The Field Guide App

Connecting Island Communities to Local Conservation Through Mobile Interaction

Daniel Sousa
cE3c/Azorean Biodiversity Group
Universidade dos Açores
Angra do Heroísmo, Portugal
field-guide@daniel.sousa.me

Alexandra R. Silva
ITI/LARSyS
and Universidade dos Açores
Angra do Heroísmo, Portugal
alexandrarochasilva@gmail.com

Isabel R. Amorim
cE3c/Azorean Biodiversity Group
Universidade dos Açores
Angra do Heroísmo, Portugal
isabel.ma.rosario@uac.pt

Simone Ashby
ITI/LARSySi
and Tilburg University
Tilburg, Netherlands
s.r.ashby@uvt.nl

Ana Moura Arroz
cE3c/Azorean Biodiversity Group
Universidade dos Açores
Angra do Heroísmo, Portugal
ana.mm.arroz@uac.pt

Flora Piasentin
cE3c/Azorean Biodiversity Group
Universidade dos Açores
Angra do Heroísmo, Portugal
florapro2002@yahoo.com.br

Rosalina Gabriel
cE3c/Azorean Biodiversity Group
Universidade dos Açores
Angra do Heroísmo, Portugal
rosalina.ma.gabriel@uac.pt

Sónia Matos
ITI/LARSySi
and University of Edinburgh
Funchal, Portugal
sonia.matos@iti.larsys.pt

ABSTRACT

Here we present Field Guide, a mobile application (app) designed to connect communities to nature-rich environments, which play a crucial role in nature conservation efforts. The app aligns to a mode of science communication that seeks to establish direct contact between publics and specialised scientific communities, most commonly known as the 'ask a scientist' approach. Field Guide uses a geolocation positioning system to offer users the opportunity to pose questions to scientists whilst exploring a nature conservation site. In this demo, we display the app as a mock-up presentation before its first use by children and teenagers during a field-trip to a nature trail later in 2021.

CCS CONCEPTS

• **Applied computing** → **Interactive learning environments**; **Environmental sciences**; • **Human-centered computing** → Mixed / augmented reality.

KEYWORDS

Mobile interaction; nature conservation; science communication; place-based learning; 'ask a scientist'

1 CONTEXT

This app integrates the Field Guide project (*Guia de Campo* in the local language), which aims to conceptualise, design and study the exposure of children and teenagers to local ecosystems through mobile interaction. Our focus is on the Azores, a vulcanic archipelago in the North Atlantic, between 37°– 40°N and 25°– 31°W.

The Azores is one of Portugal's most interesting and isolated biodiversity hotspots, including more than 400 endemic species.[2]. Despite its relatively low human population density, the archipelago faces important echological challenges, such as increasing human intervention, land use change, invasive species and climatic shifts[3]. Therefore, it is imperative to involve local communities in their natural heritage, experiencing nature and learning about biodiversity loss through active participation.

We designed the Field Guide app to support visits to the Nature Park of Terceira island. Therefore, the concept underpinning the app envisages asynchronous communication between local children and teenagers and the community of scientists that study the local biodiversity. Young users can pose questions in the form of text, and scientists can answer using text, visual, audiovisual and audio input.

In the scope of the research project mentioned earlier, the app will be used on different studies on environmental education focused on those ages. But this will provide us with a wider body of content generated by what speaks to people in practice, which we will be able to give back to the community.

2 ASK A SCIENTIST

Underpinning the app's design is the central role that questions play in the learning process. By formulating and asking questions, children and teenagers develop their critical thinking, creative thinking and problem-solving capacities[5], crucial for their development as scientifically literate citizens[9]. The act of questioning promotes

epistemic curiosity, increasing learners' motivation and interest[1], and helps them close a knowledge gap by fostering the creation of new knowledge[6].

Unfortunately, there is less opportunity to ask questions in a classroom setting, which is often bound to education curricula[4]; this leads to less intrinsic motivation and, as a result, less knowledge acquisition[8]. Therefore, it is essential to provide opportunities where children and teenagers feel free to explore their interests and consolidate their knowledge by posing questions that scientists will answer. We believe this provides an opportunity for learning-centred technological design and development with specific interest for island communities.

3 THE APP

Currently, we have an experimental prototype, which is available for use during the demo, created with Ionic - Cross-Platform Mobile App Development[1]. We designed the app primarily for the Android smartphones that will be used in the studies, but this technological stack was chosen to allow it to be used in any mobile device, smartphone, tablet or computer, running any operating system. It will be possible run it in a common web browser, or to be installed as a standalone app on Android and iOS.
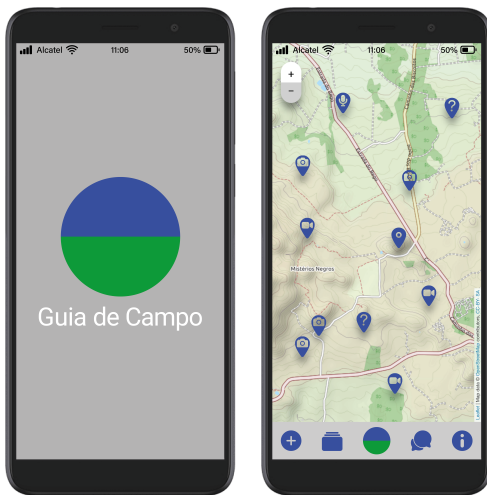

Figure 1: View of the user's location with icons representing different types of content such as images, videos, audio files, and text files with posted questions

Initially the main screen presents a map of an area corresponding to the user's geographical location. This represents the focal point where s/he can interact with the app's various components. Here, s/he can view the site through a geographical map and markers with questions posted by other users and the corresponding scientists' answers. As the user physically moves through the area, the marker representing their location is updated (Figure 1). A notification will pop up when approaching a new point of interest (e.g., a question by another user). On these points of interest, the user can swipe through the content provided for that location. It can be

just a question, but it can also include photos, text, video or audio recordings answering that question (Figure 2).
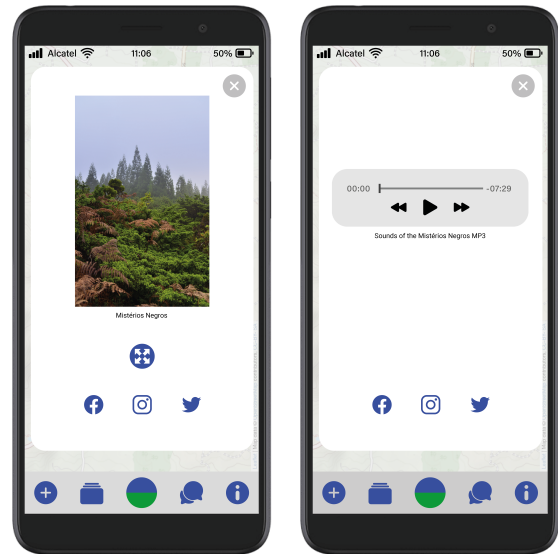
Figure 2: Two examples of content displayed. On the left a photo and on the right a an audio file

While strolling through the park, at any time the user can open the app and with the click of a button, send a question to a scientist (Figure 3). A photograph can accompany this question to complement and contextualise it, as well as an audio or a video recording.

From the start, we designed the app with a broad scope of uses in mind. The primary objective is to allow children and teenagers to engage in learning activities in a nature park environment during organised field trips. Nonetheless, we built the app using a cross-platform framework, enabling anyone to access the same content and interface from almost any device. The objective is to have it as a tool to be used on location, but that content can be also easily accessed from anywhere on a variety of devices.

Beyond that, the app is quite content-agnostic, allowing users to reuse it for different projects in the field. Keeping up with good practices of open of knowledge, respecting user freedom[7] and contributing back to the community, not only will the app be available to the public, but also its source code, allowing it to be shared, studied and modified[10].

Considering the context of the app's use, nature, we can't be sure the user will have network access. With that in mind, the content comes packaged with the app, so everything works completely offline when necessary. In future iterations, we intend to expand the online capabilities to allow users to receive content updates and the questions to be sent automatically to the scientists involved in the Field Guide project and when the connection becomes available.

4 NEXT STEPS

In December 2019, we organised a field trip to a trail located in the Nature Park of Terceira. With a group of 36 local children and teenagers and using a cultural probe toolkit, we invited participants

[1]https://ionic.io
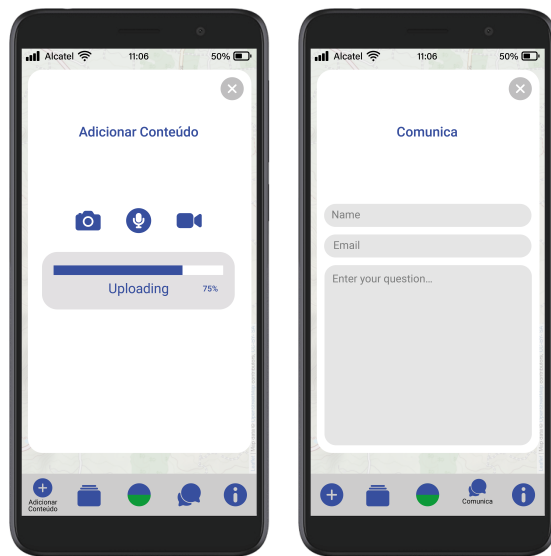
Figure 3: Two examples, one on the left, demonstrates the interface used for uploading (visual, audio, or audio-visual) content. A second example, on the right, of the interface used for posting questions by users

to pose questions regarding the local environment (data currently in review for publication). In response to some of their questions, we are currently devising an interactive podcast series featuring local scientists' answers to such questions. Answers can be read and heard whilst visiting the field. As a next step, we aim to test if interaction with the Field Guide app using an interactive podcast format can stimulate interest in learning about local biodiversity of the Azores. Moreover, we want to see if interactive podcasting can encourage further questioning.

In the meantime, we present the Field Guide app for the first time. With our demo we aim to offer a concept design and stimulate debate on the role of interactive mobile technology in bringing communities closer to nature-rich environments surrounding them, through inquiry-based learning. Instead of following a top-down approach whereby nature parks and other relevant entities present information regarding local biodiversity to the general public through printed field guides, we propose a concept that involves communities in designing environmental learning materials from an early stage. We believe that interactive mobile technology plays here a fundamental role.

ACKNOWLEDGMENTS

REFERENCES

[1] Daniel Ellis Berlyne. 1954. *A theory of human curiosity.* University of Aberdeen, Aberdeen.

[2] Paulo AV Borges, Ana Costa, Regina Cunha, Rosalina Gabriel, Vítor Gonçalves, A Frias Martins, Ireneia Melo, M Parente, P Raposeiro, P Rodrigues, et al. (Eds.). 2010. *A list of the terrestrial and marine biota from the Azores.* Princípia, Cascais, 432.

[3] Paulo AV Borges, Ana MC Santos, Rui B Elias, and Rosalina Gabriel. 2019. The Azores archipelago: biodiversity erosion and conservation biogeography. In *Encyclopedia of the world's biomes, earth systems and environmental sciences. Reference module in earth systems and environmental sciences*, Michael I. Goldstein and Dominick A. DellaSala (Eds.). Elsevier, Oxford, 1–13.

[4] Christine Chin. 2004. Students' questions: Fostering a culture of inquisitiveness in science classrooms. *School Science Review* 86, 314 (2004), 107–112.

[5] Santine Cuccio-Schirripa and H. Edwin Steiner. 2000. Enhancement and analysis of science question level for middle school students. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching* 37, 2 (2000), 210–224.

[6] Leon Festinger. 1957. *A theory of cognitive dissonance.* Vol. 2. Stanford University Press, Stanford.

[7] Joshua Gay (Ed.). 2002. *Free software, free society: Selected essays of Richard M. Stallman.* GNU Press, Boston.

[8] Paul R Pintrich and Dale H Schunk. 2002. *Motivation in education: Theory, research, and applications.* Prentice Hall, Hoboken.

[9] Michael Reiss, Robin Millar, and Jonathan Osborne. 1999. Beyond 2000: Science/biology education for the future. *Journal of Biological Education - J BIOL EDUC* 33 (03 1999), 68–70. https://doi.org/10.1080/00219266.1999.9655644

[10] Richard M. Stallman. 2001. *What is Free Software?* GNU. Retrieved April 1, 2021 from https://www.gnu.org/philosophy/free-sw.en.html

---