Intro: What is E-Learning?

What is Adaptive E-Learning?
- Adaptation: why is it important?
- What can we adapt and what can be adapted?

GRAPPLE project:
Generic Responsive Adaptive Personalized Learning Environment
- examples created with GRAPPLE software (not limited to e-learning)
- authoring your own adaptive application (course)

CHIP project:
Cultural Heritage Information Personalization
- recommender that can help learning about art, discovering interests in art & a personalized museum guide
- from museum to city guide and more
Adaptation: Why Is It Important?

We live in a 
One Size Does Not Fit All 
World
Adaptation: Why Is It Important?
Adaptation: Why Is It Important?

- We warned you!
  This was your own choice!
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Adaptive E-Learning: What Can We Adapt To?

- Consider adaptation to:
  - knowledge
  - goals & tasks
  - cognitive/learning styles
Adaptive E-Learning: What Can Be Adapted?

- Most commonly used types of relationships between course topics:
  - knowledge propagation
  - prerequisites

  **A is a prerequisite for B, means:**
  - You should study A before B
  - You should study A before you can understand B

- Example: Adaptive Presentation Overview
Adaptive E-Learning: What Can Be Adapted?

- We show examples of *links* and *content* adaptation
Adaptive E-Learning

Personalized environment

Adaptable (customizable)
*User-tuned*

User characteristics are set explicitly

Adaptive
*System-tuned*

User characteristics are discovered by the system
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• EU FP7 Project: *Generic Responsive Adaptive Personalized Learning Environment*

• Main goal: extend *Learning Management Systems* with an *Adaptive Learning Environment*

• GRAPPLE combined the expertise from 15 European partners in *adaptation, user modeling, authoring, visualization, evaluation, ...*

• GRAPPLE built on TU/e experience with AHA! (Adaptive Hypermedia Architecture)

• [http://grapple.win.tue.nl](http://grapple.win.tue.nl)
Application of Our Adaptive Technology

• First adaptive research paper: 2006, AHA!-based

• Adaptive conference talk: 2006, AHA!-based

• First adaptive PhD thesis: 2012, GRAPPLE-based

• Adaptive online course on *Hypermedia and the Web*: 1994, non-adaptive version, 1996, adaptive AHA!-based, later on GRAPPLE-based
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Example Created with GRAPPLE Tools: World of Biomes
Environment

Definition

The environment is the combined modeling of the physical environment and the biological life forms within the environment, and includes all variables, parameters as well as conditions and modes inside the Earth's biosphere. The environment can be divided into two categories: the natural environment and the built environment, with some overlap between the two. Following the industrial revolution, the built environment has become an increasingly significant part of the environment. The environment is the context describing the ambiance of any entity therein. As this described entity itself is part of the environment, the description is partially recursive.

Constituents

The scope of the environment is all that contained in the biosphere, which is that part of the Earth in which all life occurs. A environment is the complex of biotic, climatic, and edaphic factors that act upon an organism and determine its form and survival, and morphs itself in the process. Ecosystems, of which there are numerous types and are a defined part of the biosphere, collectively make up the whole of the biosphere. Within an ecosystem there are habitats in which an organism (including human beings) exists. At its most natural state, an environment would lack any effects of human activity, although the scale of this activity is such that all areas of the Earth have had at least some influence by humans. At the other end of the scale is the built environment and in some cases it has the biotic component that is virtually absent.

First visit

After the first visit
permanent ice caps and floats towards hotter waters and melt there gradually.

Big chunks of ice can float around for months before

Rich media content

hotter waters and melt there gradually.

[Image]

Big chunks of ice can float around for

No rich media content
Chapter 2 - Basics

This tutorial is aimed at getting familiar with the bare bones of LaTeX.

Before starting, ensure you have LaTeX installed on your computer (see Installation for instructions of what you will need). We begin by creating the source LaTeX file, and then take you through how to feed this file through the LaTeX system to produce quality output, such as postscript or PDF.
Clients: You Can't Always Get What You Want

If you are invited to put forward a research proposal, then you are generally not alone. Clients often ask several firms to pitch for the job and then they choose the proposal that suits them best. This does not necessarily mean that they go for the cheapest, or that expensive is always ‘good’. You normally have to do a lot of investigating and carry out an awful lot of leg work before you’re awarded a project and start your research.

The client wants. During the initial briefing with the client, you make a list of what it is they want. Often there’s a problem or a question, an objective and a reason. The objective may be that the client wants to optimize their service. The question is: how can they best go about this? Sometimes there’s a hidden agenda, an ulterior motive. Behind the issue you are presented with lies a completely different goal to the one you may see on the surface. It’s your job to get the real objective and to formulate the relevant questions. This is crucial, if you launch into the project, without getting to the real objective of the research, you’ll be talking at cross-purposes and the chances of you getting the job will be compromising. Apart from anything else, as the researcher you are supposed to be independent and objective. You are there to help solve a problem, you don’t allow yourself to be used for any other purpose. Dealing with clients and what they want is sometimes difficult. You have to make the topic ‘researchable’, but at the same time you have to keep the client happy by doing what they want as far as possible.

Tips & tricks

- Make sure you know your client’s organization and its profile.
- Be convincing.
- Listen carefully and ask questions: don’t come up with ‘the solution’ at the drop of a hat.
- Make a note of how the first meeting went! Afterwards you can remind yourself of your first impressions.
- Don’t argue the point, even if you’re right.
- Don’t get involved in the subject: be critical and objective.
- Know what the client expects of you.
- Know what you expect of the client.
- Make sure it is clear what is required (research objective).
- Use the right combination of what you’ve learned during your study and how to apply it in practice.
- During the briefing, make it very clear to the client what your intended procedure will be.
- Give serious thought to the answer you can answer your client’s question, and so, how.
- Work on your proposal at home or in the office.

Demarcating your subject. Once you know what your client’s issues and objectives are, then you can set about demarcating the subject. You check whether you are familiar with the subject, if you know something about it, or have read about it, whether research into the subject has already been done, or whether it’s connected to projects you’ve done in the past. What problem will be solved by your research? The aim of this demarcation is to translate the client’s question into a researchable question. This is also known as problem analysis.

Possibilities and limitations. Once you’ve established the main research question (more about this in Chapter 3), underformulating the central problem, you think of ways to address it. The answer depends on the nature of the question, but also on what is possible and the restrictions that the client may impose. The next suggested concept to study: Data Collection
# Example Created with GRAPPLE Tools: An Adaptive Restaurant Menu

<table>
<thead>
<tr>
<th>Appetizers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Golden Wheel</strong></td>
</tr>
<tr>
<td><em>Frequently ordered</em></td>
</tr>
<tr>
<td><strong>Sweet Purple Yam</strong></td>
</tr>
<tr>
<td><em>Frequently ordered</em></td>
</tr>
<tr>
<td><strong>Bangkok Crispy Sweet Beef</strong></td>
</tr>
<tr>
<td><strong>Original Thai Spring Rolls</strong></td>
</tr>
<tr>
<td><strong>Royal Thai Fish Cakes</strong></td>
</tr>
<tr>
<td><strong>Curry Puffs</strong></td>
</tr>
</tbody>
</table>
Example Created with GRAPPLE Tools: An Adaptive Restaurant Menu

Appetizers

Sweet Purple Yam

Imported sweet purple yam, sliced, battered and deep-fried, served with a peanut vinaigrette sauce.

Price: 5.50 Euro

ORDER NOW

[more details]
Adaptive Presentation Outline

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Consists of:

1. Designing *information structure* (domain model)
2. *Information* creation (application content)
3. Defining *navigation structure* (application content)
4. Defining *pedagogical structure* (adaptation model):
   Which navigation is desirable during learning?
Example: Milkyway Information Structure

- The “logical” structure of Milkyway
- Different relationship types result in links in the application
Example: Milkyway Pedagogical Structure

- Adaptation can be supported by Artificial Intelligence
Authoring an Adaptive Application with GRAPPLE Tools: Domain Model (Step 1)
• XHTML page using GRAPPLE syntax:
  <h2>Authoring AHA! Applications</h2>
  <p>Creating AHA! applications involves four main steps:
    writing <a href="pages">pages</a>,
    creating a <a href="domainmodel">conceptual structure</a> of the application,
    defining the <a href="rules">adaptation rules</a>,
    <gale:if expr="${rules#knowledge}&gt;50">
      <gale:block>
        <a href="rules">(event-condition-action rules)</a>
      </gale:block>
    </gale:if>, and defining the <a href="layout">look and feel, or layout</a> of the application.</p>
Authoring an Adaptive Application (Course) with GRAPPLE Tools: Adaptation Model (Step 4)
Example Created with GRAPPLE Tools:
Course about Milkyway

Natasha (nstash@win.tue.nl) has read 2 pages and still has 27 to read - list of read pages - pages still to be read
Options in stand-alone mode: change password logout

Planet

Image of Planet

![Image of Planet]

Information

A planet, as defined by the International Astronomical Union (IAU), is a celestial body orbiting a star or stellar remnant that is massive enough to be rounded by its own gravity, is not massive enough to cause thermonuclear fusion, and has cleared its neighbouring region of planetesimals. Visited: 1

Next suggested concept to study: Moon
Prerequisites Structure

- Different ways of creating prerequisites structure:
  - Top-down (deductive) approach
    *from abstract to concrete concepts*
  - Bottom-up (inductive) approach
    *from concrete to abstract concepts*
- Adaptive systems allow for the implementation of different prerequisites structures for one course to address individual learner’s preferences
How to *Realize* Prerequisites

- You should study A before B
  - “should”: different adaptation techniques either *enforce* this or *give advice*
  - “study”: this can be access or read or take a test; result is a knowledge value
  - how much knowledge is enough?
  - “before”: this does not imply just before
Conclusions (GRAPPLE Part)

- *Adaptation* to address *individual differences*
- Adaptation through *prerequisites*
- *Various* prerequisite structures are possible for the same course
- *Time estimation for authoring* an adaptive online course (TU/e master students who followed Adaptive Systems course) - *10 to 25 hours*
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CHIP

- NWO project: Cultural Heritage Information Personalization
- Resulted in a prototype of a personalized museum guide
- Developed in collaboration between TU/e, Telematica Institute and Rijksmuseum
- Recommendations based on semantically enriched collection data of the Rijksmuseum in Amsterdam
- http://chip.win.tue.nl
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CHIP Web-Based Tools: Tour de Rijks

Art Recommender: Discovering interests in artworks & art topics

Tour Wizard: Managing & visualizing museum tours

Mobile Guide: Guidance inside museum

http://chip.win.tue.nl/demo/
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From Personalized Museum Guide to City Guide: CHIP-Based Tour d’Amsterdam

Recommender for Points of Interest in the city

Tour Wizard: Managing & visualizing city tours

Mobile City Guide

http://chip.win.tue.nl/cityguide/
CHIP: Linking Different Environments

Visiting Amsterdam
- Royal Palace/Town Hall
- The Town Hall on the Dam, Amsterdam
- Same building

Central Station
- Same style Dutch Renaissance

Rijksmuseum
- Same architect Cuypers
- Interior with Women beside a Linen Chest

Online visit to museum/city website

Onsite visit to physical museum/city
Conclusions

• We looked at the tools for adaptive e-learning and examples of adaptive applications
• GRAPPLE and CHIP software is open-source and generic
  • Generic refers to application-independence:
    • GRAPPLE is not limited to e-learning environments
    • CHIP is not limited to museum environment
• Both tools support the idea of lifelong learning