

Mobile and motivating: How something very small can become big. (Mobile Microlearning)

Gabriele Frankl

Alpen-Adria-University of Klagenfurt (Austria)

Abstract: Mobile learning today is technically possible, accepted by large numbers of people and is already happening, although not always recognised as such. However, its area of application is still limited and there is inadequate integration of mobile learning into larger learning systems. Yet when embedded in a meaningful way into existing and global learning scenarios, the advantages of mobile learning can be usefully exploited. Often there is a lack of appropriate design and presentation of content, and a lack of integration into a wider context. The aim of this paper therefore is to introduce an approach that illustrates how small units of learning can be designed to motivate and thus comprise more than might be apparent.

1. Main Idea and Vision

Recently I had a conversation with a taxi driver. He told me that a couple of days ago he had purchased a PlayStation Portable (PSP)¹ that helps him to pass the time when waiting for new customers. He used to read while waiting and often still does so. Then he told me very excitedly about the advantages of the small device. When waiting in his taxi it was not always possible to read, perhaps because the bustle of daily life was too distracting or he was too tired, or the light in the taxi was poor. Therefore he often sat in his car waiting, bored and with the feeling that life was passing him by while he had to sit around idly waiting for customers. Then, however, when books seemed tiresome, he was able to use his portable PlayStation. The games are fun, immersive and waiting periods can even be filled with social interaction because Multi User Games,

¹ PSP is a registered trademark of the Sony Company.

which are played via LAN, mean that there are friends online most of the time. This gives him a sense of real life and community. For the taxi driver therefore this small thing is something very big. Yet reading has not been pushed into obscurity: for the right time, a good book remains popular.

Although it might sound somewhat futuristic, mobile learning any time and anywhere has already begun in a broad sense. While travelling by train – perhaps to a conference like this one – one can see, for example, that children are fascinated by their Game Boys², that people of all ages send SMS, that appointments are made using PDA's, that laptops make it possible to surf the Internet. Portable electronic devices have created something in western culture that is hard to plan and to control, and relatively difficult to achieve: acceptance among a wide range of social groups. When mobile phones were launched they were viewed as a temporary trend. At present, however, almost every person in Western countries has a mobile phone. In 2005, there was a mobile phone in 88 percent of households in Austria (Statistik Austria, 2005). In March 2006 there were 8 926 700 mobile phones registered across all mobile network operators in Austria (RTR, online). On 1st of April 2006, the population in Austria was about 8 274 700 (Statistik Austria, online), which means a penetration of mobile phones of 1,08 mobile phones per inhabitant. This is clear evidence for the popularity of mobile phones, which are fun to use. There is now also a recognised need for continuing education and lifelong learning. It might be argued therefore that if there is to be more learning within shorter time periods, learning should also be fun. This may be achieved by using mobile devices in life-long learning, which can deliver attractive, 'just in time' and 'on demand' learning.

2. Mobile

Let us compare the pastime of the taxi driver, described above, to a tourist strolling through the town, to a schoolgirl playing on her Game Boy on the train journey home, and finally we will focus on the work of a manufacturing company. First we shall take a closer look at the tourist's stroll through the town. He does not wish to make the

2 Game Boy is a registered trademark of Nintendo.

effort and pore over a travel guide in order to find his way. He would like to have a number of alternative routes, to walk leisurely through town but without getting lost. He wants to define what is important for him and he wants to be told how to get there. So if there is electronic information available at important sights, the tourist can use his mobile device to get information about relevant sights that can be found along his route. When he approaches a tourist sight, he can receive the appropriate information in 'light and digestible' but stimulating micro-bits in his mother tongue. If there is a word in a foreign language that he does not understand, he can get a translation via the mobile device.

And what about the commuting schoolgirl? She has to travel to and from school and thus spends a lot of time on trains or buses. In the mornings she tends to be tired and after a couple of lessons at school she is no longer interested in books. She prefers playing with her Game Boy and does so with a passion that any teacher can only dream of inspiring in lessons, despite encouraging active learning. However, computer games provide something beyond active learning – they offer vast opportunities for learning and children relish the challenge (Papert, 1994). An example is the learning capacity of five-year-olds who, as a result of playing the game on the Game Boy, can without difficulty name the 150 Pokemon-figures and describe their characteristics.

These examples outline some benefits of mobile learning, which can also be utilised in work-related fields. Therefore we next consider the manufacturing company, which is also affected by an increase in complexity. Production processes must take into account ever increasing variables and some of the factors involved are changing markets, low life-cycle products, and more specific as well as higher customer demands from products. A difficulty arises for the production worker because a machine operator has to have ever more work-related knowledge and consider ever more information, yet make decisions in an ever shorter period of time. For example, any machine malfunction needs rapid and appropriate action, which means that operators must have quick and ready access to the relevant information.

In addition to a knowledge base, however, there is a need for access to external sources of collective and shared information, and advice on how to use it effectively. Specialist machine operators need valuable knowledge on site right where the problem exists, but this is precisely where currently the knowledge is not available. Yet when problems occur there is no time to get information from desktop-eLearning platforms or colleagues. It also seems cumbersome to note potential engine problems during

inspections, which must be entered into a computer system at a later time. The solution might be a networked mobile device that a worker – like the tourist – can carry at all times. The device would provide ready access to data bases or knowledge management systems, whether for the purposes of data input or retrieval. With mobile, wearable devices, skilled workers can access information without having to leave their work station. Existing knowledge can be utilised at any time where it is needed, and new knowledge can be better retained when stored immediately and as it is discovered or emerges. This is just as in the Nintendo advert „Game Boy micro is with you at every step, wherever life takes you“ (Game Boy, online).

As noted above, the majority of people in our society possesses mobile devices, and people use the devices “wherever life takes them”, be they mobile phones, Smart-phones, PDA’s, wearable computers, mini-laptops or something similar. Those wireless mobile devices could help us to learn anywhere and whenever needed. For that reason an employee of the maintenance division of our project partner (see chapter 7) has expressed the wish that all employees should be equipped with PDA’s. Service and maintenance tasks could then be entered into PDA’s and retrieved as well as carried out on the shop floor. The advantage is that important information is available any time, and can be easily passed on and stored. Moreover, communication between workers in different divisions can take place more effectively, for example between maintenance and paper mill, as well as across the entire plant. The integration of workplace and learning thus moves into a new dimension, as does learning in real-time. The mobility is conducive to the ubiquity of learning; the persistence of learning processes increases, passive knowledge acquisition diminishes because knowledge is gained on demand and in context and therefore can be integrated into concrete experiences. This linking of knowledge and ad-hoc-problem solving is the essence of mobile Knowledge Management Systems, as Franz Lehner (2002) characterises them. The ability to search for something anywhere and any time provides a sense of security and thereby might increase the fun factor at work.

3. Motivating

There is much talk about the leisure society. If fun is so important to us, why should it not also be used actively and productively? Why should we not discover the fun in

learning for our personal and collective development? Another point to note is that the retirement age increases steadily. Most people have to work longer, perhaps for 40 years or more, and they have to learn throughout their lives, for some 80 or 90 years or even longer, from the first to the very last day of our life. Horst Siebert stated rightly that "learning is living, living is learning" (Siebert, 2003, 18). What kind of life will we live then if there is no fun in learning? What potential for growth, sense of success, or possibilities for self-fulfilment will we miss if we are not keen to meet and master challenges? If, however, the power and pleasure of learning and work can be discovered and stimulated, this power and pleasure can be used for the good of both - the individual and the community.

Many authors have written about the fascination with (computer) games (e.g. Huizinga, 1997/1971; Fritz, 1995; Turkle, 1998). Here we should note that selected aspects make handheld devices attractive also for learning. The advantage of digital information lies in its potential for creating content that enhances learning: for example, hyperlinks can link to further knowledge and information can thus be presented at different levels and in varying detail according to need. The user can interact with the learning material and receive performance feedback, either system generated messages such as 'Correct, well done!', or even interactive feedback from peers. Searching for particular learning materials is much easier because it is no longer necessary to do a serial search through books or piles of paper. Instead, the electronic environment makes it possible to find the required content quickly and without much effort. It is furthermore possible to filter content according to keywords. Another important point is that the updating of learning materials can be done easily and quickly.

Textual content can also be enriched by meaningful use of Multimedia. Animation and simulations can be used to illustrate concepts that cannot be directly observed and are difficult to explain. Information transfer on the Internet, for example, was simulated in a clear manner via TCP/IP protocol. Electronic colours cost nothing and if used with principled care, they make text visually appealing and help to create a clear and coherent design. The user is then less aware of technical aspects, is less intimidated and therefore less likely to turn away from the new technologies. The traditional 'dry' learning content can be revitalised and made more vivid. This vividness attracts the learner's attention, and provides continuing fascination and motivation. In this way learning can be delivered in fun 'parcels', it is easy to understand and retain, it is diverse and appeals to different senses, is entertaining and hence a more rewarding experience.

4. Mobile and Motivating: Micro

Mobile learning has been possible for some time, though limited in scope by factors such as the number of books and documents that can be carried, and hence the need to carefully select the literature that can be taken on journeys. It shall not be denied that traditional learning materials can be motivating and can awaken a thirst for knowledge. Rather, the intention is to show that in small formats there is great potential for mobility and motivation.

Such small formats have a variety of applications (see Chapter 2 for a description). However, the advantage of (playful) learning via fun 'parcels' also lies in the close reference to the learner's real-life context, because learning is possible right where it is needed. When students and skilled workers are asked to list factors they find motivating or de-motivating in learning, they tend to attribute a lack of motivation to situations where the need for learning and its application are not clear. It is possible, however, to make learning happen "wherever life takes you" because the end products from information and communication processes, for example iPods or head-mounted displays, are getting smaller, they are turning micro³. The learning units are getting smaller. The learning content is getting smaller. Micro end products need Microcontent and give rise to Microlearning. Microlearning fits in perfectly with the 'playful' approach to learning and the 'playful' design of learning content. The micro pieces must fit easily into a larger whole and because they tend to be used in noisy and distracting environments, they must attract and hold the user's attention for the relatively short periods they are in use. The playful approach is ideally suited for this.

Microcontent has, furthermore, a motivating and attention-grabbing effect in that the small knowledge-bits are just the right size and contain only essential and relevant information. The information is therefore easily digested. There is no need to display 989 pages which indicate the vast amount still to be learned and hence may overwhelm the learner. Instead, learners are freed from the burden of knowledge – in both the physical and mental sense. The learning experience is thus given a new dimension of levity, and on different levels.

3 Even if the trend is 'getting micro', there is a limit for the size of mobile devices because of the necessity to handle them. This limit could be broken by operating with the mobile device via voice control, for example.

The mobile learning environment has limitations but is particularly suitable for areas where learning needs to occur 'on demand' and 'just in time'. In this context learning is highly effective because it is relevant and can be applied immediately. Mobile Microlearning is less appropriate in a situation where learning must cover entire topics (to the extent that such learning is feasible) but is most successful when structured in bite-sized bits of information that can be used to refresh or add to existing knowledge. Acquiring a wide knowledge base can be difficult because the mobile device is too small to display an overview or much detail. Knowledge bits, though attractive, appear as isolated items. Thus there is a lack of the context that is necessary for initial comprehension. The small display area also makes it difficult to navigate the content pages. Although the Internet is based on 'pull' technology (Steinberger & Mayr, 2002) where the user must request information, mobile devices will lead to a rise in the delivery of information 'push' style, which can be characterised as 'finding, not searching'. Any attempt to simply transfer desktop learning applications to mobile devices is bound to fail (Zobl, 2001) because in addition to the problems of navigation, it is not access to a complete learning programme but rather to single 'knowledge-bits' that should be flexible and mobile (Steinberger & Mayr, 2002). In order to help learners succeed it is necessary to link traditional learning approaches and mobile microlearning in an effective and meaningful manner. A successful outcome, in my view, can be achieved by creating well-structured and categorised learning materials from desktop eLearning platforms. Materials are thus already divided up into smaller or micro units. Indeed, true microlearning can occur where such eLearning programmes comprise mobile and context-searchable smaller bits of information, which are interlinked in a way that makes transparent their connexions and embedding into the larger whole.

As an example, for our partner in the paper industry this would mean the ordering of learning content into categories that make orientation easier and that provide simple cognitive schema which facilitate the rapid and reliable entry of content. The process of developing best practice solutions for manufacturing processes in the paper industry produced the categories listed below.

- **Aims/Why?**

Employees must be aware of the objectives and understand the rationale for working practices. In addition to increasing motivation, transparency about the necessity of implementing certain measures ensures that 'correct' decisions are taken.

- **When/How often?**
Employees should be informed with regard to when and how often a specific procedure has to be carried out. For example, certain maintenance procedures must be followed at regular intervals, or specific measures must follow certain events.
- **Procedures**
All procedures are to be explicitly stated in coherently structured and easy to follow steps.
- **Tips**
Special advice should be listed in the form of tips, perhaps listing points to note while working through certain procedures or stating solutions to frequently encountered problems.
- **Safety measures**
Safety rules and measures must be made explicit in order to protect employees' safety and prevent accidents and injuries.

The categories above can be made more salient through colour coding and the addition of memorable icons. Figure 1 shows a simple outline that is intended to present the main idea.

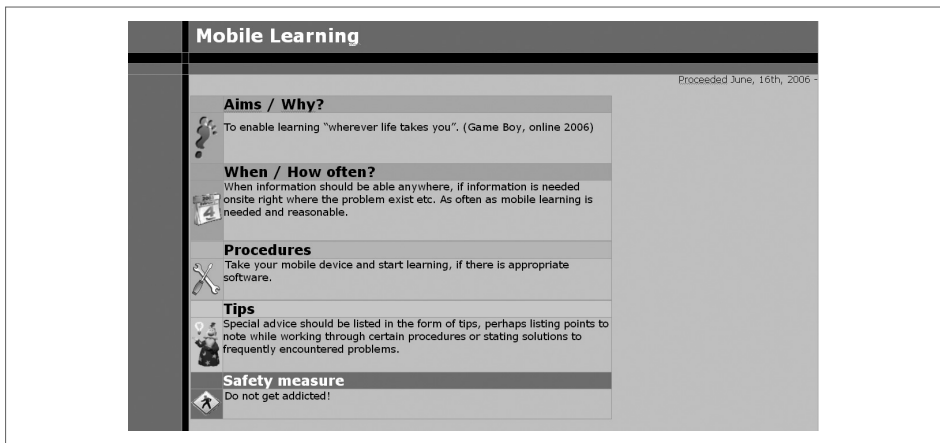


Figure 1: Design of learning units that facilitate orientation and enhance recognition⁴.

4 The learning unit was developed with Content Creator, version 2.9, from bitmedia. The icons were downloaded from <http://www.sukria.net/images/icons-window.png>, <http://dotpups.de/files/iconsets/kde-icons-48x48.jpg> and http://www.polymedial.de/digitales/websites/icondesign_04.html to show the idea.

There is colour coding and the addition of memorable icons in the design of the single categories too, as shown in figure 2.

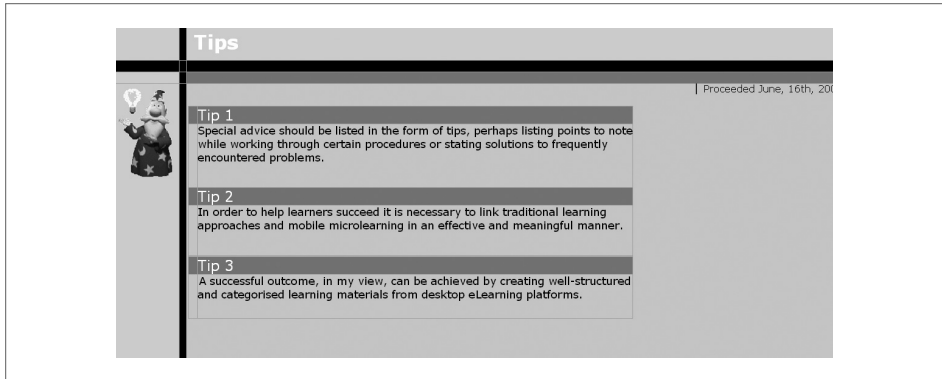


Figure 2: Example of the design of the category 'tips' in the desktop learning environment⁵

Keeping the colour coding and the memorable icons eases the classification of the knowledge-bits. The information from the mobile device is shown in the global context of the desktop eLearning system. Microcontent is subject to the limited transfer rate for mobile devices and thus has to be simple and 'slim'. Colours and small icons are therefore suitable for mirroring the embedding of micro information bits into the larger context of the desktop eLearning environment. Tips, for example, which can guide certain steps to be taken on the actual shop floor, can be delivered via mobile and instantly recognised as such by colour and icon (see figure 3).

⁵ The icon shows Merlin, the avatar from the Content Creator.



Figure 3: Application and recognition of an information bit from the 'desktop eLearning' platform on the mobile device⁶

The design of the microcontent is very vivid, motivating, suitable for mobile applications and in an appropriate situation helps to develop something very big from something very small.

6 To outline the idea a picture from the Pocket PC from Compaq was used, which can be found at <http://web.mit.edu/vivoni/www/esri/p010203.jpg>. Navigation elements are missing in the illustration because of the reduced representation.

5. Mess, Confusion and Chaos?

The question then is what the effect might be on our daily lives when we constantly carry small and often private information units, when we have access to learning and information anytime and anywhere, and when there is access to us anytime and anywhere. According to David Nott, addiction treatment manager at the Priory Hospital Marchwood in Southampton, „People are beginning to treat their mobiles as human beings because they symbolise contact, friendship and attention“ (Nott, 2006). However, Nott also found that the use of mobiles can lead to addiction. Another question is whether carrying a mobile device at all times will lead to anxiety, or perhaps a sense of being constantly subject to control. Will our identity become ever more fragmented? Can mobile information transfer maintain a certain degree of data safety and protection? What are the implications for safety at work when manufacturing workers' attention is focused on handhelds? Will we lose our overview in the face of incoherent and seemingly incoherent bits of information? Or is it an outmoded idea that one needs an overview? Do we thereby cause our lives to descend into chaos?

Even in the television it was suggested that viewers are overwhelmed by floods of pictures and comments that are often removed from context. Hertha Sturm (2000) refers to the missing 'half-second' which individuals would need in order to understand the information with which they are bombarded. In the case of a book, for example, turning pages causes breaks during which the brain can find the time needed for assimilation. However, in the absence of such important breaks, assimilation processes cannot also be cut short, at least not to the same extent. The overload of information, news and lifelong learning can lead to a fear of 'spoiled time'. In the same way as the mobile telephone has almost forced us to be available at all times and has, therefore, become a nuisance, the pressure of lifelong learning might become unpleasant and have grave consequences if every bit of time can be filled with further learning. If there are no opportunities for relaxation and 'quiet time', then there is also no opportunity for strengthening existing knowledge, for letting thoughts wander or for creativity.

As noted in the introduction above, the taxi driver's PSP has not pushed out reading, nor must we allow the technology to take over. There must be an even-handed approach, taking a step back, looking at the world away from the ubiquitous computer use.

If this can be achieved, we might, where appropriate, fill many idle moments in our lives with meaningful activity. For example, we spend time travelling by plane, train or bus, in doctors' waiting rooms or at the hairdressers, all of which takes up valuable time that might be used more effectively. And for this, mobile devices provide an ideal solution.

6. Method and Team

The theoretical and visionary explanations derive from practical experiences with projects in the paper manufacturing industry and my experiences as a university teacher using eLearning-platforms.

For our partner in the paper industry a first module of a Knowledge Management System– an electronic shift protocol – was developed and put into operation in 2002. In 2003 the system was expanded by two further modules – a shift support based on Best Practice and an extended search function including expert lexicon and technical dictionary. The project was coordinated by DI (FH) Wolfgang Meyer, the eBusiness Institute of the Alpen-Adria-University of Klagenfurt (Univ.-Prof. DDr. Heinrich C. Mayr, DI Harald Semmelrock, DI Marko Anzelak, Mag. Gabriele Frankl) and addIT as partner for implementation. At the end of 2004 the conceptualisation of an eLearning module was started, which is currently being developed with the following partners: eBusiness Industriestiftungsinstitut of the Alpen-Adria-University of Klagenfurt (Univ.-Prof. DDr. Heinrich C. Mayr, Dr. Claudia Steinberger, DI Marko Anzelak, Mag. Gabriele Frankl), Institute for Media and Communication Studies (Univ.-Prof. Dr. Christina Schachtner, Mag. Gabriele Frankl and Mag. Angelika Höber) and addIT.

7. Conclusion

The aim of the paper was to show how micro-content, delivered via mobile devices, can be designed to enhance the drive for learning and to improve the quality of materials in order to discourage passive attitudes, to enrich work and life in general, to fill idle times with useful activity, and to integrate fun learning into daily life. The goal here is to further personal as well as collective development.

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