

Kids' Club as an Idea Generator in Educational Robotics Research

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Content

- Introduction
- Kids' Club concept (video)
- Kids' Club supporting educational technology research
- Educational robotics research projects in Kids' Club
- Conclusion and future plans

Introduction to Kids' Club

- Bi-directional research laboratory, where children work in collaboration with university students and researchers of Computer Science and education
- Appears to children as technology club
- The first group began on October 2001
 - Now about 15 children and 8-10 tutors (PhD and undergraduate students of CS and education)

Kids' Club concept

- Solving open-ended scientific problems by playing
 - planning the project
 - building a concrete model
 - programming the model
 - presenting the project
- Video (about 10 minutes)

Kids' Club and learning

- Goal-oriented way within a certain subject
- Open-minded place with lots of room for individual needs
- No curriculum or tests, learning by self evaluation and reflecting
- Concretization of the subject, for example, with robotics
- Socio-cultural and constructionist views on learning
- Inventive learning, problem based learning

Kids' Club and research

- An important research resource for our research group
- A platform for developing novel methods and tools for technology education
 - Visual programming environment (IPPE)
 - Virtual reflection tool (VirRe)
 - Woven Stories
- Good results especially in special education
- Separate studies are carried out according to their own research plans

Educational robotics research

- Small-scale robotic kits
 - interactive, autonomous artifacts for learning and teaching
 - relatively cheap price
- Example: Lego Mindstorms Robotics Invention System
 - developed at mid-1980's at MIT
 - widely used in different educational contexts

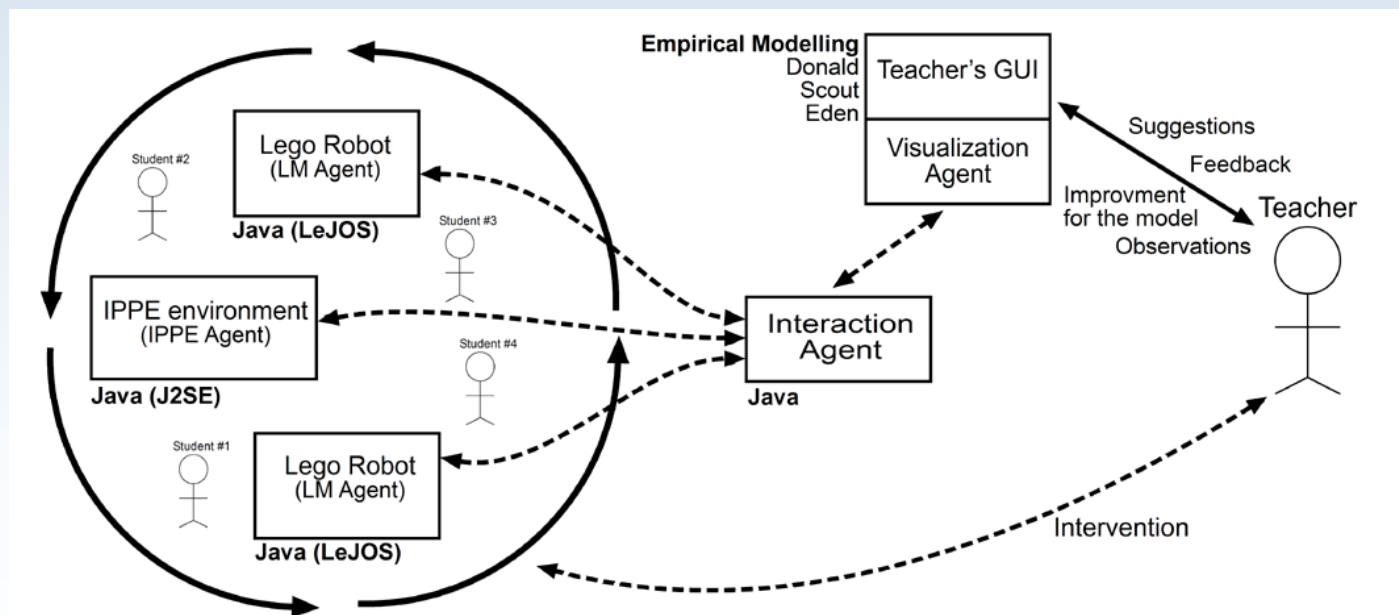
Case: RoboCup Junior

- Annual educational robotics competition for children
- Local and international tournaments
- Part of Kids' Club activities since 2002
- Has been successfully for Kids' Club teams
 - World championship in 2001
 - 4th place in 2004



Case: Pedagogical agents

- Educational agents to help the teacher's intervention in educational robotics classes



Case: Pedagogical agents

- The Integrative Learning Design Framework
 - A design-based research framework
 - Derives from instructional design, product design, usage-centred design, as well as educational research methodologies
- Not actually a research method, but a framework for research design
 - Still need for strict methods
 - Single-case research, for example, could be appropriate method for some of the phases of the framework

Case: Pedagogical agents

- Broad phases of the ILD:
 - Informed Exploration
 - Problem identification, needs analysis etc.
 - Enactment
 - Iterative cycles of design and implementation
 - Evaluation: Local Impact
 - Evaluation with the prototype with limited groups of target audience
 - Evaluation: Broader Impact
 - More rigorous evaluation in broader context

Case: Pedagogical agents

- Kids' Club concept will be strongly involved in the phases of ILD framework
 - Informed Exploration: Linguistic analysis
 - Enactment: Support for prototyping
 - Evaluation (local): Testing the agency prototype at Kids' Club (Joensuu, spring 2007)
 - Evaluation (global): Extending the evaluation to international context (Kids' Club hubs)
- Project should be finished at 2008

Conclusion

- KC creates a natural environment for technology education
- Supports development of various skills, e.g. mechanics, programming and also social interaction
- Supports development of tools and applications of educational technology
- Case project in near future: *Pedagogical Agents for Teacher Intervention in Educational Robotics Classes*

Further reading

Web:

Kids' Club: <http://cs.joensuu.fi/kidsclub/>

EdTech^Δ Research Group: <http://cs.joensuu.fi/edtech/>

Selected publications related to the topics of this presentation:

Eronen, P.J., Sutinen, E., Vesisenaho, M., & Virnes, M. (2002). Kids' Club as an ICT-based learning laboratory. In *Informatics in Education*, 1(1), 61-72.

Eronen, P.J., Jormanainen, I., Sutinen, E., & Virnes, M. (2005, July). Kids' Club Reborn: Evolution of Activities. In P. Goodyear, D. G. Sampson, D. J. Yang, Kinshuk, T. Okamoto, R. Hartley, & N. Chen (Ed.), *The 5th IEEE International Conference on Advanced Learning Technology (ICALT 2005)* (pp. 545-547). Los Alamitos, CA: IEEE Computer Society.

Jormanainen, I., Moroni, C., Zhang, Y., Kinshuk, & Sutinen, E. To appear (2006, November). Implementation of Intelligent Agents with Mobility in Educational Robotics Settings. In *The 4th IEEE International Workshop on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE 2006)*.

Jormanainen, I., Zhang, Y., Sutinen, E., & Kinshuk. (2006, July). Agency Architecture for Teacher Intervention in Robotics Classes. In Kinshuk, R. Koper, P. Kommers, P. Kirschner, D. G. Sampson, & W. Didderen (Ed.), *The 6th IEEE International Conference on Advanced Learning Technologies (ICALT 2006)* (pp. 142-143). Los Alamitos, CA: IEEE Computer Society.