Speech-enabled CALL and Pronunciation Training: Learning Goals versus Feasibility?

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A key challenge in developing speech-enabled CALL systems is
to design for more linguistic-didactic functionality while remaining
within the limits of technological feasibility. This especially applies
to systems intended for practicing grammar. This presentation describes
the DISCO system, which makes use of automatic speech
recognition (ASR) to provide feedback on grammar and pronunciation
of Dutch L2. We will also focus on the requirements for goal-oriented
design and implementation of speech technology. On the one
hand we are developing and testing speech technology modules
to determine what is feasible. On the other we use this knowledge
in the goal-oriented, ecological and ontological design of a CALL
system for practicing pronunciation and grammar.

http://lands.let.ru.nl/~strik/research/DISCO/

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J.Colpaert, C. Cucchiarini, H. Strik & M. Oberhofer
CALICO 2011
University of Victoria
 -
About the project
. Development and Integration of Speech technology
into COurseware for language learning (DISCO) ->
SPRAAKMAKKERS
. Financing:
. Partners:
 -
About the project
. Research project: lab setting
. Initial goal: integrate ASR technology (segmental
level) in a CALL application and evaluate its
usefulness/feasibility/affordances for pronunciation
training.
 -
As we went along …
. Additional requirements:
. build on CAPT acquisitions (no simplistic approaches)
. focus on pronunciation, but also on morphology and syntax
. integration aspect: learners of DL2 in Dutch & Flemish
society
 -
Initial design
. Target group:
. highly-motivated & highly-educated students of Dutch as a
second language (DL2) seeking employment or study in the
Netherlands or in Flanders
. Initial design: learner chooses between:
. pronunciation, morphology and syntax
. number of 'crucial practice situations' (CPS)
 -
But:
. We decided:
. To develop a real-world app
. To take into account all actors and factors involved
. To apply a systematic and methodological design
framework.
. See:
. Colpaert, J. (2010): Elicitation of language learners' personal
goals as design concepts. Innovation in Language Learning
and Teaching.
 -
3 paradigm shifts
. Based on what we have learned:
. Ecological
. Psychological
. Ontological
 -
Ecological shift

. No Significant Difference Syndrome
. "No technology possesses an inherent effect on learning."
 -
Ecological shift
. Learning effect is only generated by the learning environment as a whole. The better the LE, the more effect.
. Learning situation = what is
. Learning environment = what should be created
. . Which components ?
 -
The learning environment
. Ingredients:
. Actors: learner, teacher, parent …
. Content
. Teaching model
. Learning model
. Evaluation model
. Infrastructure
. Technology
+ recipe, procedure, design model… (how-to …)
 -
The learning environment
. What is a powerful learning environment?
. Geared towards the optimal realisation of goals
. How should we proceed ?
. Design in a methodological, systematic and justifiable way
 -
Design
. Creative phase between analysis and development
. Need for systematic and justifiable approach
. . Conceptual (what?) and methodological (how?) framework
. Based on theoretical findings and practical experience, taking into account the local context
 -
Engineering Lifecycle
Analysis
Development
Implementation
Evaluation
conceptualization
specification
prototyping
Design
Theory
Technology
 -
Educational engineering
. EE= analyzing, designing, developing, implementing and evaluating learning environments (<> electronic !)
. Engineering: building knowledge by formulating working hypotheses based on theory and practice, and by applying them

in a stepwise, cyclic approach
. EE is a research method if carried out in a methodological and justifiable way
. EE does not measure effect on product level, but on process level
. EE is compatible with other research methods
. Turn your daily work into research (<> n=7)
-
Psychological shift
. Design of learning environments mostly focuses on learning goals.
. The lower motivation, the more reason for taking into account factors that hinder or stimulate the learning process, that make the learning environment acceptable or not.
. Importance of personal goals
-
Personal goals
. Pedagogical goals: explicit, detailed, conscious
. Personal goals: difficult to elicit and to formulate
. Elicitation technique: analysis of emotional and cognitive friction
. When I think about … I think about the following problems
. When I think … I feel ….
. I feel … because I …
. . The learning environment should first focus on …
-
Examples
. I want more respect, support, clarity, freedom, …
. I want to see the results of my efforts, know where I stand, collaborate …
-
Ontological shift
. First specify what is needed, then define:
. Which technologies offer required functionalities as such ?
. Which technologies should / can be modified ?
. Which technologies/systems should be developed ?
. . ontological specification in UML, natural language or mock-up
-
Pedagogical goals
. provide training for oral proficiency for DL2 at A2 CEFR level
. enable DL2 speakers to reach the level of intelligibility (>< perfect pronunciation)
. give intelligent feedback on various aspects of DL2 speaking
-
Personal goals
DL2 learners want to
. ….receive tailored feedback (in correct amounts and in an adapted form) when practising communicative skills in general and pronunciation specifically
. ….be able to control or keep up with the speed of the conversation

. ….practise in a safe environment which helps them to gradually
and repeatedly improve their pronunciation and grammar skills
. …..receive respect for their identity, even if they show a
willingness to integrate in Dutch or Flemish society
 -

Design concepts
. Interaction in realistic communication situations,
without emphasis on integration
. Show interest in the learner
. No 'back-to-school' approach
. Only explicit tutoring when needed
 -

Interactive participatory drama
Learner plays active role in a pre-programmed scenario
by interacting with an "agent"
Use of drama is beneficial because:
1) Reduces inhibition, increases spontaneity, and
enhances motivation, self-esteem and empathy (Hubbard
2002:210)
2) Casts language in a social context (Hubbard 2002:210)
3) Closed response design (Ehsani 1998)
 -

. User chooses between 3 topics
. With the train to….
. Choosing a language course
. Buying a DVD
. System chooses between 3 activities
. Pronunciation ("uitspraak")
. Morphology ("zinnen aanvullen")
. Syntax ("zinnen maken")
Design
 -

Pronunciation
 -

Morphology
 -

Syntax
 -

Uttering a response
 -

Conversation tree
 -

Feedback
. clarification request for non-identification in ASR
. possibility to move on after X attempts
. two types of corrective feedback, varying with respect to learner
preference
. explicit correction + learner tries again
-> "I want lots of feedback in the conversation, in order to
correct my mistakes and achieve perfect pronunciation."
. recast + conversation goes on
-> "Even when I make mistakes, I want to go on with the
conversation, in order to practice fluency. "
. non-verbal feedback (animation)
 -

Clarification request

-

Explicit correction

-

Explicit correction

-

Explicit correction

-

Recast

-

Students' own speech

-

Review mistakes

-

Scores

-

Remediation exercise

-

Progress

-

Implementation
. Eventual learning effect will depend on its integration
in a well-designed learning environment geared
towards the realisation of pedagogical goals by
focussing first on personal goals

-

Considerations
. The added value of a particular technology is
proportional to the extent to which it contributes to
the design of a learning environment geared towards
fully realizing the pedagogical goals.
. A particular technology can be useful in one LE, but
useless in another LE. No technology can be
evaluated in a discrete, absolute way.
. No LE can be evaluated independently from its
context. It is better to evaluate the design process
than the product.

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Q&A
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http://summerschool.linguapolis.be
. Antwerp CALL August 2012:
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