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# Moles: Mobile Learning Exploration System

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**Abstract:** By now "Moles" (Mobile Learning Exploration System) is a successfully used system for mobile learning in many school projects. Students can independently use Web Moles for PC (with limited rights, we call it Moles for Kids) to prepare excursions or mobile games. In the field, whether in the urban area, in a company, or in a biotope, etc., students can playfully explore with Web Mini Moles on mobile phones the world. Back in the classroom, digital records or other results they can produce presentations again with Web Moles.

## Mobile Learning

The integration of mobile learning into students' everyday lives requires mobile learning technologies that can speed up this process (s. Roschelle, 2003). The flexibility of contextualized learning spaces and the chance of addressing the individual leaner as well as supporting collaborative processes are major benefits of mobile learning. In addition, reasonably priced mobile learning devices have become increasingly available. In the process of designing mobile learning systems these aspects can be utilized to aid teachers and learners in intertwining digital and physical learning environments, which helps students to actively and dynamically construct knowledge within relevant learning spaces. Thus knowledge is not passively absorbed in the classroom, but actively and dynamically constructed within relevant and well-contextualized learning spaces. During this process learners need a flexible infrastructure, which helps them to understand mobile learning scenarios as an important part of their livelong learning processes (s. Becking, 2004).

When equipped with the corresponding software, affordable and powerful mobile learning devices, such as mobile phones or PDAs, offer up new chances of learning effectively, but only in connection with the availability of pedagogically sound applications (Trifonova, 2003). Pedagogically sound learning does not refer to the mere accumulation of information, but focuses on the development of systemic mental structures, defined as internal symbols of representation of external reality. Mobile media and the respective software provide formal and informal processes that are deeply linked to non-linear and sensual experiences. The effectiveness of mobile learning depends on two key factors: construction and contextualization (s. Melzer, 2007). In regard to construction, effective mobile learning systems need to support explorative learning, e.g. during excursion or learning games, which means that learning is enriched with experiencing and reflecting on the richness of the physical world (s. Robertson & Good, 2004). Learners are motivated by event-based forms of learning (Herczeg, 2004).

## The Concept of Moles

At the institute for multimedia and interactive systems (IMIS) we founded the research initiative KiMM (Kids in Media and Motion), which centers around learning scenarios for children and teenagers that set the learners in motion and involve their whole bodies while exploring the potential of digital and interactive media. (Winkler & Herczeg, 2005). Within digitally augmented learning spaces, the students are brought into touch with physical and digital living spaces. Mobile learning within educational contexts has been a dominant area of our research for several years. [1] At IMIS we have developed Moles (Mobile Learning Exploration System), an application that supports the students in designing, conducting and reflecting on interdisciplinary projects autonomously and cooperatively. By now Moles is a successfully used system for mobile learning in many school projects (Melzer, 2007; Winkler, 2008). Moles can be used to support the process of preparing, carrying through and reflecting on professional excursions or mobile learning games. Multimedia Interactive Assignments (MIA) can be created, annotated onsite and edited for presentations after the mobile learning experience. Moles has been designed to open up different contexts and perspectives to the learner and enables multimodal, multicodal, creative and exploratory learning. Oftentimes narratives support the learners in constructing active knowledge. The overall goal of Moles is the sustainability of complex educational processes through event-based learning with interactive media.

Moles is comprised of Web Moles and Moles for PC for creating and reflecting on MIA using PCs, and Web Mini Moles, Mini Moles for Mobile Phones and Mini Moles for PDA to conduct mobile learning in urban areas, companies, biotopes, making use of mobile phones or PDAs. Figure 1 illustrates the three-step educational process of developing MIA, experiencing mobile learning and long-term learning through the presentation, reflection and discussion of MIA that have been annotated onsite.


*Figure 1: Three steps of sustainable education with Moles*

After planning the mobile learning experiences, information is collected and the students come up with questions to be answered within the mobile learning process. Guided by their questions, they can construct knowledge onsite while having multimodal experiences. In a third step the students make use of Moles for the purpose of reflection, discussion and presentation, which is an essential part of a sustainable learning process.

### Web Moles

Web Moles is a web application, supporting the flexibility of learning processes as well as the usage of available mobile devices. Stationary learning and mobile learning are most obviously differentiated by mobility, which does not only apply to the learners, but also to the subject matter and the devices. To use Web Moles no specific browser is need, which turns it into an application for working without the constraints of time or space, e.g. students can create and edit MIA at home. After creating a MIA, they can use the export function for uploading to the server, which enables the download and the display of a MIA on a mobile device. Flexibility with regard to time and space enables students to easily use Web Moles for working and learning collaboratively.

[1] Other areas of the research initiative KiMM focus on digitally augmented learning spaces in the form of interactive Mixed-Reality-Performances, –installations, -games or 3D-Web-spaces for communication and interaction via non-standard interfaces (s. http://www.kimm.uni-luebeck.de).

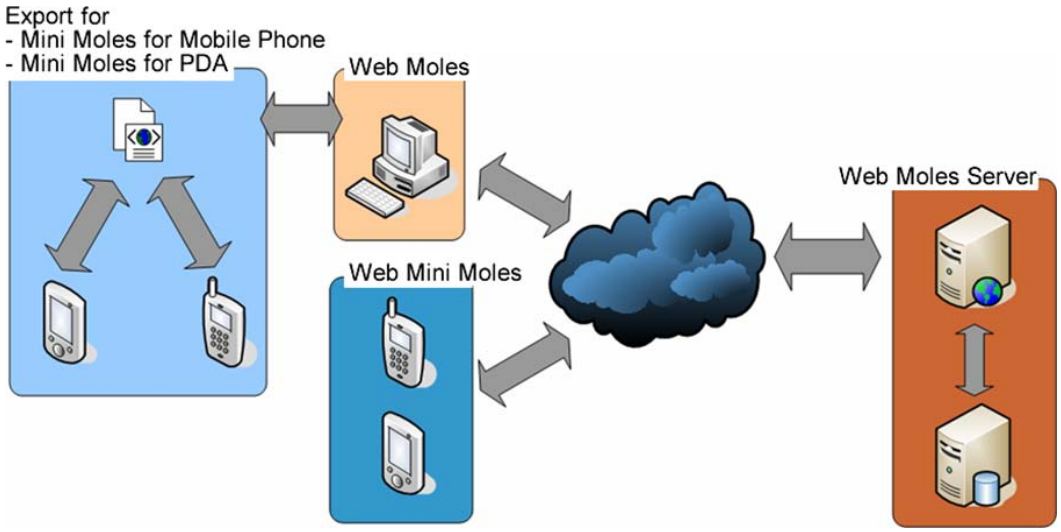


*Figure 2: Technological aspects of Moles*

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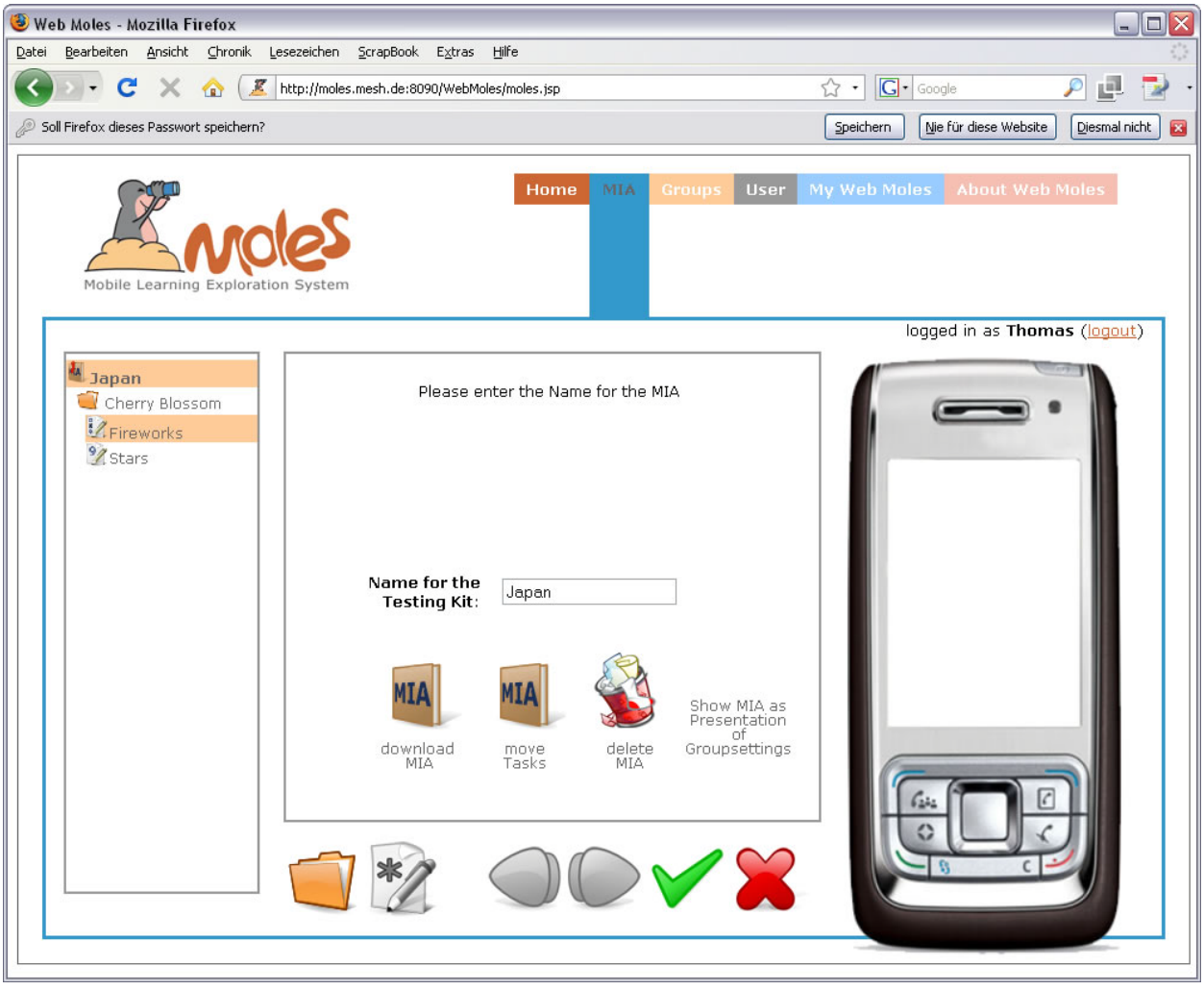


*Figure 3: Screenshot of Web Moles*

With regard to structuring learning processes at school, Web Moles offers a way of independently administrating users and groups via specific accounts for schools and thus makes room for the individual needs of educational facilities by providing a Moles server at our institute. Each school gets an account which allows the teachers to administer individual access rights. Besides Web Moles can be displayed in the form of Web Mini Moles on mobile devices, e.g. mobiles phones or PDAs, which helps students to collect information for MIA without using full-fledged PCs. Web Moles is an application that completely lives up to the “anywhere, anytime and any device“ standard of up-to-date mobile learning.

**Web Mini Moles**

Because of the increasing availability of mobile phones and PDAs with internet access and the steadily improving network coverage, Web Mini Moles aims at providing all features of Moles for PDA while using a web interface. Thus it is an interactive and mobile application that can be run on almost any mobile phone or subnotebook, e.g. OLPC, a laptop for children, which makes Web Mini Moles accessible for an even larger number of students. Web Mini Moles is accessed via a web browser. The users log onto the website offered by the system and can immediately start creating a MIA. The possibilities provided by the connectivity to the web are integrated into Mini Moles for the first time. Tasks that are created at one place in the world can be displayed and used as a resource for mobile learning at a far-away location. Apart from a standard web browser and a connection to the internet, the mobile device does not have to fulfill any requirements. As a result of this, there is no connection to any specific platforms and the system is immediately ready for worldwide use, because there is no need for installing software on the mobile device.


*Fig. 3: Web Mini Moles on a web-ready mobile phone (2008)*

In contrast to the applications Moles for PC and Mini Moles for Mobile Phones, Web Moles und Web Mini Moles free us from being bound to specific locations. MIA can be created quickly and at any location, which makes installing Moles on a PC or a mobile device no longer a requirement for mobile learning. Additionally, there is no need for transferring MIA via memory card, cable or wireless connection (Bluetooth, infrared) from a PC onto a mobile device. As everybody can take part in creating and solving interactive tasks, the Moles Portal can support worldwide online communities for mobile learning. Similar to podcasts, each user can use media to author and/or receive content, e.g. by adding to mobile learning scenarios, which can comprise groups all over the world. As a result of easily connecting people in a unique way, Web Moles turns ubiquitous learning into a new experience.

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Link to Moles: http://moles.mesh.de/