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Creating Coherent Incidental Learning Journeys on Smartphones Using Feedback and Progress Indicators:
The SCAMP Framework

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ABSTRACT

Although the motivating role of feedback and progress indicators is understood in formal learning, their role in supporting incidental mobile learning is less well understood. In this paper we argue that well-designed feedback and progress indicators (FPIs) offer guidance and structure that may encourage mobile app users to move from fragmented learning episodes towards a longer term, reflective learning journey. Drawing from relevant literature we consider how FPIs can be used in the EU-funded MASELTOV project which explores how a suite of smartphone apps can support recent immigrants to Europe to become integrated in their new cities. These apps allow learning episodes to be part of daily activities and interactions. The authors discuss what kinds of FPIs should be provided and introduce the SCAMP model which emphasises five types of FPIs-Social, Cognitive, Affective, Motivational and Progress. Finally, the authors provide examples of FPIs that will be used in the MASELTOV project.

Keywords: Feedback, Incidental Learning, Informal Learning, Learning Journeys, Mobile Learning, Progress Indicators,Reflection

INTRODUCTION

Mobile learning creates opportunities for providing feedback and assessing or reflecting on learner progress. It also presents challenges in doing so effectively, particularly in incidental learning which occurs outside formal structured learning environments. In these settings, mobile participants make use of their surroundings and interactions with other people as part of an informal learning journey, which may be individual or socially constructed with other learners. The participant we have in mind here is a relatively new immigrant to a large European city, who needs to learn and find out about their new city and its culture, and to get help with everyday problems and challenges. Their journey can be a literal journey through a city, where they use smartphone apps to help them find their way around, interpret signs and information that are not in their native language, find out about places of interest, and access information about health and employment. However, there is a danger that the use of such apps may be isolated episodes that help them with tasks such as finding the right bus or translating signs at a hospital, but which do not accumulate into anything more enduring. Therefore, we are also interested in supporting participants to engage in a more sustained and reflective *learning journey*, which would give learners "a sense of distance travelled" (Ofsted, 2010). In this paper we consider the role of feedback and progress indicators in supporting and motivating incidental mobile learning. We explore this issue in the context of the MASELTOV project.

The EU FP7 funded MASELTOV consortium (http://www.maseltov.eu) is exploring how incidental learning, which has been defined as "unintentional or unplanned learning that results from other activities" (Kerka, 2000, p.1), may support language learning and social inclusion when delivered via mobile devices (specifically, Android smartphones). It is building a number of integrated services, under a single app (the MApp) that our target audience, recent immigrants to Europe, can use in their daily activities. The aim is to both resolve their

immediate needs and also to enable reflection and further planning of learning goals to help them to become integrated into their new home and work environments, particularly urban localities. As our target audience are likely to have work and family commitments, attending formal educational classes is often difficult (Kluzer, Ferrari & Centeno, 2011). However, a smartphone based app which can be accessed anywhere and which uses the lived environment as a contextual resource is particularly suited to this group. The MApp includes:

- **Language Learning:** Activities focused around key challenges for recent immigrants such as employment, healthcare, and negotiating bureaucracy
- **Translation Tool:** Converts images taken with the phone's camera to text, and translates them using a third party translation tool or onboard dictionary
- **Navigation:** Tools to enable public transport planning and a 'pedestrian sat-nav'
- **Help Radar:** Finds nearby volunteers who can help the user solve immediate problems
- **Places of Interest:** A service that lists places of interest in the city
- A serious game providing playful learning about cultural differences
- **Information:** About services in the new city e.g. health, employment
- **Social Tools:** To enable contact with other learners, and sharing knowledge
- **Context Awareness Service:** To interpret users' location and current modes of activity to enable appropriate resources to be recommended to users at an appropriate time (a user's preference may vary depending on whether they are waiting at a bus stop or relaxing at home in the evening)
- **User Profile:** To store user preferences, records of activities, show usage statistics and display progress indicators
- **Recommender System:** To provide contextually relevant learning resources

We argue that well-designed and managed feedback and progress indicators can offer guid-

ance and a sense of structure to learners in the absence of a formal curriculum, accreditation, or predicted outcomes. Furthermore, they can encourage casual users of mobile applications to move from fragmented and isolated learning episodes towards a more long term and reflective learning journey. Feedback and progress indicators are part of a developing research agenda in which aspects of the formal learning process are re-examined and re-designed for effectiveness in a digital and mobile age (e.g. Beetham & Sharpe, 2013). Educational research suggests that timely and appropriate feedback and indicators of progress can motivate learners (Nix & Wyllie, 2009). Also, rather than being mere recipients of performance-related information, it is beneficial for the learners themselves to be actively involved in seeking, generating and using feedback (Boud & Molloy, 2012). We are considering the use of feedback and progress indicators in the context of informal and incidental learning, where the learner may be on the move, and where the information needs to be presented on a mobile device.

Our Incidental Learning Framework has been described elsewhere (Brasher et al., 2012; Scanlon et al. 2013) but to aid the reader this is summarized briefly in the next section. An important aspect of this model of learning is identifying how to encourage occasional adult users of these very different tools and services to engage with a more long term and coherent learning journey, moving beyond the resolution of immediate challenges and helping them attain broader goals (e.g. language competence sufficient to communicate with their child's school teacher, or to independently negotiate local bureaucracy in their new host country). Our research question is: **How can fragmented learning episodes be reconceived by users of educational apps as elements of a more coherent, longer term learning journey?** Drawing on literature on feedback and on practice in web-based language learning and video games, we have considered which feedback and progress indicators (FPIs) may best support incidental mobile learning, and the major challenges faced.

These have fed into recommendations for FPIs which will be tested in the field in future study.

In the next section we briefly review what is meant by incidental learning and how we understand it in the context of MApp and consider some of the challenges of learning in this way. To date, much of the extensive research on the role of feedback in learning has been in the context of formal learning, and this is reviewed briefly in Section 3. In Section 4 we introduce feedback and progress indicators (FPIs) and the pedagogical principles underlying them. We also introduce the SCAMP framework, which emphasizes the importance of five different dimensions (Social, Cognitive, Affective, Motivational, Progress). Section 5 then describes how this can work in practice through a case study of how FPIs have been conceived and applied in MApp, and the final section provides a summary of the paper and conclusions.

INCIDENTAL AND INFORMAL LEARNING

MASELTOV is exploring incidental learning, which has been described as "unintentional or unplanned learning" (Kerka, 2000, p1). Unlike formal, classroom based learning, it is not led by a tutor, nor does it follow a structured curriculum or result in formal certification. It can be distinguished from informal learning as it is not planned: no goal to achieve learning outcomes has previously been set. It may occur while pursuing another goal, or emerge while carrying out another task. For example, imagine that Francesca, when travelling in another country, decides to visit a relative. Arriving at the train station she becomes aware that there are changes to services, and has to ask for help and guidance. Her goal was to visit her relative: incidental learning occurred as she had to learn enough new vocabulary to ask directions and understand responses, or she learnt some new language by listening intently to a response and observing gestures. There is a long history of research into adults' incidental learning located

in the field of adult and continuing education. For example Marsick & Watkins's (1990) definition: "Incidental learning is defined as a byproduct of some other activity, such as task accomplishment, interpersonal interaction…." (Marsick & Watkins, 1990, p. 12) is similar to Kerka's 2000 definition above. The context investigated at that time was often workplace learning (and was the context for their definition.) Marsick and Watkins note the inevitability of some incidental learning happening through one's everyday experiences: "[i]ncidental learning… almost always takes place although people are not always conscious of it" (Marsick & Watkins, 1990, p. 12).

Smartphones are particularly suited to this type of learning and offer specific affordances. 'Affordances' are the properties of the system which allow certain actions to be performed and which encourage specific types of behavior (Tolmie & Boyle, 2000.) For example smartphones' portability and internet connectivity enable learning to be undertaken almost anywhere, any time, and to be embedded within everyday activities. The sensor-based additional functionalities increasingly offered as standard on everyday smartphones enable context aware learning. GPS receivers can identify position, cameras can gather images and video, accelerometers can detect motion: these can all provide a learning system with data that may prompt situation-specific learning activities (Scanlon, 2013). Furthermore, mobile phones are familiar personal devices, already integrated into their users' daily routines. The MASELTOV consortium chose Android smartphones as the development platform, informed by our partners' research into immigrant mobile phone ownership and usage, and supported by an in-depth qualitative study of recent Spanish and Latin American immigrants in London which showed that 23 out of the 25 immigrants interviewed owned and used a smartphone with the majority preferring Android (Gordano, 2014). The smartphone used for testing was the Motorola Moto G, identified as a low-to-mid range Android smartphone in the beginning

of 2014, and typical of the kind of device our current and future audience might use.

However, there are challenges associated with mobile incidental learning. As unplanned learning, without a specific goal in mind, it can consist of isolated, fragmentary episodes. The 'learner' may not conceive each episode as cumulative or even as a learning activity, and may not carry out any reflective or reinforcing activities. The episode may be considered "ephemeral learning", learning to resolve a specific situation and not as a skill that could be applicable in the future. Reflection is a key part of effective incidental learning. As Glahn, Specht & Koper (2009) note, drawing on earlier work stemming from the adult education literature, "Self-directed or incidental learning depends on a person's ability to take initiative and to reflect on her or his learning actions (Knowles, 1975; Marsick, 2001)"; Glahn, Specht & Koper (2009, p.300). They go on to argue that reflection is one of two key ways of supporting incidental learning and is itself stimulated and supported by feedback. The second source of support is peer support from a community.

In the previous section we gave an example of incidental learning within the context of making a journey. We noted that feedback and progress indicators could play a significant role in helping learners to connect together such isolated episodes into a learning journey. They might encourage reflection on learning episodes and motivate future, planned learning with the intention of increasing knowledge. They might also support the reconceptualisation of different tools that have been used in isolation (e.g. a vocabulary tool to understand words on a sign, or the use of a navigation tool to find a local service such as a government office) as part of a distributed ecology of learning tools that can be used in concert to enable more powerful learning over time, and across places and contexts. The relevant literature on feedback and assessment more generally is discussed in the next section.

In the MASELTOV consortium, incidental learning is conceptualized within the Incidental

Learning Framework which acts as a "boundary object" (Star, 1988) providing a representation of a learning event or journey that can be understood by experts from different domains. This is important in such an interdisciplinary project where partners including technical developers, usability specialists, researchers, content providers, and NGOs working with immigrants, collaborate to understand the opportunities and challenges of informal and incidental learning. Modelling a specific occurrence of an instance of incidental learning required a framework that could capture and enable reflection upon a number of dimensions, such as the learner's place, time, desired outcomes, and the interrelationships between these dimensions. We identified the following dimensions as significant (Kukulska-Hulme et al., 2012):

1. The place the incident occurs (and structured learning, planning or reflection): place is not just a location, but also specifies some contextual information;
2. The task(s) the learner is attempting to carry out;
3. The tools (including content) the learner can or does use to complete the task;
4. The social support that the learner can or does make use of; the combination of tools and people is conceptualised as a 'More Able Partner' (informed by Luckin's model (2010));
5. The learning outcomes that the learner wants to achieve, and those that she/he does achieve;
6. The (relative) time the incidents (or structured learning, planning or reflection) occur.

Time is not just a specification of an instant or a measurement of a duration, but may also include contextual information e.g. 'lunch time'. The framework assists us in thinking about the times when learners are likely to want feedback and may be receptive to information about their progress.

ASSESSMENT AND FEEDBACK AND FPIS IN INCIDENTAL LEARNING

In more formal education, feedback is often discussed within the area of assessment which is vast and contested; for example there is debate about the relative roles of formative and summative assessment, whether the focus should be on assessment for learning (or learning for assessment), and the role of the learner in evaluating their own learning (see e.g. Crick, Broadfoot & Claxton, (2004) or Swaffield, (2011)). However, there has been consistent evidence for some time that assessment is an important driver in learning, in affecting what learners do, how much they do and how they prioritise their time (see, e.g. Rowntree (1987)). In informal or incidental learning, where learners are themselves driving the process and there are no teachers directly involved, the feedback that learners receive is particularly important in maintaining their engagement. As Glahn (2009) notes, whereas formal education environments are designed to allow learners to receive feedback on their actions in a direct way, this is not the case in self-directed learning. Hence research in the areas of formative assessment, feedback and self-regulation, with its emphasis on the learner's role in the process, is particularly pertinent.

Given the wide and extensive literature on feedback and formal assessment (see, e.g. Yorke, 2003; Boud & Falchikov, 2006, Swaffield, 2011) we have drawn here on one very relevant piece of research into feedback and formative assessment, that of Nicol and MacFarlane-Dick (2006) which is framed within the notion of self-regulated learning (Zimmerman, 1990.) This refers to the learner's role in regulating their learning activities, for example in setting their own goals and monitoring their progress and so is particularly relevant to contexts where learners are themselves directing their learning. For example, self-regulating activities include: *"the setting of, and orientation towards, learning goals; the strategies used to achieve goals; the management of resources; the effort exerted;*

reactions to external feedback; ...” (Nicol & Macfarlane-Dick, 2006, p. 199.) They view the process as one where the student also actively constructs his or her own understanding of feedback messages derived *from external sources* (Nicol & Macfarlane-Dick, 2006, p. 201).

They also consider who is providing the feedback in relation to how effective it is in supporting the learning processes; again this is of particular relevance in a context where feedback can be made available from a number of sources, and is increasingly being provided by peers in many apps. They argue that feedback should not only be provided by the teacher but also by peers and by learners themselves, noting that self-regulated learners actively interpret external feedback (for example, from teachers and other students), in relation to their internal goals. One role for feedback and progress indicators in MApp is to support self-regulated, reflective learning (Gaved et al., 2013). A similar argument for including learners’ own feedback is made by Buckingham Shum and Crick (2012). So, whilst MASELTOV learners do not have teachers as such, we expect them to be actively interpreting the feedback they get from the MASELTOV system, their peers, and more experienced community members.

Drawing from self-regulation theory, Nicol and Macfarlane-Dick (op. cit.) also emphasise the importance of considering assessment and feedback within a wide framework that considers how learners regulate their behavior and motivation as well as responding to feedback on their cognitive competence. This view aligns well with one of the MASELTOV ambitions to consider cognitive, social, affective and motivational feedback.

CATEGORIES OF FEEDBACK AND PROGRESS INDICATORS

Through our investigations, we have identified five key types of feedback and progress indicator, derived from the literature. Here we describe each one, and provide general examples.

Social

This refers to feedback, or indicators of activity or progress derived from a learner’s interactions with others who may be peers, mentors or friends, members of their social network, or people encountered in daily activities. We note that these categories overlap significantly and, of course, mentors and peers have a considerable role in affecting the learner’s level of confidence. Feedback from others may be cognitive, affective or motivational. Examples include: interaction with others (peers, mentors); exchange of knowledge; evaluative user rating of the interaction; and, social feedback tools such as Facebook’s “like” ratings of others, “friending” and/or tagging. The sense of community, presence and online cooperation are also relevant (Ferguson & Buckingham Shum, 2012). Finally, as we noted earlier, peer and community support is viewed as particularly important in supporting *self-directed* learning (Glahn, Specht & Koper, 2009).

Cognitive

Cognitive feedback focuses on the learner’s cognitive actions and output. In a real world language context, where a learner is communicating in the target language, they receive feedback from the person they are speaking to about whether or not they have been understood. In MApp, when users are learning their target language, feedback provided by the system can focus on the accuracy of the learner’s input, whether it is about the form of a verb or vocabulary. Popular and well used language learning websites, such as Busuu and Duolingo, use a range of feedback approaches for assessing learners’ competencies. Many computer-based assessment systems, especially when they are making use of multiple choice questions provide essentially cognitive feedback; see for example, Ross, Jordan and Butcher (2006). Examples of cognitive assessment that provide feedback include: multiple choice items (e.g. to measure vocabulary acquisition; tests (formative assessment) to “identify knowledge gaps” (Kraiger,

Ford, & Salas,1993, p. 314), which in language learning could be testing comprehension and production; indicators of lessons completed; marks gained for exercises; and time taken to complete a task.

Cognitive feedback in games, another important element of the MASELTOV services, may be supported through reflection, debriefing and articulation (Obikwelu & Read, 2012). The focus here is on progress through efforts which are energised by challenges. Cornillie et al. (2012) argue that by using mini-game remedial exercises, input enhancements or corrective feedback for language learning may improve learning outcomes.

Affective

Hurd (2008) writes about affect in the very relevant context of independent language learning: "affect is about emotions and feelings, moods and attitudes, anxiety, tolerance of ambiguity and motivation". For some it is also connected with dispositions and preferences (Oatley & Jenkins, 1996). It is generally accepted that "the affective domain encompasses a wide range of elements which reflect the human side of being, and play a part in conditioning behaviour and influencing learning" (Hurd, 2008, p. 218). Like other researchers, Hurd also notes that affective factors such as a learner's mood, confidence and anxiety have a significant effect on language learning. Note that here motivation is included as part of affect and that a learner's beliefs about their learning capabilities are very important. Commenting on learning in general, not just language learning, Bandura noted that: "Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. The stronger the perceived self-efficacy, the more active the efforts" (Bandura, 1977, p.194). Examples include attitudes, motivations, and goals; measurement of feelings, such as what the person likes or dislikes (which could be by self-reflection); motivational disposition and change; confidence (which is a key affective concept); and anxiety.

Confidence, lack of anxiety and tolerance of short term failings in the context of long term success are particularly important for language learning, so an important consideration is how do we encourage confidence? Self-reporting, for example on their strategies or successes and failures (Hurd, 2008) can allow learners to reflect on their emotional state. Mentors and peers can also play a role here, for example, by reminding the learner that language learning is a bumpy journey, with low points as well as high points (Pritchard-Newcombe, 2009) and boosting their confidence with positive feedback.

Motivational

Over the last twenty years, the most prominent perspective on research on motivation in learning has been the view that motivation is socially influenced (Zimmerman & Schunk, 2007). Some studies have investigated motivation and/or engagement in game-based contexts, notably Schwabe and Goth (2005), Huizenga et al. (2009) and Iacovides et al. (2012). Hurd, writing in the context of online distance learning, notes that "Motivation is the factor most frequently cited as critical to successful learning by distance learners themselves" (Hurd, 2008, p.227). Often, engagement and motivation are seen as similar or overlapping. Iacovides et al. (2012), considering the definition from a game based context, suggests that whilst motivation gets you started, engagement keeps you going. Examples of motivational indicators and strategies to promote engagement include usage statistics that provide feedback on engagement in terms of persistence, feedback from peers or more able partners, and achievements; for example the award of certificates which can be publicly displayed.

Progress

"Progress" in learning refers to the increasing competency of the learner towards a mastery of a field of knowledge, and indicates a recording of performance and an assessment of competency (e.g. see Brown, 1999). In technology enhanced learning, this may also refer to increased

Table 1. The SCAMP framework: key types of FPIs, and examples of practice used in mobile learning apps

Type of FPI	Example
Social	'Liking posts' in a social forum
Cognitive	Language lesson quizzes
Affect	Mood indicators in language learning service
Motivational	Winning currency in a serious game Goal setting, summaries of activity with tools
Progress	Skill or content progress in learning services and other resources; goal setting tools, activity summarizations per service and across services

competency in using a tool which enables the performance of learning tasks. Identification of progress can occur during engagement with tools or content (formative assessment), or at completion (summative assessment.) Both concepts are well established in the field of educational research (e.g. Whitelock & Warburton (2011)). For the MApp, an additional focus is on identifying progress of users towards the higher level goals of the MASELTOV project, to encourage communication competencies and social integration within their new community and environment. User progress is not a measurable concept for the majority of the MApp services, either in terms of competence in using a tool, or successful completion of content. Many of the services are 'stateless': their continued usage is not influenced by previous use, so there is no progression in what will be attempted with the service from one time to the next, and users are not assessed on their achievements. The services are designed to be simple in operation, so there is not the concept of a novice user progressing towards expertise in their use, and this is not captured.

As can be seen from our discussion above, the literature suggests that all types of FPIs are important, and taken together give the learner important and necessary feedback on her progress (and current state). We have developed the SCAMP framework (Social, Cognitive Affective, Motivational dimensions for reviewing Progress) which emphasises these dimensions and is shown in Table 1.

The provision of feedback and progress indicators implies a mechanism for their implementation. This is often found as a service within each individual app, and where there is a service which comprises a number of apps, such as in the overall MASELTOV MApp, there may be both reporting of feedback occurring in individual apps but also in an overarching service. Within the MASELTOV MApp, there is the concept of a user profile, that receives data from each service, and the data are then stored and interpreted to (a) provide overall indications of progress as visualisations in a "Progress" view, and (b) prompt action and reflection through recommendations delivered by a separate Recommendation service. The functioning of this service is beyond the scope of this paper and is described elsewhere (Gaved et al. 2014).

The main audience for the feedback is usually considered to be the users, though there are reasons for making feedback more widely available. For example learner or user activity data can also be used by systems developers to identify whether there are problems with the apps themselves (e.g. poor user interface design leading to confusion about how to use the tools, or broken functionalities). This information can then be used to improve the tools and services to make them more effective: a common approach in the mobile phone app and gaming world,

Table 2. Principles of good feedback practice as used in MASELTOV: (based on Nicol and Macfarlane-Dick, 2006, p.205)

Feedback Principles	Type of FPIs Derived from SCAMP	MApp Example
Encourages goal setting and planning, and measurement against peers in a community of informal learners	Social	Tagging forum posts, rating volunteers, posting, engaging with the online community
Delivers high quality information to students about their learning	Cognitive	Testing learners' understanding of content within the language learning tool
Encourages peer dialogue around learning	Affective	Learners' self-assessment of enjoyment of activities in the language learning tool.
Encourages positive motivational beliefs and self-esteem	Motivational	Acquiring virtual currency in the serious game; peer feedback
Facilitates the development of self-assessment and reflection in learning; i.e. helps to extend "incidents" into a learning journey	Progress	Formative and summative assessment within the language learning tool; overall activity summaries and recommendation service prompting further actions based on activity
Provides opportunities to close the gap between current and desired performance	Cognitive/Progress	Setting a goal and checking progress towards it
Provides information to the systems about the learners	Progress	Services report activity to central user profile tool; data can be analysed by systems managers to improve both learning resources and interfaces. Users are presented with summaries of activities.

where close analysis of user data informs rapid iterative development of services.

MASELTOV CASE STUDY

An overall challenge is how we apply what is known about FPIs from more 'traditional' forms of learning to the incidental learning we wish to support in the MASELTOV project. Derived from the literature on Feedback and Progress Indicators, primarily Nicole and Macfarlane-Dick's principles, and the SCAMP identification of FPI types, we have identified a range of FPIs to implement within the MASELTOV MApp. Nicol and Macfarlane-Dick (2006, p.205) outline seven principles of good feedback practice, drawn from the literature, and our application

of these principles of good practice to MApp is shown in Table 2 where we categorise each of the principles in terms of the SCAMP framework. As we noted in the previous section, we drew on established good feedback practice in developing our FPIs, and examples of each of the SCAMP components are given in Table 2.

The main audience for the feedback is usually considered to be the users but there are reasons for making the feedback more widely available. For example learner or user activity data can also be used by systems developers to identify whether there are problems with the apps themselves (e.g. poor user interface design leading to confusion about how to use the tools, or broken functionalities). This information can then be used to improve the tools and services to

Figure 1. Forum posting showing 'thumbs up' icon option to 'like' the post
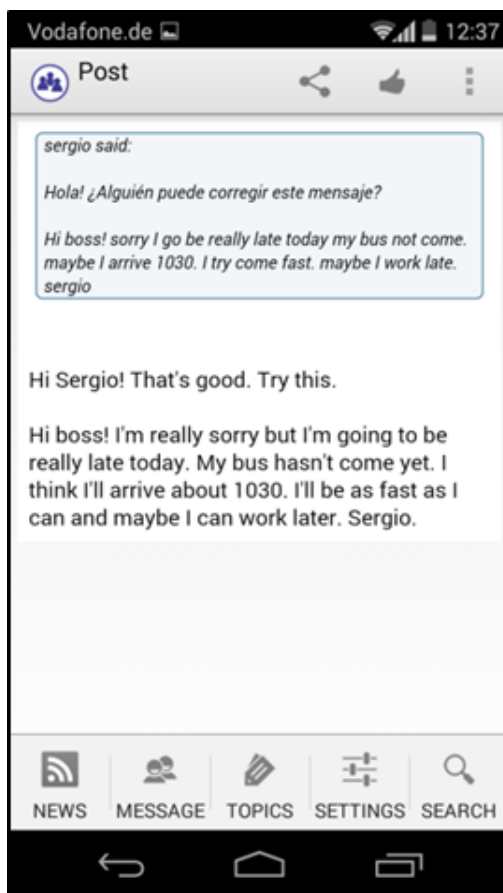
make them more effective: a common approach in the mobile phone app and gaming world, where close analysis of user data informs the rapid development iterations of services.

Below we discuss each type of FPI in more detail and provide examples of their use in MApp. (Note that the screen shots are taken from the version of MApp used for our London field trials where the users are Spanish speakers).

Social

In the MApp, social FPIs are represented by mechanisms to enable the recording of peer support: for example, posts on the forum can be tagged as "liked" by fellow learners (Figure 1.) Learners who act as volunteer expert help-

ers in the Help Radar are rated by the people they help on the quality of their support. Social learning is enabled in the language learning activities and the Translation Tool, with users encouraged to post images and text to the Social Forum, where they may receive help, community participation and feedback. In Figure 2, the learner has the option by clicking on the network or Google Plus icon to share the presented text, or to select a photo to share on the MASELTOV Social Forum.

Cognitive

Within the MApp Language Learning service, formative and summative assessment is offered in the form of quizzes that test the users' un-

derstanding of the content. These are offered at activity level (offering a small section of content suitable for engaging with while mobile) and module level (summarizing a group of activities) (see Figure 3).

Affective

Within the Language Learning service, users can self-assess their confidence, enjoyment of the activities, and likelihood of using their language skills more at the end of each module by selecting a rating. Figure 4 shows an example of this in Spanish, where the user is asked to indicate on a scale of 1 to 5 three measures: (1) their increase in confidence; (2) their enjoyment of the lesson; and (3) how much more likely they are to use the language they are learning. These scores are passed to the central User Profile where they can be viewed by the user, or analysed by the recommendation service in order to recommend other learning resources.

Motivation

Current views of motivation in language learning emphasise the role that the development of new identities play in language learning. For example, Ushioda (2011) notes that: "if we wish to enable learners to visualize themselves as competent L2 [second language] users in the future…it seems important that they are enabled to engage their current selves and identities in their L2 interactions with people (Ushioda, 2011, p.203). Thus feedback from others can play a very important role in confirming and developing a learner's identity as a speaker of the language they are learning and as a member of that culture. In addition to such feedback from other users, learners' activity and achievements are rewarded through the earning of a virtual currency that is recorded in the User Profile. This is both an indicator of engagement and can also be used to purchase items in the game to enhance gameplay.

Progress

User progress in terms of learning, or moving through content, is most relevant to two services: language learning and the game. In language learning, a user progresses through content, and can improve their scores in formative and summative assessments through repeated

Figure 2. Encouragement for social participation in the Translation Tool by sharing text or images
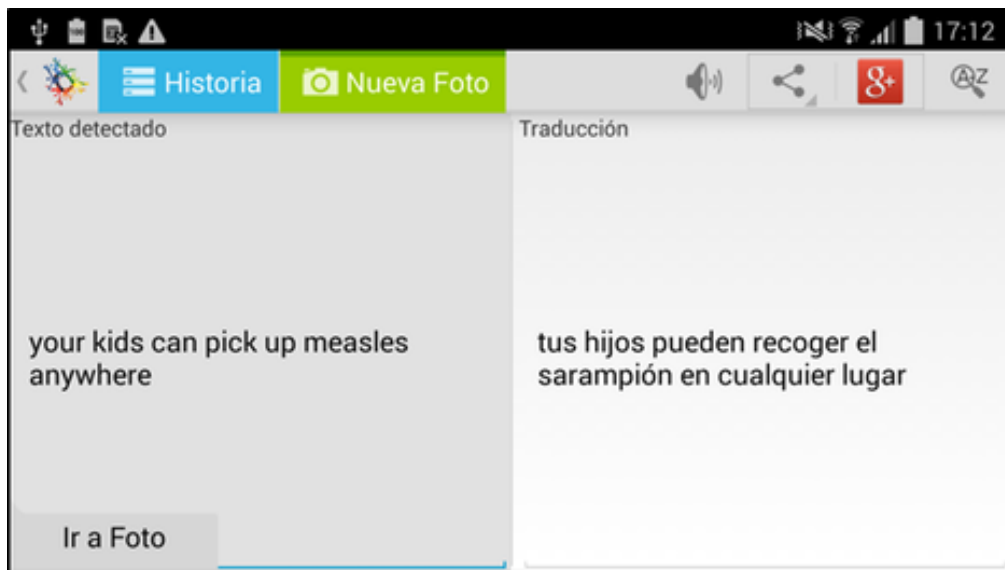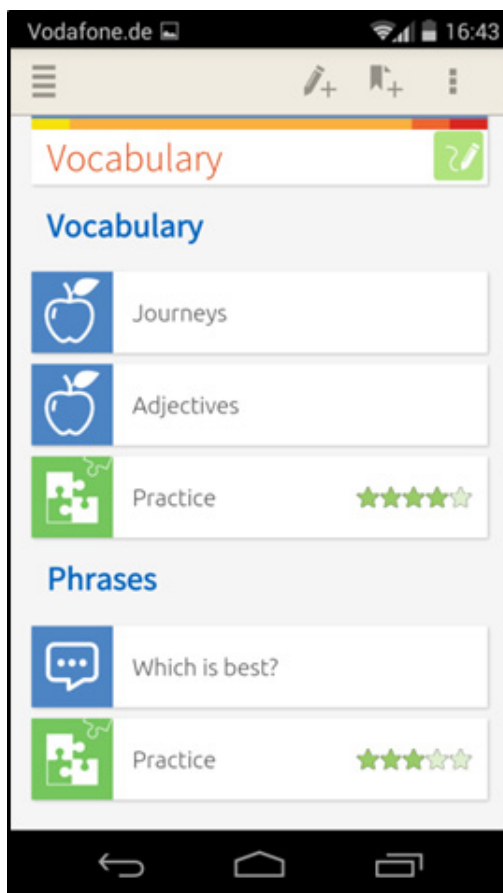
Figure 3. Scores from activities carried out in the language learning service, indicated by stars

attempts at quizzes. Users are also given the opportunity to self-assess their confidence or enjoyment of the learning materials. The game is an extended activity, intended to be played over several sessions, so there is progress in the sense of moving forwards through the narrative, but also in the terms of success in solving problems in the game and being rewarded with a virtual currency.

For the majority of the MApp services, progress can only be defined as continued engagement with the services, which may indicate a willingness on the part of the user to engage with their new environment and community mediated by the aid of the MApp services. This is captured through a visualisation of user activ-ity: a pie chart indicating the relative amount of time spent using each service within the MApp (Figure 5). Users can click on each slice of the pie to find out the total time spent using the service (calculated as when the service is actively being used, not when it is open on the user's phone) and can customise the visualisation to capture specific time periods.

EVALUATING THE USE OF THE MASELTOV MAPP

The MASELTOV project has adopted a user-centred design approach both to the systems developed and to their evaluation in our field trials: an approach which is iterative and involves

Figure 4. Self-assessment of confidence and enjoyment of language learning activities

users at various stages in the process. Whilst earlier trials and focus groups have focused on usability, later trials are conducting broader evaluations of use.

Individual services have been tested separately in the first field trials in three cities (London, Madrid, Graz) and took place over a period of one week. The final integrated trials will take place in two cities (London and Graz) and will include around 70 participants from three different backgrounds with experience of using smartphones. This field trial will take place over a period of seven weeks and involve a number of approaches including question-naires, usage activity logs, the experience sample method (collecting information about the content and context of individuals' daily lives) and content analysis.

Finally there will be a trial in Milton Keynes that will focus on more qualitative data with 20 Spanish speaking participants. Whilst the overall focus of these field trials is broader than evaluating the success of the FPIs, they will provide information on the extent to which the FPIs have been successful.

SUMMARY AND CONCLUSION

In this paper, we began by briefly describing the different services developed as part of the overall MASELTOV app, the MApp. For example, the navigation tools including public

Figure 5. Summary of user activity presented as pie chart with pop-up details
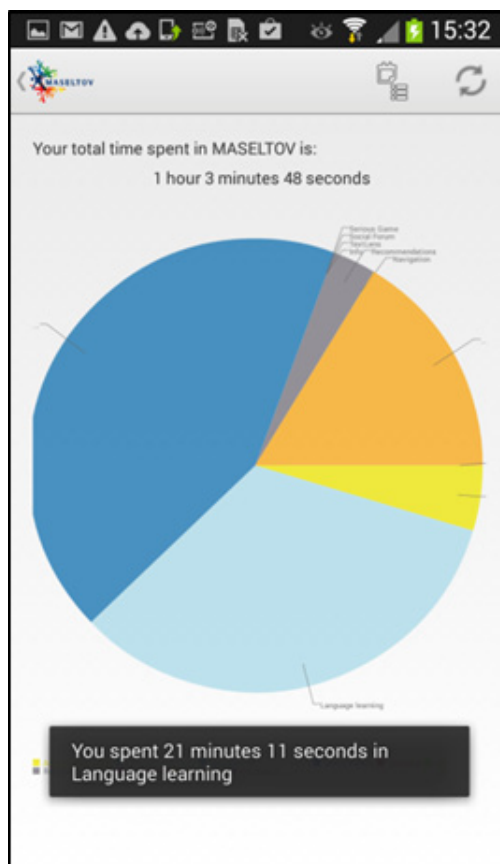
transport planning and pedestrian sat-nav can support recent immigrants to navigate around their new cities, whilst the Help Radar can find nearby volunteers to help the user to solve immediate problems. Other services available on MApp are more explicitly learning apps. For example the language learning activities support immigrants in learning the language of their new city, focusing on areas of key relevance to them such as employment and healthcare. A Translation Tool supports this process through converting photographs to text and translating them, whilst the serious game provides playful learning about cultural differences.

Using such tools provides a plethora of opportunities for incidental learning that are rooted in the user's everyday activities, but this kind of learning also presents some particular challenges. A key challenge is how best to support users of the MApp in moving beyond episodic use for resolving immediate problems to reflecting on their experiences and engaging in a longer term learning journey as encapsulated by our Incidental Learning Framework, summarized in section 2. We have argued that feedback and progress indicators (FPIs) can encourage this longer term learning and have drawn on both mobile learning practice and relevant literature to develop suitable FPIs for use in and across MApp services. In doing so, we developed the SCAMP framework which emphasizes five types of FPI: Social, Cognitive, Affective, Motivational, and Progress. Examples were given of how each type of FPI

is used in the MApp services, and more detailed descriptions were given of how they are used in three particular tools. Overall the FPIs on the MApp can help learners by:

- Encouraging the learner to look forward and plan how to reconceptualise their immediate problem solving as part of a larger journey towards social inclusion, linguistic competence and cultural familiarity
- Encouraging them to reflect upon what has been learnt in a situation and how the response might be improved in future similar scenarios
- Providing opportunities to engage with and elicit interaction from peers

Informal learning supported by the MApp challenges users to become more aware of how and where they can learn and to see their surroundings as a rich source of learning opportunities, resources, triggers for questions about how language is used and consideration of observed cultural differences. Learners who have only experienced traditional, teacher-led education in formal classes may find this challenging and their adaptation to a new way of learning is likely to take some time. The Mapp gives users access to a range of tools and services that may be used only occasionally or in a more sustained way as part of daily activities and routines. To support longer term sustained learning, MApp users should learn to connect what might be fragmentary experiences of using particular tools into a more coherent and reflective learning journey. We believe that personal goal-setting will play an important role, and that frequent reflection on learning is a vital component in building coherence. We have also argued for the importance of feedback in learning. The user field trials will provide the MASELTOV consortium with feedback on how successful we have been in our endeavour.

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