

M-LEARNING OF THE SUPERCONDUCTIVITY

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Abstract

The fast emerging mobile e-learning (m-learning) is a natural development in the product evolution of conventional e-learning and represents exciting new frontiers in education and pedagogy. To illustrate how mobile technologies can be used in teaching and learning in discipline such Physics, this paper presents an example connected with the phenomenon **Superconductivity**.

1. Introduction

Over the past ten years mobile learning has grown from a minor research interest to a set of significant projects in schools, workplaces, museums, cities and rural areas around the world. The main reasons for this is that there are more wireless networks, services, and devices than ever before, wireless communications industry is in global growth mode, consumers are demanding better mobile experiences than ever before, people want "anytime, anywhere" connections more than ever before. The fast emerging mobile e-learning (m-learning) is a natural development in the product evolution of conventional e-learning. With its "wearable" computing feature and multimedia content delivery, mobile learning offers new benefits to teachers and learners (Wagner 2005). To illustrate how mobile technologies can be used in teaching and learning in discipline such Physics, this paper presents an example connected with the phenomenon **Superconductivity**.

2. Advantages and disadvantages of m-learning

2.1. Advantages

The main advantages (Wagner 2005; Kukulska-Hulme 2007; Shih 2007) of m-learning are:

- Learners can interact with each other instead of hiding behind large monitors. It's much easier to accommodate several mobile devices in a classroom than several desktop computers.
- PDAs or tablets holding notes and e-books are lighter and less bulky than bags full of files, paper and textbooks, or even laptops. Handwriting with the stylus pen is more intuitive than using keyboard and mouse.
- Mobile devices can be used anywhere, anytime, including at home, on the train, in hotels - this is invaluable for work-based training. These devices engage learners - young people who may have lost interest in education - like mobile phones, gadgets and games devices.
- It's possible to share assignments and work collaboratively, learners and teachers can e-mail, cut, copy and paste text, pass the device around a group, or 'beam' the work to each other using the infrared function of a PDA or a wireless network.
- Mobile learning helps learners to remain more focused for longer periods, to raise self-esteem and self-confidence and can be used to encourage both independent and collaborative learning experiences and helps learners to identify areas where they need assistance and support.
- Mobile learning helps learners to improve their literacy and numeracy skills, to recognise their existing abilities and to remove some of the formality from the learning experience and engages reluctant learners.
- Mobile learning helps to combat resistance to the use of ICT and can help bridge the gap between mobile phone literacy and ICT literacy. Interaction between the instructor and students was more enhanced. Students appeared to be more encouraged to collaborate (Shih 2007).
- The capabilities for learning anytime and anywhere, just in time, just for me, and multimedia (text, voice, image, or video) messaging are essential characteristics. (Shih 2007).
- Technology in and of itself may not guarantee better learning, but when effectively deployed, technology can help focus attention while attracting and maintaining a

learner's interest. Perhaps even more important, technology allows us to have relationships with information in our own, unique ways (Wagner 2005).

2.2. Disadvantages

However, there are a few potential disadvantages (Kukulska-Hulme 2007):

- Small mobile and PDA screens limit the amount and type of information that can be displayed.
- There are limited storage capacities for mobiles and PDAs.
- Batteries have to be charged regularly, and data can be lost if this is not done correctly.
- They can be much less robust than desktops (although tablet PCs are beginning to tackle this problem).
- It's difficult to use moving graphics, especially with mobile phones, although 3G and 4G will eventually allow this.
- It's a fast-moving market, especially for mobile phones, so devices can become out of date very quickly.

3. Realization of the m-lecture "Superconductivity"

Superconductivity is one of the most exotic physics phenomenon with many different practical applications (Nancheva 2006). The lecture "**Superconductivity**" is produced in Learning Management Systems (LMS) Moodle. The courses created in Moodle can be used by means of MLE-Moodle, which is an out-of-the-box **mobile Learning** (mLearning) system, designed for mobile Phone. It is realized as a plugin for Moodle, which adds mLearning functionality to this open-source eLearning system. With MLE-Moodle it is possible to enhance the eLearning system to mobile Learning, and can learn either with mobile phone (mLearning) or with PC/Notebook (eLearning). Fig.1 presents the screenshot of lecture "**Superconductivity**" for MLE.

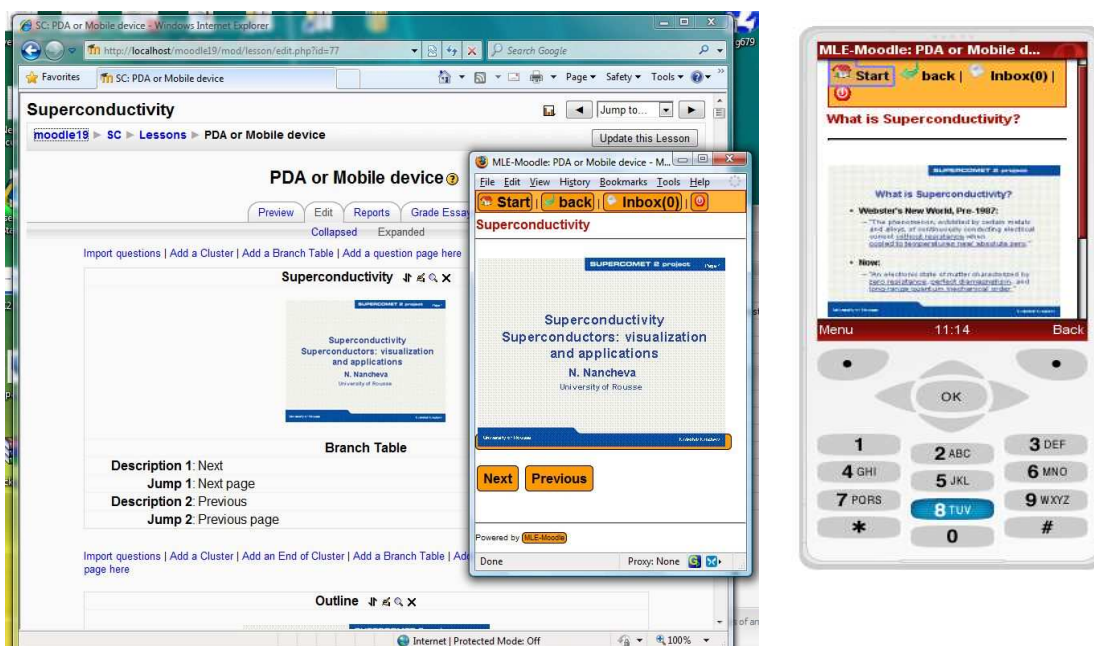


Fig.1. Screenshot of lecture "Superconductivity" for MLE

The text for lecture "**Superconductivity**" has been prepared in form as 58 power point slides and has been a part of SUPERCOMET 2 project. It presents one slide after another: what is superconductivity; discovery of the superconductivity; superconducting state; what causes superconductivity; history of superconductivity; the superconductor race; Nobel

awards connected with superconductivity; what is a superconductor; superconductive elements; type 1 and type 2 superconductors and their main properties; examples of crystal lattices for type 1 and type 2 superconductors; superconductor MgB₂; atypical superconductors and examples; significant benefits and disadvantages of superconductors; applications of superconductors for magnets, cables, wires, quantum devices, transformer, transistors; applications in medicine. A few video clips (Nancheva 2006), worked up with Programme Quick Media Converter is added for visualization of the phenomenon (Fig.2).



Fig.2. Screenshot of video clip in MLE in addition of lecture "Superconductivity"

Conclusion

M-Learning creates learning opportunities that are significantly different to those provided by e-learning (at a desktop) or paper-based distance learning. Some of the best applications for mobile computers are lecture notes, homework, interactive student chatting, mentoring, and remote access to live computer labs. It is widely believed that mobile learning could be a huge factor in getting disaffected young adults to engage in learning, where more traditional methods have failed. The communication and data transfer possibilities created by mobile technologies (m-technologies) can significantly reduce dependence on fixed locations for work and study, and thus have the potential to revolutionise the way we work and learn.

The work of the team creating mobile multimedia version of the presentation showed that the skills needed for processing and conversion of video presentations in the form suitable for the Internet are beyond those of regular teachers. Team aims to improve Moodle to perform this activity without the participation of teachers.

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