The Importance of the Learner's Environmental Context in the Design of M-Learning Products

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Abstract:

As mobile devices, such as PDAs, iPods, and mobile phones become more common, corporations are turning to mobile learning to improve employee performance. Today's m-learning designers often tend to borrow design ideas from their e-learning experience; many designs attempt to re-fit e-learning methods—even e-learning products—to a small screen. I suggest here that designers would be better served by considering the entire context in which learners will use a particular m-learning program. In this paper I describe two examples of m-learning designs that go well beyond the idea of refitting e-learning to a small screen and illustrate how these designs make use of the learner's environmental context. Finally, I propose a set of contextual factors designers should consider when designing m-learning products.

1 Introduction

As mobile devices, such as PDAs, iPods, and mobile phones become more common, corporations are turning to mobile learning to improve employee job performance. Mobile devices have tremendous potential to improve employees' efficiency and effectiveness in a variety of jobs, used for both performance support and training purposes depending on the particular needs. These devices, however, are still quite new to the corporate world, particularly for learning and job performance purposes, and designers therefore currently lack a large body of existing "m-learning" design work to draw from. Thus the natural temptation for m-learning designers is to borrow from their e-learning experience; their designs often attempt to re-fit methods used in e-learning design—or even to "convert" entire e-learning products—to a small screen.

While such an approach may work well in certain circumstances, designers would be better served by considering the entire context in which learners will use a particular m-learning program. People typically sit at a desk to use an e-learning product on a computer, but m-learners might use their mobile devices to learn at home, on a subway, on the floor of the retail store where they work, or just about anywhere.

Such mobility may imply the need for some design constraints (certain m-learning products must be usable in a wide variety of situations or locations, to the designer must plan for all reasonable usage instances), but I believe that designers should view mobility as producing design opportunities rather than constraints. M-learning design, whether training or performance support, means much more than designing an interface for a small screen and limited keyboard; indeed, it calls for the development of entirely new design methodologies. To learners, mobile devices are not just small computers—they're seen as different devices

that can be used in different ways and in different situations. It's up to the m-learning design community to create appropriate, innovative learning and performance support methods.

In this paper I describe two examples of m-learning designs that go well beyond the idea of refitting e-learning to a small screen. I'll illustrate how these designs make use of the learner's environmental context, then propose a set of contextual factors designers should take into account when designing m-learning products.

2 M-Learning Approaches Relying on Environmental Context

2.1 Mobile Stocking Training: "Real-Life" simulation using a PDA

The Mobile Stocking Training System (Guralnick, 2005) was designed to teach sales floor employees at a major U.S. retailer how to stock merchandise correctly on store shelves. Since stocking is a physical task—the job is to take merchandise and arrange it properly on the shelves—the Mobile Stocking Training System uses learning-by-doing as its basis. But rather than giving learners simulated tasks to complete on a computer (as a more traditional e-learning approach would), this system takes advantage of the *mobility* of mobile devices and incorporates a real-life task into the design. The program, which runs on a Pocket PC-based Personal Digital Assistant (PDA), asks learners to perform a stocking task in a store aisle—that is, in an actual aisle of the store that the learner works in. This method maintains the core benefits of learn-by-doing online simulations, but ups the ante: the "simulated" component is actually real—thus the mapping from the training to the real-life task is exact and the task is authentic in the truest sense.

The training exercise follows the outline below:

- The exercise begins on the PDA by giving the learner some background information (in both text and audio) about how important it is to stock the shelves exactly in the prescribed way (good or bad stocking has an enormous effect on the customers, and thus on the store's overall success), explains the basic rules in text and audio, and shows what good shelves look like.
- Next, the learner is asked to stock a shelf in a particular aisle in the store as quickly and precisely as possible (the way the merchandise flow systems work, there will always be some item available for stocking in the aisle, at least in the particular aisles chosen to be included in the training exercise. So there is no danger that the real-life task will not be available when needed).
- After completing stocking the shelf, the learner uses the PDA to compare his or her shelf to photos of a model shelf, and also shelves that are not perfect, with particular photographic emphasis and annotation on the subtle mistakes that affect customers' perceptions.
- The learner is asked to, after thorough review of the photos, fix any errors in his shelf.
- The learner then works through additional examples in the same, way, with the examples increasing in difficulty. Additional content is provided to the learner, via text and audio, as needed.
- At the end of the training, not only has the learner become a stocking expert, but has also stocked actual shelves—that is, done productive work for his store (which is financially very useful for the company, since "training" time also produces some actual work!).

The overall design of this product is intended to suit the retailer's internal brand: "Fast, Fun, and Friendly." To this end, the program makes use of audio narration and coaching, a motivational on-screen timer, and even music (when the employee stocks the shelf). So this training is used not only to teach the employees how to stock shelves, but there is also a strong motivational component to this program: it is making the point that the store is an energetic, fun, modern place to work, and that the job itself is fun as well as "work."

The idea for the Mobile Stocking Training System came from an understanding of the environmental context in which a learner could use the PDA—that is, such a product could only be designed using a mobile device that could be moved during the user's interaction with the program. It is also designed to suit its audience—mostly younger people—and to reflect the company's style and brand.

2.2 Mobile Performance Support for Fiber-Optics Technicians

In addition to training, mobile devices can help improve the job performance of employees, mainly by providing just-in-time performance support. Consider the case of fiber-optics technicians, who do not have access to computers while doing their jobs, but who carry a mobile phone instead. If you could give these technicians a performance support tool that runs on their phone, could you help them work more efficiently and accurately? That's the question that drove the design of the Mobile Online System for Fiber-Optics Technicians (Guralnick, 2006).

In order to perform their jobs effectively, fiber-optics technicians need to be both *skilled* and *knowledgeable*—they must exhibit the core set of fiber-optics technician skills, and they must know details about the particular parts they work with on each job. The difference between a mid-level and a senior technician is often due to knowledge as much as to skill, so specific information regarding particular parts is of heightened importance.

Fiber-optics technicians must be able to correctly identify, distinguish, and use thousands of individual parts while on the job. To achieve this goal, technicians—even experienced ones—often find themselves calling the office for information on, for example, a connector they are not familiar with. These calls can be expensive for the company (at the very least, both the technician and the office worker are spending time on the same problem), and because the telephone is limited to sound, the technician and the office worker cannot, for example, see a photo of a particular connector together to be sure they are discussing the same thing.

The Mobile Online System for Fiber-Optics Technicians eliminates these office calls by giving technicians a just-in-time, just-in-place performance support tool. While on a job site, technicians use their mobile phone to find information that helps them:

- Figure out which connectors to use
- Install various connectors
- Find tools and parts to use with different cable and connectors
- Test different connectors according to industry standards

Figures 1 and 2 show several sample screens from this product. Figure 1(a) shows the main menu for the system, organized by the user's goals (e.g., install a connector, or get information). Figure 1 (b) and (c) jump ahead and show product information for a particular connector. The user can choose "Get product information" from the Main Menu in Figure 1(a) to get general information about any connector, including an overview, features and benefits, specifications, diagrams, and part information.

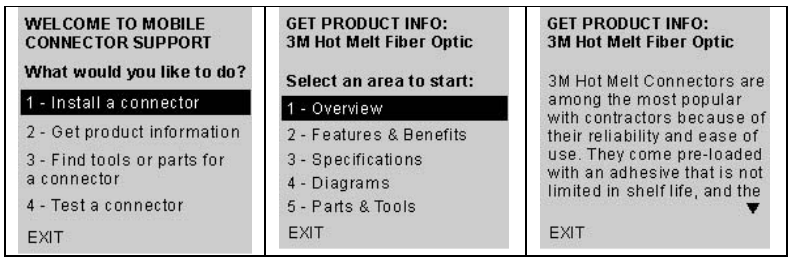

Figure 1. (a) The Main Menu; (b), (c) Product Information for a Connector

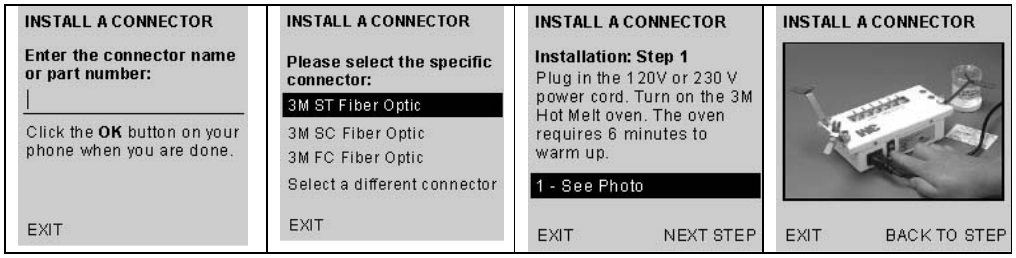

Figure 2. (a),(b) Product Information; (c), (d) Connector Installation.

After selecting a menu item such as "Install a Connector" or "Get Product Information" from the Main Menu in Figure 1(a), the user enters the connector information (usually a part number) using the phone keyboard, as in Figure 2(a), then selects or confirms the model (as shown Figure 2(b)). After a connector has been selected (in this case the 3M Hot Melt Fiber Optic), the user gets the desired information; Figure 2(c) and Figure 2(d) show information on installing a connector, including a color photo. Photos are available wherever possible.

The product's design allows technicians to quickly and easily browse for the types of information they need, thus minimizing typing (which is difficult and frustrating on a mobile phone), but still allows them to search when necessary. Moreover, the design takes advantage of a device technicians already had, the mobile phone, thus saving the client the expense of rolling out PDAs to all technicians.

3 Implications for M-Learning Design

The designs of both of these m-learning products take important contextual factors into account, such as how the audience will be using the product, when they'll be using it, and for what goals. While this approach is sound in almost any design situation, it is particularly crucial in m-learning. That's because m-learning designers are accustomed to creating stationary e-learning sites and must shift their thinking to learn how to make the most of the opportunities that *mobile* devices present for training and performance support.

Consequently, here are some key questions designers need to ask themselves when creating an m-learning program:

- Where will the audience use the device and program? In one location? Multiple locations?
- When will learners use the device and program? Does the time of day influence learners' freedom to move? Is it a factor in the level of distraction the learner may be faced with while using the program?
- Do users need to move while using the device for this task?

- Is sound, with or without headphones, advisable to use? Or is it inappropriate or dangerous, because learners also need to be able to hear what's going on in the rest of their environment?
- What is the availability of the Internet signal?
- What is the interface of the device like? Different devices have different hardware and software interfaces; for example, a mobile phone has a limited keyboard and an iPod has a scroll wheel and specialized buttons.

4. Conclusion

As mobile devices, such as PDAs, iPods, and mobile phones become more common, corporations are turning to mobile learning to improve employee performance. These devices, however, are still quite new on the learning front and therefore currently lack a large body of existing "m-learning" design work to draw from. Therefore, the natural temptation for m-learning designers is to borrow from the e-learning experience; their designs attempt to re-fit e-learning methods—even e-learning products—to a small screen.

While such an approach may work well in certain circumstances, designers would be better served by considering the entire context in which learners will use a particular m-learning program. The products described above and the set of design questions presented may help encourage designers to invent new methods and approaches geared toward m-learning in particular. With the philosophy described above, m-learning can continue to grow beyond being a limited, anytime/anywhere version of e-learning, but into a thriving, independent area for both research and practice.

References:

[1] Guralnick, D. (2005). "Real-Life Learn-By-Doing Training on a PDA." Mobile Learning 2005, Qawra, Malta.

[2] Guralnick, D. (2006). "Using Mobile Phones to Improve the Efficiency of Field Workers." Mobile Learning 2006, Dublin, Ireland.

[3] Nielsen, J. (1993). Usability Engineering. San Diego, CA: Academic Press.

[4] Norman, D.A. (1988). The Design of Everyday Things. New York: Basic Books.

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