DELIVERABLE REPORT
D7.1.1
"Incidental Learning Framework"

MASELTOV

Mobile Assistance for Social Inclusion and Empowerment of Immigrants with
Persuasive Learning Technologies and Social Network Services

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CONTENT

EXECUTIVE SUMMARY

This is the first steps towards creating an 'Incidental learning framework', and it is a work in progress.

It is intended that the Incidental learning framework will facilitate the creation of technology rich learning opportunities for immigrants within cities. The framework will be a descriptive mechanism that permits analysis, a generative tool to support software system design, and it will facilitate the communication of learning design ideas both visually and textually. The framework focuses on incidental learning i.e. learning that is spontaneous and unplanned, in the knowledge domains of interest to the MASELTOV project including health care, culture, and language and information access. However, it provides links and triggers to structured and reflective learning to back up and deepen learning that happens incidentally.

This document describes the initial version of the Incidental Learning Framework, presents a few examples of its use, and describes some conclusions and recommendations for work towards the next version of the framework including

- Using the framework to develop it,

- Extending the literature review,

- Gathering evidence about immigrants day-to-day lives,

- Running design workshop(s) using the framework.

1. INTRODUCTION

This deliverable describes the progress made towards an incidental learning framework for the MASELTOV project. In section 3. we describes the purpose of the framework, and in section 4 we present some background information to help the reader understand the framework and the situation in which it will be used. Section 5 contains a review of some existing frameworks and tools relevant to incidental learning, and in section 6 we present the first version of the incidental learning framework. In section 7 we focus on the relationship between serious games and incidental learning, and in section 8 we present some examples of our framework in both textual and graphical forms. Finally, in section 9 we round up with some conclusions on the work done so far, and present some recommendations for work to be carried out towards the next version of the incidental learning framework.

2. PURPOSE OF THE FRAMEWORK

This framework is intended to facilitate the coordination of technologies, content, pedagogies, processes and practices into learning services that can be used effectively by immigrants, their networks and mentors so as to meet the objectives of WP7. It should also provide guidelines for development of new technologies, content, pedagogies, processes and practices aimed at onward improvement of the way technologies, content, pedagogies, processes and practices can be coordinated to meet the aims of WP7 (stated below).

The framework is intended to help users of the framework produce adaptive services that take account of individual learner's characteristics and contexts. The framework is intended to be used by the partners implementing software and content within the MASELTOV project. The framework should provide an indication of facilities that the MASELTOV system should provide.

The aims of WP7 are

- "To increase immigrants' ability to function in an unfamiliar society by facilitating communication and learning, and by structuring technological supports according to user needs.

- To change in a positive way immigrants' attitudes and behaviours through technology-mediated persuasion and social networking influence.

- To take advantage of situation and context to capture user motivation and extend immediate assistance into more structured learning, game-playing, and interaction with other immigrants and the wider community".

3. BACKGROUND FOR THIS DELIVERABLE: LEARNING TERMINOLOGY

In this section we introduce some terminology for characterising learning that will be used in the remainder of the deliverable. It should help the reader understand the deliverable, and aspects of the context in which the incidental learning framework will have to operate.

The notion of *incidental learning* highlights opportunistic elements of learning when compared with the learning opportunities that occur in *formal* and *structured* programmes. Incidental learning occurs as the by-product of some other activity; it is unplanned (Kerka, 2000, Silva, 2007).

Valvoula's typology of learning shown in Figure 1 is useful in understanding the relationship between structured, formal, informal and incidental learning (Vavoula, 2004). *Structured learning* is learning that is planned in advance. *Formal learning* occurs on learning pathways through pre-established bodies of knowledge, and the pathways are defined by experts in the knowledge domain in question (Livingstone, 2001).
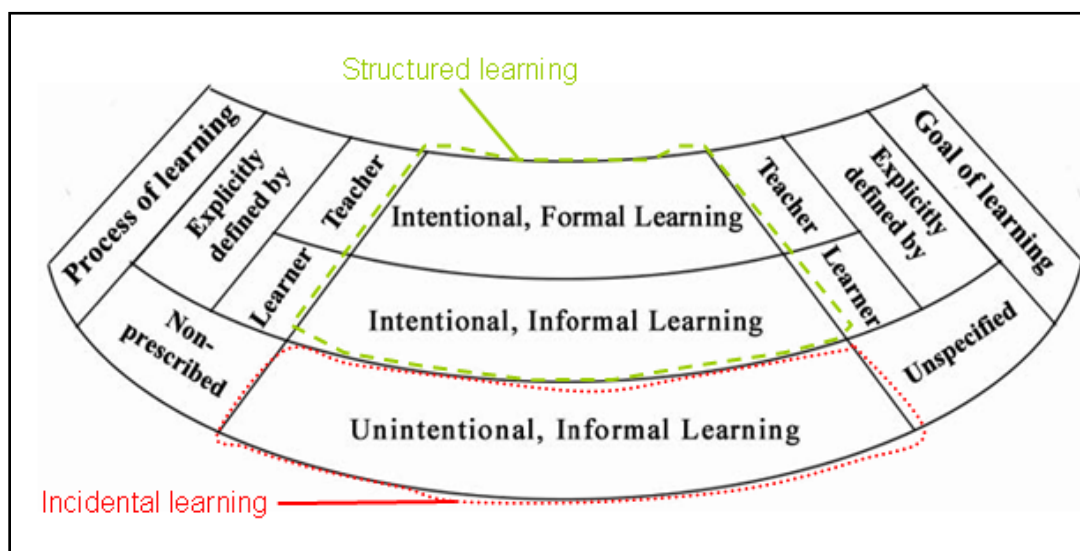
Figure 1   Typology of learning based on the presence of, and control over, the object and the process of learning (adapted from Vavoula, 2004)

Note that incidental learning can occur in the same situation as any occurrence of structured learning. For example, a student may be in an English lesson at high school, and may incidentally learn about YouTube because their teacher makes use of YouTube to show an excerpt from 'Macbeth'.

In any form of learning, the learner maybe *scaffolded* by other people, tools or resources, so that the learner is able to attain outcomes that they would not have been able to do without the scaffolding. In formal learning, *scaffolding* is often provided by teachers who guide their students learning via questions, answers and other interactions.

This guidance is often provided as *feedback i.e.* information given to the learner which describes positive aspects of a work or performance and informing them of aspects which could be improved. Feedback is an essential component of *formative assessment*, the practice of assessing learners so that they can improve their learning and achievement, **and** so that

teachers can modify their teaching in response to learners' needs (Nicol and Macfarlane-Dick, 2006).

Peer-to-peer teaching and learning can take several forms, and occurs in formal and informal settings. In a particular group of learners, those that are more advanced may take on a peer teaching role (and the others in the group take on a learning role). Alternatively, it may be reciprocal, where those in a group act as both teachers and learners (Boud et al., 1999).

Gamification is an umbrella term for the use of video game elements in an attempt to improve user experience and engagement in non-game services and applications (Deterding et al., 2011).

4. REVIEW OF EXISTING FRAMEWORKS AND TOOLS

4.1   INTRODUCTION

Learning frameworks can be categorised in many ways. For example they may be categorised according to the theories underpinning them, or by the intended purpose for the frameworks. Considering the aims of task 7.1 there are two categories of purpose that are useful to consider. These are

- Analytical frameworks
  This category includes frameworks whose main purpose is to provide a mechanism for analysing, understanding and evaluating existing learning events, i.e. events that have or are happening.

- Design frameworks
  This category includes frameworks whose main purpose is to support the planning and instantiation of new learning events and situations.

Given the goals of task 7.1 described in section 3, the focus of this review is on design frameworks and tools. That said, most design frameworks include an iterative design cycle, which includes cyclical stages of analysis and evaluation to inform subsequent stages of design and implementation. This means that the design framework chosen or created by task 7.1 will need to include analytical elements, but it must be design focused.

This section reviews existing frameworks and tools for the analysis and design of technology enhanced learning, focusing on those that deal with mobile learning. Issues related to use within the MASELTOV project are highlighted for each framework or tool. We also present a brief overview of the social context for language learning provided by busuu.com. This social context is of import because it already exists and it is work that the project will adapt and build on through both WP7 and WP8.

4.2   DESIGN FRAMEWORKS

4.2.1   FRAMEWORKS FOR DESIGNING TECHNOLOGY ASSISTED LEARNING: THE ECOLOGY OF RESOURCES MODEL AND DESIGN FRAMEWORK

Luckin and her collaborators define a model to describe technology assisted learning, and a design framework, which uses the model to guide the implementation of technology-rich

learning. Their 'Ecology of Resources' model builds on activity theory and Vygotskyian concepts of the Zone of Proximal Development (ZPD[1]) and scaffolding. (R Luckin, 2008; Rosemary Luckin, 2010; Rosemary Luckin et al., 2010). Luckin makes some observations about the Ecology of Resources model that can be considered to be characteristics of any useful model or framework, i.e. that a useful framework "needs to bridge the divide between the social and the technical. It needs to be able to be a descriptive mechanism that permits analysis and a generative tool to support software system design. It also needs to be represented at an appropriate level of abstraction so that it can be shared" (Luckin, 2010).

Key components in the model include the Zone of Available Assistance (ZAA), the Zone of Proximal Adjustment (ZPA), the Zone of Collaboration and the 'More Able Partner' (MAP) (Figure 2). Luckin defines the ZAA as the set of resources within a learners world that could provide different qualities and quantities of assistance, and the Zone of Proximal Adjustment (ZPA) as a subset of the resources from the ZAA that are appropriate for a learner's needs (Luckin, 2010page 49). To achieve this appropriate selection the learner depends on a 'More Able Partner' (MAP): "the MAP is responsible for working with the learner to ensure that an optimal subset resources from the ZAA is pulled together, so that the subset of resources form a ZPA centred around the needs of the learner" (ibid p95). The ZPD is the subset of resources from the ZPA that are nearest (most proximal) to the learners needs, as shown in Figure 2. The role of the MAP can be played by technology, a peer, a teacher, or a combination of these, and can be thought of as a kind of filter on the resources available.
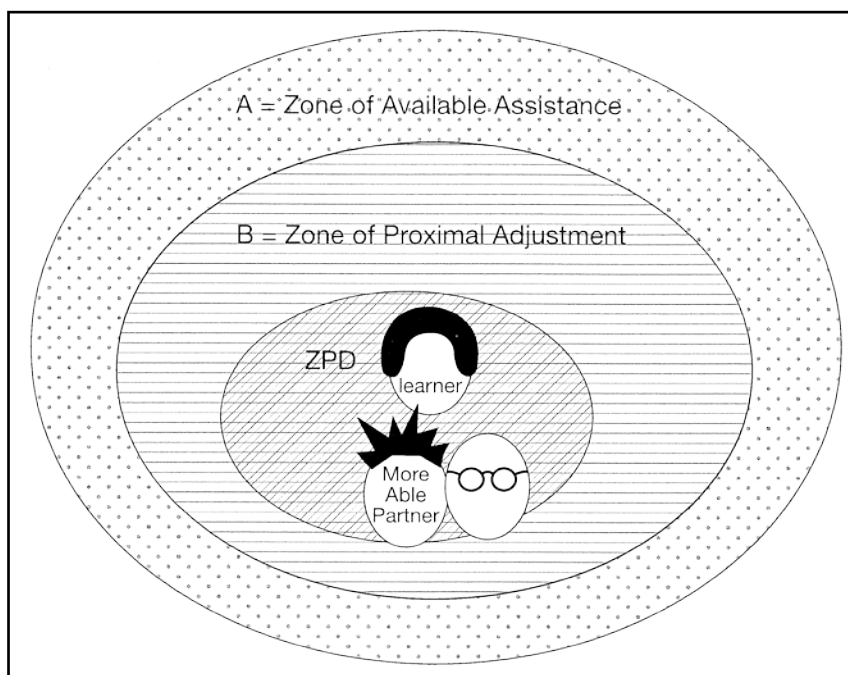
Figure 2   **The Zone of Collaboration, including the ZAA, ZPA and MAP** (Rosemary Luckin, 2010, p29)

Luckin's discussion of the role of technology includes a consideration of the importance of 'fading' i.e. that "there is a growing body of evidence that fading is a fundamental and intrinsic component of scaffolding" (Luckin, 2010) (fading is a term used to describe a

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[1] The ZPD is the distance between what a learner can do without help and what he or she can do with help from a more able assistant (Vygotsky, L.S. (1978)).

process by which the assistance given to a learner is reduced so that the learner gradually has to carry out more of the task to be learnt unaided).

The use of Vygotsky's ZPD in many effective teaching and learning interventions in the literature makes the Zone of Collaboration seems a good basis for a design model. Also, the Zone of Collaboration, ZAA, ZPA ZPD and MAP are concepts that are relatively easy to understand, so the basic concepts of the model as illustrated in Figure 2 can be grasped by laymen not just experts in learning or pedagogy.

The full Ecology of Resources model (Figure 3) describes the Zone of Collaboration in terms of a learner's interactions and context in terms of three categories of resources: tools, knowledge and skills, and the environment (people are included in the tools category). The extent of a learner's interactions with the resources are modelled using the notion of filters. For example, there are many knowledge resources for numeracy, but in formal education the curriculum will be an appropriate filter. In the model each category of resource can influence the other categories, and the strength of this influence may vary. Within a category of resources there are influenced-by relationships between the resource elements that constitute the category, and other relationships such as part-of type-of. The schematic diagram in Figure 4 shows the incidence of these relationships in an Ecology of Resources model for a particular context (numeracy).
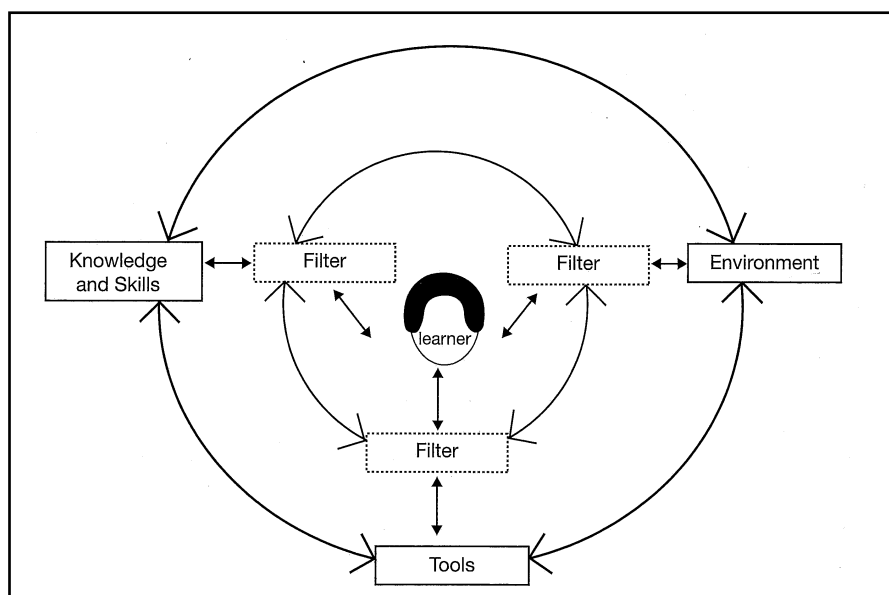
Figure 3　　　**The Ecology of Resources model: resource elements and their filters (Luckin, 2010)**
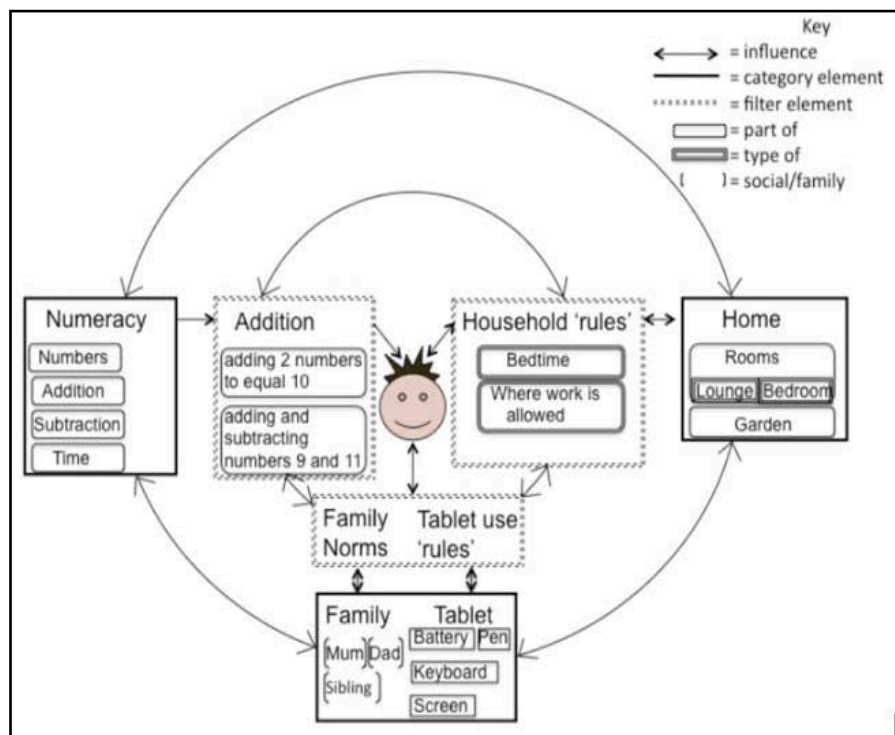
Figure 4   Ecology of resources model of the ZAA for a homework activity about numeracy (Clark et al., 2009)

The Ecology of Resources (EoR) design framework consists of three phases, each of which is broken down into a number of steps. These phases are carried out iteratively until the design is considered complete:

Phase 1:   Create an EoR model to identify and organise the potential Forms of Assistance that can act as Resources for learning

Phase 2:   Identify Relationships within/between Resources and Filters identified in Phase 1. Identify the extent to which they meet the learner's needs and how they might be optimized.

Phase 3:   Develop Scaffolds and Adjustments to activate the Learner's EoR to enable the formation of the ZPA and facilitate quantification (Clark et al., 2009, Luckin, 2010).

The framework is described in detail in both Luckin's book and on the wiki (Clark et al., 2009). The steps seem logical and should produce a good result, but there are many which seem to require detailed knowledge of individual learners or classes, which is often possible in a classroom or research setting, but may not be possible in the applications envisaged in the MASELTOV project; the amount of information that can be gathered by technologically will be an important constraint.

Also, it is acknowledged that the framework is intended to deliver a design which will work for a particular context bounded in both space and time, and that the optimal design will change as both temporal and spatial boundaries change. One way of applying this framework within the MASELTOV project without incurring a huge amount of work could be to identify a few 'typical' contexts, which would be designed for. Application to other contexts could be achieved by considering how an atypical context differs from one or more of the typical contexts. (When introducing the notion of 'context', Luckin refers to Manovich's discussion

of electronically augmented space (Manovich, 2006), i.e. that "a learner is not exposed to multiple contexts, but rather has a single context that is their lived experience of the world" (Luckin, 2010). Taking this into account would mean modelling context as a sequence of snapshots taken from the continuous flow of an individual's experience.)

The EoR model and framework will need to be applied with care to work effectively within the MASELTOV project, paying particular attention to choosing the 'typical' contexts to model and share. That said, the idea of the 'More Able Partner', and the concept of 'fading' are essential and seem easily transferable to a novel incidental learning framework.

4.2.2 FRAMEWORKS FOR DESIGNING LANGUAGE LEARNING

Kukulska-Hulme puts forward a framework for mobile technology assisted language learning based on evidence gained from interviews with 30 learners (mostly beginners) engaged in both formal and informal language learning (Kukulska-Hulme, 2012). The framework consists of three dimensions (activity, time and place), and a set of questions for each dimension to guide the exploration of decisions that need to be taken when designing new language learning activities, "so that they will have a good fit with learners' preferences and habits concerning locations and times for study" (see Figure 5).
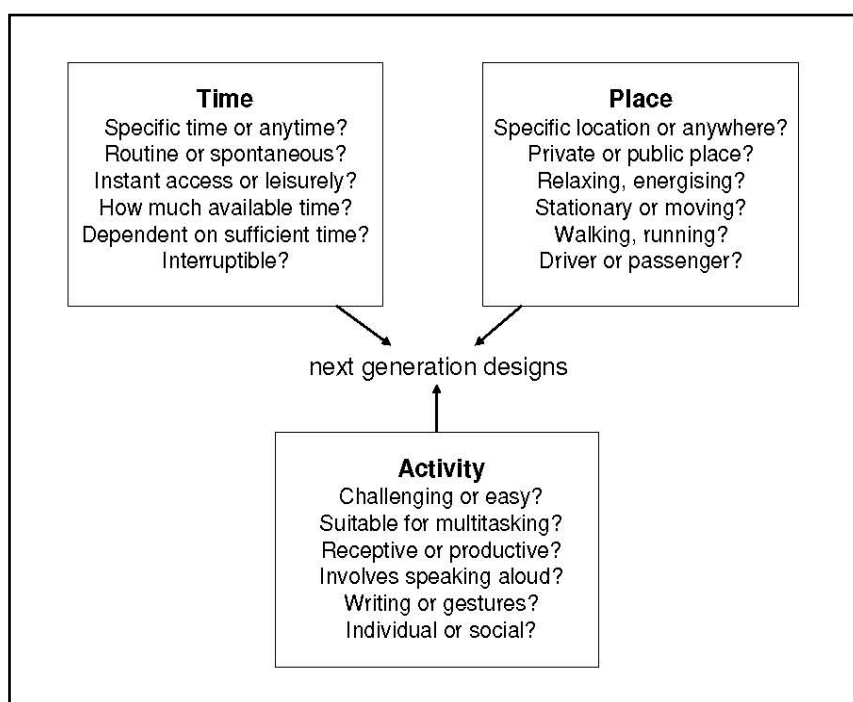
Figure 5   Conceptual framework for next generation designs for mobile-supported language learning in informal settings (Kukulska-Hulme, 2012, p9)

Kukulska-Hulme states that 'adequate knowledge about the learners is assumed' on the part of the teacher as a pre-requisite for planning and design for informal settings. This means that although the framework can act as a useful guide to acquiring some of the information about learners that will be necessary for a particular design to be effective, other knowledge (e.g. the learner's current capability and confidence) needs to come from other sources. In the MASELTOV project, these sources may include the learners themselves or their proxies, e.g. the NGOs supporting migrants.

Kukulska-Hulme makes the point that social context is very important to both language learning and use (p 10, ibid). Given the importance of the social context to the framework (Figure 5), it seems appropriate to consider defining the notions of 'place' and 'time' in a way that may help specify contexts in a way that is useful in the MASELTOV project. For example, the definition of place given by Sean Gillies of the Pleiades project is useful:

'A Place is a geographical and historical context for Names and Locations' (Gillies, 2011).

In Gillies conception, a 'Place' has a name and a location, and each may be applicable for a particular time period. For example, the place that may be identified as "Andrew's workplace" currently has the name "the Open University" and the location 'map reference SP 88626 37058". This form will be useful when applying Kukulska-Hulme's framework to real design problems. A similar discussion of the notion of time could be useful. For example, a 'Time' could be the demarcation of a particular instant or period (e.g. 12.30 a.m. on the 4th August 1965) and the name given to that instant or period e.g. 'lunchtime' or 'bedtime'. Defining 'Time' and 'Place' in this way can contribute to the specification of typical contexts, for application of the EoR or other frameworks as suggested in section 5.2.1. For example, 'Lunchtime' at 'Work' might be a good context for people to be prompted to practice vocabulary related to their work setting[2].

4.2.3 FRAMEWORKS FOR DESIGNING SERIOUS GAMES

The four-dimensional framework described by de Freitas and Oliver is intended to be used by tutors who wish to make use of games or simulations in their teaching (de Freitas and Oliver, 2006). It is to be used iteratively to evaluate and select games or simulations prior to their use, and is intended to provide heuristics, which allow practitioners "to be more critical about how they embed games and simulations in their lesson plans".

The dimensions of the framework shown in Figure 6. One key difference between it and other frameworks is the third dimension 'Representation' which is concerned with the 'internal representation world' of a game or simulation.

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[2] Luckin makes reference to several papers about time and space which should be explored for later iterations of this deliverable (Rosemary Luckin, 2010, p5).
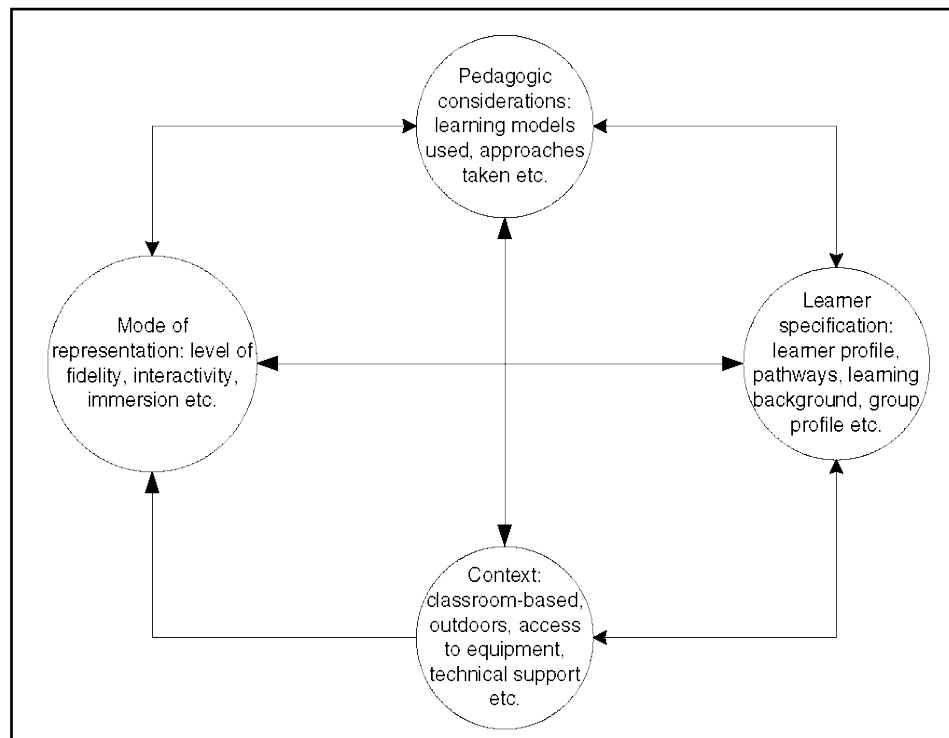
Figure 6 **The four dimensional framework for games and simulation based education** (de Freitas & Oliver, 2006, p. 253)

The four dimensions in the framework are:

- Context
  Context is considered at both macro (historical, political, economic factors) and micro levels (e.g. availability of specific resources and tools). The recognition of both levels concurs with the way context is discussed by Luckin with respect to the Ecology of Resources model. In the MASELTOV project, context is handled in WP5 (Personalisation and recommendation). It will be decided at a later stage of the project how macro factors should be handled.

- Learner (or learner group) specification
  In the examples given, the specification is of a typical learner, not an individual e.g. 'School learners 14-16 year olds' (de Freitas & Oliver, 2006, page 259). In MASELTOV, it could be sufficient for some situations to describe categories of learners (e.g. a category could be 'knows no English'), in others a more complete picture of the learner and their knowledge may be required.

- Representation
  This is concerned with factors which describe the 'internal representation world' of the game or simulation, including the interactivity, level of immersion, and fidelity of display used. The conceptualisation of representation in this way allows a clear distinction to be made between being involved in the game itself, and any reflection that might take place outside of the game, e.g. as part of a learning experience involving the game.

- Process of learning
This dimension should promote practitioners' reflection on theories, methods and frameworks used to support learning practice, in both formal and informal settings.

In common with the "Language learning defined by time and place" framework (Kukulska-Hulme, 2012), de Freitas and Oliver provide questions to prompt practitioners to reflect on each dimension of their framework, and thereby to apply it. The checklist provided (de Freitas & Oliver, 2006, page 256) and the examples given (de Freitas et al., 2010) show how the framework can been used to evaluate and redesign existing learning technology and experiences, thus the four-dimensional framework is most useful given an existing learning design to build on. That said, the introduction of the notion of 'Representation' as the internal representation world of the game, and the relationship of this to the learners' behaviour outside of the game is an important one that should be included within the incidental learning framework.

4.2.4 FRAMEWORKS FOR GUIDING IMPLEMENTATION OF MOBILE LEARNING APPLICATIONS

Muyinda et al (Muyinda et al., 2011) contend that frameworks for categorising or theorising about mobile learning exist, but that frameworks for guiding practical development of mobile learning applications do not. Furthermore, they point to 3 papers (all published in 2007) which call for research that targets the development of frameworks for guiding the instantiation of applications for utilising learning objects on mobile devices (we note that the situation has changed since 2007 and that several papers (as reported in this section) and tools (section 5.2.5) are now available which bridge the gap between pedagogical ideas and technological implementation). Muyinda et al's paper is included here because of its desire for a practical approach.

The authors use Khan's eLearning framework (Khan, 2001) as a basis on which to build their own mLearning framework, the Mobile Learning Objects Deployment and Utilisation Framework (MoLODUF). Kahn's framework has 8 main dimensions: Institutional, Pedagogical, Interface Design, Evaluation, Management, Resource Support, Ethical and Technological. Muyinda et al. created the MoLODUF by considering and synthesising 8 mLearning bjects frameworks and Kahn's framework; they provide brief reviews of each of these 9 frameworks (page 203). This results in the 12 dimensions in the MoLODUF, i.e.

- mLearning Cost
This dimension reflects the issues of costs to the producers of deployment and sustainability , and to the consumers of utilisation of mLearning.

- mLearning Processes
This dimension provides 'all the learning and teaching models commensurate with the limitations of mobile devices'.

- mLearning Objects
This dimension is concerned with the design and implementation of the Mlearning objects that will be delivered to learners.

- mLearning Devices
This dimension characterises the targeted device hardware.

- mLearning Resources
  This has 3 sub-dimensions which characterise the organisation delivering the mobile learning: Infrastructure, human and financial resources.

- mLearning Connectivity
  This characterises the ability of learners to connect with mLearning offerings in terms such as the bandwidth available to them.

- mLearning User profile
  This is called 'mLearning Pedagogy' in the paper, but it is actually concerned only with users (not just learners, also lecturers and administrators).

- mLearning Interface
  This describes how the platforms through which the mLearning is made available, e.g. various desktop and mobile platforms.

- mLearning Evaluation
  This dimension is concerned with assessment of learners, as well as evaluating the quality of mLearning provision.

- mLearning Ethics
  This includes issues such as privacy and security.

- mLearning Policy
  This is concerned with institutional and government policies related to mLearning.

- mLearning Context
  the author recognise that learners' contexts are important. In this dimension, 'Propellers' of mLearning can be identified and exploited, and 'Inhibitors' can be identified and mitigated.

Muyinda et al propose that the framework is used in an iterative way, staring from policy, and ending with evaluation, so that results of evaluation inform changes in policy, as shown in Figure 7. All dimensions of the MoLODUF are affected by the cost dimension.

The MoLODUF is interesting because it covers a wide range of dimensions that are all relevant to institutionally delivered mobile learning, and can be used to check that we have covered many of the aspects that our framework should deal with. However, it offers no assistance in making design decisions in response to variations in the dimensions (such as learner profile or context), thus can only be used to perform an initial cursory check of completeness.
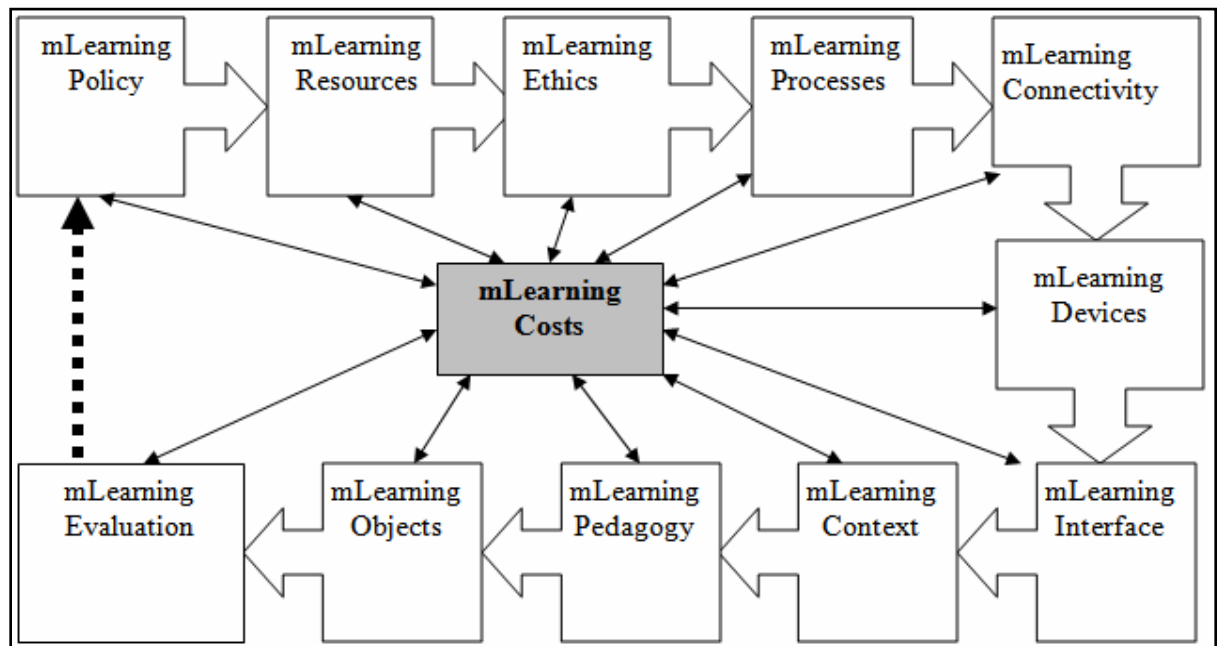
Figure 7 **Showing the Process Steps for Instantiating mLearning Applications using the MoLODUF** (Muyinda et al., 2011, page 213)

4.2.5 LEARNING DESIGN TOOLS

In the last 5 years there have been considerable developments in terms of learning design tools and practices. The Learning Design Workgroup funded by the STELLAR (Sustaining Technology Enhanced Learning at a LARge Scale) project catalogues some of these tools (Sustaining Technology Enhanced Learning at a LARge Scale, 2011). The tools available include text based module planners, graphical modelling tools, and tools that can produce runnable elearning modules (e.g. via the IMS learning design specification (IMS, 2005)).

At this stage in the development of the incidental learning framework we can only remark that some of the tools and resources may be useful to support the design process, and a more thorough analysis is necessary. However, some of the icons used in the representation of the initial version of the incidental learning framework shown in section 6.1.2 were developed for one of these tools, CompendiumLD (Conole et al., 2008).

4.3 ANALYTICAL FRAMEWORKS

4.3.1 FRAMEWORKS FOR ANALYSING AND CATEGORISING MOBILE LEARNING

Sharples et al define mobile learning as 'the processes of coming to know through conversations across multiple contexts amongst people and personal interactive technologies' and put forward a theory of learning for a mobile society (Sharples et al., 2007). Their framework for analysing mobile learning builds on the notion of conversation as an essential component in the process of learning (Laurillard, 2002), and uses an activity theory approach to the analysis of learning in context as shown in Figure 8. The framework makes a distinction between two layers: a semiotic layer in which learners activities are enacted through cultural tools and signs, and a technological layer in which learners interact with devices whilst in the process of learning. The distinction between semiotic and technological interaction may be

valuable for our incidental learning framework, in that it can help to identify scenarios in which technology may or may not be an effective support to learners' communication and shared understanding.
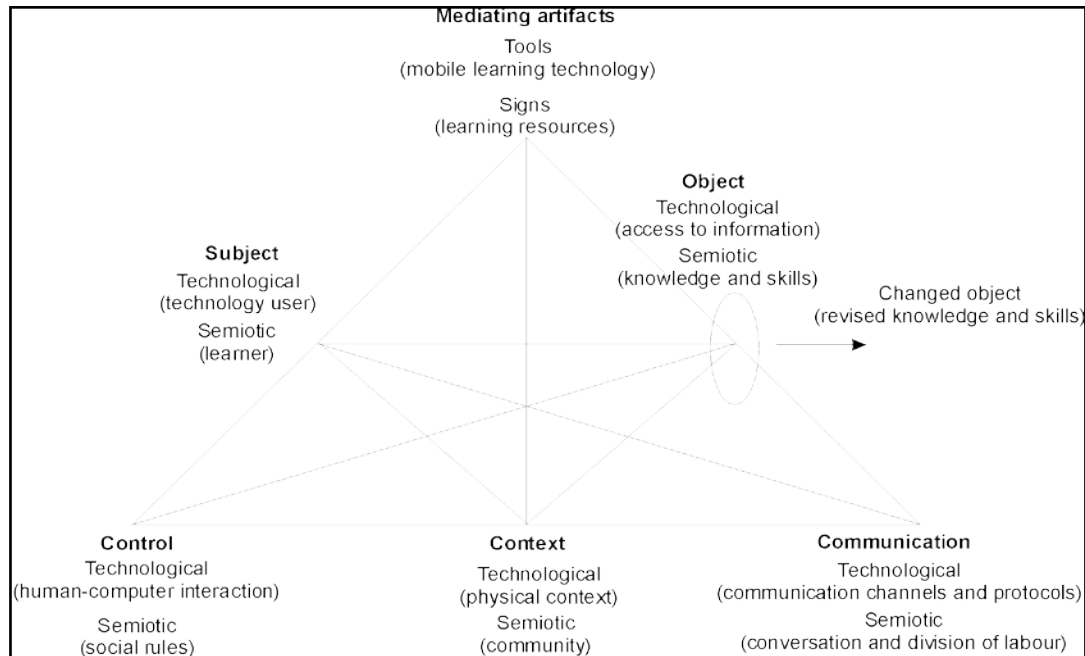
Figure 8   A framework for analysing mobile learning (Sharples et al., 2007)

In common with other researchers, researchers, Park makes use of activity theory, but utilises transactional distance i.e. 'the extent of psychological separation between the learner and the instructor' (Moore, 2007; Shearer, 2007 in (Park, 2011)) as the basis for a four dimensional framework to review and classify examples of mobile learning (Park, 2011). Park adapts transactional distance theory by adding a dimension to enable the theory to reflect social as well as individual aspects of learning, something that was lacking in Moore's original conception of the theory, and adds both a social dimension and the idea of mobile devices as mediating artifacts as in activity theory.   Park's framework is shown in Figure 9.

She states (p 95) 'I developed this classification scheme hoping to help instructional designers and instructors to design and implement mobile learning more effectively'.   However, it is not clear how this framework can be used to help learning designers. Park does not consider the effectiveness   of any of the mobile learning interventions in the case studies she categorises, and there is very little detail given to indicate how this framework might be used to increase the effectiveness of learning designs.   For example, Park states that 'mobile assisted language learning is a notable example of type 2'. The lack of detailed advice offered to learning designers is exemplified by that offered to 'instructional designers and support staff' developing activities of type 2, i.e. that they should'pay special attention to the creation and management of a knowledge database, including well-organized learning materials such as lecture (audio or video) files, reading materials, and vocabulary databases. The most important considerations might be accessibility and technical connection problems'. However, there is no indication of what 'well-organized' means in this particular scenario.
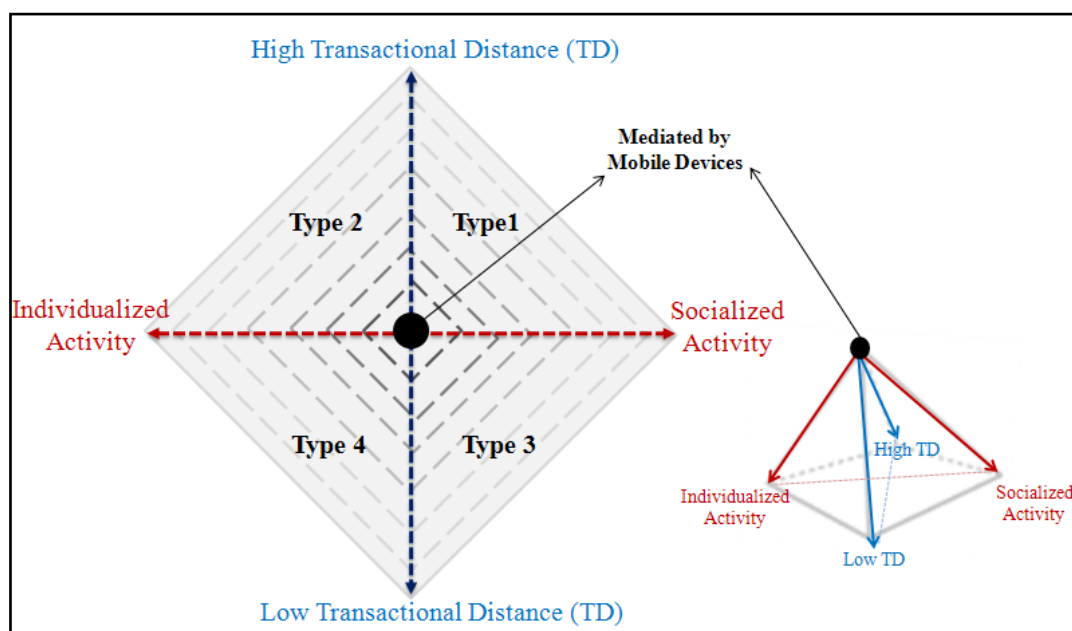
Figure 9   Four types of mobile learning: A pedagogical framework (Park, 2011, p. 89)

The dimensions of transactional distance theory (structure, dialogue and learner autonomy) are interesting because they are concepts that can be easily understood. However, they are also difficult because they seem to be interdependent, and because the concept of dialogue is potentially difficult when considering communication across cultures. When considering how transactional distance theory should be used it is worth bearing in mind that "Just as it is desirable for some students to have a high degree of dialogue, so for others it is equally desirable that they have little. Our theories have to describe the full range of relationships, without advocacy towards any" (Moore, 2007).

Moore's theory is useful in that it offers up variables that should be considered when designing, but it needs extending if is to offer anything concrete to designers. Park's extension of it is useful because it introduces the social dimension.

4.4   MODELLING THE LEARNER

Models of learners are used frequently in elearning systems to describe the state of the learner so that the system can react appropriately. Within MASELTOV there are several ways learner models may be used, e.g. to trigger the delivery of material relevant to a learner in a particular context, or to record and display achievements (Bull and Kay, 2007). Some aspects of a learner model may be used directly by an elearning system, some may be used by learners and their social networks (e.g. progress indicators), and some may be used by both system and human actors. Feedback and progress indicators are the topic of MASELTOV task 7.2 but an initial exploration of learner models is included here as we consider a specification of a learner model to be part of the incidental learning framework.

A recent review of learner modelling (Desmarais and Baker, 2011) indicates that a system that does not transfer knowledge of what is considered mastered between learning experiences can only react to current observable data about the learner. It seems essential that the learner model in the MASELTOV system does record a history of the learner's accomplishments. However, developing software to utilise a model to respond automatically to individual learner's contexts can be a complex task so we need to judge if, and in what circumstances,

this approach could be vlauable. It is likely that our initial approach should be some sort of open learner model, whereby aspects of the systems model are made available to the learner and/or their social network so as to promote learning and reflection (Bull & Kay, 2007).

Desmarais & Baker also discuss use of learner models to address affect, motivation and disengagement, but the accuracy of diagnoses made sytematically on the basis of such models is often low when compared with human performance, and the techniques used often rley on data that is unlikely to be available in the Masletov system e.g. heart rate and posture.

4.5   BUSUU: A SOCIAL CONTEXT FOR LANGUAGE LEARNING

This section on frameworks and tools concludes with a brief overview of the social context for language learning provided by busuu.com. Though not a design or analytical framework or design tool, this social context already exists and it is work that the project will adapt and build on through both WP7 and WP8.

The MASELTOV partner busuu.com is the largest language learning community in the world with more than 19 million users online and more than 8 million users on mobile. The factors that define the busuu.com learning experience are the fun online e-learning method and the social community that supports it.

busuu.com's success is built on:
1. **The learning process** whereby: a user learns a new language and that same user teaches his mother tongue to others in an interactive social environment
2. **The social interaction of the community**.

4.5.1   THE LEARNING PROCESS

Each user learns a language but also helps others develop their knowledge of his own native language, he is therefore a learner and a teacher. From the moment a user signs in on busuu.com, he is invited to add friends with whom he can learn and to whom he can teach.

Figure 10   Peer-to-peer teaching and learning in busuu.com.

Strictly speaking users learn using two main features with other members of the community or their friends.

The user, Marcel in this case can help others, like Susanne, get a better grasp of his mother tongue. Susanne will also help him learn her language. They will be able to do so using the following tools:

1. **Integrated video chats** within the lesson plan which make conversation and interaction with native speakers a major part of the learning experience.

2. **Exercise correction**, which allows Susanne to send her writing exercises for corrections and tips.

4.5.2 THE SOCIAL INTERACTION OF THE COMMUNITY

In addition to helping others with their exercices or their conversation skills, users have access to other social tools to keep their friends motivated and on track with their learning.

A user can **send messages of encouragement**, or a busuu berry (the point system used on busuu.com) to make sure that the other user is on track and does not lose focus.

On busuu.com there is also the possibility to create **groups**, where users with the same interests in languages, topics, grammar etc. meet to discuss their interests and share their ideas.

Finally the learning activity and progress on busuu.com, is not hidden from **other social activity and networks**. Everything you do on busuu.com can also be shared with your friends on Facebook and followed on Twitter.

 shows what social interaction a user on busuu.com can have with one or many friends, or community members. In this case Marcel can socialize with Susane to support her language learning experience as shown below.
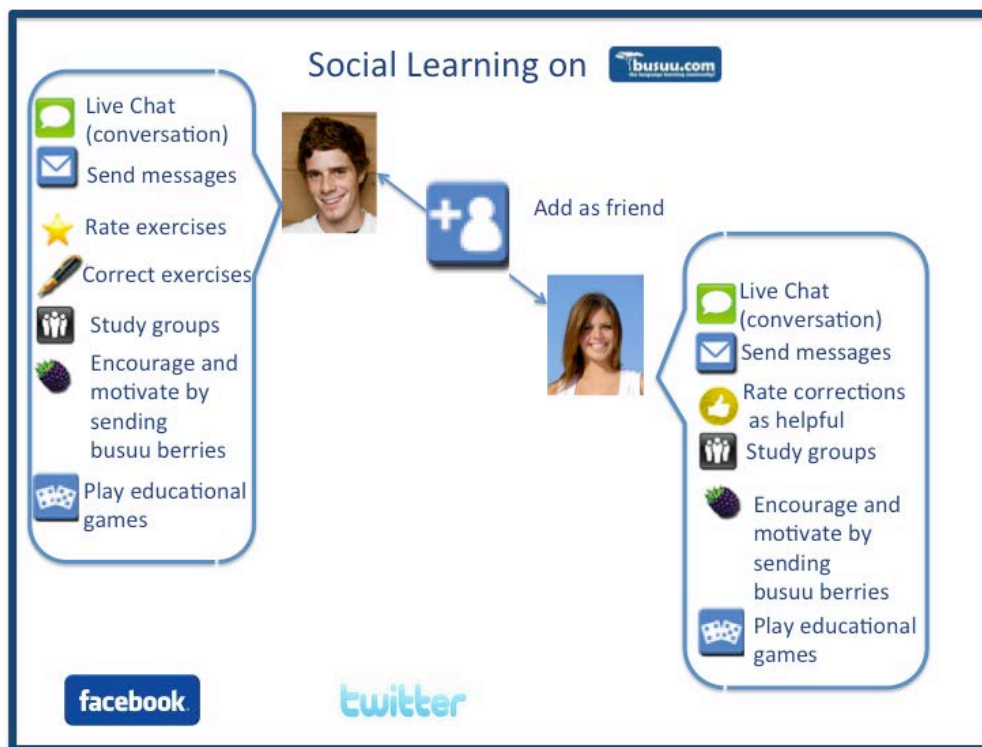
Figure 11   Social learning on busuu.com.

This social learning behaviour is organized around ¨Karma¨, you help others and they will help you. The community is therefore an integrant part of the user learning progress and experience. A user is motivated to correct others because this will increase the chances of his exercises being corrected. The same logic is applied to encouraging others to follow their learning objectives. If a user encourages another to stay on track with their learning objectives then, the latter will do the same for him.

Furthermore, a user's progress and success is also visible to others. This is the gamified layer of the learning experience. If one achieves his goal, one will receive a badge that will demonstrate his success to the whole community. The busuu berry count shows others your social ranking, the more points you have the more of an authority you become.

To summarise, busuu.com's success as a social learning community has been built on the following foundations:

1. Interactive social learning and teaching experience

2. Fun and gamified learning process

3. The engagement of its community.

5. THE INCIDENTAL LEARNING FRAMEWORK

5.1.1 INTRODUCTION

As we stated in section 4, the notion of "incidental" learning highlights opportunistic elements of learning when compared with the learning opportunities that occur in structured programmes. Incidental learning occurs as the by-product of some other activity; it is unplanned (Kerka, 2000; Silva, 2007). We have used Luckin's Ecology of Resources model (Figure 3) as the basis for our incidental framework because of its strong theoretical foundation, and its focus on the concept of the 'More Able Partner'. However, we recognise that although it is a generic framework that may be applied to all types of technology-supported learning, examples of its use focus on learning that occurs within formal structured settings. Because of this, we build on Kolb's theory of experiential learning (Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. M. (2000). This is often depicted as a learning cycle consisting of four steps i.e. concrete experience, reflective observation, abstract conceptualization, and active experimentation as shown in Figure 12.
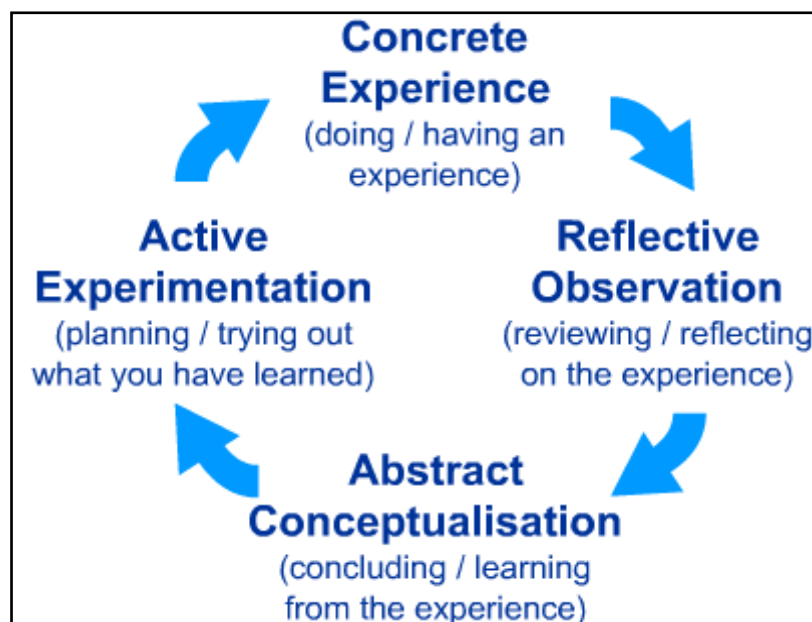
Figure 12   Kolb's learning cycle (image by Davies & Lowe)

In our framework the incidents represent the 'concrete experience', and the framework should depict how the learner may be supported in the incidents themselves, and also in reflecting, planning and learning from and in addition to the incidents.

5.1.2 REPRESENTING THE INCIDENTAL LEARNING FRAMEWORK

The framework is intended to depict interactions from the point of view of a learner. It can show the learners journey from one incident to another, over time. Incidents can be interspersed with reflection, planning and structured learning each of which may be triggered by the MASELTOV system. Each incident is characterised in terms of

- the place the incident (and structured learning, planning or reflection) occurs; place is not just a location, but also specifies some context information (see section 5.2.2),

- the task(s) the learner is attempting to carry out; these can be within incidents (e.g. buying a bus ticket to a specific destination), or part of structured learning or reflection, both of which may be prompted by the MASELTOV system,

- the tools (including content) the leaner can or does use to complete the task;

- the social support that the learner can or does make use of; the learner should be supported by tools and/or people to reach the intended learning outcomes, and the combination of tools and people is conceptualised as a 'More Able Partner' from the point of view of the learner (see below),

- the learning outcomes that the learner wants to achieve, and those that the learner does achieve; some language learning outcomes, e.g. 'can understand frequently used expressions related to bus travel' may be specified in accordance with the "Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR)" (Council of Europe, 2007),

- the (relative) time the incidents (or structured learning, planning or reflection) occur; as learning is a process which occurs over time, and previous learning outcomes affect the leaner's readiness for subsequent tasks, the framework must represent the relative time that learning occurs. In the framework, time is not necessarily just a specification of an instant or a measurement of a duration, it may also include contextual information e.g. 'Lunchtime' (see section 5.2.2).

In addition to this characterisation of incidents, the framework will also need to include some sort of characterisation of the learner, i.e. a learner model or profile. Issues concerning the nature of the learner model were discussed in section 5.4.

A schematic of the framework is shown in Figure 13.

In any incident, the learner may receive support from a 'More Able Partner' (MAP) to reach their learning outcomes. This MAP may be a person, a tool, or a combination of one or more of either of these; hence the MAP straddles the tools and social layers in Figure 13. MAPs should support the learner during any incidental learning activities that occur, and also prompt both reflection after an incident and planning of subsequent learning practice. Prompts initiated by the system are denoted as 'trigger's in Figure 13.

Figure 13 **A schematic of the first version of the incidental learning framework**

5.1.3 USING THE INCIDENTAL LEARNING FRAMEWORK

The framework should enable its users (i.e. learning designer) to bridge between an initial conceptualisation of an instance of incident learning and a detailed specification of the data and technology interactions needed for a system to offer support to a learner during the incident. This specification will include details about data needed to describe learners, places, times, outcomes, tasks and their interrelations, and the relative time that the learning incidents should occur.

The framework is represented as a circle in Figure 13, due to the limitations of this medium (Word/PDF) and our desire to initially present a simple view. However, we recognise that learning is an ongoing process in which learners perform iteration and reiteration of (modified) tasks to achieve a learning outcome and move on to the next level. Thus the presentation of the framework in Figure 13 can be thought of as a basis for modelling one iteration of a learning pattern (see e.g. McAndrew, Goodyear, & Dalziel, 2006). Our intention is that a learning pattern should be able to be applied in a slightly modified form to produce iterations of learning to enable the learner to reach other higher outcomes. This is discussed more in section 8.

Depending on the nature of the incident (or reflection, planning or structured learning period) that is being conceptualised, the learning designer can use guidance provided by other frameworks and tools to derive the more detailed specification. For example, if the incident is language related, the designer could use Kukulska-Hulme's framework as a guide (see section 5.2.2.). This is also discussed more in section 8.

6. SERIOUS GAMES AND INCIDENTAL LEARNING

In this section, we introduce the application of digital games within the contexts suited to incidental learning identified in Section 4, as well as within the broader scope of the MASELTOV project. In Section 7.1, a brief review of the current state-of-the-art in the use of digital games for "serious" purposes is presented. Whilst the scope of this deliverable means this review is by no means exhaustive, it does seek to identify the cases most relevant to supporting groups at-risk of social exclusion. The section then presents a range of frameworks and methodologies with various applications in serious game development, noting the lack of ubiquity and their shortcomings in prescribing generic, high-cost approaches. To address this issue, Section 7.2 and 7.3 focus specifically on the MASELTOV case, discussing the potential roles a game could play to foster social inclusion, as well as how the game may integrate with existing resources through the "gamification" paradigm, an extension of the content repurposing and reuse strategies applied to game-based learning in other European projects such as mEducator (Bamidis et al., 2011, Protopsaltis et al., 2011). The section concludes with a summary of the key considerations relevant to the application of serious games both within the general context of incidental learning, as well as the specific case of the MASELTOV project.

6.1 BACKGROUND

The notion of using digital games for serious purposes has been increasingly supported by evidence suggesting broad European engagement with entertainment gaming (ISFE, 2010), with around 1/4 of 13,000 Europeans surveyed by this report considering themselves a "gamer". Yet whilst evidence soundly supports the *principle* of using games to achieve educational goals, the methods by which these goals might be efficiently and efficaciously fulfilled remain the subject of on-going research. Examples of successful serious games supported by empirical study are increasingly emerging, such as Re-Missions impact on treatment adherence amongst young cancer sufferers (Kato et al., 2008), Triage Trainer's value as a learning aid for first responders (Knight et al., 2010). Similarly, games have been introduced and evaluated within classroom contexts with demonstrable success (Annetta et al., 2006). In each case, the findings are domain-specific and offer little guidance to those seeking to develop games in new arenas, save for general principles of end-user involvement, close integration of research within the development lifecycle, and support for iterative methods (Thompson et al., 2010). Thus, to best inform development within MASELTOV, this section is split into two sub-sections: the first focuses specifically on developed games and their associated evaluations with emphasis on cases where findings might be transposed to the scenarios addressed within MASELTOV, whilst the second reviews established frameworks and methodologies for serious game development, asking whether they can be effectively reused. This is particularly challenging when considering the evidence base supporting these frameworks, pragmatic considerations, and support for incidental learning through the framework presented in Section 6; therefore, rather than adhere firmly to one of these

frameworks, Sections 7.2 and 7.3 focus specifically on how their individual components and guiding concepts might be best adapted to the MASELTOV case.

6.1.1 STATE-OF-THE-ART: A BRIEF REVIEW

The paucity of objective, empirical evaluations of game-based learning is well-noted (Dunwell et al., 2011a). This is not the result of a single barrier, rather, multiple underlying factors present themselves as obstructions when seeking to evaluate any given serious game in a form that would provide the development community with evidence of high value in seeking to build subsequent interventions. The first is the inescapable impact of evaluator-stakeholders in conducting impartial evaluations of their own interventions. Evidence from meta-analyses in public health showed through systematic review of 100 trials that developers were 2.6 times more likely to show a positive outcome than an independent evaluator (Garg et al., 2005). This is not necessarily down to a conscious bias on the part of the developer, but can also manifest itself through the continuation of erroneous assumptions from design through to evaluation, for example that an intervention is reaching its target rather than appealing to a more engaged, technology literate, and, consequently, lower-risk demographic (Taylor, 2007). Often, negative evaluations that do emerge have significant value, for example Reeve's reflections on the needs for integration with a wider programme of study, scaffolding, and peer support (Reeve, 2011). A second barrier to objective evaluation stems from the nature of the problems game-based approaches frequently aim to address. These are typified as problems without existing solutions, hence the motivation for attempting a game-based approach, yet often this lack of existing solutions is linked not only with the difficulty to deliver a solution, but also to demonstrate conclusively its value. Consider for example road safety: the incident cost of a pedestrian fatality can be in excess of €1m (Andersson, 2007, Elvik, 2001), therefore an intervention preventing only a handful of such incidents would be of high value. Providing such proof, however, is less straightforward, particularly in the practical constraints of limited samples and the need to assess impact through indirect and subjective means such as survey.

This list of barriers could easily be continued; however, these two considerations alone, both of which are relevant to MASELTOV, have limited the emergence of evaluations which conclusively and concretely shape the direction of serious game research and application. Nonetheless, if we are willing to accept these limitations, a range of studies have shown the value of serious games. Children are an obvious audience for game-based education, with established pedagogical theory often reflecting on the central role of play and abstraction in learning (Vygotsky, 1978). Several evaluations have shown games can impact not only the knowledge, but also the attitudes of children around topics such as nutrition (Baranowski et al., 2003), self-management of diabetes (Thompson et al., 2010), treatment adherence in chemotherapy (Kato et al., 2008), or exercise (Christison and Khan, 2012). These have largely validated concepts such as the need for entertainment to supersede instruction (Zyda, 2005), as well as the need for games to be carefully blended into the wider curriculum (Annetta et al., 2006). These concepts themselves are intertwined, since effective blending can allow a serious game's designer the freedom to focus less on instructional content and more on the delivery of an engaging and compelling experience for the player. Despite what could be considered a focus on younger audiences, serious games have also been applied to a wider audience. Exercise, or "exergaming", for example, has also been explored with older generations (Anderson-Hanley et al., 2012). Though difficult to infer a trend from the limited number of available studies, it could be suggested that games for younger audiences focus more on motivational or informational aspects (Best, 2011, Garn et al., 2012, Shayne et al.,

2012, Christison and Khan, 2012), and those for older generations on the activity itself (Anderson-Hanley et al., 2012, Snyder et al., 2012). Even then, the evidence base must be cast in light of studies showing the limitations of exergaming when compared to other forms of exercise (Bailey and McInnis, 2011, Kraft et al., 2011). This single case highlights the particular challenge in assessing serious games deployed in a blended learning context: playing a game might in itself not lead to significant exercise, but does it stimulate the learner to develop a more active lifestyle, or restrict it? Again, this is a question difficult to conclusively answer due to the nature of planned behaviour and surveys (Ajzen, 2011).

Returning to the review theme of this section, public health is not alone in having gained attention as an area in which serious games might be applied. Awareness-raising of flooding risk was demonstrated through FloodSim (Rebolledo-Mendez et al., 2009), with 25,000 users attracted to the game over a 4-week period. Smaller-sample work supported its value in raising awareness amongst players, validating in part the notion that a game thematically linked to a topic could promote awareness whilst also appealing to a broad demographic. Public engagement with sustainability issues has also been approached through game-based techniques (Antle et al., 2011), with collaborative and community aspects of gaming cited as valuable assets in this case. Political perceptions and human rights have also been tackled through game-based methods, for example in the case of conflict in Palestine (Klemperer et al., 2011), though again the difficulty in assessing conclusively impact on planned behaviour (Ajzen, 2011), as well as reach beyond the confines of an experimental environment, mean again conclusive efficacy has yet to be demonstrated.

Directly relevant to MASELTOV are a number of applications of serious games in the area of intercultural learning. The game *It's a Deal!* (Guillen-Nieto and Aleson-Carbonell, 2012) was created to support intercultural learning of business communication skills between English and Spanish participants. A study (n=106) demonstrated efficacy for the game, though the intra-group nature of analysis lends itself more to qualitative and indicative validation of the authors' principles put forward as central to creating an effective serious game in this case: specifically, a balance of instructional content, game dimensions, game cycle, debriefing, perceived educational value, transfer of learnt skills and intrinsic motivation. The generic and vague nature of these principles is a criticism that might readily be applied to many game-based design approaches: creating a game is as much an artistic endeavour as it is a technical undertaking, and it is perhaps for this reason that games defy attempts to provide such generic and prescriptive frameworks for their creation - we can no more write a recipe for an entertaining game than we can for a classical painting or composition. Certainly we can identify commonalities and ensure the necessary ingredients are in-place, but we must also acknowledge the creative process and move beyond the expectations of policymakers and instructional designers to fully embrace the medium. If we take the stance that such entertainment is a critical component of a successful serious game (Zyda, 2005, Prensky, 2003) then we must also accept this problem as one at the centre of building an effective solution.

A review of serious games in intercultural learning focussed on the notion of the "intercultural simulator" (Fowler and Pusch, 2010). This immediately constrains the design to a certain approach, though one which, by the findings of Fowler and Pusch's review, warrants further exploration. At its simplest level the intercultural simulator provides a playful environment for exploration of cultural difference through dialogues between with either virtual agents or real-world confederates. For example, *Calder Connections* (Fowler, 2003) seeks to transfer an understanding of impressions, knowledge, and connections the user brings to art and other intercultural encounters. Similar approaches have been taken within a business context to

allow individuals to better understand the cultural implications of both gestural and verbal communication styles (Hogue et al., 2010). As with any simulator, an intrinsic link exists between the fidelity of the simulation and the effectiveness of learning transfer (Wang et al., 2008), and a principal issue in the efficacy of these simulators is the need to provide high-fidelity interpersonal interactions. Not only is this a demanding task visually, with the many nuances of gestural communication requiring sophisticated avatars and animation techniques (Endrass et al., 2010), but also dialogically, as the multiple-choice approach to dialogue commonly adopted for interactions with a virtual agent is inherently unrealistic. Technology is increasingly enabling more natural interactions between human and agent (Kemke, 2006); however, as increased ability for divergence and "sandbox" approaches to game-based scenarios emerge, methods for providing effective analysis and feedback to learners become correspondingly more complex (Dunwell et al., 2011a).

An alternative game-based approach to cultural learning is presented through the use of the accelerometer in a mobile device to recognise and respond to gestures (Rehm et al., 2010). Though its value remains undetermined, an intriguing potential is demonstrated here for mobile devices to reflect and identify the behaviour of their user and, through play, scaffold learning. The social element of gaming, and particularly mobile gaming, has been explored as a basis for intercultural communication. An exploration of the use of mobile games for "backpackers", defined as individuals travelling outside their home country, again showed promise as a method for bringing diverse cultures together, but is again limited by the lack of sufficient validation and evidence, with the authors' principally focussing on the design rather than efficacy of the game (Wong et al., 2009). However, here the game and its design itself are largely irrelevant to the task, rather it is the underlying community and its interactions that hold the strongest impact potential. In this case what is essential is that the game appeals to this community and has sufficient technological capacity to support meaningful social interactions between players. This contrasts with the intercultural simulation approach presented previously, which is built around a dyadic interaction between human and confederate, or human and virtual agent. Either approach is likely to preclude a certain audience; it could be naively argued in the face of the lack of evidence that more active and outgoing migrants may thrive in a social community, whilst those more reluctant to socialise, and therefore at the greatest risk of exclusion, could prefer a single-player approach. This is reinforced by evidence suggesting gender bias and other factors present in challenge-type games is absent in more collaborative situations (Chen and Wang, 2009), though as is the case throughout this section, there is a lack of the conclusiveness that would be required to recommend a certain approach within MASELTOV.

Inclusivity is an important theme when considering how games might be applied to tackle social exclusion. From a design standpoint, this would advocate conformity in user-interfaces, limited assumption of a priori knowledge, and end-user involvement in design and testing (Gill, 2007). However, given the constraints this would place on a serious game's designer, rather than attempt to engineer a single, ubiquitously-accepted game, a potential route is an approach which allows for the game to be tailored either directly or autonomously by understanding individual users (Grammenos et al., 2009). Whilst in-principle such an approach has the potential to provide an inclusive game, it is difficult to enact in practice due to the costs associated with providing sufficient content and methods for customisation. A community driven approach may offer a solution, and is an argument behind a wholly or partially open-source directive when creating such games, but comes with the pre-requisite of an engaged community willing to add to the development and customisation effort.

6.1.2 FRAMEWORKS AND METHODOLOGIES FOR SERIOUS GAME DEVELOPMENT

Though, as noted by the introduction to Section 7, the lack of ubiquitous, detailed, and empirically validated methods for serious game design limits the number of available frameworks and methodologies, some general principles do exist. On a technical level, a digital game is not dissimilar to any other large software development project, and therefore recognised models such as Boehm's spiral (Boehm, 1989) are readily applicable. One perspective describes a serious game as an iterative, user-centric agile development project (Asuncion et al., 2011); iteration is expressed as central in a range of methodologies for serious game development (Nadolski et al., 2008, Kelle et al., 2011). However, in its loosest form, iteration can be suggested as a solution to a wide range of issues; the problem is translating the iterative cycle into one sufficiently pragmatic for game development within resource constraints. In doing so a range of unanswered questions emerge: if investing resources into multiple iterations results in a lower-fidelity game, does it remain the optimum route in the face of research suggesting such fidelity is so valuable (Petridis et al., 2010)? If we do iterate, how do we ensure each prototype is sufficiently well-researched to ensure valuable feedback into the next cycle? Here games again present some unique considerations in terms of both the challenges and potential they afford when used as research instruments (Gamez et al., 2010).

Also noted in literature is the need for development effort to be genuinely collaborative in nature (Taylor et al., 2009, Tran and Biddle, 2008), a consequence of the need to balance carefully the needs of engagement with the needs of instructional design (Zyda, 2005). The various stakeholders in a serious game development project are seldom co-located, a major factor in effective collaborative design (Tran and Biddle, 2008). Furthermore, the various perspectives of these stakeholders must be considered through objective research rather than subjective input, else a game can risk duplicating existing problems (Dunwell and Jarvis, 2012). Similarly, a risk may exist of games being designed to meet stakeholder expectations, taking a simulative route due to the ease in aligning the look-and-feel of the game with that of more conventional educational material. Simulation is partly paradigmatically-opposed to gaming: simulations strive for reality, whereas games will readily sacrifice it if it becomes a barrier to user experience. Evidence comparing high-fidelity simulation to lower-fidelity game have demonstrated results in favour of the more engaging experience. Social games present a particular challenge from this perspective, as the game may function more as a tool for populating and sustaining a social network, rather than an instructional medium. As such, a purely entertainment game could serve as an effective "serious" tool, with its key defining characteristic being its owner, rather than its content.

Reports from pragmatic development contexts reinforce these concerns (Werneck and Chang, 2009). In addition to over-prescription of iteration and reluctance to embrace fully a game-based medium, Werneck and Cheng report other issues to include negotiation within the project, level of scrutiny imposed to more novel approaches, revisioning and postponement, and misinformation on resources. These alone each represent significant barrier in attempting to enact a collaborative development project, even more so when cast in the light of negative perceptions of gaming still noted in some sections of the organisational hierarchy by this study. It is important to consider this study in terms of the single case it reports on, but other studies have similarly reported difficulties in serious game development to arise from the complex multi-organisational structure at the core of many projects (Khaled and Ingram, 2012), as well as the constraints of technology, domain knowledge, user research, and game design. This is reiterated from an alternative perspective in the four-dimensional framework (de Freitas and Oliver, 2005), which posits learners, their context, the representational

medium, and pedagogic method to be key, though offers little guidance beyond highlighting these initial considerations due to the lack of an evidence base on which to construct such guidelines.

The value of blended learning was noted in the previous section, and thus it is worth giving some consideration to the frameworks and methods, which have in the past been used to achieve the effective integration of game-based learning in a wider curriculum. From a technological perspective, integration within the learning environment offers potential for exploration of the role a serious game might play (Dunwell et al., 2011b). In this case, developed within the EU-funded ALICE project, a game-based approach to evacuation training is integrated into the Intelligent Web Teacher (IWT) Learning Content Management System (LCMS). The integration is then leveraged pedagogically as a basis for creating a blended learning environment, which allows educators to define and manipulate the game as a content object. The integration also allows the tutor to monitor how learners are interacting with the game to identify knowledge deficits and refine their teaching programme in response. Other evidence also suggests success for games deployed through blended approaches (Tsai et al., 2009). This is contextually-limited, however, as beyond the confines of the classroom, blended learning is less straightforward to apply. Certainly other resources can be used to supplement, replace, or augment the game-based learning approach, but scope for pedagogical diversity is more limited given the confines of a desktop computing environment and absence of a facilitator.

Pervasive and mobile computing offer some potential to move beyond these confines and create new models and mediums for learning transfer. Physical activity is an obvious area for this application which has been explored through a number of systems with positive outcomes (Fujiki et al., 2008). Sensor networks and virtual worlds have also been explored towards more general learning objectives with promising early findings (Mottola et al., 2006). Frameworks in support of the development and deployment of games in pervasive and mobile contexts are emerging, and though again lacking in conclusive demonstrations of efficacy, provide some relevant considerations. In an attempt to prescribe a framework for persuasive gaming, Oja and Riekki focus primarily on the case of ubiquitous games, noting the importance of access to data and considering both bespoke games and gamification (Oja and Riekki, 2012). Omitted, however, are the underlying ethical questions raised when seeking to adjust behaviour, and particularly how this access to data can be achieved consensually without compromising the efficacy of the intervention: if we inform users of the purpose of the activity to inform consent, we might similarly compromise its efficacy as a means of "stealthy" learning transfer (Hildmann et al., 2009).

Reflecting on these frameworks and studies in the context of the MASELTOV project is the emphasis of Section 7.2. Adopting the principles identified in this section of a blended and holistic approach to the inclusion of game-based learning is essential, as is recognising the constraints and opportunities of the incidental learning model. Hence, in this following section we present both the consideration of the incidental learning model, and how a 'gamification' approach might enable the repurposing of learning content to capitalize on the benefits of gaming.

6.2 THE ROLE OF GAMING IN AN INCIDENTAL LEARNING CONTEXT: A GAME FOR MASELTOV

Incidental learning, defined more fully in Section 6, refers to learning which occurs indirectly during an informal or formal learning experience.

"Personally, I'm always ready to learn, although I do not always like being taught"

- Churchill

If we take the standpoint that humans are indeed in this constant state of learning, then this incidental learning refers not to specific, episodic periods when it can occur, but to a constant and holistic process. However, this does not mean we are unable to engineer specific episodes where informal learning is more probable and effective (Bahrick, 1954). A relationship can be seen to the notion of a "flow" experience (Cziksentmihalyi, 1997), though whilst a common advocation in serious game design is to achieve this high level of learner engagement, how this might interact with incidental learning? Examples from entertainment gaming have shown the impact of *World of Warcraft*[3] on a range of skills developed by players, including conversation (Nardi et al., 2007), intergenerational learning (Kurniawan, 2008), and collaboration (Nardi and Harris, 2006). As players are not explicitly seeking to develop these skills, but rather they are a means to achieving game-based objectives, they could be argued as a form of incidental learning. To explore these issues, this section is split into two distinct subsections: the first relates the model of incidental learning presented in Section 6 to the notion of game-based learning, seeking to understand how it may be best accommodated through play. The second subsection focuses on the notion of gamification, particularly relevant to MASELTOV both through its increased prominence as a means to make learning content more accessible, engaging, and compelling, as well as the pragmatic benefits of reusing and repurposing content, rather than generating it.

6.2.1 INCIDENTAL LEARNING AND GAMES

Given the argument that serious games should first and foremost be fun (Zyda, 2005), this provides a potential route to relax the requirements of including instructional content within the game, and focus more on exploring how the skills developed to play it might be a more significant outcome. Caution must be observed, as attempts to implement behaviourist paradigms in serious games have met with limited success: players tend to learn to defeat the game by circumventing rather than achieving the learning objectives (Binsubaih et al., 2008). This has an important relationship to motivation, as if we are reliant on the fun aspects of the game to stimulate intrinsic motivation, we must be wary of assuming that players automatically become interested in its pedagogical content. Yet despite these pitfalls, examples have shown such indirect learning through play to be a valuable tool (Chen and Yang, 2011). The main barrier may not be one of design, but rather of design process, as a more entertainment-centric design with pedagogical content on the periphery may contribute to a serious game being perceived as a less valuable learning resource (Werneck and Chang, 2009). Furthermore, it poses the question of why investiture in a bespoke serious game is worthwhile when an entertainment game could similarly be purposed to the task.

Referring to the incidental framework briefly presented in Section 6.1.2, several considerations present themselves. As the framework is derived from an experiential model, a number of issues relevant specifically to a gaming or simulation context emerge; consider for example Figure 14, which illustrates the need for exploratory elements as well as consideration of the impact of abstraction on an experiential cycle. The first issue reflects the consideration that games can be highly non-linear in nature, allowing the learner a greater

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[3] http://us.battle.net/wow/en/

degree of freedom to diverge from the learning path than a didactic or more structured resource. Whilst this supports better the "intuitive" approach to learning described by Kolb (Kolb, 1984), and hence provides more holistic support than a more structured experiential method in line with Kolb's "sensing" categorisation of learners, it complicates assessment: intuitive learners want to *explore* the outcomes to a situation by trying all possibilities, therefore an incorrect action might not correlate to a deficit in knowledge or understanding, instead representing this exploratory nature of intuitive learning. The second issue, of the rift between virtual (game environment) and real-world spaces, relies on learner understanding and ability to transition in-game events to real-world learning outcomes. Clearly this relies on this capacity being in the learner's zone of proximal development (Vygotsky, 1978), else some form of external scaffolding such as an instructor will be required to ensure an effective learning experience. Whilst this might be trivial if a game's message or form of information transfer is direct, more subtle approaches to changing perceptions, affect, or behaviour can prove hard for learners to relate to concrete outcomes (Lee et al., 2012).
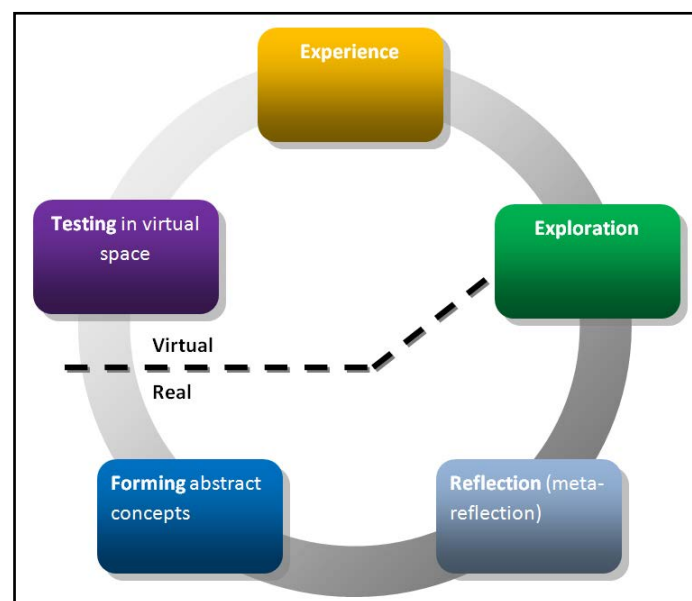
Figure 14: Exploratory model of learning for serious games (Dunwell et al., 2011a)

Games can nonetheless provide an important backdrop against which incidental learning occurs. Much evidence supports the capacity of games to transfer learning indirectly (Ke, 2008, Monk et al., 2010) within a "flow" experience (Cziksentmihalyi, 1997), in which the enjoyability of the task is not compromised. As such, many incidental learning examples could be seen as arising through an episode of gameplay, ranging from an interface level (e.g. keyboard skills), through to cognitive skills development (Connolly et al., 2012). A particular value of incidental learning applied to games might prove to be its ability to transfer its outcomes indirectly, and hence not impede the game experience with pedagogical content or learning materials. Key to ensuring this learning contributes towards an intended set of learning requirements is deep and careful consideration of the various factors presented in Section 6; in particular what supplemental resources might be available, the context in which learning is occurring, and the affective and motivational states of the learner should all be considered. The resulting implications may inform the design of the overall experience rather than the game itself, since by nature incidental learning is difficult to intentionally direct to a

narrow set of required outcomes. Rather, a broad approach which facilities learning in multiple dimensions, and provides adequate scaffolding and resources as demanded by the learner, is more likely to prove effective than a concerted effort towards a single learning outcome when implementing an incidental learning approach. Moreover the consideration of to what extent incidental learning is emphasized in development, and if it should assume priority in any conflicts with the formal or informal pedagogical structure of the learning experience, should be considered.

6.2.2 GAMIFICATION

In this section, the notion of gamification and its relationship to both incidental learning, and the MASELTOV project in general is explored. Though the term itself has only recently entered widespread usage (Deterding et al., 2011) to describe the concept of making existing content more engaging through the incorporation of game-based elements and paradigms, the concept of repurposing resources into a game based form has been explored through a range of projects. These include explorations of the use of gamification in such diverse contexts as social media (Vassileva, 2012), intelligent environments (Liu et al., 2011), and archiving (Grace, 2011). Core to all these studies is the notion of addressing a lack of engagement amongst users through a game-based approach, posited to stimulate intrinsic motivation. Also common is the use of existing resources as a basis for gamification, though these resources can take a wide range of forms, including processes and multimedia as well as simple text-based objects. The learning object (LO) approach, which advocates expressing learning content in discrete, composable, and reusable pedagogical terms, is a potentially rich source of material for gamification. In this context, gamification can be seen as an evolution of the research effort into repurposing learning objects (Verbert et al., 2005) to focus specifically on the case of game-based learning. This has already been attempted at the scenario level with some success (Protopsaltis et al., 2011); here the authors show the repurposing of the *Happy Night Club* game between educational contexts, with game-based elements added or removed as required. To enable such approaches on a wider scale requires both consideration on technical and pedagogical levels of how a more autonomous approach to such repurposing might be applied.

A study of gamification in a mobile context for university students demonstrated both the potential of the approach to engage students, but also several drawbacks (Fitz-Walter et al., 2011). Game-based approaches are not universally welcomed, and in this case could be perceived as making a resource less valued as a learning resource. The "strictness" of game rules and level of difficulty are also noted as challenging to effect without leading to usability issues. Given the recognised importance of usefulness and ease-of-use in technology acceptance (Davis, 1989), these findings suggest gamification must be carefully and selectively applied to avoid a negative outcome. This could be achieved by adaptivity on an individual level, for example giving users the choice between the initial resource and its gamified form, though this assumes users would be able to introspectively select the ideal resource for their learning needs, a theory partly contradicted by a number of studies (Kostons et al., 2010, Tsui et al., 2008). A more comprehensive solution, therefore, should seek to understand the learner more fully and provide them with the optimum resource based on this understanding, a task which is the subject of continued research (Komedani et al., 2005).

A possible categorisation of gamification could be achieved by considering its application as a means of learning transfer versus its application as a means of (self-)assessment and feedback. In the latter case, existing systems have sought to transpose linked data into automatically generated assessments (Foulonneau, 2012), and a potential transition from question, to quiz,

and simple game can be suggested. Much existing research into the automated generation of assessment and feedback, particularly that focussed on empowering the user with the capacity for self-assessment (Sitthisak et al., 2008), could be considered as a basis for gamification at the self-assessment level. Given the importance of feedback in both gaming and learning, and its central role in effective game based learning (Dunwell et al., 2011a), this is an area worthy of future exploration. In particular, how a transition can be achieved from primitive quiz-based game designs to more interactive assessments of learner competence, drawing for example from areas such as simulation, is a relevant area of continued work. In the context of MASELTOV, however, the lack of existing research defining methods through how this might be achieved could lead to a simplistic solution at the assessment level.

Considering instead then the application of gamification as a means to promote or enhance learning transfer, the scope is far wider, though this carries with it a challenge in defining best-practices and techniques for effectiveness. One approach explored through games such as *MeTycoon*[4] is to gamify at a content management level, controlling access and path through content through an overarching game. As a game for career guidance, *MeTycoon* embeds existing and conventional learning objects including video interviews with employers and employees within an overarching gameplay mechanic built around the notion of the player progressing through their life in a way similar to a character in a role-playing game. Though its efficacy remains unproven, it demonstrates a distinct design concept in gamifying at a meta rather than content level, migrating the game into the learning content management system rather than expressing it as a learning content object, a notion explored in other studies (Dunwell et al., 2011b). In simple terms, this approach assumes we can stimulate learners to experience content more readily if they are challenged and rewarded through an overarching game for doing so. The potential value of such an approach is reflected in the reward systems frequently being applied to commercial learning environments, such as *busuu.com*'s berries, stars, and badges.

An alternative perspective observed by Reimer is that many activities are already inherently game-like, and gamification can involve fostering the recognition of this, rather than explicitly attempting to modify the activity (Reimer, 2011). The simple notion of gaming can stimulate interest in certain audiences (Rankin et al., 2008), and it could be argued, based on the author's own subjective experience, that simply referencing pop-culture shows built around teamworking such as *The Apprentice* can have a dramatic impact on students' enthusiasm and attitude in approaching team-based activities. In the context of MASELTOV, then, could gamification in the form identified by Reimer be applied to make real-world cultural situations seem less intimidating and more enjoyable to migrants? Given the importance of social support in reducing "culture shock" for migrants (Pantelidou and Craig, 2006), such gamification might emphasize the social aspects of these situations as well as how the overall perspective of the migrant might be adjusted through experiences within the game.

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[4] http://metycoon.org

6.3 CONSIDERATIONS IN APPLYING GAMES IN SUPPORT OF INCIDENTAL LEARNING

Table 1 illustrates a comparison of the incidental learning characteristics defined in Section 6.1.2 to the specific case of a serious game. It can be observed that the application of game-based learning presents both constraints and opportunities, for example allowing the game-based elements of the platform to serve as a means for increasing contact time and provide a more informal environment for learning. It is important to note that the learner's desired outcomes during gameplay may be difficult to ascertain as this is likely to represent a highly informal learning environment, as an effective serious game should serve as an engaging piece of entertainment media (Zyda, 2005). Important also is the recognition that game design itself can serve to influence the time at which incidents occur, particularly in a mixed-reality context.

Incident characterisation (Section 6.1.2)	Relationship to game-based learning
The place the incident (and structured learning, planning or reflection) occur;	Mobile games are commonly played to pass time during travel or periods of waiting, and are less likely to be played in the home than more static gaming platforms such as consoles.
The task(s) the learner is attempting to carry out;	A learner in a high-stress environment attempting a culturally-challenging or social task is unlikely to be simultaneously engaged with the game; however, prior to attempting the task, for example whilst travelling to a meeting, a game may be engaged with.
The social support that the learner can or does make use of;	Potential exists to foster a gaming community to build this social support structure. This may emphasise the game, rather than its serious objectives, however.
The tools (including content) the leaner can or does use to complete the task;	Assuming a mobile platform is present, potential exists to branch off from the game into additional or supplemental resources.
The learning outcomes that the learner wants to achieve	Game-based content is likely to be tangential to required learning outcomes and might be perceived as an inefficient or less useful resource for a motivated learner. Therefore a key target audience is less motivated learners, or those seeking to learn general principles rather than achieve specific learning outcomes.
The (relative) time the incidents (or structured learning, planning or reflection) occur;	Game design can exert a degree of control over the frequency with which the game is played by designing for a specific play duration, and constructing longer-term engagement through sessions or supportive technologies such as leaderboards, communication between peers, or similar social tools.

Table 1: Mapping of incidental learning concepts to serious games

6.4 SUMMARY AND CONCLUSIONS

Translating an overall pedagogic concept to a game design is seldom a straightforward task. The critique of existing frameworks for serious game design delivered in Section 7.1.2 notes the lack of pragmatic consideration and tendency to overprescribe iteration; however, brief consideration of the core factors of learners, their context, representational medium, and pedagogic approach (de Freitas and Oliver, 2005) is beneficial in establishing some initial principles as working guidelines.

The **learners** for MASELTOV are described as migrants entering the EU from non-EU states with 0-5 years experience within their host country. The purpose of the learning activity is minimalization of the risk of exclusion, a state in which an individual is not contributing socially, economically, or politically to their host country (Glenister and Tilley, 1996). To achieve this, it is posited, and reinforced by evidence (Baumeister et al., 2005), that cultural learning is an essential tool in facilitating inclusion amongst the migrant population. For the specific context of game-based learning within MASELTOV, we focus on the learning of these cultural skills and understanding as more direct skills development (e.g. languages), as well as immediately usable tools (e.g. a text recognition lens) are addressed in other tasks within the project. However, as these skills will be learnt, an immediate inference is that language skills cannot be assumed; nor can an existing level of cultural awareness or competence. This immediately complicates game design as it limits the capacity for participatory design
, noted as beneficial in Section 7.1, as well as communication between stakeholder groups.

The **context** in which learning can occur is broad; a consequence of the use of a mobile device as a learning platform. This in turn affects what might be expected of learner motivation: when faced with a problem, migrants may urgently need a solution, but the paths they learn may lead towards exclusion as well as inclusion - consider, for example, a migrant developing the means to avoid rather than overcome key areas of cultural conflict.

The **representational medium** is the touch-screen of a current-generation smartphone, with the game deployed in a standalone fashion, though it may draw from and supply data sourced from other technologies within the MASELTOV platform. This presents both constraints and opportunities: foremost amongst the former is the difficulty in creating the truly blended learning environments in which game-based learning approaches have been shown to thrive (Tsai et al., 2009); though the integration alongside the other MASELTOV services, as well as the technologies which may be assumed to be intrinsic components of the mobile platform, for example the ability to search the web and view multimedia content, presents a broadening of this immediate context. The primary consideration from this context dimension is the extent to which these other services should, and can, be integrated, and how the role of the game is incorporated and acknowledged in the wider platform. Such integration may prove significant in allowing the game to focus on specific objectives, rather than the general challenge of cultural learning, and allow for a solution, which capitalizes on the strengths of game based learning such as motivation, engagement, and abstraction.

These three aforementioned dimensions tend to be static, set by practical and project requirements. Flexibility, therefore, exists primarily in the **pedagogic** dimension: the incidental learning framework must be shaped to address the challenges posed by the constraints of these remaining dimensions.

7. APPLICATIONS/EXAMPLES OF USE OF THE FRAMEWORK

We present three examples of the framework being used to design incidental learning patterns. It is intended that this section will enable project partners who are not part of WP7 to make use of the framework by following and reversioning the examples to suit their purposes. To this end we describe working practices and processes for applying the framework.

7.1 EXAMPLE 1: LEARNING LANGUAGE ABOUT WORK THROUGH POIS

This example considers ways in which a person can be helped to develop their language skills about a specific subject, and uses incidents related to positions of interest to motivate and inform the learner. The initial motivation for the learner is that they want to change their visa status, and need to understand the language related to categories of work that is used on the visa form.

The scenario
The learner is at home, looking at the visa form (on paper), and they realise that they do not understand the vocabulary used to describe work categories. They take an image of the relevant page of the form, and send it to the MASELTOV service, which responds with a translation, and a question "How much of this did you understand before we translated it for you?". The user selects their answer ('not much') from a list of options, and leaves to do some shopping for food and groceries.

The learner walks to the high street to do their shopping. Whilst walking, the MASELTOV system prompts them with vocabulary about the work which occurs in various positions of interest (POIs) in the high street (e.g. bakers, supermarkets, solicitors, estate agent, bank etc.). When they return by bus (which goes a different route to the one they walked to the shops) the MASELTOV system again prompts them with nouns describing the workers who work in each of the POIs they pass (pharmacy, Doctor's surgery, car showroom etc.).

When they return home they can access structured learning exercises, which build on the vocabulary they have experienced whilst on their shopping trip, hence deepening their knowledge of language related to work. At some time later, they are prompted to consider what they want to next to further their learning. They decide to do a Serious game in which they practice speaking work related sentences.

Applying the incidental learning framework
Figure 15 shows a framework for incidental learning to support novice learners develop language skills through incidents related to POIs. Now this example exists, the types of activity needed to progress include

1. Checking that the learner's activities in the learning pattern described in the scenario are important, and roughly realistic for potential users.
   This could be done by interviewing immigrants, or their proxies (i.e. the NGOs).

2. Editing the pattern to take account of the findings from step 1

3. Discussing with MASELTOV service providers to establish technical constraints.

All these steps could be carried out at a MASELTOV project workshop.
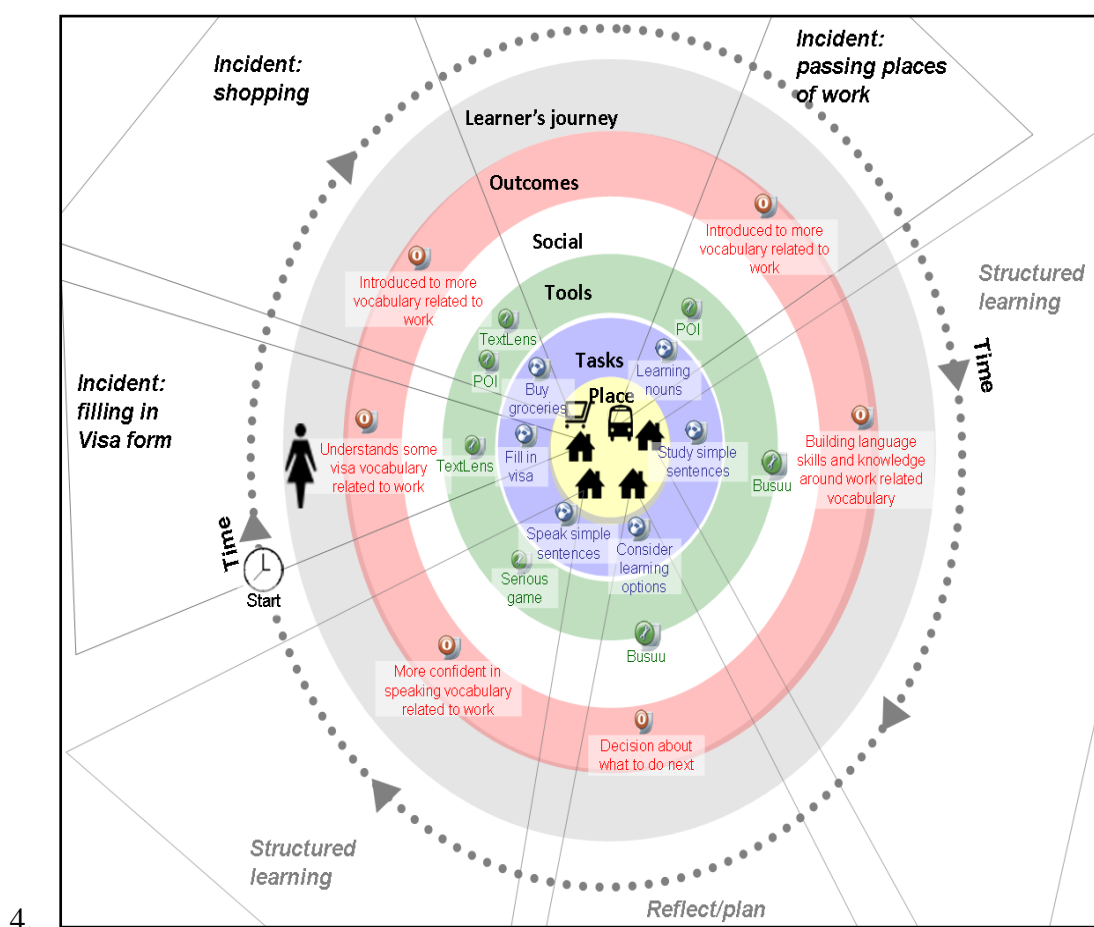
Figure 15   Learning vocabulary thorough POIs

7.2   EXAMPLE 2: NEEDS BASED LANGUAGE LEARNING

This example describes the first encounter of a user with the MASELTOV application, and the first usage of the language-learning component.

The learning at this stage is incidental and is need based. The user is looking to solve a difficult situation that he is in and in which language aid is necessary. Then he will later be confronted with a more structured learning once his immediate needs are answered.

The Scenario

Ali first arrives to the airport and has his first encounter with the MASELTOV application. He felt from the way this application was presented that it would be perfect for him and that it would help him starting this right moment.

After downloading it, he automatically sees the different categories that would answer his immediate needs as he is entering the host country.

At this point his first concern is getting directions to his cousin's apartment. The language icon is very easy to find. As soon as he touches the logo, he is redirected to different situations with key information and learning. He focuses on the category ¨how to ask for

directions?¨. Once he taps on the section, he is directly given key phrases covering the main questions and answers. It is simple and not overwhelming, with pronunciation tips, and translation in Arabic. He is able to read the questions, see the translation in Arabic below, and listen to an audio file prompting the right pronunciation.

This part of the learning focuses on acquiring basic vocabulary and expressions without focusing on more complex linguistic constructions. This learning happens on the go wherever the learner is, and is specific to the ¨place¨ he is in.

Once he is home, MASELTOV sends him a push message, asking him if he would like to learn more about his query from the morning. This push message triggers a more structured lesson plan, where the objective will be clearly stated and it will give him the tools to deepen his acquisition of the language. This comprises a structured lesson with grammar tips and exercises that include questions and answers, location adverbs etc. He is also offered a more extensive vocabulary offering of situation verbs. Each time he achieves a section, he earns points, which allowed him to feel like he is playing a game.

Applying the incidental learning framework

In this scenario, learning is happening on the "place" level at first, and then later within a larger time frame in a more structured way, helping the learner on his learning journey providing him with the required tools and support. The support offered in this structured learning could include a MAP via the kind of interaction suggested in . It would be beneficial to Ali if the MASELTOV system could recommend a MAP who has knowledge of both the relevant language, and also of the cultural context, e.g. through living in the same city.

An issue, which will need further consideration is the process by which the learner gets initial access to the tools they require, i.e. in this example the nature of the push message and the associated structured lesson plan. As Ali has just downloaded the MASELTOV app, we assume that the MASELTOV system knows nothing about him before he starts interacting with it. In this case the push message could contain merely a link to a lesson about asking for, and understanding directions. Once he has completed the lesson, Ali's profile should be updated on the MASELTOV system so that the nature or order that lessons are presented in the future could be influenced by his accomplishments as recorded in his profile.

7.3   EXAMPLE 3: LEARNING ABOUT CULURAL DIFFERENCES THROUGH GAMING

In the case of a serious game, the learner may not have an intended learning need or outcome, as noted in Section 7.3. Therefore, an informal learning context is observed in which the incidental learning framework must be applied effectively to support a learner who may not be able to define their own learning objectives. Hence the game supports a wider learning environment, whereby learning transfer is less effective than with a didactic resource, but more pervasive.

The Scenario

The learner - though they may not describe themselves as such - is in transit to an important job interview. To alleviate both their nervousness and boredom, they engage in play with the MASELTOV game as they travel via train to their destination, as the more formal elements of learning content are either too difficult for them to engage with, or match poorly to their anxious affective state.

In playing the game, they are able to enjoy the experience, whilst exploring some potential events and outcomes, which might occur in a light-hearted fashion. The game takes them through the process of developing their character and getting them through a similar, but abstracted job interview process.

As they play, they incidentally learn several cultural differences in how interviews are conducted, empowering them with a better understanding of these events. More importantly, however, their confidence is increased and they arrive at the interview more relaxed and ready to communicate than if they had been struggling with more direct learning resources.

Applying the incidental learning framework

In this case, we consider what happens after the interview. Either the leaner will know they have got the job because the employer will have offered it to them there and then, or they will be waiting for the outcome which may come hours or days later. If the learner knows or believes that the interview has gone well, what should the next step in their learning be? Alternatively, if the learner knows or believes that the interview has gone badly, what should the next steps be?

The MASELTOV system should prompt the learner to reflect, e.g. via a question "How did the interview go?", and depending on the learner's answer, it could provide different options. If the learner thinks (or knows) that the interview went badly, it may be appropriate to direct them towards resources (not necessarily games) that are focused initially on rebuilding confidence, rather than cultural learning. However, if the interview went well, I may be appropriate to offer resources focused on deepening the learner's knowledge of their host country's culture.

8. CONCLUSIONS AND RECOMMENDATIONS

In this deliverable we have presented an initial version of an incidental learning framework for facilitating the creation of technology rich learning opportunities for immigrants within cities. We have analysed some relevant literature and used it inform the structure of the framework, so that it builds on theories and previous research related to learning, elearning and serious gaming. We have put forward the case that incidental and game based learning need to be blended into a wider programme of study and support to be most effective, and the framework reflects this. We have shown three examples how the framework can be used to model a persons journey through incidents, structured learning and reflection, with the aim of encouraging deeper learning that build on incidental needs. . At this stage, the examples given are fairly trivial and lacking in detail but they will serve as a staring point for more detailed discussion of the technical and pedagogical requirements for supporting incidental learning.

We can identify several themes that we intend to work on to move towards the next version of the incidental learning framework, and have identified some issues that require further consideration.

8.1 NEXT STEPS

Use the framework to develop it

We need to determine if the framework is at the right level of abstraction (section 5.2.1), and represents the necessary components by trying it out on more realistic examples. We can start from the information being generated by WP2. For example, a draft version of Deliverable D2.3.1 was available at the time of writing, and in that known problems and barriers for immigrants are identified by the NGOs, and descriptions of the circumstances of several immigrants are given from evidence obtained via interviews. Next steps in development of this incidental learning framework will be to envision some target learning outcomes that are informed by the evidence gathered and presented in deliverable D2.3.1, and to use the incidental learning framework to create models of incidents, structured learning and reflection that could help immigrants attain these outcomes. Particular aspects of the framework that may be developed in this way include requirements for a learner model, necessary attributes of MAPs and a sense of if and when fading of support could be most beneficial.

Development of the learner model will also contribute to task 7.2 "Feedback and progress indicators". We will ensure that the models created include those that focus on the learning of cultural skills and understanding via serious games (see section 7.4); the development of the games themselves is the subject of task 7.4.

Extend the literature review

So far our literature review has focused on literature related to frameworks and tools for analysing and designing mobile learning, and on issues related to serious games. We need to extend this to include (at least) literature related to technology supported language learning.

Gather evidence about target immigrants day-to-day lives

One aspect that is missing from the evidence that we have seen to date from WP2 is an indication of the time spent on different activities by immigrants once the have arrived in their host country. The evidence presented in draft D2.3.1 describes issues, barriers and potential solutions, but we do not have an understanding, even through stereotypes, of the kind of ways that immigrants use their time over periods of days, weeks and months or longer. This kind of information is important because it can help to determine the kinds of situations that incidental or other learning may occur most frequently. For example, if we know that typical members of the target group spend 20 hours a week watching television then developing support for incidental learning during TV viewing will be worth considering.

This kind of information could be gathered, e.g. via interview of immigrants themselves or their proxies (i.e. NGO workers). The aim of such studies would be to inform our knowledge of the lives of the target users, so we can plan how to integrate and support learning through the sorts of incidents that occur in their everyday lives.

Run design workshop(s) using the framework

We think it would be beneficial to the project to run a design workshop in which multifaceted teams work together on design problems focused on incidental learning. The aims of the workshop would be to generate a catalogue of issues and solutions from technical, pedagogic and user perspectives to inform e.g. the system specification (WP3), individual technical WPs and WP7. Each team would be composed of representatives from different MASELTOV

work packages, and include members with knowledge of at least one technical solution being developed, one representative from the NGOs, and one representative with pedagogic knowledge. . The team would work together to produce a model using the incidental learning framework, and record issues and solutions from the technical, pedagogic and target user perspective.

We think that such a workshop could be run with at minimum 6 people (2 teams of 3) plus one facilitator over one afternoon, e.g. before, during or after a plenary meeting. The inclusion of NGO representatives instead of immigrants themselves will mean that the workshops will be a form participatory design-by-proxy.

8.2   ISSUES

Specification of context

In the current version of the incidental learning framework we have focused on the micro level of context, i.e. the features of context that are related directly and immediately to the learner e.g. tools (section 5.2.3). We need to consider if or how macro context factors such as social economic and political factors should be handled.

Implications of the incidental learning framework for WP9 "Field trials and evaluation"

Our framework can represent learning that takes place over periods of hours, days, weeks or longer. Methods for evaluating user experience and learning over long periods need to be used, e.g. diary studies.

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