

*Principles on creating
eLessons – case study in
‘Software metrics’*

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Topics:

- eLearning Experiences at the DMI
- Case study:
Software Engineering eCourse
- eLesson Prototype: Software Metrics Topic
 - Planning
 - Design
 - Implementation
 - Demonstration
- Quality criteria for SE eLessons
- Goals

eLearning Experiences at the Department of Mathematics and Informatics in Novi Sad



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eLearning Experiences at the DMI

- **Supporting regular courses with their e-equivalents**
 - Course Support of the Chair of Computer Science
 - <http://perun.im.ns.ac.yu/courses/>
 - currently driven by Moodle
 - 6 regular courses
- **An elective eLearning course**
 - offered to students in their third and fourth year of studies
 - promising reactions
 - succeeded in creating their own eCourses
 - various topics, mainly selected from regular courses in Operating Systems and Software Engineering

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eLearning Experiences at the DMI

PeLCER: Course categories - Mozilla Firefox

http://perun.im.ns.ac.yu/courses/course/index.php

Chair of Computer Science Course Support PeLCER: Course categories University of Novi Sad

You are not logged in. (Login)

Courses
PeLCER » Course categories

Course categories

Communities	1
Regular courses / redovna nastava	6
eLearning 2006.	28
Ostalo	10
Demo courses	11

Search courses

Done

Course Support of the Chair of Computer Science – Currently available courses

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Case study: Software Engineering eCourse



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Software Engineering eCourse

- Simple website – lecture downloads



- Moodle course - loads of downloadable lectures, formulated assignments, sample tests, polls, forums, chats, glossaries etc. supporting regular classes



- Complete eCourse - complete eLessons instead of pdf lectures, more specialized tasks for students, improved collaboration, diversity and more reusability of teaching material

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The screenshot shows a web browser window displaying a Moodle course page. The browser title is "Course: Software Engineering eLessons - Mozilla Firefox". The address bar shows "http://localhost/moodle/course/view.php?id=2". The page header includes the logo for "Chair of Computer Science" and a login status for "Zivana Komlenov". The main content area is titled "Topic outline" and contains text about the course's international project background, supported by DAAD and the Stability Pact for South-Eastern Europe. A logo for the "Stabilitätspakt für Südosteuropa" is displayed. The page also features a sidebar with navigation links for "People", "Activities", "Search Forums", and "Administration". On the right, there are sections for "Latest News", "Upcoming Events", "Recent Activity", and "Calendar". The footer of the page indicates the "6th Workshop 'SEERE', Ravda, 18-23 September 2006".

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Software Engineering eCourse

- Each topic of the regular course presented in a separate section of the eCourse
- Tasks:
 - Adding more challenging, flexible activities (Especially carefully prepared eLessons)
 - Introducing adaptivity (With adaptive eLessons students can explicitly choose different paths through lessons (where available) or can be directed to different parts depending on their answers.)
- Implementation in Moodle (Latest release, with navigational and other useful extensions)

eLesson Prototype: Software Metrics Topic



eLesson on Software Metrics

- Topic 21 of the current Software Engineering course
- Very important and interesting topic
- Rather complex
- Chosen to be transformed into an eLesson prototype to be used during the later development of all the other eLesson equivalents of regular topics.
- The main goal - creating a flexible eLesson, out of presentation slides.
- Contents of each slide (or sometimes several slides that are naturally connected) is transformed into a question page within the eLesson
- A question page is here considered to be the basic learning object - LO.

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eLesson on Software Metrics

- Wherever is possible, a question is added at the end of that content, and answers are offered or just expected from the student (depending on the type of the question).
- The questions do not just prove that students read something from the screen but that they understood it.
- Second phase – implementation of cycles and different paths through the eLesson based on student's answer.
- Some answers could return students to previously read material, some can lead to additional explanations, while some could lead to skipping some parts of the lesson.
- Lessons are mostly sequential, which sometimes causes production of additional material - explanations, background etc. or connecting the current contents with LOs from other eLessons.

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eLesson on Software Metrics

- **Before creating an eLesson, it is a good idea to draw a lesson flowchart.**
 - [SM eLesson flowchart](#)
 - Basic structures that could be identified in eLessons
- **Lessons require rather advanced planning.**
- **With the potential for branching on each page, advanced planning is critical before the beginning of development.**
- **The key to minimizing the number of pages is to reuse as many as possible.**

eLesson on Software Metrics

- **With a scheme like that, it is much easier to transform existing material (slides) into meaningful eLessons, add questions where planned, and stay focused on implementing explored learning paths.**
- **Course creator should, while doing all that, always keep in mind a set of quality criteria determined for eLessons - the general ones as well as the specific ones.**
- **This procedure was strictly followed during development of Software metrics eLesson.**
- **Section 21 in SE eCourse consists of downloadable resources, glossary, quiz, assignment, forum, and of course a well designed and carefully prepared eLesson.**

eLesson on Software Metrics

- Srpski - 2 slajda po strani
- Srpski - 6 slajdova po strani

Software metrics

- English - 1 slide per page
- English - 2 slides per page
- English - 6 slides per page
- Srpski - 1 slajd po strani
- Srpski - 2 slajda po strani
- Srpski - 6 slajdova po strani

Prototype section for Software Engineering eCourse

- Software metrics eLesson
- Software metrics Glossary

Software metrics Quiz

- 7. Softverska metrika / Software metrics
 - Eclipse
 - Software metrics plug-in for Eclipse
 - Java implementation of SemOrg (Seminar organization)
 - A short introduction to software-metrics-plugin for Eclipse
- Srpski - 7. zadatak
- English - 7. assignment

Maintenance

Quality Criteria for SE eLearning Courseware



Quality Criteria for SE eLearning Courseware

- Quality criteria: Content

- *Accuracy*

- The course provides accurate information, knowledge and skills; following the pattern set in lecture slides and notes.
 - The content is credible with sources identified.
 - The content does not violate existing copyrights.

- *Completeness*

- The content is sufficient in depth and breadth for learners to meet learning objectives, given the support of online facilitator and other offline learning activities, where provided.

Quality Criteria for SE eLearning Courseware

- *Clarity*

- Presentation of the content is clear. Text is well written. Learners find it easy to understand the materials.

- *Appropriateness*

- Content is appropriate to the level of knowledge, skills and experience of learners.
 - Tone and language are proper.
 - Case studies, scenarios, simulations, examples or problems are credible and relevant to learners.
 - Practice activities and assessments are designed with appropriate level of difficulty.
 - Up-to-date (every change in lecture slides, notes, assignments, etc. must be reflected in eLessons).

Quality Criteria for SE eLearning Courseware

– Organization

- Content is structured into meaningful sections - each course topic is converted into an eLesson, which consists of various learning objects (LO).
- Before constructing an eLesson a great deal of planning is required in order to define and granulate LOs. The final result of such planning effort should be a drawn scheme of connected LOs, representing all possible paths for following the lesson's contents.
- Usual duration of SE lectures is 2-3 hours and the materials provided for them are quite sufficient.
- This amount of material is to be transformed into an eLesson whose scheme should be drawn on maximum one page (size A4).

Quality Criteria for SE eLearning Courseware

• Quality criteria: Usability

– Interface

- Font Consistency (the same as in lecture slides)
- Text Consistency
- Element Placement Consistency (following the pattern set in lecture slides and notes)
- Presentation Consistency
- Texts or graphics are surrounded by sufficient space
- Text is distinct from background (black text on white background, titles in green, important definitions, (parts of) sentences, examples etc. in blue/magenta)
- Font size: 12 pt
- Links change colour when clicked

Quality Criteria for SE eLearning Courseware

– Navigation

- All pages have a title to identify the location
- Course menu is readily accessible
- Moving forward / backward
- Moving to the main menu
- Exit
- Main menu allows navigation to any part of the course

– Technology

- Bandwidth constraints of learners
- Compliance of current technology standards
- Scalability
- Hyperlink error
- Programming error
- Image / Multimedia error

Quality Criteria for SE eLearning Courseware

– Learner Support

- Hardware requirement
 - Connection speed; Audio and video capabilities
- Software requirement
 - Minimum browser; Operating system requirement
- Instructions for acquiring hardware and plug-ins
- How to resolve commonly encountered technical problems
- Where to get help when technical problems occur
- Discussion / Chat functionalities (where appropriate)
- Glossary (the specific ones for each topic + the main one for the whole SE course - entries from all topics)
- Resources
- Search tool

Quality Criteria for SE eLearning Courseware

- **Quality criteria: Instructional Design**


- ***The eLesson:***

- **transfers knowledge or skills through effective presentation.**
 - **The instruction methods are appropriately selected according to their suitability in helping learners achieve the particular learning objective.**
 - **Where appropriate, the eLesson uses a variety of methods in presenting the knowledge and skills, including explanations, examples and demonstration.**
 - **The eLesson stimulates learners' recall of prior knowledge and experiences to facilitate learning.**
 - **The eLesson adequately explains and clarifies the important and the difficult learning points.**

Quality Criteria for SE eLearning Courseware

- **provides effective practice activities to reinforce new knowledge /skills.**
 - **The eLesson contains a variety of practice activities that are helpful for learners to achieve the particular learning objective.**
 - **The practice activities are adequate.**
 - **Apply the newly acquired knowledge and skills.**
 - **Demonstrate the newly acquired knowledge and skills.**
 - **Reflect on or discuss the newly acquired knowledge and skills.**
 - **Explore new ways to use the newly acquired knowledge and skills.**

Quality Criteria for SE eLearning Courseware

- **includes adequate and reliable learning assessment**
 - **Assessments are presented to students throughout the eLesson. There are various convenient forms:**
 - » **Simulation of interaction/discussion with the student (i.e. questions and comments from the lecture slides).**
 - » **Questions after (each) LO.** 
 - » **After the whole eLesson – a quiz, an assignment, or both.**
 - » **Not all the available questions are to be used for practice – there should be a collection of that can be used for grading purposes.**

Quality Criteria for SE eLearning Courseware

- **Where appropriate, the course includes both pre and post assessment for evaluation of learning effectiveness.**
- **The assessment adequately covers learning objectives of the course.**
- **Moodle keeps a record of learners' assessment results.**
- **The course provides instructions on how to take assessment, where assessment results are stored, and how to retrieve assessment results, where appropriate.**

Quality Criteria for SE eLearning Courseware

- **uses appropriate engagement techniques to gain attention, sustain interest and provide motivation.**
 - Role-plays
 - Stories
 - Games
 - Simulations
 - Case studies
- **selects appropriate media and makes effective use of media to enhance learning experience.**
 - Graphics to focus learners' attention
(all graphics from lecture slides should be used either directly in LOs, or if the graphic is too large to be incorporated into contents of a single page, it should be offered to the student to see it in a new window, or in some other location).

Quality Criteria for SE eLearning Courseware

- Graphics should be carefully introduced, i.e. not all the original material should be converted into graphics (tables can be easily reconstructed), especially not as the whole slides.
- Video clips to demonstrate complex concepts
- Animations to sustain interest. Beware the distraction they might cause.
- Audio narration to enhance learning
- **uses appropriate collaborative tools to facilitate learning.**
 - Discussion groups
 - Notice board
 - Chat room
 - Audio conferencing
 - Videoconferencing

Quality Criteria for SE eLearning Courseware

- is able to adapt learning activities according to individual performance and learning needs
 - Learners should be kept interested in the material presented, acquiring new knowledge at their own pace, without wasting time on information already known to them.
- **Learners:**
 - are made aware of the learning objectives for each unit of the course
 - receive effective feedback on their performance
 - Timely, relevant and positive (feedback for incorrect answers offers an explanation / hints / further attempts).

Goals

- Complete Software Engineering eCourse
- Other (joint) eCourses – OOP, OS, CC, etc. ?
- Further testing, upgrades and evaluation

- Ideas?
- Questions?