Utilisation and Operation of Information Technologies
to Support Educational Services

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Abstract

The use of innovative information technologies to support education and learning scenarios offers a global and world wide market of knowledge transfer services. To ensure the quality of these services concepts for utilisation and operation of implemented information technologies are necessary. This contribution shows an example of a process-oriented utilisation and operation concept which will be introduced at the Faculty of Informatics at the University of Karlsruhe (TH).
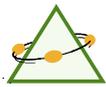
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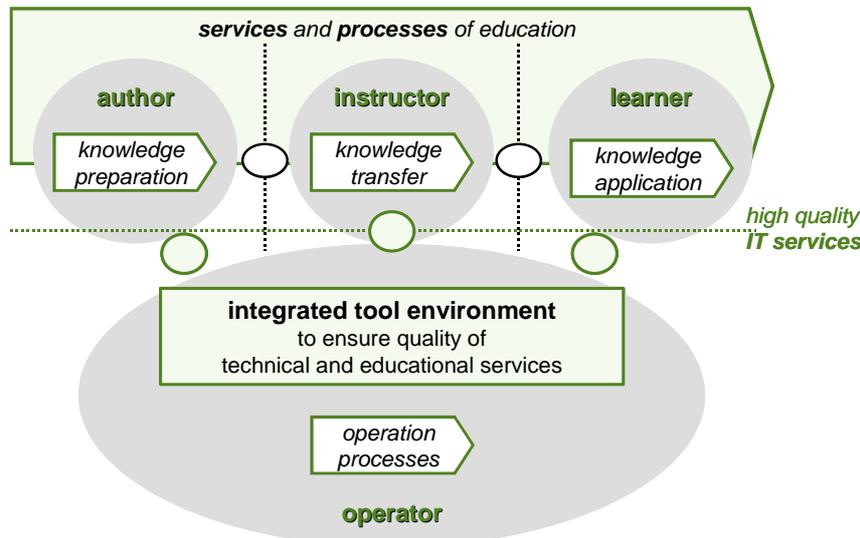
The figure shows a simplified overview of services, processes and roles of an educational scenario. Students as customers of the University of Karlsruhe (TH) execute the role of a learner using educational services for example from the Faculty of Informatics. Services are events (lectures, tutorials, seminars etc.), learning materials (scripts, exercises, solutions, recorded audio and video streams etc.), office hours and communication services using telephone or Internet applications like chat, email or news. Such information technologies (IT) enable a more flexible and distant knowledge transfer between instructor and learner [1]. Therefore students of the Faculty of Informatics can do a course synchronously inside a lecture hall or asynchronously downloading learning material and visiting screen capture video and audio steams at home.

Utilisation and Operation Concept of IT

To ensure high quality of IT-based educational services an utilisation and operation concept of IT is necessary [2]. Processes as part of the concept structure tasks which have to be executed to deliver educational services. Roles define areas of responsibility. To execute processes roles have to be filled by organisational units and persons. Thereby one person can play one ore more roles, also a role can be carried out by one or more persons. At the Faculty of Informatics for example one ore more students can fill the role of a learner, but also the role of author producing own learning material and the role of instructor as tutor teaching other students. Offering educational services the following processes can be defined.

- Main business processes are production of (digital) learning material executed by authors and utilisation of the material by instructors and learners. To produce multimedia learning material authors use tools like Authorware, Toolbook, Dreamweaver, Adobes CyberStudio, Macromedia Director, PowerPoint etc. This learning material is used by instructors. To transfer knowledge to students instructors annotate digital materials during lessons using electronic white-

boards and beamers. To communicate with students they use Internet applications like email, chat, news etc. To get access to learning material like scripts, exercises or screen capture videos learners use courseware delivery tools like WebCT Campus, Blackboard Portal, CLIX Campus etc.

- To support the main processes organisational processes have to be defined. An organiser plans and coordinates educational services for individual learners. Therefore the organiser specifies content, events, dates etc. and monitors and controls the main processes to ensure the quality of services. An organiser uses tools like a training plan. During a course the organiser ensures the fulfilment of deadlines preparing learning material. For lessons an organiser reserves lecture halls or seminar rooms and necessary IT to support the instructor for teaching students. To test the learning goals the organizer executes exams with learners and evaluates the quality of educational services. Therefore the organiser uses tools which implement questionnaires.

The more complex the educational scenario is the more complex is the used IT to support the processes. At the Faculty of Informatics more than one author produces multimedia learning material using different authoring tools. During educational events instructors use IT to present learning material and to transfer it to learners. Using Internet applications learners get access to material and communicate with instructors. The more distributed this scenario is the more distributed is the IT which supports the processes. For example a student might use learning material which was prepared by authors and annotated by instructors in different countries. Applications of learners communicate with applications of authors and instructors using system and network components. To hide the complexity of IT itself and of running IT an operator role must be defined. The aim of an operator is to offer functionalities of IT as services and to fulfil technical quality demands specified by users (organiser, author, instructor, learner) as service level agreements.

- To ensure the quality of IT services operation processes have to be defined. For the implementation of IT services software and hardware components have to be installed and configured. To ensure technical service level agreements network, system and application components are monitored and controlled. In case of problems a problem management process defines a sequence of tasks to repair the problem. A change management process plans and coordinates manipulations of IT without jeopardizing the quality of IT services.

Integrated Tool Environment

The demands derived from the different processes lead to a distributed application architecture of an integrated tool environment. This architecture consists of the following functional building blocks:

- Organization tools to plan and coordinate the production and the delivery of learning material.

- Authoring tools to produce multimedia learning material.

- Tools to support instructors annotating learning material.

- Learning tools to get access to learning material and to communicate with instructors.

- Management tools to monitor and control to ensure the technical service level agreements.

The first step to integrate these tools is to specify manuals as descriptive guidelines for using the tools to support the processes. These manuals can be implemented using a Web server. Users can navigate through manuals and follow links to tools. At next tools can be integrated using common communication platforms to exchange information between their interfaces. The working group ALFI [3] was founded to implement an integrated tool environment based on the concepts described in this paper.

References

[1]   B. Collis and J. Moonen, *Flexible Learning in a Digital World : Experiences and Expectations*, 2001.

[2]   H.-G. Hegering, S. Abeck, and B. Neumair, *Integrated Management of Networked Systems: Concepts, Architectures, and Their Operational Application*: Morgan Kaufmann Publishers, 1999.

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