Adaptive E-learning System for Language Learning: Architecture Overview

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Outline

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  • computer-based language learning

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  • vs. teaching
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  • intelligent tutoring systems

• Architecture proposition
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  • roles and implementation of system models and modules

• Conclusion
Introduction – computers in LL

• Using computers for language teaching/learning may be designated as
  (1) computer-enhanced language learning, or
  (2) computer-based language learning.

• Although similar, a distinction may be drawn between the two terms
Computer-enhanced language learning

- Using computer software as teaching aide to support and complement day-to-day activities
- Technologies/tools:
  - spell checkers,
  - digital dictionaries or glossaries,
  - wikis,
  - blogs,
  - social networks, etc.
- These help teachers (and students) to carry out language learning activities with increased efficacy and efficiency
Computer-based language learning

- Characterised by the use of advanced language learning software (web-based or standalone)
- The software acts independently in constructing learners’ linguistic knowledge and developing language competences and skills
- The computer acts as a tutor, role different than that of a teacher in the traditional sense
Tutoring role

- Learning process is adapted to the needs of individual students – *personalisation*
- Tutor’s tasks include:
  - monitoring the learner,
  - inferring learner’s characteristics,
  - making appropriate on-the-spot adjustments to the teaching process.
Tutoring software

- Intelligent computer assisted language learning (ICALL) field deals with the development of tutoring software and research of its effects on teaching/learning

- Technology able to address tutoring requirements is intelligent tutoring systems (ITSs)
  - represent a micro-adaptive approach to adaptivity;
  - evaluate learner actions during the entire course of learning;
  - keep an up-to-date learner model of relevant learner characteristics;
  - make informed decisions on how learning is adapted to learners’ needs;
  - traditionally consist of 4 models: domain model, learner model, instructional model and interface model.
Language tutoring systems in use

- Often developed for commercial purposes
  - costs,
  - complexity of design, implementation and maintenance,
  - multidisciplinary context.
- Relevant literature reveals a number of systems developed for research purposes
- Systems differ in adaptation methods employed
  - individualised feedback (TAGARELLA, E-Tutor);
  - transforming learning content (AL-TESL-e-learning system, UoLmP);
  - adjusting the sequence of learning activities (VocabTutor, PIMS).
Language tutoring systems – issues

• Existing systems exhibit certain issues
  • horizontal restriction,
  • vertical restriction, and
  • overt focus on curriculum.

• The emphasis today is on the **integrative approach** to language teaching and learning, bringing together language skills, general and language strategies, and linguistic knowledge for the purpose of enabling communication.
Adaptive e-learning system - overview

• Main characteristics of the system:
  • adaptive,
  • web-based,
  • enriched traditional ITS structure,
  • teaching/learning English,
  • for learners with different level of language competence,
  • under development.

• The system has a twofold purpose:
  1. identification of the level of a learner’s language competence, and
  2. systematic learning support through guidance (based on CEFR competence level of learners)
Architecture of the proposed system

- **User Interface (Browser)**
  - Language learner
  - Interaction results/products

- **Controller module**
  - Selected object
  - Learning request

- **Evaluation module**
  - Answer analysis
    - Correct answers
    - Evaluator
  - Evaluated results of learner interaction

- **Learner model**
  - Learning data
    - Update
  - Learner characteristics database

- **Instructional model**
  - Selected values of learner characteristics
  - Rules for adapting feedback messages
  - Rules for adapting learning process

- **Domain model**
  - Domain concepts
  - Request for and delivery of learning materials or tests

- **Domain designer**
  - Test item

- **Initial test items/Item results**
  - Learner model initialisation module
    - Stereotype activator
    - Adaptive testing procedure

- **Domain organisation**
  - Learning content and test items

- **Learning (object) sequencing**
  - Feedback
  - Learning
  - Testing

- **Domain designer**
  - Evaluator

- **Evaluation module**
  - Learner model
  - Stereotypes/evaluated answers
Proposed system components 2/4

- **Learner model initialization** module
  - deals with the initial lack of knowledge about the learner;
  - adaptive computerised test with Item Response Theory as the basis.
Proposed system components 1/4

- **Domain model**
  - implementation in two parts: (1) domain organisation part, and (2) a database containing all learning materials;
  - designed based on the Common European Framework of Reference for Languages (CEFR), for each skill separately;
  - enables highly granular monitoring of learner progress;
  - focus shifted from achievement to proficiency.

- **Learner model**
  - represented by an up-to-date database of each learner’s characteristics and domain coverage by the same learner – a version of the well-known overlay model;
  - initialisation problem solved by implementing an adaptive testing procedure.
Proposed system components 3/4

- **Instructional model**
  - central point of the system and the educational process;
  - defines the logic of system behaviour;
  - implemented as a repository of heuristic rules concerning tutoring/teaching;
  - rules are activated according to the values stored in the learner model.

- **Controller module**
  - coordinates the work of the entire adaptive system;
  - responsible for checking values stored in the learner model, selecting rules and applying them during the learning process;
  - also able to deal with possible learner requests for learning.
Proposed system components 4/4

- **Evaluation module**
  - evaluates the accuracy of learner activities;
  - proscribes how learner activity will be mapped onto the learner model (i.e., how it is updated).

- **Interface model**
  - communication point between the learner and the system;
  - access using a web-browser;
  - client-side technologies (AJAX) in implementation.
Conclusion & future work

- Architecture overview of an adaptive e-learning system for language learning
  - enriched traditional ITS architecture
- System addresses issues detected in other adaptive language-learning systems in use
- Aims to detect the CEFR competence level of learners and guide them towards higher levels of proficiency
- Future work
  - completion of the system,
  - testing the system with learners.
Questions

Thank you for your attention.