

A self-instructive course on Principles of databases

Ivana Ivánová
Wim F. Feringa, Rolf A. de By, Bas Retsios

Department Geo-information Processing, ITC

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Two essential concepts

In this presentation we use two essential concepts:

Distance education:

- Distance education comprises learning episodes, during which educator and the educated (student) are typically not at the same location.

Self-instructiveness:

- A self-instructive didactic approach offers to the student the possibility to study:
 - at her/his own pace,
 - in her/his own time, and
 - at her/his own location.
- content of the self-instructive course acts as a teacher, i.e.
- material in a lesson **must** explain itself.



Distance education on Principles of databases

- Distance education on Principles of databases (DE PoDB) covers the regular module of ITC's degree programs.
- It is the first module of GFM/GIMLA Master/M.Sc. degree programs.
- The aim of the course is to provide students with enough knowledge to understand when to apply database technology and when not.
- Completing the course successfully implies exemption from the respective module at ITC in context of Master or M.Sc. degree programs.



Distance education on Principles of databases

The scope covered by the content of the course:

- Unit 1
 - Lesson 1.1 - Introduction to database technology
 - Lesson 1.2 - Database management systems
 - Lesson 1.3 - Relational data model

- Unit 2
 - Lesson 2.1 - Logic & Set theory
 - Lesson 2.2 - Principles of data extraction from databases
 - Lesson 2.3 - Operating on databases using mathematics in queries

- Unit 3
 - Lesson 3.1 - JSP Queries
 - Lesson 3.2 - Parametric & Nested queries
 - Lesson 3.3 - Summary Queries

- Unit 4
 - Lesson 4.1 - Database updating
 - Lesson 4.2 - Introduction to database design
 - Lesson 4.3 - Database implementation



Premises for the course design

Main premise – to comply with the strategic plan of ITC's E-learning project group, which states the following (ITC, 2005):

- “When the same courseware is used for ‘face-to-face’ and distance education, adaptation or re-development of the existing courseware is needed.
- This requires that the courseware is less lecturer-dependent.
- The expertise of the lecturer that is needed for regulation of the learning process, guidance of the exercises and provision of the feedback is integrated in the courseware.”

This premises resulted to a choice of self-instructive course.



Premises for the course design

Other premises of the course design were:

- It is an e-learning course and should be offered as short course in distance education mode (duration of the course is 6 weeks, as a part-time study).
- The course offers high flexibility while following it with a suggestion ('ideal path').
- The material and course conduct must also be manageable with low-end technical infrastructure.
- The technical solution of the courseware should make the course material re-usable, maintainable, independent from software versions, and easy to update (also during the course run).



Applied didactic principles

The **ICARE** system supported by principles of instructional theory, which uses various taxonomies:

- Gagne's *Nine events of instructions*
- Merrill's *Component display theory*
- Bloom's *Taxonomy of higher order learning*

Application of ICARE system:

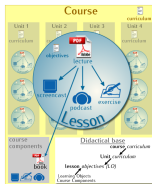
I nroduce	Introduction to (Unit, Lesson, Lecture, Exercises)
C onnect	Lecture, Demonstration
A pply	Demonstration, Exercise
R eflect	Self-test, Discussion board
E xtend	Additional links



Toward content-layout separation

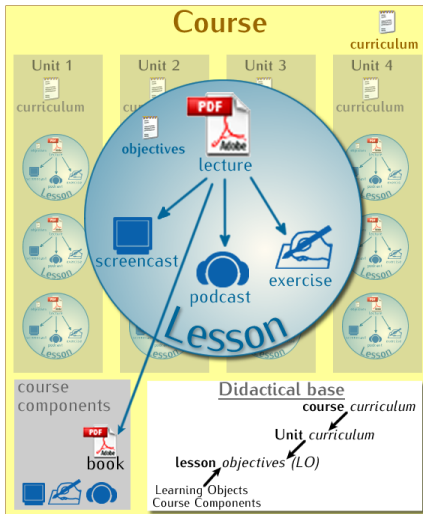
The concept of 'learning object' (Chiappe, 2007):

- it is a "self-contained, reusable entity with a clear learning aim that contains at least three internal changing and editable components: content, instructional (learning) activities, and context elements."





Toward content-layout separation





Design principles

Premises for a design of PoDB:

- Function of the courseware has the highest priority.
- Content provider is busy only with the content.
- One style for all learning objects (ITC's house-style incorporated).
- Content separated from content management system.



Color schema

Color schema – applied ITC house-style with assigned functions:

- **important items**
- **page** in reader/lecture reference
- glossary
- **examples** can be two fold:
 - within the text of a lecture referring to an example (e.g. attribute **NUMB** from *AvianSpecies*)
 - **example as a separate content item:**

Example (Attribute constraints)

Habitation code (*HAB* ∈ *MacroHabitat*) contains one character and one number.





Main component of the courseware

In DE PoDB, the lecture serves as a **main** course component.

The content of a lecture (.pdf) acts as 'knowledge glue' in a specific topic - it:

- *glues* together ideas presented elsewhere in a course (reader, exercise, demonstration),
- *adds* connections,
- *shows* the application of the discussed theory, and
- *relates* all the course materials referring to a discussed topic.

Content of the lecture is split in parts, sections and subsections (max 7-7-7).





Enhancing the 'self-instructiveness'

Three important learning objectives of the course:

- Learn how to specify data manipulation requests on an existing database.
- Learn how to execute these requests against that database.
- Gain or regain familiarity with the basics of mathematical logic and set theory.
- Rejuvenated mathematical logic and set theory serves as a basis for other modules on GIS & Remote sensing.



Educational applet

Educational applet(EA) is a piece of software that allows student to enter an expression in a formal language, that:

- Parses expressions entered in a formal language for correctness and gives direct and specific feedback.
- Compares the correct expression entered in a formal language against the correct solution.
- Gives feedback - in case of incorrect answer the feedback is with indication of possible error.





Learning experience support

Introduction:

- Unit introduction - Interviews (podcast).
- Lesson introduction - .pdf with learning objectives, activities, study load, and suggested path.
- DBMS introduction - how to operate on MS Access DBMS (screencast)
- Exercises - how to use EA (screencast)

Demonstration:

- Screencast is a digital movie, in which the setting is a partial or complete computer screen, and in which audio/text boxes narration describes the on-screen action.

Self-tests

Additional links

Reader + Exercise book

Unit tests

Exam





Blackboard & Backpack symbiosis

On-line access to a content: Learning management system (LMS):

- Blackboard Academic Suite™

Off-line to a content:

- Agilix Backpack™

Advantages of using the two together:

- One environment for navigating through the content.
- Backpack allows student to make digital notes, edit captions, use the discussion board and upload assignments.
- Unit tests are available only through Blackboard (this 'constraint' allows the tutor to monitor students progress).

Content (set of .pdf files embedded in .html) will be:

- uploaded in Blackboard,
- downloaded into Backpack, and
- saved on media (DVD, USB) for distribution.



Innovation & added value

Main design objective of a self-instructive course on PoDB was:

- to lower the tutors input during the course run, **but**
- to not let the student drown in a stack of lecture notes, readers, articles and software manipulation instructions.

Explained design ensures the above.

For content authoring process:

- the write-up, formatting and styling of the teaching materials into hyperlinked and multimedia enriched courseware is controllable and manageable.
- addressing the errors and fast update of the courseware can be done on-the-fly.

The presented approach is the first step toward separation of the content from layout and true content management.



Lessons learned

- 1 From 'face-to-face' to distance education:
 - it is not a transition,
 - it is not a translation, but
 - **redesign** of the existing courseware
- 2 Every content is specific, therefore there is no 'universal' approach to distance education.
- 3 One of the great challenges is to preserve the feeling of human being on both sides of the educational process even in a case where we often hope for automated process.



and finally..

Thank you!
ivanova@itc.nl