



Training Future Anthropologists by Innovative Means: Professional Vision from Augmented Reality NKISI Representations

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Abstract

Augmented reality learning tools can give significant contributions to the development of anthropological practices. The steps to acquire a professional vision in a specific research field can be supported and enhanced by ITC applications creating content for students and practitioners. Digital tools can be created and supported by versatile cross-medial Content Management Systems, allowing for the creation of networked and collaborative knowledge ecosystems that can extend the reach of digital communication onto physical artifacts, geographic locations, architectures and even bodies. Here users/researchers/students are able to stratify layers of information in ways that are directly accessible from the physical objects/places/spaces of research/study, and that allow achieving a state of continuous correlation of data, information and points of view that are extremely effective and usable: users can behave as publishers of their own impressions and experiences, or as designers building their own tools needed for their fields of activities. Innovation in education seems possible even in Humanities and specifically in fields such as ethnography research, where the practices of scientific enquiring and methodology depend strongly on how they are reproduced and transmitted. The adoption of augmented reality learning tools can be helpful for education in Cultural Anthropology and opens itself up to new transdisciplinary horizons of research for Information Science and Anthropology. In this case study, Minkisi, power figures from Congo, are used to create a materialized learning and knowledge sharing environment, implemented using advanced augmented reality techniques. The design encloses the choice of objects, their encoding as learning facilities, the representation of possible usage scenarios of the platform, and the definition of the scope of the AR experiences, from the point of view of the acquisition of professional skills. The case study covers an end to end process in which the description of cultural processes and insights is used from the beginning as a basic tool both in the specific case (describing the salient characteristics of the NKISI) and as a methodological scenario that allows apprentices and students to describe and to add their experiences of the cultural meaning of these ethnic representations. Learning by doing seems not always possible and the access to virtual representation of foreign cultures can be a good compromise between a static picture on a book and the learning experience with a real ethnical artifact. Only through a testing activity in a real learning environment can a new tool can be shaped according to users' needs and can be compared to how professional vision is gained by training and experience in other ways and by other educational means.

1. Introduction

Augmented reality (AR, for short) seems to be an innovative way to represent objects and practices. Thanks to development and diffusion of mobile technologies, massive and trasversal use of digital environments and applications AR can now embody different services and spread among different communities. Applications in education already constitute a wide body of research as development of learning object with AR [1].

In this paper Fake Press publishing firm and some researchers present an AR application designed for training anthropologists. Getting to know about cultural objects and becoming confident in meanings and practices incorporated in other cultures' artifacts need the availability of learning objects. In the field of AR applications such objects need to be designed and constructed by an articulated collaboration between technology and the community, tuned by both the designer and the user.



Experiments and dialogue constitute necessary elements for the development of a conceptual frame to learn a profession and acquire therefore a professional vision.

The aim of this paper is to contribute to the conceptual frame and experiments of Virtual Learning Environments (VLE), where technological solutions are adopted for learning from experience and not simply from descriptions on books, or from class experience.

2. Nkisi as cultural and mediatic object

In traditional Congo society religious and medical experts, called banganga, perform a variety of rituals of protection and healing using potent artifacts called nkisi (plural: minkisi). Minkisi are considered power figures capable of inheriting the qualities of dead people through a ritual sometimes performed at their grave. The nkisi becomes the recipient of the deceased's soul (mooyo) and in particular of his/her personal qualities, based on the reputation he/she had while still alive (e.g. physical strength, hunting prowess, or sexual attractiveness). The minkisi embody the deceased's personal characteristics and the banganga then pass them onto their clients who need them [2]. Congo was a place of historic importance for what is referred to as the Black Atlantic, the triangle related to slavery, and hundreds of thousands of people were expatriated from the country [3]. As Mirzoeff points out [4], in this period and throughout the colonial history, foreign government functionaries claimed Congo's people were cannibals who practiced human sacrifices, judgments by poison, fetishism, slavery, polygamy, polyandry. Congo was truly considered the Heart of Darkness of Africa [5]. Minkisi played a crucial role in the histories of Kongo: as perspectival constructs, they collected radically different narratives, memories, beliefs, and emotions, all woven into a reactive, complex, animated artifact. The minkisi act as the material embodiment of invisible, strong powers: imagined worlds or multiple worlds constituted by the historically situated imaginations of people or by phenomena pertaining to different levels of reality [6].

3. Professional vision by AR technology

In order to become a professional anthropologist apprentices must be trained by observing, trying, learning and practicing; all this is needed to get the extensive knowledge of a scientific paradigm. How to train anthropologists has been a debated issue for a long time. Already in the 50's there was a considerable debate around this topic; what emerged mainly was that young anthropologists are not adequately trained for their jobs [7] and that some items of focus were to be introduced for training better cultural anthropologists [8].

The anthropologist Charles Goodwin has explored how discursive practices are related to acquire a professional vision. [9] Different steps are needed for it and vision is as much helpful as discourse and codified language in learning. Goodwin identifies three practices in learning and acquiring the professional vision:

a) Coding; b) Highlighting; c) Graphic Representation.

In designing an AR application for Nkisi object such theoretical approach has been considered. Anthropology is an empirical science that needs working on the field and practical training. As ethnography turns to participation [10] interaction during the training to become ethnographically competent is also important. Collaborative AR in education [11] may constitute an integrative resource to learn the practice as it reproduces not only the object, but gives a dynamic description of the practice itself adopted by professional anthropologists. The goal of such an approach is to create an interaction between the apprentice and the program. Learning experience may result also from an interaction ("transaction") between the student and a program [12], where pedagogical research, technological applications and social collaborative environment are at work [13]. Such practices can become a sort of serious play [14] more than a simple simulation.

Classes in Cultural Anthropology and Ethnography could benefit from this, as well as online classes, or distance education and training institutions. Students and apprentices could become easily acknowledged with Nkisi even if they have never seen a real one in their lives. Nkisi AR representations could find a further role as background for developing other related experiences. Even museums could feature virtual statues and ethnographical objects to the public on their stands without the need for safety measures, insurance agreements, night watch service and would save costs in many cases.



4 Technical description

The system is composed of several integrated modules:

- a trainable computer vision module
- a multimedia CMS (Content Management System)
- a service infrastructure

A computer vision (CV) module is used to provide image recognition features to the system. The CV module uses SURF (Speeded Up Robust Features) algorithms and techniques to identify the parts of the nkisi. The SURF image detection techniques and descriptors described in [15] are used in the system together with a customized version of the optimizations described in [16]. Specifically, the CV component is integrated in a system enacting the following process:

- image acquisition
- generators of feature descriptors
- classification and initial configuration of the CMS

A guided procedure allows the user to capture all the images that are required to correctly identify the visual features of the nkisi to the multimedia information in the end system. This phase produces the groups of images of the relevant features that will be used in the next phase of the process in which an interface is used to navigate the groups of images of each feature and to use them in generating the SURF descriptors. Each one of them uses information captured by the images as suggested in [15] and [16] to create the data that is needed for the real-time image recognition process. An initial descriptor is iteratively redefined by the user, thus producing a better, more efficient. At the end of the process each descriptor (related to each relevant visual feature of the nkisi) is associated to a series of interrelated keywords (e.g.: knee, head, ear...) , establishing a taxonomy whose nodes are associated to the visual elements of the nkisi. This taxonomy is used in the CMS. The CMS is implemented using a customized version of the Wordpress content management platform. The taxonomy produced in the previous phase is reproduced inside Wordpress under the form of a "customized taxonomy". Using the standard features of the CMS it is possible to associate multimedia content (videos, sounds, texts, documents and interactive experiences) to each part of the taxonomy and, therefore, to the visual elements of the nkisi.

The CMS is used in practice according to a very simple process. After gathering all the multimedia information that teachers wish to associate to the Nkisi, they can arrange them in readable layouts using a visual editor that closely resembles common document writing interfaces, including the usual formatting tools (bold, italics...), layouts (alignment, tables...) and multimedia object insertion (images, videos, sounds). This simple interaction metaphor ensures that the CMS is instantly usable by a wide range of individuals, leveraging easily available skills and enacting extremely rapid learning curves. The information prepared in this manner can be easily associated to the three-dimensional parts of the Nkisi by using a point-and-click interface in which both the images of the parts of the Nkisi and the taxonomy created to describe them can be clicked to create the associations.

After saving the content, this will be immediately available for fruition, using the service infrastructure is composed by a series of interactive components that can be added to a wide range of interfaces on the web, on mobile phones, on desktop applications and on dedicated interactive systems (for example media kiosks or interactive installations). These components contain the front-end computer vision system that uses the SURF descriptors to identify the various parts of the nkisi framed by a webcam. When a visual feature is identified by the CV system, the related keywords are activated and, thus, the proper content is fetched from the Wordpress CMS, and provided as output of the service infrastructure, ready to be visualized and/or delivered to the user. In the prototypal system several options have been experimented: transparent holographic screens created by attaching a reflective, transparent film onto a clear surface that allowed us to project the multimedia content directly in front of the identified features; and mobile interfaces created on smartphones such as the iPhone and several models of Android devices, using viewfinder-based Augmented Reality interaction metaphors to overlay information onto the nkisi. While a smartphone-based solution promised the best effects in terms of user experience, processing power available on these devices extremely limits the possibilities of creating a satisfactory implementation. We are now, thus, focusing on installation-



based solutions, while actively searching for suitable handheld devices with more powerful processors.

5. Conclusions

Nkisi AR representations can be included in the sphere of development of virtual applications for education [17] and might as well be embodied in different learning realities and be used for different finalities. The integration of learning discursive practices and AR system can enhance the training and acquisition of professional vision for anthropologists.

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