

# Interfaces in Intelligent CALL

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The six papers in this special issue were first presented at a conference with the title *Interfaces in Intelligent CALL 2* (IICALL2: <http://www.purl.org/i-call/>) at the University of Waterloo in Southwestern Ontario, Canada in December 2007, which was planned and co-ordinated by Mathias Schulze, Peter Wood, Tetyana Reichert, and Johanna Mildebrath – all of the University of Waterloo. The idea for these conferences came from Detmar Meurers and Luiz Amaral, who organized the first IICALL conference at Ohio State University in December 2006. It was also them who suggested to us organizing the second conference.

Intelligent CALL (ICALL) borrows the adjective ‘intelligent’ from the area of Artificial Intelligence. It is the sub-discipline of CALL which applies research findings from natural language processing and student modeling – both areas of Artificial Intelligence – to CALL. This interdisciplinary field of research and development draws on research findings from academic disciplines such as second language acquisition theories, formal, corpus, and computational linguistics, artificial intelligence, and computer science (for an overview see Heift & Schulze, 2007). Natural language processing has had surprisingly little effect on the research and development in CALL as well as on the general academic discourse in CALL (Nerbonne, 2003; Zock, 1996), in spite of the fact that both computer-assisted *language* learning and natural *language* processing share an interest in the intersection of language and computing. This lack of productive interaction can be overcome so that both research communities can benefit. Researchers in natural language processing find a wealth of interesting, challenging (linguistic) problems in the treatment of (learner) texts (ten Hacken, 2003); researchers in CALL find a wealth of linguistic tools and resources from natural language processing at their disposal and (mostly) ready for implementation and adaptation, which will facilitate the individualization of the learning experience, the improvement of contingent and contextualized error feedback, and increased error awareness. Such a successful collaboration between members of two large research communities necessitates the creation of venues for sustained communication by the specialists from this diverse range of fields (Schulze, 2008) – in other words, the creation of an interface.

Of course, ‘interface’ is an established technical term in domains such as Computer Science (e.g., the interface of the computer to a monitor or projector), Software Engineering (e.g., the application programming interfaces of an operating system which supports requests by other computer programs), and Human Computer Interaction (the interfaces between user and machine). However, the metaphor of ‘interfaces’ in the title of both conferences and in the title of this special issue, first and foremost stands for the connections that have to be made between the specialists in these areas. The first IICALL conference was preceded by three workshops led by Cathy McCoy (University of Delaware / Computer Science), Susan Bull (University of Birmingham (UK) / Computer Science), and Eckhard Bick (South Denmark University / Computational Linguistics). The papers on ICALL were given by researchers with a background in second language acquisition research, computational linguistics, and computer science.

A similarly diverse group of people came together for the second conference. The conference was preceded by a workshop presentation by the applied linguist Roy Lyster who discussed a counter-balanced approach to form-focused foreign language instruction (see Lyster, 2007). The one-day conference consisted of eight papers, six of which are published in this special issue.

The first section contains two papers which deal with student models in ICALL – the invisible interface between student and system. Student modeling is based on a fine-grained analysis of student interactions with language learning systems. The resulting information structure is used to

draw inferences about selected traits of the student's learning behavior, which in turn inform future decisions of the system, for instance, on what type and level of feedback is provided on student input or what learning objects are likely to be most valuable at the next stage in the learning process.

**Trude Heift** considers issues of learner variability in the context of student modeling. Her longitudinal data set stems from student interactions with a parser-based, online language tutoring system (*E-Tutor*). Her data analysis shows the importance of monitoring fine-grained information about students' learning over extended periods of time and provides evidence for the nonlinearity of SLA processes.

**Luiz Amaral and Detmar Meurers** take a broader perspective of student models than has been the case in most previous ICALL projects in that they look at students' language use in (a mainly instructional) context. Their study motivates the inclusion of an explicit activity model in student modeling. Such a model provides information in addition to the information obtained from a linguistic analysis of the student input during learning activities and leads to an improved quality of the inferences the student model can draw.

The second section of this issue with its three papers gives examples of different application domains in ICALL – interfacing ICALL research with different areas of language learning. **Karin Harbusch, Gergana Itsova, Ulrich Koch, and Christine Kühner** discuss an ICALL system which helps German elementary school children to learn more about different aspects of written text production in their native language. This system – *The Sentence Fairy* – utilizes natural language generation which basically turns a formal, computational representation of a story line into appropriate and linguistically well-formed prose.

The paper by **Yoko Futagi, Paul Deane, Martin Chodorow, and Joel Tetreault** discusses an application of ICALL in the realm of language testing. Their prototype system aims to detect collocation errors in learner texts. They present the system, motivate its design, which relies on the automatic correction of orthographic and morphological errors and the automatic calculation and measuring of collocation strength, and discuss results from an evaluation.

In the about thirty years of its existence, ICALL researchers and developers have mainly concentrated on systems which could be described as tutorial CALL. Parser-based systems are often used to facilitate language learning in a direct student-computer interaction by, for example, providing error-contingent and contextualized feedback or by presenting relevant, individualized linguistic information and material for further learning. **Markus Dickinson, Soojeong Eom, Yunkyong Kang, Chong Min Lee, and Rebecca Sachs** explore the application of NLP technology in computer-mediated communication. Their system is intended to provide feedback on particle errors made by learners of Korean in a task-based chat environment.

The paper by **Peter Wood** in the final section on natural language processing resources in ICALL discusses an important interface between natural language processing and CALL – the re-use of available language engineering resources in CALL. He discusses the use of the General Architecture for Text Engineering (GATE) as a tool for the development of ICALL applications. The first of the two remaining conference presentations was by Kazuya Saito who presented on the influence of explicit phonetic instruction on EFL learners. My own presentation on the role of Construction Grammar in ICALL appeared in a different issue of *Computer-Assisted Language Learning* (Schulze & Penner, forthcoming).

In concluding this short introduction, I would like to express my sincere thanks to all contributors for their thoughtful and stimulating papers, their adherence to tight editing deadlines, and generally for their wonderful, collegial co-operation. It was a genuine pleasure to work with you. A great thank-you is also due to Jozef Colpaert, the editor of *Computer Assisted Language Learning*, who has been a great support with his detailed and prompt advice from the very start of this project. No refereed journal could appear without the work of reviewers. Evaluations and constructive comments for the papers in this special issue on *Interfaces in Intelligent CALL* were provided by Monica Ward, Cornelia Tschichold, Nick Pedlar, Hans Paulussen, Wolfgang Menzel, Olivier Kraif, Eunice Jang, Debra Hoven, Dominique Hemard, Graham Davies, Ron Cowan, David Coniam, Carol Chapelle, Thierry Chanier, Susan Bull, Chris Bowerman, Lars Borin, Jean Claude Bertin, and Georges Antoniadis. Thank you.

- Heift, T., & Schulze, M. (2007). *Errors and Intelligence in CALL. Parsers and Pedagogues*. New York: Routledge.
- Lyster, R. (2007). *Learning and teaching languages through content : a counterbalanced approach*. Amsterdam ; Philadelphia: John Benjamins Pub.
- Nerbonne, J. (2003). Natural Language Processing in Computer-Assisted Language Learning. In R. Mitkov (Ed.), *The Oxford Handbook of Computational Linguistics* (pp. 670-698). Oxford.
- Schulze, M. (2008). AI in CALL - Artificially Inflated or Almost Imminent? *CALICO JOURNAL*, 25(3), 510-527.
- Schulze, M., & Penner, N. (forthcoming). Construction Grammar in ICALL. *Computer Assisted Language Learning*.
- ten Hacken, P. (2003). Computer-Assisted Language Learning and the Revolution in Computational Linguistics. *Linguistik online*, 17(5), 23-39.
- Zock, M. (1996). Computational Linguistics and its Use in Real World: The Case of Computer Assisted Language Learning. In *Proceedings of Coling'96: The Sixteenth International Conference on Computational Linguistics* (Vol. 1, pp. 1002-1004). Copenhagen: Center for Sprogteknologi.