

New non-routine skills via mobile game-based learning

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Abstract— The hard world-leading financial crisis caused a massive shake to relationships' balances and stability, reshaping the economy and its job dynamics. The need to compete in this renewed job market led companies to search both a different expertise and a more proper and continuous training for workers. The InTouch project is aimed to define an innovative approach to the new generations of workers in order to improve their non-routine key competences in a flexible and technologically advanced way as well as in line with job market new needs.

Keywords: *m-learning, serious game, lifelong learning, non routine skill, workplace learning*

I. THE LABOUR MARKET INTouch PROJECT

In November 2010, a consortium of European partners started working on “Labour Market InTouch: new non-routine skills via mobile game-based learning” project, funded by Leonardo da Vinci Multilateral projects for Development of Innovation Program. InTouch aims to define an innovative approach enabling new generations of workers to develop their crucial non routine skills according to the new exigencies of the labour market.

In 2020, almost three quarters of all jobs will be in services, especially in business services [1]; in this sector there will be a growing demand of employees equipped with transversal key competencies, such as problem solving, self-management and communication, more generally “non-routine skills”.

Following the “New Skills for New Jobs” strategy [2], we will design an innovative m-learning kit for working adults focused on crucial non-routine skills, in order to improve interaction and collaboration and to provide SMEs employees with the key skills needed to answer to labour market requests and to deal with the deep changes taking place in the economy.

In order to detect which are the more requested non routine skills in labour market, each InTouch project partner interviewed managers or/and employers of business service SMEs. During interview, each respondent was asked to evaluate non routine tasks skills and to provide related cases.

After the analysis of gathered data, we found out the ten non routine skill to take into account for the project:

- Communication
- Planning

- Conflict management
- Openness to change
- Decision making
- Teamwork
- Flexibility
- Strategic thinking
- Initiative
- Learning and improvement

II. MOBILE TECHNOLOGIES

According to Naismith et al [3] the term “mobile” technologies is taken to mean ‘portable’ and ‘movable’ technologies but can also implicate a ‘personal’ as opposed to ‘shared’ context of use. The authors represent a classification of mobile technologies using the two orthogonal dimensions of personal vs. shared and portable vs. static as we can see in Figure 1.

Through an accurate research among our target in SMEs we found out that smartphones are the most used mobile devices. Smartphones’ wireless connectivity allows employees to sync their contacts, agenda and data with their pcs. Wifi and 3G are useful to be online everywhere so that is possible to check email and use software like Skype to be always in touch with the enterprise and with other workteam members.

Besides, smartphones run different operating systems such as Android, iOS, Java ME, Blackberry OS: in order to develop an appropriate e-learning kit, we had to take into account the several OS operating on different smartphones. The mobile phones used are increasingly stunted by fragmented protocols, standards, and regional differences. A new technology called HTML5 promises to remedy this by delivering an unprecedented open, democratic and fertile mobile web. HTML5 heralds huge efficiencies for web publishers, because it lets companies develop once and distribute across any device via an Internet browser.

HTML5 is the fifth generation of HyperText Markup Language, which gets to bypass much of a phone’s underlying “iron,” or the chips, graphic cards and other components — all things that native apps rely on. Most phones being sold today have modern browsers that will operate on super fast 4g or LTE networks — the sort of thing that the HTML5 technology needs to thrive [4]. Thus, as HTML5 advances, the InTouch games will be developed in jQuery Mobile, a mobile framework that allows users to

design a single highly branded and customized web application that will work on all popular smartphone and tablet platforms [5].

III. DESIGN GUIDELINES

Based on emerging findings from the desk and field research, we drew up a list of key recommendations to design our mobile games:

- Delivery vehicle: smartphones.
- Create games first and foremost: learning content mapped to game style, embedded naturally in the game.
- Modular game design: customisable games; tools for users.
- Attention to speed, level of difficulty, timing and range of feedback.
- Variety in game context and complexity: novelty, surprise, humour.
- Keep user cognitive load down: limited use of text, simple and intuitive interface.
- Focus on lifelong learning
- Do not simply port pc style games to mobile

We chose to adopt a user-friendly design, informed by Nokia© guidelines [6] which provides considerations for mobile game design. Table 1 shows an overview of our primary areas of focus as we sought to relate to these with each of the games.

All games are designed to be easy to use with mobile phones. Although all games need to communicate with the server to inform the teacher of the learners' progress, we were mindful to keep usage costs as low as possible: indeed it is possible to download the game and play it offline.

As we said, we decided to develop different mobile games and to do that in the best way we had to take into account devices' interface and context of use. First of all we had to consider that people usually use mobile apps in a short lapse of time between other activities and not in places always comfortable. That's why our games will be short, simple in their structure and have a really straightforward interface with very simple functionalities.

We also had to consider devices' small display dimensions and way of interaction (indeed not all devices have touch interface).

Embedding too much details in a small screen can be nice to see but counter-productive to use. Our scenarios will be simple and a simple touch, or click, will be enough to interact with the game. This will also enable one-hand playing

To support take-up of the games on mobile phones, the games are modular in design:

- Game Component, e.g. Quiz / Simulation / Game Event / fieldwork 'Chance'
- Game Element, e.g. Question Element / Question sequence
- Game Asset, e.g. text item, picture, audio clip.
- Each of the above is a Game Learning Object (GLO).

For the InTouch Project we decided to develop different mobile games with different learning goals, so it was crucial to define which kind of learning goals we aimed to obtain.

To do this we took into account learning goals related to 3 key knowledge and skill areas:

1. Knowledge and related skills (facts, research, data gathering and organisation skills, retention, summarising, dissemination, multi-modal literacy).
2. Interpersonal skills (cooperative and competitive behaviour within a strategic context, taking into account socio-affective factors).
3. Higher order cognitive skills (analysis, reflection, iterative and strategic planning) [7].

All the three areas above are involved in the InTouch Project. Indeed, what we wanted to do is to develop an ad hoc mobile learning kit for adult learners based on a set of games designed to challenge players to confront themselves with non routine tasks involving skills like planning, teamwork, communication, conflict management and others.

IV. PROTOTYPE

For the first game we decided to adopt the branching story structure.

Clark Aldrich defines a branching story as "an educational simulation genre in which students make a series of decision through a series of multiple choices to progress through an event (or story) that develops in different ways according to the choices each student makes" [8].

We thought that branching stories would be a good tool to improve soft skills like non routine skills through decision making and identification; furthermore, the story structure would be more involving for the user and their ease of use and deployment makes this product suitable for mobile devices.

For the game interface we chose comic style for three reasons:

- The graphic rendering of comics is suitable for mobile displays;
- Comics are an excellent instrument for storytelling;
- A Comic style story is lighter and then faster to download than a clip with audio stream.

We can see an interface example in figure 2.

Not all the games will be branching stories nonetheless we will use the same characters and settings for all the games in order to keep narrative coherence.

The scores obtained by each user in each application will be recorded on a database. This will allow to index the game's results to understand what and where are the main difficulties and for the user to have a self evaluation of their skills level.

V. CONCLUSIONS

As we have seen the labour market keeps evolving and that's why the request of non routine skills is increasing.

In order to encourage the acquisition and the improvement of these skills, the adoption of mobile learning strategies can be helpful. It is also useful to take advantage of a better integration between work and learning.

This learning strategy will be deployed in 30 mobile games and will be tested by InTouch Partners in late 2011 in order to evaluate its effectiveness, to improve the educational model and to test the technology adopted.

- [1] CEDEFOP Research about new jobs: <http://www.cedefop.europa.eu/EN/>
- [2] InTouch Project portal: www.intouch-project.eu
- [3] HTML5: <http://www.w3.org/html/logo/>
- [4] L. Naismith et al, Report 11: Literature Review in Mobile Technologies and Learning, nesta futurelab, 2004
- [5] jQuery Mobile: <http://jquerymobile.com/>
- [6] http://www.developer.nokia.com/Community/Wiki/Guidelines_for_Mobile_Interface_Design
- [7] mGBL European Project: <http://www.mg-bl.com/index.php?id=40>
- [8] C. Aldrich, The Complete Guide to Simulations and Serious Games: How the Most Valuable Content Will Be Created in the Age Beyond Gutenberg to Google, Pfeiffer & Company, 2009

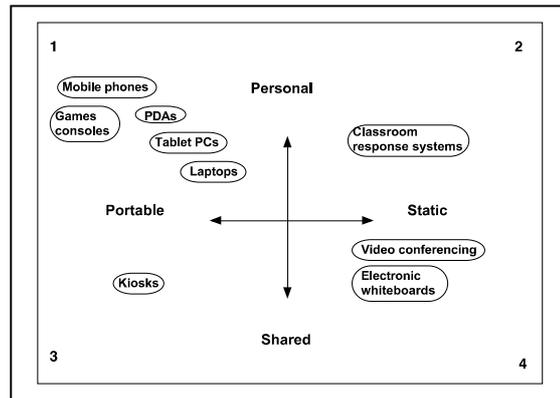


Figure 1. Classification of mobile technologies Naismith et al, (2004)

| Nokia© design issue | | | | | |
|-----------------------------|--------------------------------|---------------|--|-----------------------|-----------|
| | | Key focus | | | Key focus |
| Who is playing | accessibility | X | For how long at a sitting | small modules | X |
| | individual player | X | | time limit | X |
| | team player | | | variety of feedback | X |
| Why played - reasons | social factors (communication) | | How played | single-player | X |
| | competitiveness | X | | turn-based | |
| | enhancing personal profile | X | | multi-player | |
| | intellectual challenge | | In what situations | leisure | X |
| reaction challenge | X | project based | | | |
| Where played | private space, download | X | What the function of playing is | learning as content | X |
| | public space | | | learning as discovery | |
| | networked game | | | learning as process | |
| Player satisfaction | easily saved | X | | | |

Table 1. Nokia© guidelines

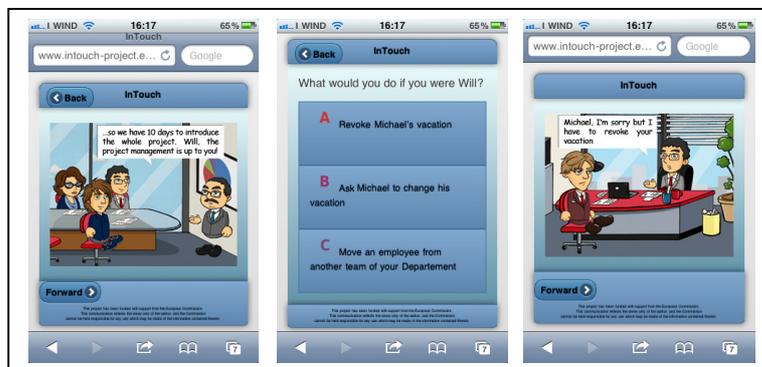


Figure 2. InTouch Game Interface