Using mobile game-based technologies to engage young adults in lifelong learning

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Abstract - Tough challenges face Higher Education in a knowledge-based, net-centric economy as we gear up to meet the pressures of global competition. New perspectives are needed in catering for the needs and interests of learners who have grown up in a digital age. Increasingly schools, colleges and universities are harnessing mobile technologies and the Internet to support learning. At the same time research findings indicate the motivating potential and possible learning gains of games played on mobile devices with young adult audiences. Arguably therefore the 'mobile learning' approach (m-learning) needs to be extended to include use of mobile learning games. The 3-year EC-funded project mG-BL (mobile Game-based Learning) is a practical response to that need.

I. INTRODUCTION

In a society where use of mobile technologies has become second-nature for many, the Internet is evolving from:

> *'a place you go to read things ... (to) a place you go to interact'* (Downes, 2005).

With the growing sophistication and affordability of mobile technologies and applications, their use as learning tools becomes increasingly viable, hence the growing interest in the field of m-learning (Naismith *et al*, 2004).

However in seeking to cater for the learning needs of young audiences who in general have high relation to mobile technologies (Fabricatore, 2000; Prensky, 2001), merely trying to adapt e-learning approaches for use with mobile technologies will not be enough. Young adults in particular need m-learning opportunities that are not only cognitively accessible but that also engage them in affective learning. mG-BL will seek to demonstrate how a mobile game-based approach can effectively be used to this end.

mG-BL is a 3-year pan-European project that began in October 2005 and is supported by the European Commission's Information Society Technologies (IST) programme within the Sixth Framework. mG-BL sets out to improve the effectiveness and efficiency of learning in young adults aged 18 - 24 through the development of innovative learning models based on mobile games. Ten partner organizations form the consortium, from EU countries as diverse as Austria, Croatia, Italy, Slovenia and the UK. The project is led by evolaris research lab from Graz, Austria.

Our mission: the design of gripping mobile game models that are fun to use and that can support development of decision-making skills and strategies for crisis situations. We aim to produce templates for great learning games that can effectively engage young adults. Prototype games will be developed in three pre-determined sectors: e-health, e-commerce and career guidance. These are areas where the consortium has particular strengths. However the templates will be 'generic' in design and therefore useful in a wider range of sectors.

This short paper outlines key aims and stages of mG-BL development and identifies emerging issues in the exploratory phase of the research.

II. mG-BL RATIONALE

The overall goal of the mG-BL project is to support the development of decision-making skills in our target audiences through the design of innovative learning models based on mobile games. A minimum of two prototype game templates will be created for teacher use. The templates will be used to create a minimum of three example games in the pre-determined fields of e-health, e-commerce and career guidance.

Ultimately we expect teachers will want the option of creating their own mobile learning games easily and efficiently, so a platform will be developed that will enable them quickly to develop mobile games from their own existing material (scripts, lesson plans etc.) and to distribute these to their students via mobile technologies.

III. PEDAGOGICAL FRAMEWORK

New generation mobile phones and hybrid PDAs have been turning into 'world phones' or 'microbrowsers' with multimedia functionality. Connectivity continues to improve and at the same time devices are becoming more affordable. There are nevertheless still real user interface issues for mG-BL game designers to consider. These include for example slow text input facilities, small storage capacity, limited battery life, low bandwidth network capabilities etc. In particular, screen size limitations directly affect user behaviour (Ioannis *et al,* 2003). There is also the issue of screen quality – some screens are still difficult to use in daylight.

From a pedagogical perspective however, the key issue arguably resides less in connectivity and phone quality and more in the extent to which we can exploit the nature of the Web, where a shift is perceived from supporting the individual to supporting interaction and relationships between individuals (Seely-Brown, 1999; Downes, 2005). We believe therefore that mG-BL developers should design for interactivity and should seek to promote collaborative as well as individual learning, encouraging students' awareness of learning *processes* in the context of lifelong learning. This is a social constructivist stance.

Social constructivism (Vygotsky 1978) emphasises intrinsic learning through social interactions such as modeling or imitation and accepts the plurality of meanings. As a theoretical paradigm we find it especially relevant to mG-BL development: our young adult target audiences will exhibit a range of learning styles and preferences and may be attracted by alternatives to formal, extrinsically motivated learning. Furthermore, social constructivism considers socio-affective factors and the role of mediation of action through artefacts to be significant in encouraging learning. Again, this is highly relevant to the mG-BL project.

Specific social-constructivist theories that will inform mG-BL prototype design include:

- experiential learning theory (Kolb 1984), understood here as: 'education that occurs as a direct participation in the events of life' (Houle 1980, page 221; cited by Smith 2001) and achieved through reflection upon that experience;
- situated learning theory (Lave 1990), which sees the active learner graduating from 'newcomer' to 'oldtimer' within a learning community;
- Laurillard's (1993) concept of a conversational framework; this enables a 'continually iterative dialogue between teacher and students to reach shared understanding'.

These concepts fit the benefits of m-learning, which lie not only in its potential for making learning opportunities available anywhere, anytime (e.g. Mitchell, 2003; *Naismith* et al*, 2004*) but also in the opportunity for social interaction, which plays a key role in the development of cognition. As Vygotsky (1978) states:

> *'Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals.'*

Following on from the above is the social constructivist theory (Vygotsky, *ibid*) that the potential for cognitive development is dependent upon the 'zone of proximal development'. By this is meant the level of development that learners achieve when they engage in social behaviour: the range of skills that can be developed with the guidance of adults and/or the collaboration of peers is greater than what can be achieved when working alone.

The potential of mobile games applications to promote social constructivist learning is increasingly recognised (e.g. Mitchell, 2003. Mitchell and Savill-Smith, 2004), while a wide body of research already documents the pedagogical role of fun in learning (e.g. Doolittle, 1995; Dempsey et al, 1996; Fabricatore, 2000; Prensky, 2001; Wu et al, 2004). Furthermore it is held that strategic use of games can contribute a 'flow' experience that is a characteristic of successful learning processes (Csiksentmihalyi, 1990).

mG-BL will therefore seek to use recent advances in mobile networking and mobile games applications to develop new learning models that support social constructivist learning and lifelong learning.

As it evolves, the design process will be informed by the reading of literature and will take into account for example research findings concerning ethical and legal issues as well as learning theory. To ensure that game design is needs led, we will be working with Focus Groups drawn from mG-BL target audiences and from experts in the field. The emerging findings will be fed into the iterative demonstrator development. We have already begun this process, holding 30 hour-long interviews with experts in all five partner countries, as is explained below.

VI. CONSULTING THE EXPERTS

In February/March we interviewed 30 professionals based in Croatia, Italy, Slovenia and the U.K. All were experts in their field, equally distributed among the following areas:

- Mobile technologies – market oriented
- m-learning – publishing
- e-learning professionals
- teaching professionals
- social services.

These were hour-long open-ended interviews, analysed using conceptual analysis. Findings showed consensus among the experts on an impressive range of points, notably the following:

- The need for flexible access to advice and support on financial/health/career/social matters:
  > *"Increasingly typical in today's society, many lack an extended family they can turn to."*
- Potential mG-BL game options should include

games geared around real life communication – to fulfil social needs.

- We should use pedagogy we know works – a social-constructivist framework to achieve user-centric solutions.

Mobile games generally were thought to be potentially good for social constructivist learning – games delivered not just on phones but on any mobile device. However phones were judged to be the favourite delivery platforms, not least because they are small, portable, with instantaneous connection. They are also widely used by target audiences as they are:

- *"Complex, pocketable, fistable."*
- *"Multi-media - they do good everything!"*
- *"You don't have to worry overmuch about battery life."*

Moreover phones are ubiquitous, indispensable:

> "*We're going to get to a stage where no-one will be without them … There's been nothing like it. I never carry a pen around with me anymore. Everyone will carry around with them a connection to the outside world."*

V. USER TRIALS AND VALIDATION

If the mG-BL learning games are to engage and inspire the target audiences, their design should go far beyond facilitating information collection and distribution. They must cater for affective as well as cognitive issues behind decisio-making. This then will be the main focus of the evaluation as it gathers feedback on project outputs from potential and actual users. Special consideration will also be given to:

- usability;
- user behaviour and interaction;
- organizational aspects.

The trials will be conducted at several stages for formative and summary evaluation. An initial review will focus on the kinds of bias that users may have towards mobile technologies in all participating countries. To this end we will gather data concerning usage of information and communication technologies by target audiences, including data on related skills, former experiences in e-learning, etc. Of particular interest will be data concerning mobile phone usage, which we will compare with published data. Subsequent reviews will consider the overall functioning of the transnational partnership and what benefits, if any, partners are deriving from participation. These reviews will take place periodically throughout the lifetime of the project and will be conducted during project meetings in open discussion and in special problem solving sessions.

There will be two main data-gathering approaches:

1. Use of questionnaires, interviews and focus groups to collect feedback on the game prototypes and to generate ideas for possible future actions.
2. The involvement of educationalists and other experts in the field (for example via the dissemination events). This will be not only to collect feedback concerning the mG-BL platform and tools, but also to invite comments and ideas concerning the usage of games to support learning, in particular life-long learning.

Summary evaluation will be carried out at end project in order to assess whether and to what extent the project objectives have been achieved and to suggest future actions.

The evaluation process will provide the mG-BL project with understandings and insights concerning potential user behaviors and expectations. The results will be aggregated in a comprehensive report and presented to all mG-BL members.

VII. IN CONCLUSION

Early research findings encourage us that we are on the right track:

First of all, in respect of the mG-BL pre-determined sector areas there does indeed appear to be a huge need among people in general for financial literacy, for advice on health aspects and for guidance on career choices. At the same time we find signs of the strong potential of mobile game-based learning as an engaging way of learning in these sectors, especially where games are integrated into existing educational provision.

However in seeking to cater for the learning needs of young people who in general have high relation to mobile technologies (Fabricatore 2000, Prensky 2001), merely trying to incorporate material from existing educational books or lecture notes into formats that fit the screen of mobile phones will by far not be enough. They need m-learning opportunities that are not only cognitively accessible but also engage them in affective learning. The MG-BL project will seek to demonstrate how a mobile game-based approach can effectively be used to this end.

Taking into account the emerging research findings, m-BL games designers will consider ways of building around communication, tacit learning and ambient learning, using the full functionality of the mobile phone:

> *"No-one actually takes advantage of it all – I'm sure a game could – photos, video – heady mix of all those things coming together…."*

We will consider ways of bringing people together to solve real-world issues: players in different locations exchange/trade information, ideas. We will continue to investigate the learning potential of mobile games such as management and strategy games, quiz games and other game types. However in designing the mG-BL game models we will be mindful of a clear warning, made repeatedly by our expert respondents and also found frequently in the literature (e.g. Fabricatore 2000, Prensky 2001): an educational game will not work unless it is a *real* game first and foremost. Half measures will not do. It need

not be an "all-whizzy" computer game, but it *must* be great fun - and relevant to people's learning and lifestyle, otherwise they simply won't be interested.

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