphasized that there is no good or bad story or right or wrong way to create one.

Instead of handing out our prototype to the villagers and collecting them later, we would visit the villagers in their homesteads in a 5km² area around where we were staying and then ask them to create their stories in collaboration with the research assistant on our prototype. The basic format of our homestead visits was about the same throughout our time in-situ. To give an impression of how we conducted our homestead visits we will discuss three visits in detail. The participants of these visits gave us permission to share their names, stories, and pictures.

On our second day we met with Mama Rhoda Auma Majiwa and her grandchild in her homestead. After introducing ourselves and the aims of our research, we asked her if she would like to share a story with us. She told us a tale about an impoverished fisherman, who had fished a woman out of Lake Gwasi. After marrying her, he became very rich and had many animals, but when he started abusing her, she returned to the lake with the livestock following her. We asked her if she had a more local story; one where pictures could more easily be taken. She immediately pointed towards a calabash which was standing in front of her house and got up and started singing and dancing towards it. She then sat back down and started telling us a story about past times. She said that her great grandfathers used to drink fermented alcohol from that calabash while their wives were dancing. She continued her story by talking about the responsibilities of women and children. When she recorded the story's audio she did not look at the phone, but instead looked deep into our eyes. She then wanted to add some pictures to the story, which we took since she wanted to be in them. In one picture, she role-played drinking alcohol from long straws out of the calabash and in another she demonstrated how women used to grind millet on a stone. Together with her granddaughter and the research assistant she then added the pictures to the storyline and rearranged them after listening to the story's audio. Finally she stitched the story together with our help.

Later on that day, we met Mama Theresa and Mama Helena Ajwang', both widows. When we showed them the story that Mama Rhoda had created, they recognized her voice. They liked her story and indicated that they would go visit her later. After a similar introduction, Mama Theresa recorded a tale about a woman who was married to a hyena. After more villagers arrived, we played Mama Rhoda's story again. Mama Theresa and Mama

Helena asked if they could add more pictures to Rhoda's story. When we were taking the pictures, Mama Theresa asked if she could take pictures of the orphans, who had just gotten home from school. She wanted us to show the photos around in Nairobi. We then asked if they also wanted to tell a story about them. They did and started to take pictures of themselves doing various activities (farming, carrying wood, cooking, cleaning). Supported by the research assistant they then added some of these pictures to our prototype's storyline. They looked through the pictures, thought of a story, and started to record a voice-over while looking at the pictures. They started each picture's segment in the same way: "With the widows ...". The story was about the hardships widows face every day and that they increase the suffering of the orphans.

On the fourth day, we met with Hezron Anyango, who wanted to create a story about his skin and hides workshop inherited from his father. He was very proud of it, as this business allowed him to build a house and provide for his wife and daughter. The research assistant facilitated this homestead visit differently. He approached our participant more cautiously, delicately inquiring what the most natural way would be for Hezron to create his story. Hezron and the research assistant ended up taking first a single picture, over which Hezron recorded his story. Hezron then wanted to add more pictures to the story, which they then took, before stitching audio and pictures together.

3. RESULTS & DISCUSSION

In-situ we recorded data using handwritten notes and took 167 photos, most of which featured people interacting with our prototype. Listening and conversing through a translator was beneficial during our homestead visits, as it slowed things down. This allowed us to focus first on interactions, storytelling technique, expressions, and body language and, later on, story content. At the end of each day, we discussed the day's work with the research assistant — looking at photos and stories and discussing interesting aspects in detail, such as why people were laughing when they were listening to a certain part of Mama Rhoda's story (she had mispronounced a word).

We observed how the research assistant became increasingly familiar with our prototype, including in the way he facilitated each homestead visit. These different scenarios, contexts, and stories uncovered different usability problems and taught us many things about users and storytelling in rural settings. In this section we look at the stories we collected and how they were created. Then we discuss the usability problems we discovered, describe unanticipated usage and motivate future design directions.

3.1 Story Content and Story Creation

During our time in-situ, we collected 15 full stories and eight other stories to which participants were not able to add pictures. The full stories had an average, minimum, and maximum length of 2:50 min, 0:38 min, and 6:44 min, respectively. Stories had between one and 16 pictures; on average 7.73. For the most part, participants told stories about past times or well-known tales. We got the sense that participants had told these stories before and, hence, preferred to record audio first. For stories that were more spontaneous, such as the widows' story, participants preferred to use a photo-driven approach. That is, participants took photos first, to which they then recorded a voice-over. It was interesting to see how a picture-first approach benefited brainstorming, as was the case when Mama Theresa only thought of the exact narrative after taking 14 pictures and looking at them. We were pleased to see stories being created in different ways, as we later

became aware that the structure of our homestead visits may have influenced participants to tell well-known stories instead of creating spontaneous ones. Hence, for most of the digital stories we collected in-situ, an audio-driven approach was used.

We were fascinated to see that Hezron's story was created in a hybrid fashion, where he first took a picture, then recorded the story, before adding more pictures. After a few days spent exploring our prototype's features, the research assistant was now familiar with our prototype, and was now able to accommodate the different ways in which our participants might like to create a digital story. We concluded that the constant visibility of the 'add picture' and 'record audio' icons of the toolbar affords that a story can be created in different ways. It also showed us that users would stand to benefit from our prototype's flexibility by not forcing them down a strictly audio-driven or picture-driven path.

3.2 Usability Problems

We discovered numerous usability problems while conducting our field tests, some still in-situ, others ex-situ when going over field notes and photos. The ones we discovered in-situ, we discussed with our research assistant. Since he was the one guiding our participants through the story creating process, he obtained a good understanding of these problems. Being familiar with our prototype and sensitive to local needs and constraints, we could use the research assistant as a proxy, or human access point, into the wider community [2]. Together we discussed some usability issues and interrogated and sketched out solutions. This was a delicate process, as he did not harbor the same views towards constructive criticism as we did. However, by the time we discussed usability issues we had already been working together for almost a week and a trusting relationship had formed. In our discussions, we conceded that he was the expert—not us—since only he could know what designs would be appropriate for his community. We elaborate on two of these usability issues below.

Most participants favored an audio-first approach when creating their digital stories, so only after they had recorded their stories' audio did they take pictures. Especially for longer stories, we observed how they were unsure in which order to add those pictures to the storyline. To help the participants with this task we would play back the stories' audio. Unfortunately, our prototype could only playback audio in its entirety. This was not much help, since by the time the playback had finished, participants would often forget the intended sequence of the pictures. We improvised by noting down on paper in which order pictures were to be added to the storyline. Together we discussed this issue and came up with the solution that it should be made possible to playback audio bit-by-bit, so that users can iteratively add, rearrange, and transition pictures.

Another issue was our use of contextually inappropriate icons. Participants would struggle to uncover which function could be accessed through a particular icon and sometimes would resort to guessing. Using the research assistant as a proxy into the wider community, we challenged him to sketch-out locally appropriate icons. For instance, we re-designed the round 'record audio' icon seen in Figure 1c. Instead of using the standard record icon from audio editing software, the research assistant suggested we use an icon which shows a person's head in profile with waves coming from his mouth next to a radio with waves coming from its speakers. He commented that the villagers were familiar with how recorded sounds can be played back on a radio. We ended up agreeing on using an animated version of that icon, toggling three times between the head and the radio when it is selected; in

addition, such animation would increase icon visibility. This would also address the usability issue that it can be hard to see which icon is currently selected.

3.3 Probing Future Design Directions

We designed our prototype to allow users to create digital stories in many different ways. This broader range combined with the social setting in which we deployed our prototype enabled us to use our prototype to probe future design directions; it allowed us to observe unexpected usage from which we could gain insights into the relationship between a story, its storyteller(s), and its listeners, and learn more about storytelling in rural contexts.

3.3.1 Locative storytelling

Many of the stories we heard attached to objects or places. For instance, Mama Rhoda's first story about the impoverished fisherman took place at a nearby lake. In fact, at the end of the story, she mentioned that the abusive fisherman has now taken the form of a dead tree, which can actually be seen on the shores of Lake Gwasi. Additionally, we heard tales about how the crater-lake Simbi came to be, or about the origin of a nearby hot-spring. Even when stories did not directly associate with a place, people were often able to recognize a storyteller's voice and could thus associate the story with a homestead.

3.3.2 Collaborative storytelling

Contrary to mobile phone use in Western contexts, in Adiedo the mobile phone is not a personal device. This could clearly be seen by the surprising comfort of our storyteller participants, when a cluster of sometimes 15 people— all trying to catch a glimpse of the mobile's screen— formed around them during story playback. People collaborated in many different ways while creating digital stories. A child would often be eager to take, or feature in, a picture for a story recorded by a relative. Another group of storytellers wanted to record a story's audio together, but ended up using a single voice instead because of time constraints. We observed participants wanting to add pictures to another storyteller's digital story. One participant wanted to amend another storyteller's digital story claiming that his account of how people used to wear clothes was incomplete. She illustrated the "correct" way people used to wear clothes with three pictures and about a minute of audio, which our prototype was able to append to the original story. We heard slightly different versions of the same story and the same story being told once as a narrative and once as a song.

These accounts challenge us to come up with new design directions, which make use of a story's, storyteller's, and listener's location and exploit the mobility offered to us by the mobile phone. We are provoked to explore how people can better collaborate on stories using one or several mobiles, how we can integrate differing views, or provide the means of accessing alternative ones. We can analyze how such a system might affect social relations. Will it strengthen social bonds as shown by Mama Theresa, who wanted to visit Mama Rhoda after listening to her story, or will it weaken them?

4. CONCLUSION

Our understanding of users and their needs is often limited and unfinalized, and especially so when designing across cultures. Our unfinalized understanding means that we cannot be sure how useable a technology will be nor, perhaps more importantly, how a particular technology will be used. Thus, we believe that in the

field of HCI4D it is important to evaluate and test technologies in-situ. In this paper, we illustrated the importance of also conducting intermittent, formative evaluations to shape a design rather than simply assessing a design's performance or worth through a summative evaluation in later design stages.

We believe that by structuring our field test around the research assistant and having him facilitate our participants' use of the prototype, we also discovered interesting aspects about field testing and use of our prototype within other culture groups. In taking over, the research assistant could act as a form of cultural liaison: re-distributing some of the power relations and addressing some of the misunderstandings that inevitably associate with cross cultural research. Further, by observing the research assistant facilitate during homestead visits we propose that it may be sufficient for one person in a community to adopt a technology and act as a champion and gateway for the technology — perhaps allowing less savvy users to slowly learn how to use unfamiliar technologies.

We would like to encourage researchers in the field of HCI4D to design flexible technologies that people can use in ways that they deem appropriate for themselves, their context, and their culture. While we believe that we should emphasize understanding users and their needs, we should also accept that in HCI4D our user understanding is often incomplete and unfinalized, and design flexible technologies, that users can appropriate according to their needs, even if we do not know these a-priori.

Finally, we would like to reiterate Medhi's claim that time spent in-situ is more important than any other particular process and encourage researchers to conduct and report on in-situ user evaluations [3]. The data we gathered while in Kenya is not only invaluable for future designs, but our proximity to, albeit brief, and direct observations of users situated interactions with our prototype helped us to devise a more accurate means to assess our improved prototype's worth through a summative user evaluation. We believe that to improve the design of technologies targeted towards rural users, it is only through time spent in-situ that we can develop the HCI4D methods to shape and evaluate those designs.

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6. REFERENCES

1. Bidwell, N.J., Reitmaier, T., Marsden, G., & Hansen, S. (2010) Designing with Mobile Digital Storytelling in Rural Africa. *CHI'10*, 1593-1602.
2. Marsden, G., Maunder, A., & Parker, M. People are people, but technology is not technology. *Philosophical transactions. Series A, Mathematical, physical, and engineering sciences* 366, 1881 (2008), 795-804.
3. Medhi, I. User-Centered Design for Development. *interactions* 14, 4 (2007), 12 - 14.
4. Sherwani, J., Ali, N., Rosé, C.P., & Rosenfeld, R. Orality-Grounded HCID: Understanding the Oral User. *Information Technologies & International Development* 5, 4 (2009), 37-49