CloudBank: Mobile Knowledge Sharing for Language Learners

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Abstract

The rapid transformation of mobile phones from voice-based communication devices to networked mini computers with advanced sensing and multimedia capabilities affords new ways of m-learning. This paper describes the development of collaborative mobile knowledge sharing system for language learners (CloudBank) that combines the characteristics of personal use, contextual use, informal learning, Web 2.0 ideas of user-generated content, content syndication and social networks, to build a mobile- and web-based crowed-source information system to help international students further their knowledge and understanding of local UK language and culture. An overview of the application design using the scenario based design approach is given and technical architecture and implementation of the system is discussed. The paper concludes with a discussion of future research issues that arise in the context of crowed source information system for ubiquitous language learning.

1. Introduction

The last ten years have seen a steady growth in research and development aimed at realising the potential of mobile devices for language learning. In their review of these developments, Kukulska-Hulme and Shields [1] report on a variety of initiatives to deliver web materials via mobile devices, podcasting of language learning materials and vocabulary teaching to mobile phone subscribers [2, 3, 4, 5, 6, 7, 8]. Mobile phones have a number of characteristics that can be exploited to design the most appropriate learning services for language learners. They are personal, in the sense that they are carried by an individual wherever s/he goes and contain information - profiles, contact lists, preferences and so on - specific to the individual. For language learners, this offers the potential for a personalised approach. Mobiles are also used in a broad range of contexts, indoor and outdoor, and are constant companions even when users are consuming other media, via digital technologies such as PC and TV [9]. Thus mobile learning services have the potential to tap into a very wide range of contexts. Mobiles are also part of everyday life, rather than classroom settings, suggesting that they should lend themselves well to use in informal learning as well as more formal educational settings. The communication aspects of mobile phones point to two additional powerful trends that can also be exploited by language learners. The first of these is social networking, e.g. communicating via programs such as FaceBook or Twitter. These programs are often the channel for the second trend, user created content, which has already had an important impact on field such as journalism and consumer behaviour, but which has yet to be widely exploited in language learning applications, although Petersen and Divitini [10] and Kukulska-Hulme et al [11] point to the potential of such approaches. Ishikawa et al also describe a user created video content to illustrate linguistic items [12].

The CloudBank project combine the characteristics of personal use, contextual use, informal learning, Web 2.0 ideas of user-generated content, content syndication and social networks, to build a mobile- and web-based crowed-source information system to help international students further their knowledge and understanding of local UK language and culture. We first provide an overview of application design using the scenario and participatory design approach that led the development of CloudBank system, whose technical architecture is sketched. We then describe details of design and
implementation, followed by a discussion of future research issues that arise in the context of crowd source information system for ubiquitous language learning.

2. Scenario-based design

In order to ground the design of the system in the reality of its potential users, the CloudBank project employs a scenario based design process [13, 14]. User scenarios have a number of uses in application design and development. They can simply be used as a representation of the system, ensuring that the whole development team shares the same vision of the system. They are also useful in communicating this vision to potential users, as for instance in our user group sessions, where they can make concrete what might otherwise appear to be a rather nebulous set of concepts. In this way, users can feel confident about commenting on proposed functionality and suggesting refinements and additions.

An initial user scenario was devised to ground the design and communicate a shared vision of the CloudBank system as a basis for discussions in user focus groups and co-design sessions:

Khalil is Jordanian student at the University of Brighton. He is in the Student Union watching a football game with some English friends. A goal is scored and there is much hilarity over the goalkeeper being nutmegged. Khalil cannot make sense of this: there’s not much connection with the nutmegs of his experience, which are used in cooking. He asks his UK friends what it means to be nutmegged. They explain that it means the striker played the ball through the keeper’s legs. Khalil thinks other non-native speakers may be interested in this new nugget of knowledge. He gets out his Android G1 phone, starts the CloudBank app and keys in “to nutmeg: in football: to play through an opponent’s legs”, tagging the entry with “nutmeg” and “football”. For good measure he also records an English friend pronouncing the word, and adds the recording to the entry, before sending it to the CloudBank cloud.

This same evening, Keichi, a Japanese student, reads the new item about the term to nutmeg through the CloudBank RSS feed on his profile page. By chance he’s just been watching a video clip of the goal from tonight’s match. He follows the link to call up the nutmeg entry on the CloudBank community portal, and adds a reference to the video clip, so that others can get a better understanding of what it means to be nutmegged.

With the aim to obtain a solid understanding of our user group, in this case International students at our home institution, we set up two user groups: A larger group, consisting of 11 participants, are consulted approximately every six weeks on issues like functionality, terminology and so on. A smaller core user group, consisting of a further six students, are consulted more frequently on detailed interaction design issues. The participants were recruited by email and via the tutor for a pre-sessional English class. Between them the groups consist of eight postgraduate and nine undergraduate students, with ten different first languages. There are seven female and ten male participants.

While the initial idea behind CloudBank focused primarily on the process of collecting and sharing content, our user group participants emphasised the additional requirements, including a personal storage area for collecting, saving, browsing and filtering content and a quick application start-up.

Another interesting and rather challenging finding was related to information retrieval aspects of the system, i.e. looking up a word or phrase that someone else has contributed, which are mentioned by our participants to be more readily grasped rather than scenarios in which users contribute to a common knowledge base. In addition to this, participants appreciate to be able to follow links and content that are added by others, possibly through filtering and/or recommendation option. Finally, being able to link learning content to the web resources was mentioned to be beneficial. In particular, linking the learning content to online Wikipedia and/or dictionary was pointed.

3. System description and implementation

The system allows students to collect, annotate and tag interesting or intriguing language- and culture-related content found in everyday life, including text, images and other media, and to upload these content items to a repository. From the repository, learner generated content can be syndicated, for example via RSS feeds and mobile alerts. In addition to syndication, the repository offers a web interface for language learners to allow adding, editing, annotating, tagging and discussion of content items, and to provide a central point around which a community of practice can crystallise [15].

An overview of the system initially envisaged is shown in Figure 1.

The CloudBank system comprises components to accumulate and organise crowd-sourced knowledge, to
browse and interrogate content, and to allow syndication in a range of formats and contexts:

**Mobile application** - The mobile application enables language learners to collect, annotate, tag and upload nuggets of knowledge on the move as they arise.

**Online repository** - The repository stores tagged and annotated nuggets of knowledge. It exposes an API for the mobile application (and possibly other clients) to upload and access information, and provides RSS feeds that are consumed by web- and mobile widgets.

**Web interface** - The web interface allows browser-based searching, viewing and editing of content from desktop and mobile devices. There is scope to develop the web interface into an online community of practice in the future by adding community and social networking functionality.

**RSS widgets** - Syndication in websites, blogs, profile pages, etc. either through platform functionality or consumer-level RSS widgets.

**Mobile alerts** - Mobile alerts are provided through commercial services like WidSet [16] or Plusmo [17], which allow user to set up and configure widgets for a wide range of mobile phones. These services minimise network traffic by providing server-side polling of RSS feeds, and notify subscribers when new content is posted.

Reflecting the user-centred RAD approach of the
The mobile client (Figure 2) is implemented as an Android application that communicates via WiFi or 3G data connections with the CloudBank REST server on the internet. The client utilises existing functionality on the Android platform to capture audio and images, and takes advantage of open-source Java libraries for HTTP file uploads and XML parsing.

5. Discussion

While the current CloudBank prototype implements, and in some aspects exceeds, the original application idea and fulfils the requirements of our initial use case, discussions in user group sessions already have pointed out a number of aspects to explore.

One aspect derives from the fact that CloudBank is fundamentally a content-agnostic system that can be used in a variety of different contexts and domains. User's ideas for possible application contexts range from supporting local interpreters for aid workers in Africa learn and share domain specific English terms, to a jargon-busting application at academic conferences, where delegates might be too embarrassed to ask someone for the meaning of acronyms or specific terms but would prefer a discrete and anonymous mobile application to issue information requests and share their knowledge. In order to effectively support a wide range of application domains, the system needs a notion of users and user groups. User groups can be open or closed (e.g. to protect vulnerable members) and can be set up on the fly for specific purposes. Learners can belong to, and dynamically switch between, different user groups relating to the domains they want to improve in.

Another aspect to develop is the integration with social networks. Discussions in user group sessions repeatedly touched on concepts and functionality familiar to them from social networking sites. For instance, users made the point that content contributed by their friends might be more relevant to them and asked whether it was possible in CloudBank to follow a friend, filter content by friends, discuss content with friends, see a friend's personal content collection, or invite friends to use the CloudBank application. While this functionality is familiar to users, thereby potentially enhancing overall usability, and is in line with our aim to support social, collaborative learning, it is not entirely clear in which form this functionality should be provided. One possible route would be to implement the functionality as part of the CloudBank application and tap into the social graph exposed by users' preferred networks through their specific APIs. The diametrically opposed approach would be to build a portable widget for social networking sites that communicates with, and draws content from, the CloudBank server but benefits from the underlying infrastructure and communication functionality offered by the host network. The question of how this functionality is provided ultimately also affects the planned web interface for CloudBank, described in the initial system design as a "central point around which a community of practice can crystallise" (v.s.). To date, social networks are the most successful phenomenon providing networking and group communication functionality, with a huge user base and in many ways surpassing the capabilities of custom-built applications to support learning communities. An interesting question therefore is whether a centralised CloudBank community would be more effective in involving language learners and fostering meaningful exchange and discussion of language and culture related issues than a de-centralised CloudBank application tapping into existing user groups on social networks.

Both of these aspects, user groups to leverage the fundamentally content-agnostic CloudBank system in different contexts, and integration with social networks, either to tap into the social graph or directly use their communications infrastructure, require more research and development for CloudBank to fulfill its potential.

5. Further work

The CloudBank system is currently developed and evaluated with our user group in terms of its usability, acceptance and desirability as a tool for informal and contextual language learning. Their feedback is used to develop an extended version of the system. Also, we would expect to develop the application for a wider range of phones or to be incorporated into the existing institutional learning management system that may promote wider take-up for the future. We hope a future horizon for system such as CloudBank brings more opportunities for informal learning in a content-agnostic way where a community of learners can share their knowledge and benefit from each other.

7. Acknowledgments

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8. References


[17] Plusmo, 2009