

CLASSIFYING MOBILE GAMES AND THEIR APPLICABILITY TO DIFFERENT LEARNING SITUATIONS AND TARGET AUDIENCES: PRELIMINARY RESEARCH PHASE IN A EUROPEAN PROJECT

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ABSTRACT

Research shows the potential of computer games, including mobile games, to promote learning in young adults. The 3-year EC-supported project mobile Game-Based Learning (mG-BL) will prototype a platform for the cost- and time-efficient development and deployment of mobile learning games. These will be strategy games that can support young adults in developing decision-making skills for crisis situations. At least two types of game model will be designed. Example implementations will be in the fields of e-health, e-commerce and career guidance. This short paper outlines the theory-based development of a Classification of mobile games that has been an important first step in the mG-BL games design process and highlights emerging findings of underpinning field research.

KEYWORDS

Classification, mobile learning games.

1. INTRODUCTION

Research (e.g. Mitchell, 2003) shows that games designed for mobile devices have considerable potential for encouraging learning in young adults. The mobile Game-Based Learning (mG-BL) project is a 3-year initiative, supported by the European Commission's Information Society Technologies (IST) programme within the Sixth Framework. mG-BL sets out to encourage the development of decision-making skills in young adults aged 18 - 24 through the development of innovative learning models based on mobile games.

mG-BL began in October 2005. It is led by project co-ordinators evolaris Privatstiftung, who are based in the city of Graz, Austria. Nine other organisations are also engaged in this project, from EC countries as diverse as Austria, Croatia, Italy, Slovenia and the UK.

Ultralab at Anglia Ruskin University is leading the development of the pedagogical framework and the learning game models. Our brief: the design of gripping mobile game models for use in the fields of e-health, e-business and career guidance. We aim to design exciting learning games that are fun to use and that can support young adults in developing decision-making skills for use in crisis situations. Our challenge lies in producing great games that can engage young adults.

An important precursor of prototype design is the development a Classification of mobile games and their applicability to different learning situations depending on learning goals, learning content and target audiences. The Classification is a spreadsheet document that lists and describes various styles of mobile game and maps these against example learning situations and example target audiences. informs the development of an mG-BL software tool that will assist users in selecting a type of mobile game for a particular learning purpose.

This short paper provides a general description of the Classification framework, outlines its development and highlights emerging findings of the underpinning research.

Table 1 below is an extract from the Classification:

Table 1. mG-BL classification headings

Example mobile game styles		Example learning situations					No. of players		Example target audiences (Intelligence types after Gardner, 1983)	
Game style	Description	Learning goals	Learning content	Learning activities	Individual	Collaborative	1	2+	Intelligence types	Capabilities & perception

2. DEVELOPING THE CLASSIFICATION

In Months 01-06 of the mG-BL project, the mG-BL research team undertook a programme of desk and field research to inform the iterative development of the Classification. This underwent considerable changes before the final draft was achieved and the process is explained below.

2.1 Literature search

Underpinning the development of the Classification was a desk study of game based learning and mobile game genres. As a starting point, the study used the findings of two in-depth literature reviews: one concerning the potential of computer games for learning (Mitchell and Savill-Smith, 2004) and one concerning mobile learning (Naismith *et al*, 2004). An additional literature search was then undertaken to consult other papers and articles for pertinent findings. The mobile games sector is fast moving and printed material is soon out of date, so Internet sites were searched, principally those that focus on mobile games categories and on m-learning (learning facilitated by mobile technologies). Commercial sites and reference sites such as Wikipedia were also searched. Keywords used for the initial search included:

- Game, mobile game
- m-learning, m-learning game
- mobile game-based learning
- game genres, game categories, game types.

As the search widened, different genres of games were used as keywords, for example:

- action game, adventure game
- building game, construction game
- role-play game, role-playing game
- strategy game.

The findings that informed the Classification are reported briefly below.

2.2 Definition of terms: ‘game’, ‘mobile games’, ‘mobile technologies’, ‘m-learning’, ‘learning situation’, ‘target audiences’

An important first task in designing the Classification was to define key terms. For this purpose we referred to the literature:

‘Game’ is recognised as ‘organised play that gives us enjoyment and pleasure’ (Prensky 2001). Computer games (mobile games can be seen to fall into this category) are characterised by six key structural elements which, when combined together, strongly engage the player. These elements (*ibid*, pages 118–119) are:

- rules, goals and objectives
- outcomes and feedback
- conflict/competition/challenge/opposition
- interaction
- representation or story.

‘Mobile games’ are understood for the Classification purposes as games that are delivered via personal and portable mobile technologies. Naismith *et al* (2004) usefully outline what is generally understood by ‘mobile technologies’: they explain the term is taken to mean ‘portable’ and ‘movable’ technologies but can

also implicate a 'personal' as opposed to 'shared' context of use. The terms 'mobile' and 'personal' may often be used interchangeably but a device might be one without necessarily being the other. The authors go on to offer a classification of mobile technologies using the two orthogonal dimensions of personal vs. shared and portable vs. static, as illustrated in Figure 1 below:

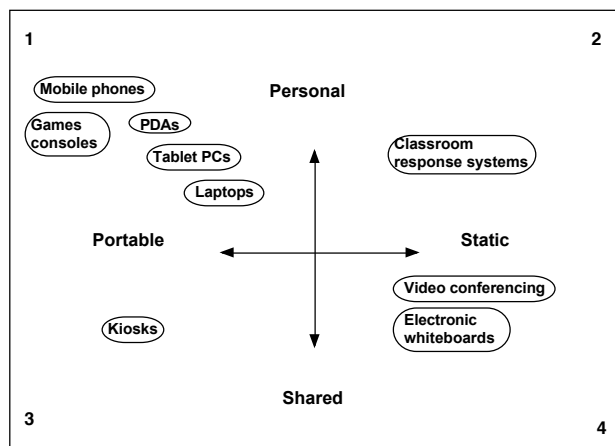


Figure 1. Classification of mobile technologies, Naismith *et al*, (2004) Page 7

Considering the above, 'm-learning' is taken to mean learning facilitated by the three most personal and portable mobile technologies:

- mobile phones;
- portable, dedicated gaming devices (such as the Nokia N-Gage);
- PDA's (Personal Digital Assistants).

With built-in connectivity, functions of these technologies are beginning to overlap: all three can be used by an individual who is learning alone and also for collaborative learning and 'blended' learning.

'Learning situations' are countless and examples myriad. For the Classification some generic descriptors for the term were needed. We therefore understand 'learning situations' in terms of learning goals, learning activities and individual or collaborative learning modes. Bloom and Kratzwohl's (1956) taxonomy of educational objectives provided a definition of learning goals. To help the user's understanding of learning activities that can be mapped against these goals, the Classification provides examples. Pivec *et al*'s (2004) and Prensky's (2001) categorisations served as guidelines in selecting these examples.

'Target audiences' for mG-BL are mainly students and younger people in the age range 16-24 and their teachers and mentors in the pre-determined sectors career guidance, e-commerce and e-health. As this broad definition does not take account of individual learning needs, we turned to personality theories for differentiation. These propose (Chapman, 2006) that people have different thinking preferences, dominant learning styles and natural strengths and they include the following classical intelligence and learning styles models:

- Kolb's (1984) learning types, how people tend to approach a task, *i.e.*:
 - 'grasping experience', preferring either to watch or to do;
 - 'transforming experience', preferring either to think or to feel.
- Honey and Mumford's (1992) 'activist', 'reflector', 'theorist', and 'pragmatist' learning styles model that is based on Kolb's (*ibid*) learning types.
- Myers' (1962) theory, that sees each person characterised by four preferences:
 - Extraversion or introversion
 - Sensing or intuition
 - Thinking or feeling
 - Judging or perceiving.
- Gardner's (1983) Theory of Multiple Intelligences, which proposes that human intelligence is a mixture of several intelligences.

All of these models can be applied to people in general, regardless of qualifying factors such as business sector, country or culture. This is important for the potential usefulness of the Classification outside of the

mG-BL project. However although all of the above different learning types, styles or intelligences can be measured through tests, it was felt that the first three models do not easily lend themselves to mapping against all the categories in the Classification, whereas Gardner's (*ibid*) model can fulfil this requirement and his model was therefore selected to differentiate among the target audiences. Further reasons why Gardner's model is fit for purpose are explained below:

First of all, as Chapman (2006) explains, Gardner's (*ibid*) is a classical model widely used in education and industry to understand and teach many aspects of human intelligence, learning style, personality and behaviour. It proposes that human intelligence is a mixture of several intelligences, all valuable in life (see Table 2 below). It further suggests that most people are strong in three types of intelligence and that developing an individual's natural strengths will have a significant positive effect on learning effectiveness.

Table 2. Gardner's seven intelligences

Intelligence type	Capability and perception
Linguistic	Words and language
Logical-mathematical	Logic and numbers
Musical	Music, sound, rhythm
Bodily-kinesthetic	Body movement control
Spatial-visual	Images and space
Interpersonal	Other people's feelings
Intrapersonal	Self-awareness

Chapman (2006) explains that Gardner subsequently found it difficult to add to these seven intelligences. These are clearcut and measurable, whereas potential additions that he later envisaged, such as those proposed in Table 3 below, are not only highly subjective and complex but contain overlapping aspects.

Table 3: Gardner's potential additional intelligences

Intelligence type	Capability and perception
Naturalist	Natural environment
Spiritual/Existential	Religion and 'ultimate issues'
Moral	Ethics, humanity, value of life

The Classification uses Gardner's (*ibid*) original seven intelligences model. With potential users in mind, a particular advantage of adopting the original model for the Classification is that multiple intelligence tests based on this model are readily available. Links to free tests can be found for example at Chapman's (2006) website, together with descriptors that relate the different intelligences to a variety of professional roles.

2.3 Focus Group research

To complement the desk research, we held sessions with 2 Focus Groups drawn from mG-BL target audiences in the UK and in Italy, age range 18-24. Focus Group 1 consisted of four females and one male studying Health Care at the Institute of Health and Social Sciences, Anglia Ruskin University, UK. Focus Group 2 consisted of four males and four females, Career Guidance students at the University of Bologna, Italy.

A set of research tools was developed collaboratively by the Ultralab research team for use in:

- approaching and briefing 'gatekeepers';
- briefing respondents and obtaining their informed consent;
- carrying out the Focus Group sessions;
- collating, analysing and reporting the results.

The tools would help to achieve rigour and consistency in the research. They were made available in English and Italian, the languages used by the Focus Groups.

After an introductory briefing, participants signed the Focus Group Consent Form. This committed them to a minimum of one 2-hour face-to-face session and to subsequent Focus Group activity online: minimum 2 hours active participation on a dedicated password-protected website developed by the lead research team. Each session was facilitated by 3 researchers: a Focus Group leader, a facilitator and an observer/scribe.

While the UK activity took place over one session only, the Italian Focus Group activity took place over three sessions. However with each group the same main activity areas were covered:

- Participants were introduced to various types of mobile games, following which they were asked to participate in a related discussion. This discussion was facilitated by the Focus Group Leader, making use of a prepared aide-memoire that contained warm-up questions, key questions, and closing questions.
- Participants were introduced to a Task Brief. This asked respondents to consider different kinds of mobile technologies and mobile games and to identify their suitability for use with mG-BL target audiences.
- Follow-on discussion.

It is acknowledged that the Focus Group results cannot be treated as the definitive views of target audiences. The respondents needed much briefing concerning characteristics of the various technologies and mobile games being considered. A number of them were initially unconvinced at the learning potential of mobile games but changed their minds during the session. It cannot therefore be assumed that all respondents were able to make fully informed or unbiased decisions. Accordingly the results must be viewed with great caution. Nevertheless, when taken together with the outcomes of the discussions, they do permit some tentative findings.

In summary these findings are that a key benefit of learning games delivered via mobile technologies would lie in providing flexible access to information and experiences that could help people make choices. Quiz games, simulation games and strategy games could be developed into mobile games for this purpose. Quiz games could offer a fun way of testing factual knowledge, while simulation and strategy games would enable people to experience a critical situation such as a job interview or a challenging working situation in a relatively risk-free way. People might also arrive at better self-knowledge, through trying out new situations and strategies.

All in all, the Focus Group activity and findings proved useful in helping the mG-BL research team get a 'feel' for the views and perspectives of prospective users. This facilitated insightful use of the findings of the desk research in developing the Classification.

3. CONCLUSION

The Classification design is fit for purpose. It maps a wide range of mobile games types against different learning situations and target audiences. It assists the user further by providing descriptions for each mobile game type and also indicates learner mode (individual or collaborative). As has been explained, its development was informed by Focus Group research as well as the reading of literature and it is theory-based.

The Classification makes no distinction between mobile games designed for entertainment or educational purposes. This is because in principle all game types have the potential to support learning or consolidation of learning (e.g. Fabricatore, 2000; Prensky, 2001; Mitchell and Savill-Smith, 2004).

The mobile games industry is fast-paced, with games moving from concept to completion in three months or less. In this scenario, the likelihood of new mobile genres emerging is high. The mG-BL Classification cannot therefore claim completeness. Many of the genres in mobile gaming such as Action, Role Play, Simulation Strategy, Sports, etc. may be seen to blend in with each other and/or have popular sub-categories. As genres are continually evolving and as boundaries become blurred it follows that any classification will have limitations and is open to challenge. It is not therefore proposed that the mG-BL Classification is the 'correct' one, nor is it accepted that any correct classification can be formulated (*c.f.* Crawford, 1982).

It has been explained that the Classification provides a basis for developing a software tool that will assist teachers in selecting mobile games for specific learning purposes and audiences. At the same time it provides mG-BL researchers and programmers with a starting point for prototype design. Together with the software

tool, the Classification will eventually be made available on an official project website, where it will be of interest to researchers and teachers active in the field of m-learning and game-based learning.

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