

Developing a Digital Game to Support Cultural Learning amongst Immigrants

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ABSTRACT

Immigrants entering the European Community face a range of challenges in adapting to and understanding the culture of their host nation. Failure to address these challenges can lead to isolation and difficulties integrating into the society of the host country, leading to fragmented communities and a range of social issues. As part of a comprehensive suite of services for immigrants, the European-funded Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services (MASELTOV) project seeks to provide both practical tools and learning services via mobile devices, providing a readily usable resource for immigrants. In this workshop paper, the game-based learning aspect of the MASELTOV project is introduced, with the rationale behind its design presented. In doing so, the benefits and implications of mobile platforms and emergent data capture techniques for game-based learning are discussed, as are methods for putting engaging gameplay at the forefront of the experience whilst relying on rich data capture and analysis to provide an effective learning solution. Through comparison to several other projects, a number of recommendations are put forward for games deployed in contexts similar to that of MASELTOV: a focus on establishing a significant audience with which to conduct ethical research into efficacy, the need for robust pedagogical frameworks suited to the learning context, and the evolution of methods for data capture and analysis of player activity.

Categories and Subject Descriptors

I.3.8 [Computer Graphics]: Applications; K.3 [Computers and Education]: Computer Uses in Education—Computer-assisted instruction; K.4 [Computers and Society]: Social Issues—Employment

General Terms

Design, Human Factors

Keywords

Game-based learning; Serious Games; Inclusivity; Cultural learning; Mobile learning, Migration

1. INTRODUCTION

Game-based components of education have been widely used in pedagogical approaches such as those of Vygotsky [1] as a means for allowing learners to develop their understanding through abstraction; however, the emergence of digital technologies has played a key role in defining the notion of "serious" games, a term which broadly recognizes the use of digital technologies and parallels to digital gaming for entertainment purposes as having educational potential when aligned with a set of pedagogical goals. Context is of central relevance when seeking to deploy game-based learning [2], as it can drive decisions regarding how much intrinsic motivation can be expected on the part of the learner, and in turn how much the game must foster the desire amongst learners to engage with the game as a recreational activity rather than a formal educational pursuit.

In the particular case of cultural learning amongst immigrants, the MASELTOV project (<http://www.maseltoev.eu>) addresses the particular challenge of providing mobile services to immigrants via a suite of Android applications, on the one hand providing immediate support in addressing day-to-day challenges, whilst simultaneously allowing immigrants to learn key skills so these immediate supports become less required over time: "scaffolding" to learning that can fade into the background when no longer required [3]. The role of game-based learning in such a context must be carefully considered; the suite of MASELTOV services will provide on-demand educational content, and therefore caution must be taken to prevent game-based learning services simply presenting a more obtuse representation of this educational content. The MASELTOV game may also go beyond its target audience of immigrants, involving and raising awareness amongst the general population through the provision of an entertaining game. Section 2 provides more background into the target audience, and existing games targeted at raising cultural awareness or conveying cultural learning content.

In the case of game-based learning within MASELTOV, it is suggested that a game may provide a resource which allows users to identify though analogy areas in which cultural differences are most prominent, the form these differences might take, and strategies to address them. A game-based resource might also

have appeal to audiences with little willingness to engage with more formal educational content, such as structured language lessons. This synergizes with the gamified, social approach to language learning presented by other services within MASELTOV such as those provided by the Busuu language learning community (<http://www.busuu.com/>), though also presents challenges in developing a game design suitable for this usage context and target audience. In Section 3, these challenges and the design approaches taken to address them are outlined. Sections 4 and 5 then present an early prototype design of the MASELTOV game, and discuss how it aims to synergize with the other MASELTOV services whilst providing a playful environment for cultural learning.

2. BACKGROUND

In a broader context, the changes in attitudes, expectations, and subsequent behaviours which might be anticipated from a cultural learning aid can be seen to be relevant to a wide range of other educational objectives. Game-based learning has frequently been employed in attempts to induce attitudinal and/or behavioural change, in part due to the potential games might have to effect such changes through the significant time and social investment of players [4], and in-part as these objectives often remain difficult to achieve with more conventional methods such as direct messaging [5].

In an effort to demonstrate the disparity of the cultural definitions Hofstede [6] provided a narrow view that is commonly perceived in Western countries: “civilisation or refinement of the mind and in particular the results of the refinement including education, art, and literature”. Biggs and Moore [7] define culture as the ‘the sum of total ways of living built up by a group of human beings which is transmitted from one generation to another. Wild and Henderson [8] and Hofstede added the element of adaptation in the definition of culture in a sense that culture is a demonstration of ways in which an identifiable group adapts to its changing environment. In this view people may belong to more than one cultural group and therefore, possess a subset of a culture’s total identifiable characteristics. Finally, individuals may not remain totally committed to their birth culture and exhibit aspects of other cultures.

Culture should be distinguished from human nature [6]. Human nature encompasses the common characteristics of all human beings, like the ability to feel fear, the need to associate with others, and the facility to observe the environment and to communicate it with other humans. However, what one does with these feelings and how one expresses them is modified by culture. The individual’s personality includes the individual’s unique personal set of patterns of thinking, feeling and acting that need not to be shared with other individuals [6]. Individual personality patterns are partly inherited within the individual’s unique set of genes and partly modified by the influence of culture as well as by unique social experiences [8].

Collis [9] defined several cultural levels that should be taken into account when implementing learning environments: societal, personal, organisational, and disciplinary. These cultural levels as argued by Seufert [10] influence the acceptance, use and impact of online learning environments. Moreover it appears to be a general consensus that ‘culture has a definite and very strong influence on the design and use of information, communication and learning systems, as well as on their management, despite the lack of identifiable research in these areas’ [8]. Several

educational researchers [11-13] highlighted the influence of culture on different learning styles. The cultural learning styles approach arose from an attempt to achieve a transition from surface approaches (e.g. rote learning) to deep approaches (e.g. constructive learning through learning communities). Although surface approaches to learning are still prevalent [14], the cultural style approach offers a way to characterize cultural groups without suggesting hierarchies in cultural practices [11].

It is apparent therefore that socio-cultural insights in conjunction to understanding how individuals learn may assist game and educational designers to develop more culturally sensitive games by balancing play with pedagogically-driven cultural learning processes. However, caution should be placed on over-generalising such balance as different combinations between pedagogical approaches and game mechanics may have certain implications when establishing learning activities aimed at culturally diverse groups of individuals. This impact will ultimately result of either success or failure of the group dynamics and therefore of the learning activity itself [15].

The European MASELTOV project recognizes the major risks for social exclusion of immigrants from the local information society and identifies the huge potential of mobile services for promoting integration and cultural diversity: Everywhere/everytime – pervasive assistance is crucial for more efficient and sustainable support of immigrants. Language understanding, local community building, and consciousness and knowledge for the bridging of cultural differences shall be fostered via the development of innovative social computing services that motivate and support informal learning for the appropriation of highly relevant daily skills.



Figure 1. Immigrant using a smartphone for dialogue enhancement and mixed reality gaming at the market.

A mobile service based assistant embeds these novel information and learning services such as ubiquitous language translation, navigation, administrative and emergency health services that address activities towards the social inclusion of immigrants in a pervasive and playful manner: Besides a virtual world, MASELTOV develops a mixed reality game (cf. Figure 1) in which the user is applying her language skills in various, critical situations, such as in dialogues during shopping, or for navigation in the urban environment. The mobile service supports her in the situation as well as receives feedback from the user in order to measure and estimate performance success.

Multisensory context awareness is an important functionality in MASELTOV that feeds into the information and learning services (Figure 2); together these cooperate to feed into the community building services. The complete interplay of components develops an activity and information flow from the user's behaviour to - eventually - the community building which represents the key objective of the project: to prevent social exclusion using assistance, mobile learning and social networking.

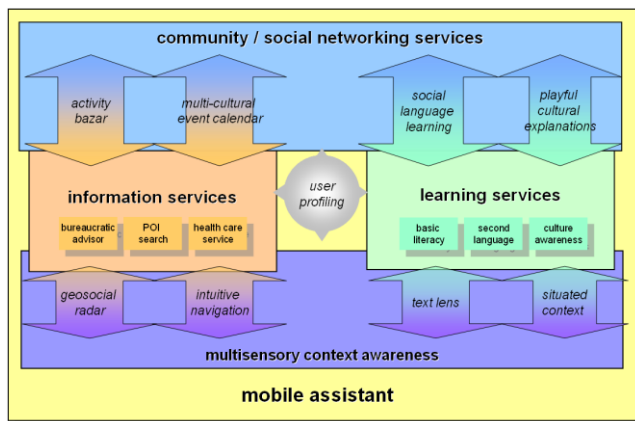


Figure 2. Schematic sketch of MASELTOV services and functional components.

As a component of the overall suite of MASELTOV services shown in Figure 2, the game-based learning elements must reflect upon the nature of culture and cultural learning, as outlined briefly in this Section, as well as integrate effectively with a broad range of complementary and diverse services including both practical tools, and educational packages. Presenting the overall approach taken in this context, and the prototype game, is the aim of Sections 3 and 4.

3. DESIGNING A GAME FOR CULTURAL LEARNING

In this Section, a number of principles for game-based cultural learning using mobile devices are introduced, based upon the background in Section 2 and other previous research. Section 3.1 introduces some core principles for consideration when developing digital games for learning on a mobile platform, regarding how to best exploit the advantages of a mobile platform (3.1.1), the need for ethical data capture (3.1.2), how to integrate and gamify other services and content (3.1.3) and supporting translation, localization, and support for repurposing (3.1.4). To support the pedagogical design of the game, as well as combine effectively research and development, Sections 3.2 addresses cultural frameworks relevant to games for cultural learning, and how they might be applied.

3.1 Core Principles for Mobile Game-based Learning

Previous research has highlighted a number of principal considerations when developing game-based learning interventions. Amongst the most common are the need for careful balance between game-based 'fun' content and pedagogical objectives [16], and the need for broad involvement from stakeholders alongside a robust research methodology for

ascertaining and refining the efficacy of the developed solution [17]. Other analyses have noted the importance of factors such as inter-team communication, particularly between different domains of expertise [18], a significant challenge when these experts are not commonly co-located. Mobile learning brings its own challenges and opportunities that must be accounted for, and the "mobility" may refer to learning while on the move, or being able to access learning resources in different places. Mobile gaming has distinct characteristics from desktop gaming, such as taking advantage of fragments of 'dead time' while waiting at a bus stop, or travelling for brief interactions with the game while out and about, and the challenge of intermittent connectivity which demands game play and data transfer must be at best occasional.

In this Section, a range of design concepts are presented with a view towards addressing these difficult issues of balancing engagement with pedagogical value, and supporting participatory and iterative design whilst also reflecting on the pragmatic concerns that often limit the ability to develop a game-based learning solution in a highly iterative and participatory fashion. To this end, this paper considers in Section 3.1.1 how ethical data capture and analysis might be used to generate an understanding of pedagogical impact through analysis of data from end-users, promoting a development paradigm which seeks to make a game accessible at an early stage and build on data from actual users to refine and validate it. Furthermore, Section 3.1.2 argues emerging platforms for content distribution are making it increasingly practical for developers to respond to this data and the outcomes of analysis to adapt and improve a serious game.

With specific regard to the context of the MASELTOV project, Sections 3.1.3 and 3.1.4 present considerations particular relevant to a immigrant audience: how the game might be integrated effectively with a suite of other immigrant services, and how a game might be effectively repurposed to support a range of cultures and languages. These considerations lead to the presentation in Section 4 of an early prototype of the MASELTOV game, and discussion in Section 5 of its implementation and key areas for future work.

3.1.1 Exploiting the benefits of Mobile Platforms for Game-based Learning

Mobile platforms such as Apple's iPhone or Google's Android present both a distinct format for game design, as well as methods for deployment which support developers in providing frequent updates to their games (distribution and updating content via the web. This increasing prevalence of this digital form of distribution has seen rise to metric-driven approaches to game design, whereby variants of games can be presented to players and decisions made on future development through analysis of player behaviour [16; 19].

For serious games, these methods of deployment present a broad range of potential benefits for both designers and educators. The careful balance between entertainment and education can be managed over a series of incremental changes, rather than requiring the initial version of the game fully satisfy the objectives of both domains. Given the need for a substantive user base to fully take advantage of a metric-driven approach to game design and development, the logical approach is to first develop a game which establishes a user base through predominance of engaging, fun aspects, then works with this audience over time to introduce and validate pedagogical aspects. This in itself represents a step-change away from the off-the-shelf model of deployment, and

towards a model on which a serious game can be seen as constantly evolving both in terms of its content and community.

Presenting stakeholders with such a model can be challenging, with views commonly reflecting expectations of educational games to provide simulations driven by experiential pedagogy, rather than more abstract forms of learning. However, in the case of games that cannot rely on deployment context to provide extrinsic motivation to play, awareness of the challenges in competing for screen-time with other entertainment media is essential. The abstract serious game for road safety *Code of Everand*, for example, attracted 100,000 players with a mean playtime of 91 minutes¹. In this case, the entertainment and narrative aspects of the game were developed in depth, presenting the user with a massively-multiplayer online (MMO) environment. Given the substantial reach of this game when compared to other educational games, an argument can be made for adopting this "entertainment first" approach, supported by other serious games with audiences over 100,000 such as *America's Army* [20].

3.1.2 Ethical Data Capture and Analysis

In order to apply metrics of player behaviour to the ongoing development of a serious game, ethical methods for data capture and analysis are essential. The basic principles of ethical data capture, such as informed consent and the right to opt-out, must be adhered to through the implementation of technologies which provide both richness of data capture and transparency to end-users [21]. This is particularly relevant to serious games when compared to entertainment games, as pedagogical objectives may require the collation and analysis of significantly more sensitive or personal forms of data to analyze when compared to the simpler objectives of entertainment games, which can often be evaluated solely in financial terms. Serious games tend to adopt a more diverse range of business models [22], and consequently objective assessment of impact can be more relevant than simpler metrics such as reach in terms of numbers of players [23].

The precise elements of data required to validate a serious game against pedagogical goals depend heavily on the nature of these objectives; in MASELTOV's case these are cultural awareness and sensitizing of differences, social inclusion, and language learning. However, recurrent areas in which data capture for game-based learning approaches tend to differ from entertainment gaming include the requirement for personal or sensitive data relating to attitudinal or behavioural change, alongside the need to identify the demographics of the target audience [24]. Ethical considerations surrounding data capture are of particular significance within the MASELTOV project given that the audience (recent immigrants to Europe) may be highly cautious of sharing personal data, given their past or current personal circumstances and relationship with authorities.

3.1.3 Integration and Gamification of Related Services and Learning Content

Specific to the case of the MASELTOV is the deployment of the game as one of a suite of mobile applications. These applications include:

Geo-social radar: A volunteer helper service allowing users to find nearby volunteers who can help them with a problem, for example acting as a translator at a doctor's appointment, or negotiating local bureaucracy.

TextLens: allows a learner to take a photo of a sign, and have this converted to text. This can then be coupled with a language translation tool such as Google Translate. Images and text can be uploaded for help when the meaning is ambiguous, and if the learner wishes to discuss their social, cultural or legal implications.

Peer reviewed language learning: language exercises focusing around everyday tasks. Offering learning set at the Common European Framework of Reference for Languages (CEFR) A1 and A2 standard, but also some more elementary material to help very recent immigrants with their immediate needs. Like the current busuu.com online learning tools, when an exercise is completed, it will be assessed by a peer learner. Further discussion will be possible via linked social forums.. Progress will be recorded by a user profile system.

Mobile navigation tool: to help with directions, indicating local places of interest and services. The navigation tool will support pedestrian as well as public transport travel giving orientation information, distance to location and best route. Information about important services in the nearby environment will be shown (e.g. doctors, libraries, public transport stops). If selected by the learner, proximity to particular locations or types of buildings may trigger learning exercises or in context language support.

Profile system: the user's details and learning progress will be recorded to enable personalized learning. The MASELTOV system will recommend particular types of content or learning exercises to support each learner's particular needs. Learners will be able to personalize their learning journey, indicating what is important to them.

Social networking: users will be able to join a community of fellow learners, and share their experiences, conversing informally but also discussing learning episodes.

In particular, the MASELTOV project seeks to explore the benefits of integration between these services. By integrating educational content with service provision, the platform seeks to support both tools for immediate assistance, and deeper learning over time to lessen reliance on these tools, and promote integration. There are several roles a game could play which capitalize on the strengths of game-based learning: a game might reach a wider audience than purely pedagogical or service-based content; it may offer a means to provide feedback and rewards to learners and hence stimulate certain actions; and it may allow for a different perspective on cultural learning than that provided by more conventional forms of education such as text-based content. Effective integration, therefore, demands the ability to capitalize on these advantages, whilst similarly leveraging the strengths of the other services to provide a comprehensive and integrated mobile solution. In Section 4, some ways in which this may be achieved are discussed, such as using the game to incentivize the use of other services through rewards, and providing a means for the player to observe areas in which cultural differences arise in a engaging, game-based format.

3.2 Cultural Framework

To enable robust cultural adaptation in the MASELTOV programme, a series of cultural indexing values is required. It is

¹<http://assets.dft.gov.uk/publications/think-research/code-of-everand-2011.pdf>

using these values that cultural personalisation within MASELTOV would be created and monitored.

There have been several cultural studies that have each developed their own cultural classification system, their own framework. One of the most popular is the Value Survey Module (VSM) created by Hofstede [6]. The original study included over 100,000 responses and this has been the most quoted and used survey of its type. This study originally identified four indices by which a culture could be measured:

- Power-distance index (PDI)
- Collectivism vs. individualism index (IDV)
- Femininity vs. masculinity index (MAS)
- Uncertainty avoidance index (UAI)

The early VSM versions contained questions specific to the business populations (for example one concerning the behaviour of the 'boss') and as such were invalid for the general population. A later study corrected this by adapting to respondents without a paid job – however, it was still employment focused.

There are other studies, such as Schwartz's Value Inventory [25] and Inglehart's World Values Survey², though Smith, after a detailed examination of these theories concluded that all of them have produced convergent results:

"The three major surveys of values published since the time of Hofstede's project have thus sustained and amplified his conclusions rather than contradicted them." [26]

However as the VSM research has often focused on the employment sector this means that these findings are not readily applicable for adoption and use in other areas such as serious games and eLearning.

3.2.1 Cultural Artefacts in Education

The CAE study [CAE, 2010], on the other hand, builds on the work of Hofstede and Marcus & Gould [27] whilst focusing on the educational sector, to determine the intercultural differences before most people enter the job market. The CAE framework is a semantic framework around which learning materials could be personalized for a user from a specific culture. As well as building on the Hofstede indices, this framework adds a further two indices:

Cultural Education Index (CEI, deals with issues such as: the learner's acceptance of being taught in another language; acceptance of presence/availability to access other languages; and access or separation of cultures different to the learner's own.)

Adaptive Education Index (AEI, deals with issues such as: do the learners actively desire a personalized learning experience; should personalized materials always be noticeably approved by an authority figure?)

The selection of the cultural framework for use in the MASELTOV game must be robust and easily extensible, as this will underpin any personalization.

3.2.2 Applying Cultural Frameworks to Game-based Learning

A key challenge, given the diversity of these cultural frameworks and their broad applications, is how to translate effective methods

for promoting cultural learning to a game-based format. Whilst Section 4 outlines the specific approach taken in MASELTOV, more general rationale behind the approach taken stem from the need to converge general principles of persuasive game design (e.g. Khaled [5]), with the principles put forward in these cultural frameworks. A benefit of the rich media approach used by many games is the ability to create simulative content and approaches which build on an experiential model of learning to provide or gamify a simulation of a particular activity. Thus, for example, a game could provide simulations of common areas in which cultural differences or difficulties arise, such as travel, healthcare, or job applications and interviews. However, a simulation-driven approach might struggle in practice to reflect an individual immigrant's situation - consider, for example, the difference in scenarios faced by a North African migrant entering Spain, versus those faced by an Asian migrant entering Austria; before even considering how common tasks might vary with age, experience, and gender, the diverse range of European cultures makes a ubiquitous simulation-driven solution difficult to envisage.

However, games also provide a fertile ground for developing methods of learning through analogy or abstraction. By focusing on the commonalities in terms of themes and factors defined by the cultural frameworks presented in this section, it is possible to suggest central themes around which a game may be derived without requiring a realistic simulation at its core. This in itself requires some review of the role a game might play in this form of cultural learning: abstract, fictitious cultures and their differences could provide a basis for the learner to experience and interact with a game whilst learning areas in which cultural differences are likely to occur. In turn, the motivated learner who has identified that they themselves are likely to face these situations, can be directed from the game to other forms of learning resources designed for direct instruction or education. Similarly, a game with an associated social network might utilize this to deliver cultural learning along social principles. To this end, Section 4 describes how an abstract approach to cultural learning, coupled with complementary services and capitalizing on the advantages of a mobile platform has the potential to support both the cultural considerations described by this paper, alongside the need to provide an engaging and entertaining game.

3.3 Summary

In this section, some general considerations in the development of mobile gaming for cultural learning have been presented, with particular regard to the context of the MASELTOV project. In particular, the benefits of integration with other services, as well as maximum use of the mobile platform in terms of its capacity to capture data on player behaviour, and the ease with which context can be updated, have been presented as key areas for design consideration. Similarly, the pedagogical framework underlying the MASELTOV project, which builds upon the notion of incidental learning, as well as the overall research framework within which the game will be developed has been outlined. The following section hence goes on to present the first iteration of the game's design, in advance of the first stage of user testing and feedback. Future work will emphasize the need to validate not only the specific design of the game itself, but also the principles presented in Section 3, relevant to any mobile game which seeks to achieve cultural learning objectives.

² http://www.worldvaluessurvey.org/statistics/some_findings.html

4. THE MASELTOV GAME

In this Section, the overall game design created for MASELTOV and its underlying rationale are presented, as well as several key considerations for future development, including the integration path for other services, and the need to provide a pragmatic yet iterative and user-centric approach to development.

4.1 Conceptual outline

Noting the need to avoid excessive simulation based on the rationale presented in Section 3.2.2, the game itself builds upon a mechanic with dual relevance in both gameplay and pedagogical terms: the player can 'jump' between two dimensions as they play. In doing so, they can observe cultural differences between dimensions, and by following the narrative of the game, learn by analogy areas in which cultural differences are likely to arise, and how they might best be tackled. Topics currently under consideration include negotiating transport, health, and local bureaucracies. However, the game must also play a role as an incentive to use, or integrated component of, the diverse range of other MASELTOV services. To achieve this, a second mechanic with clear parallels to entertainment gaming is introduced: an online 'store' in which the player can purchase both cosmetic and practical upgrades for their character using a combination of credits earned in-game, and through the use of other MASELTOV services. As such, the game provides an interface for the developers of other MASELTOV services to reward players within the game for specific actions outside of it, such as using the context-aware services to assist, or request assistance in a real-world interaction.



Figure 3: Look and feel of the prototype game. This mirrors the 'platform game' design common in entertainment gaming.

To accomplish this design, an iterative and participatory approach has been adopted, again reflecting the outcomes of studies which have indicated the efficacy of these methods [28]. In practice, these ideals are offset against the pragmatic need to develop with finite resources, whereby iteration and end-user involvement carry associated costs. Hence, whilst small-scale focus groups are used in early stage development to provide direction on decisions such as the user interface, visual look-and-feel (Figures 3 and 4), and initial pedagogical impact, making the game available at the earliest stage and reflecting on data from end-users as part of the participatory, iterative cycle, is made possible by the use of a mobile platform and associated content distribution method.

Effective integration with other components is a central issue in the design of game-based learning within MASELTOV. Section 4.2 outlines one such service, the context recognition framework. Sections 4.3 and 4.4 then go on to discuss how this game design might complement the use of such services, whilst proving relevant to immigrants' lifestyles.



Figure 4: Several player avatar types are being used in early-stage user testing. Upgrading the avatar provides an integration path for other services, allowing developers of these services to provide in-game rewards.

4.2 Context aware progress indicators

MASELTOV embeds an easily scalable context recognition framework [29] that receives contributions from various context feature generating services; it evaluates the user behavior and from this maps to appropriately motivating actions in the form of recommendations. The user behavior is evaluated in MASELTOV in terms of progress indicators in the frame of the various independent services. An important progress indicator for language learning is the capability to memorize vocabulary and apply it at the spot of interest. Activities such as successful interaction in geosocial radar, effectively finding the point of interest in the urban environment (job application, doctor, shop, sight), or the visiting of a local event are further indicators for progress.

In MASELTOV we consider long-term dialogue assessments with multimodal mobile context awareness on the basis of affect and attention sensitive services in order to classify the language learning behavior of the recent immigrant. The recommender system then instantiates – according to the individual human factors profile and the measured performance – personalized motivating games, in order to change the behavior of the user. For example, to reinforce the training on interaction with local citizen, the rewarding of dialogue supporting activities will be increased, such as, by doubling virtual credits in return for dialogue specific language learning and measured communication in shopping scenarios. The success of an applied dialogue in terms of the emotion and frustration of the user is sensed with the smartphone in situ, using recent computational audio-based affective computing. Advanced human factors studies with wearable interfaces are further applied to extract the decisive parameters of

affective and attention oriented content in audio. Next, wearable eye-tracking glasses data are interpreted with semantic 3D mapping of attention [30], bio-signal sensing, and classification to automatically extract from a huge data analysis the decisive parameters for dialogue evaluation.

An important aspect in short dialogues is attention as manifested by eye-contact between subjects. In a first study we provided quantitative evidence that visual attention is evident in the acoustic properties of a speaker's voice (Figure 5), and extracting a significant relation between the acoustic features and the distance between the point of view and the eye region of the dialogue partner.

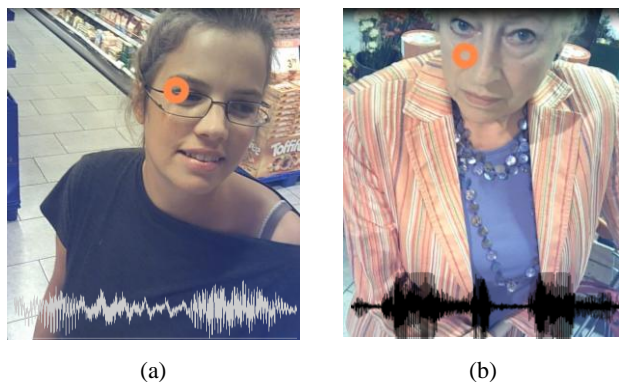


Figure 5. Typical progress indicator underlying the mobile game based language learning. The dialogue is evaluated under examination of voice (waveforms left/white and right/black at bottom) and its support of eye contact which is itself one parameter to characterize the successful engagement in the application of language knowledge in a dialogue.

Mobile service components detecting eye contact, speaker's capability in controlling the host language, and user's satisfaction will become available to evaluate the progress of applying language knowledge in-situ. In the following section, we discuss how this service might be related to the game-based components of MASELTOV.

4.3 Reward mechanisms

For the provider of any learning or practical service for immigrants, the ability to incentivize particular forms of usage offers benefits, particularly in terms of fostering communities and encouraging users to collaborate and interact. From a research perspective, a gamified user experience may also encourage participation and engagement with both the platform itself, and the research aspects. The mobile game environment illustrated in Figures 3 and 4 uses an avatar-centric design in which the player is represented in the game as an "upgradable" avatar, which can be cosmetically (e.g. clothing), and functionally (e.g. run speed) upgraded through purchases, analogous to the free-to-play model increasingly common in entertainment gaming. However, in the case of MASELTOV, these rewards will be provided through credits awarded by the developers of individual services. Hence, the providers of these individual services can integrate and gamify the service by defining these rewards and assigning them to specific uses of the tool, or actions by the end-user.

5. DISCUSSION

The approach taken to game-based learning development in MASELTOV intends to capitalize on both the strengths of the mobile platform, in terms of the ability to capture data on users and adapt the game accordingly. In this paper, we have suggested that such an approach could benefit from focusing first on entertainment and engagement aspects, and then work with the resultant user base to implement and assess pedagogical goals. Validating this approach will be a central goal of future work, as will comparing the efficacy of the resultant solution to approaches which place pedagogical design at the forefront. Such an approach can be particularly challenging to communicate to stakeholders with expectations of a game which "appears" immediately educational at the earliest stage, such as a simulation-driven approach. However, for the reasons outlined in Section 3.2.2, it is difficult to define how a ubiquitous simulation-driven solution might be achieved. The more abstract approach proposed by this paper reflects on the context of mobile gaming for cultural learning alongside, and blended with, a wide range of other educational and practical tools for immigrants. Achieving this integration effectively requires reflection on the limitations of game-based learning as well as its strengths: in contexts where information is needed urgently, a game is likely to prove a cumbersome means of transferring this information. However, in contexts in which mobile games are commonly played, for example during travel, a chance to reflect upon cultural differences in a gamified form, with immediate access to educational resources if requested, may prove an effective combination.

Defining the means by which efficacy can be established and measured is another central topic of research. The nature of learning, which includes a temporal component as well as multiple levels of comprehension, can only be assessed to a limited degree by existing instruments such as surveys. In this paper, it has also been posited that game-based learning deployed on a mobile platform represents an ideal opportunity to move the evaluation process away from smaller-scale trials, and towards a larger community of active players. Provided ethical requirements can be met, interesting future potential exists in understanding the rich volume of data these communities might generate in their online interactions, both in-game and in the wider context of the MASELTOV services and social network.

6. ACKNOWLEDGMENTS

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