Towards a pedagogical framework for the mobile Game-Based Learning project – key considerations

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Abstract:

A growing body of research indicates that mobile technologies can be effective tools in catering for students in a digital age and there are signs of the motivating potential and possible learning gains of games played on mobile devices with young adult audiences. The 3-year EC-funded project mobile Game-based Learning (mGBL) therefore seeks to design new learning models based on mobile games. These will be standards-based for use in blended learning programmes. Specifically we aim to support development of decision-making skills and strategies for crisis situations – a priority concern of the European Community. Our vision is for great games that can effectively engage young people and that exemplify best practice – but what exactly is this in the new field? This paper considers a pedagogical framework for mGBL that also addresses emerging ethical and legal issues.

1 Introduction

As Education adapts to the needs of students in a digital age, rapid advances in mobile technologies makes these increasingly viable and attractive as learning tools [1]. There is also growing recognition that games designed for mobile devices have considerable potential for encouraging learning, especially socio-affective learning, in children and young adults. This is in line with a wide body of research that documents the pedagogical role of fun in learning [2]. Moreover strategic use of games can contribute a 'flow' experience that is a characteristic of successful learning processes [3].

The market for mobile games is growing rapidly, with the convergence of mobile technologies and with mobile applications becoming less constrained by device limitations. Newer mobile devices with higher definition colour screens, enhanced memory and functionality are making mobile gaming more appealing - and development costs are also lower for mobile games than for games on 'traditional' platforms. The mobile Game-Based Learning project (mGBL) [4] will contribute new learning models to this market.

mGBL is a 3-year pan-European project that began in October 2005 and is supported by the European Commission (EC) Information Society Technologies (IST) programme within the Sixth Framework [5]. mGBL sets out to improve the effectiveness and efficiency of learning in young adults aged 16 - 24 through the development of innovative learning models based on mobile games. Ten partner organizations form the consortium, from EC countries as diverse as Austria, Croatia, Italy, Slovenia and the UK. The project is co-ordinated by evolaris Privatstiftung, a research lab based in the city of Graz, Austria. Our core mission: designing

gripping mobile games that are fun to use and that can effectively engage young adults in developing decision-making skills and strategies for use in crisis situations. Ultimately we expect people will want the option of creating their own mobile learning games easily and efficiently, so a platform and templates will be developed for their use. A minimum of two prototype game templates will be created and a minimum of three example games developed in the fields of e-health, e-commerce and career guidance, areas where the mGBL consortium has particular strengths. However the templates themselves will be 'generic' in design and therefore useful in a wider range of sectors.

In this paper we describe the developing social-constructivist pedagogical framework for mGBL game design and highlight new kinds of challenges, including ethical and legal issues, that we are encountering as we seek to realise the vision.

2 Designing the pedagogical framework

2.1 A social-constructivist approach

Ultralab, a learning technology research centre at Anglia Ruskin University, leads iterative design of the pedagogical framework and learning models for mGBL. This process is informed initially by desk research, then increasingly by field research that uses surveys, semi-structured interviews and focus groups with target audiences as co-designers, to ensure that the models are user-led, not technology-led. Such a process is in line with Ultralab's social-constructivist convictions: social constructivism [6] emphasises intrinsic learning through social interactions and is learner-centred. Figure 1 below encapsulates the learning concepts that are at the heart of any pedagogical framework proposed by Ultralab:

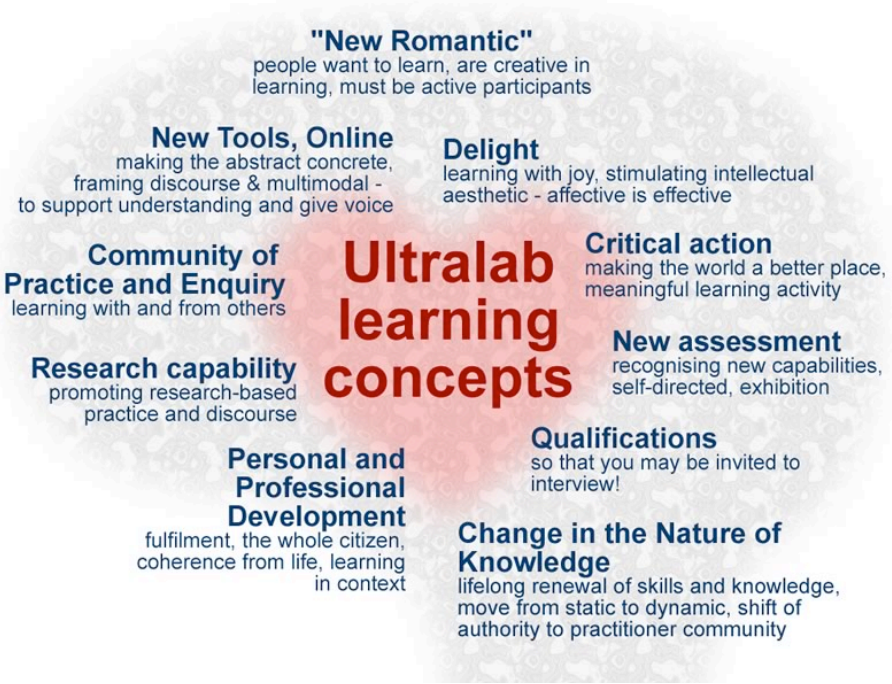


Figure 1: Ultralab learning concepts, Richard Millwood, 2005

A social constructivist approach to design fits trends in learning globally [7]:

learning globally is moving from:	**learning globally is moving to:**
transforming	ingenious
stable	agile
quality controlled	quality assured
content delivery	user generated content
one size fits all	personalisation
individualised	collaborative
national	global
one to many	peer to peer
interactive	participative
curriculum centric	learner centric
teaching	learning
pieces	projects
piaget	vygotsky
mundane	engaging

Table 1: Trends in learning globally, Stephen Heppell, 2006

Specific social-constructivist theories that will inform mGBL game design include:

- Vygotsky's [6] theory of the 'zone of proximal development', *i.e.* the level of development that learners achieve when they engage in social behaviour. This proposes that 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;
- Kolb's experiential learning theory [8] understood here as: 'education that occurs as a direct participation in the events of life' and achieved through reflection upon that experience [9];
- Lave's situated learning theory [10], which sees the active learner graduating from 'newcomer' to 'oldtimer' within a learning community;
- Laurillard's concept of a conversational framework; this enables a 'continually iterative dialogue between teacher and students to reach shared understanding' [11].

These concepts fit the benefits of m-learning, which lie not only in its potential for making learning opportunities available anywhere, anytime [2] but also in the opportunity for social interaction. However as will be seen further below, there are considerable challenges in seeking to use mobile networking and mobile games applications to support social constructivist learning.

2.2 Using mobile technologies to support social constructivist learning – some issues

New generation mobile phones and hybrid PDAs have been turning into 'world phones' with multimedia functionality. Connectivity continues to improve and at the same time devices are becoming much more affordable and user friendly. There are nevertheless still real user interface issues for mG-BL game designers to consider. These include for example slow text input facilities, low storage capacity, limited battery life, low bandwidth network capabilities etc. In particular, screen limitations (size, resolution, – some screens are still difficult to use in daylight) directly affect user behaviour [12]. From a pedagogical perspective however, the central issue arguably resides less in connectivity and phone quality (these will improve) 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 [13 and 14]. We believe therefore that mGBL game design should offer opportunities for collaborative learning. Here there are a number of important considerations that need to be addressed.

First of all we need to find effective ways of utilising the unique educational affordances of the latest mobile phones: portability, social interactivity, context sensitivity, connectivity and individuality [1]. This means finding ways of building around communication, tacit learning and ambient learning [15], 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…."[16]

Questions include: How can we use the latest technologies to bring people together to solve real-world issues, for example players in different locations building/exchanging/trading information, ideas? How can this concept be integrated into mobile learning games that are true games? How can we ensure that our game models are standards-based, so that they can be used to encourage an interest in life-long learning, within blended learning programmes? What are the ethical and legal issues involved in designing and implementing mobile learning games? These aspects are briefly considered below.

2.3 Bringing people together to solve real-world issues

As a starting point we envisage strategy game models where a player's decisions and actions (in real-world or simulated scenarios) have consequences – *intended* and perhaps also *unintended*, for themselves and for others [17] - and they are encouraged to reflect on these. Central is the concept [18] that there are four main phases of learner experience:

- 'Wanting'
- 'Doing'
- 'Feedback'
- 'Digesting'.

Our pedagogical framework sees the Feedback and Digesting phases as key stages in a 'double loop' [19] learning process, where players engage and re-engage with a critical situation, 'reflecting in action' [20]. Very roughly we think this might work as follows:

- *Single loop:* The player enters the critical situation with an 'espoused theory', *i.e.* they have, outwardly at least, committed to following agreed procedures, e.g. an official plan for dealing with emergencies, and perhaps assuming a number of team roles [21]. Feedback is provided via a Quiz component, where the focus is on efficient use of strategies, procedures and techniques – a co-operative approach [22].
- *Double loop:* A Debrief component encourages all the players to question the assumptions behind their actions, subjecting these to critical scrutiny from a number of

different perspectives in turn [23], each time sharing their thoughts in a designated team webspace – a collaborative approach [22].

Results of Quiz and Debrief are recorded in the player profile that is hosted within an e-learning environment. The approach is illustrated below:

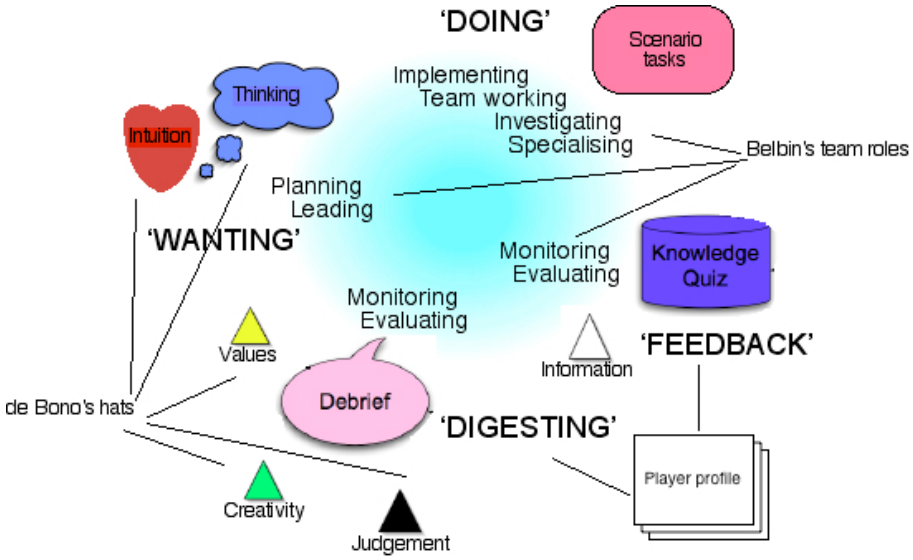


Figure 2: The mGBL learning experience, Alice Mitchell, Ultralab 2006

It is thought that this approach can encourage socio-affective learning and creativity in resolving critical situations.

All this may sound good – but how does it actually work as a *game*? And how do players score points in the double loop? There are difficulties here to be resolved. Solutions may lie with a modular format for use within blended learning programmes, as is proposed below.

2.4 A modular approach for use within blended learning programmes

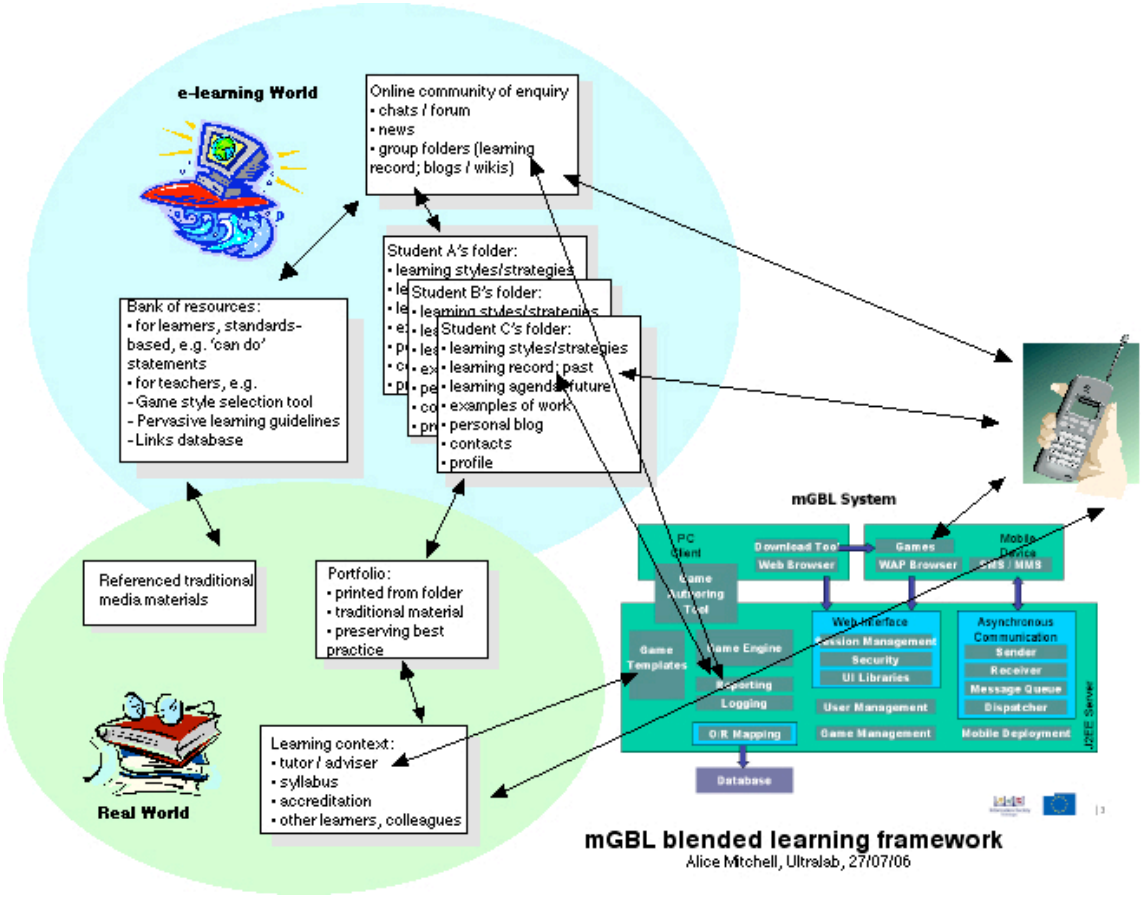
We envisage flexible and fun m-gaming solutions that are standards-based for use in blended learning programmes. The fun and motivation come from competing/co-operating/collaborating with:

- self (ipsative referencing).
- others, including the game system itself (criterion-based referencing)

As the game delivery mode is the mobile phone, individual components will be kept short and relatively simple, enabling game-play in short sessions, each with feedback. Overall however we envisage a complex game that contains many surprises / red herrings and can be replayed from different perspectives. During the game, the player struggles to meet the challenges [24] that are set, as s/he encounters the kinds of experiences necessary for learning about resolving complex and emotional issues. A variety of opportunities for developing problem-solving skills offer support for co-operation and collaboration, based on game theory [22]. There is also encouragement for reflection [17, 18, 19 and 25] on decision-making processes and outcomes of decisions, including longer term outcomes [26]. Feedback takes various forms, both cognitive and affective. For example there is a quiz component, while an option to pause the game at strategic points allows players to consult peers and experts. Such consultation may be face-to-face, for example in classroom situations, or technology-enabled, using for example SMS, voice call or accessing online resources *via* internet phone or 'traditional'

computer. The related assessment issues will be addressed *via* a project-based approach, where quiz results and project outputs are mapped against predefined cognitive and affective learning outcomes [27]. All results will be recorded on an e-learning website.

Below, an overview of the proposed framework:



2.5 *Emerging ethical and legal considerations*

Of crucial importance in developing the pedagogical framework is the need to take into account emerging ethical and legal issues.

Ethical and legal issues in learning environments include community and equity of access as well as security, privacy, information and identity [28]. Educational institutions seek to deal with these through developing and implementing policies, regulations and disciplinary procedures. However use of the internet and mobile technologies introduces additional complexity. In the envisaged mGBL solution, security, privacy and some identity issues are dealt with at the level of the learning platform, which is being developed to offer the full range of mGBL products and services and from which all the mGBL games are accessed. In respect of online community issues, alongside constitutions, etiquettes and group policies *etc*., policing strategies and procedures need to be developed [29]. These could be both formal (for example loss of points, exclusion from using the software) and social (ostracisation, negative reinforcement) to ensure for example that game blogs and wikis are protected from inappropriate use. Concerning equity of access, it remains to be seen what can be achieved where students' mobile devices will have differing characteristics and functionality and where student diversity is a further issue. Our aim is to promote the principles inherent in

international, national and state legislation related to human rights, anti-discrimination and equal opportunity - finding ways to achieve this will remain a subject of research and review throughout project development.

Legal issues include those of copyright, gaming law and data protection. Markus Fallenboek reports [30]:

„The provider of mobile game-based learning necessarily uses a range of content from different sources: logos, pictures, graphics and other material from third parties that might be protected under copyright law. Copyright laws of EU states usually have an exception for the use of copyrighted material for educational purposes. However these exceptions are narrow and apply mostly to non-digital copying. Therefore exploitation rights concerning the content used in the mGBL games have to be closely observed. Ways of approaching this difficult issue will be explored during the creation of the example mGBL games, when teams of subject experts will identify and prepare content for use with the game templates. An important by-product of this process will be the development of a set of guidelines for teacher use.

A related issue is gaming law, which is especially stringent when it involves minors. At first sight there should be no problem as with most mobile games formats the result depends solely on the knowledge and skills of the user and not on some chance element. Additionally there would appear to be no 'gaming stake' that the user brings in. However in many EU countries even charges for mobile premium services constitute such a stake that makes certain mobile services a game of chance. It is here that the difficulty will lie unless we can avoid use of such services.

A third key legal issue is data protection. Wherever personalized data such as a phone number is required from the user, the game provider must comply with the data protection law of EU countries. This especially applies to the provisions of the EU Data Protection Directives 2002/58/EC and 95/46/EC and respective local laws that implement these Directives. As far as mGBL game design is concerned, this again anticipates the protection of the mGBL platform."

3 In conclusion

The pedagogical framework proposed for mGBL will be informed by social-constructivist theory to support co-operative and collaborative learning. It will be iteratively developed in a programme of field research that includes use of surveys, interviews and focus groups. The aim is to offer guidelines for the design of standards-based, learning games that base on the unique affordances of mobile technologies and on current usage: true games that can engage students in cognitive and affective learning experiences and support development of decision-making skills for use in critical situations. Lastly and importantly, it will highlight ethical and legal requirements concerning learning and gaming online and propose ways of catering for these in mGBL learning game design.

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