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Smart learning technologies

"Smart learning environment" encompasses "intelligent tutoring", "adaptive learning", "technology-enhanced learning", "web- based learning", "mobile learning", and "context-aware ubiquitous learning". In particulars, we use "intelligent digital agents" to define customized learning paths and to motivate learners offering them instant and adaptive support by immediate analyses of their needs (learning analytics).

Smart learning is a broad term for education in today's digital age. It reflects how advanced technologies are enabling learners to digest knowledge and skills more effectively, efficiently and conveniently. Although the ongoing global movement towards smart learning marks an important paradigm shift in modern learning, many people still find the concept vague. It is best viewed from the perspective of the Three T's, or Total Transformational Thinking.

Total Transformational Thinking involves four components: learner, faculty, curriculum and the learning environment. The learner becomes a proactive leader rather than a static follower of the educational process. Faculty focus on being a mentor and a coach rather than just being a teacher, which requires training to effectively impart knowledge under a learner-centric framework. The curriculum is overhauled to better reflect how knowledge is evolving both in form and delivery. Finally, the Learning environment is expanded to consider new realities, such as the dominance of mobility, which has opened vast opportunities for mobile learning [1].

Intelligent tutoring system

An **intelligent tutoring system** (**ITS**) is a computer system that aims to provide immediate and customized instruction or feedback to learners, usually without requiring intervention from a human teacher. ITSs have the common goal of enabling learning in a meaningful and effective manner by using a variety of computing technologies. There are many examples of ITSs being used in both formal education and professional settings in which they

have demonstrated their capabilities and limitations. There is a close relationship between intelligent tutoring, cognitive learning theories and design; and there is ongoing research to improve the effectiveness of ITS. An ITS typically aims to replicate the demonstrated benefits of one-to-one, personalized tutoring, in contexts where students would otherwise have access to one-to-many instruction from a single teacher (e.g., classroom lectures), or no teacher at all (e.g., online homework). ITSs are often designed with the goal of providing access to high quality education to each and every student [2].

Adaptive learning

Adaptive learning is one technique for providing personalized learning, which aims to provide efficient, effective, and customized learning paths to engage each student. Adaptive learning systems use a data-driven approach to adjust the path and pace of learning, enabling the delivery of personalized learning at scale. Adaptive systems can support changes in the role of faculty, enable innovative teaching practices, and incorporate a variety of content formats to support students according to their learning needs [3].

With adaptive learning, instead of a broad-based approach, students in schools and colleges can have learning modules tailored around their specific needs, ways of learning, and any learning difficulties they have [4].

Technology-enhanced learning

The term **Technology-enhanced learning (TEL)** is used to describe the application of technology to teaching and learning. It is a broad category that isn't particularly defined, but, in short, TEL is any technology that enhances the learning experience. The term can be used to describe both analogue and digital technologies, but more recently, we see that digital TEL is taking over education in the form of different types of educational software. TEL is transforming and enhancing education and educational institutions beyond recognition [5].

Web based learning

Many of us use the internet or the "web" (world wide web) as a source of information. In medical education, the web is increasingly used both as a learning tool to support formal programmes and as a means of delivering online learning programmes. What can educators do to ensure that the potential of the web is used effectively to support both their own learning and that of their students?

Much of the literature on web based learning shows that one of the main barriers to the effective use of teaching materials is the technology (for example, poor access, slow downloading) rather than the design of the learning materials themselves. Some of these issues are discussed later in the article, but it is vital that teachers take on expert help with technical issues in the planning, design, and delivery of web based learning programmes. Through programming and the use of "plug-ins" (programs that can be downloaded from the internet), designers can produce interactive course materials containing online activities (such as self assessments), animations, and simulations. These can improve learning and are often more enjoyable and meaningful for learners.

Web based learning offers huge opportunities for learning and access to a vast amount of knowledge and information. The role of teachers is to ensure that the learning environment provided takes account of learners' needs and ensures that they are effectively prepared and supported. Online learning has advantages, but web based learning should not always be viewed as the method of choice because barriers (such as inadequate equipment) can easily detract from student learning. The technology must therefore be applied appropriately and not used simply because it is available and new or because students and teachers have particular expectations of this means of course delivery [6].

Mobile learning

Mobile learning is new. It is currently difficult to define, conceptualise and discuss. It could perhaps be a wholly new and distinct educational format, needing to set its own standards and expectations, or it could be a variety of e-learning, inheriting the discourse and limitations

of this slightly more mature discipline. This paper is a preliminary attempt to address this issue of definition and conceptualisation, and draws on recent research examining case studies from the UK and elsewhere.

Mobile learning can perhaps be defined as 'any educational provision where the sole or dominant technologies are handheld or palmtop devices'. This definition may mean that mobile learning could include mobile phones, smartphones, personal digital assistants (PDAs) and their peripherals, perhaps tablet PCs and perhaps laptop PCs, but not desktops in carts and other similar solutions. Perhaps the definition should address also the growing number of experiments with dedicated mobile devices such as games consoles and iPODs, and it should encompass both mainstream industrial technologies and one-off experimental technologies [7].

Intelligent digital agents

The ability to recognize natural language and learn from user input will help virtual assistants improve human-computer interactions significantly.

The quest to make computers easier to use has been going on for decades. Virtual assistants that respond to voice commands - including Apple's Siri, Amazon's Alexa and Microsoft's Cortana - are among current efforts to simplify interaction with smartphones, tablets, computers and internet of things (IoT) devices. By enabling users to speak a command or request certain tasks to be accomplished, they eliminate the need to dig through layers of menu trees or squint at a small screen crowded with icons.

The latest entry in this field is Samsung's digital assistant, called Bixby, which relies on artificial intelligence (AI) to improve human-machine interaction. An expert on speech recognition and language-based communication between humans and robots recently shared some insights on the subject with Baseline.

Typically, developers have "hand-crafted" intelligent agents to work with voice commands, a time-consuming process, observed Alex Rudnicky, research professor in the Language Technologies Institute at Carnegie Mellon University's School of Computer Science. "Somebody had to figure out how each individual app would be activated by voice and what

language the app would recognize," he said, adding that the vast number of apps available makes it's impossible to develop intelligent agents for all of them.

Translating natural language into something a system can recognize and act on is "non-trivial," in his words. "You might tell your phone, 'Find me an Italian restaurant in my neighborhood' or 'I'd like to eat Italian tonight,'" he offered as an example. "The system has to understand what you want and map the results into actions [8]."

Moodle - Online Learning Management System

Moodle is a free, online learning management system enabling educators to create their own private website filled with dynamic courses that extend learning, anytime, anywhere. Moodle acronym means Modular Object Oriented Dynamic Learning Environment. Growing up in the Australian outback in the late 1970s, Moodle's Founder and Lead Developer Martin Dougiamas took lessons from the School of the Air, giving him from a young age an insight into distance learning.

General Moodle features:

1. Modern, easy to use interface - Designed to be responsive and accessible, the Moodle interface is easy to navigate on both desktop and mobile devices.
2. Personalised Dashboard - Display current, past and future courses, along with tasks due.
3. Collaborative tools and activities - Work and learn together in forums, wikis, glossaries, database activities, and much more.
4. All-in-one calendar - Moodle's calendar tool helps you keep track of your academic or company calendar, course deadlines, group meetings, and other personal events.
5. Convenient file management - Drag and drop files from cloud storage services including MS OneDrive, Dropbox and Google Drive.
6. Simple and intuitive text editor - Format text and conveniently add media and images with an editor that works across all web browsers and devices.

7. Notifications - When enabled, users can receive automatic alerts on new assignments and deadlines, forum posts and also send private messages to one another.
8. Track progress - Educators and learners can track progress and completion with an array of options for tracking individual activities or resources and at course level.
9. Multilingual capability - Allow users to view course content and learn in their own language, or set it up for multilingual users and organisations.

Course Development and Management Features:

- Direct learning paths - Design and manage courses to meet various requirements. Classes can be instructor-led, self-paced, blended or entirely online.
- Encourage collaboration - Built-in collaborative publishing features foster engagement and encourage content-driven collaboration.
- Embed external resources - Teach materials and include assignments from other sites and connect to the gradebook in Moodle.
- Multimedia Integration - Moodle's built-in media support enables you to easily search for and insert video and audio files in your courses.
- Group management - Group learners to share courses, differentiate activities and facilitate team work.
- Marking workflow - Conveniently assign different markers to assignments, manage grade moderation and control when marks are released to individual learners.
- In-line marking - Easily review and provide in-line feedback by annotating files directly within browser.
- Peer and self assessment - Built-in activities such as workshops and surveys encourages learners to view, grade and assess their own and other course members' work as a group.
- Integrated Badges - Fully compatible with Mozilla Open Badges, motivate learners and reward participation and achievement with customised Badges.

- Outcomes and rubrics - Select from advanced grading methods to tailor the gradebook to your course and examination criteria.
- Competency based marking - Set up competencies with personal learning plans across courses and activities..
- Security and privacy - Teach and share in a private space only you and your class can access.

Moodle is the world's most popular open source Learning Management System backed by a strong community. Since its initial release in 2002, Moodle users have grown leaps and bounds in all countries and across all sectors. Despite having a lot of competitors, it remains the best open source LMS around the world because of its strong community and pedagogical design.

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