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Conception, Models and Realization of Advanced Generative Learning Objects

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THE AIM OF THE RESEARCH:

Create and investigate the methods of formation of advanced generative learning objects (AGLO), determine and investigate the characteristics of AGLO.

RESEARCH QUESTION(S):

1. AGLO model: development and specification.
2. Transformation: GLO model specification → executable specification.
3. AGLO complexity: evaluation and management: multi-stage GLO.
4. Overall assessment and experimental study of AGLO.

AN IDENTIFICATION OF THE SIGNIFICANT PROBLEMS IN THE FIELD OF RESEARCH:

1. How to solve the GLO specification problem and to create a flexible generation/transformation methods.
2. How to use generative technologies in programming teaching and learning effectively.
3. How to evaluate the quality of AGLO for programming teaching and learning.

AN OUTLINE OF THE CURRENT KNOWLEDGE OF THE PROBLEM DOMAIN, AS WELL AS THE STATE OF EXISTING SOLUTIONS:

The LO models should be relevant to respond to new challenges and IT advances. In this regard, the introduction of the GLO by (Leeder & Boyle et al., 2004) has been a significant event in LO research. The GLO model, as “a next generation of LO”, has new capabilities such as generativity and flexibility for adaptation and reuse. The basic idea, upon which a GLO works, is the separation of the LO structure from its content (Leeder et al., 2004; Morales et al., 2005; Boyle, 2009; Boyle, 2010). The separation is introduced by the LO model and implemented using a generative technology (hence the name ‘generative LO’). Though research on GLOs is still in its infancy (despite the works of GLO pioneers and other researchers (Di Iorio et al., 2006; Oldfield, 2008; Han & Krämer, 2009)), the approach has a great potential for achieving advancements in e-Learning.

A PRESENTATION OF ANY PRELIMINARY IDEAS, THE PROPOSED APPROACH AND ACHIEVED RESULTS:

1. The model of technology-enhanced GLOs and a framework for systematic analysis and understanding of the impact of GLOs for e-Learning is proposed. As we use meta-programming-based (MPB) generative technology to specify GLOs, we called them MPB GLOs.
2. LEGO NXT robot-based environments and sets of AGLO for programming teaching and learning are developed.
3. Pedagogical experiment was done to evaluate pedagogical effectiveness of AGLO.

A SKETCH OF THE APPLIED RESEARCH METHODOLOGY (DATA COLLECTION AND ANALYZING METHODS):

1. Analysis and evaluation of the common structure and attributes of GLO – review and summary of latest references.
2. Feature-based method (feature diagrams) for AGLO domain conceptual model.
3. Transformation of AGLO model specification to executable specification – metaprogramming.
4. Pedagogical effectiveness of a GLO – evaluated by “engagement levels” using the methodology described in (Urquiza-Fuentes & Velázquez-Iturbide 2008).
5. Data mining methods to estimate the use of AGLO in education process.

QUESTIONS RELATED TO THE:

AGLOs should be well-designed meaning: the well documentation, the use of approved design principles such as concept separation and modularization (i.e. deep granularity), explicit requirement (pedagogical, social, technological) statement for both learning context features and learning content features, for example, through visualization, e.g. using feature diagrams. How to estimate pedagogical and technological aspects (complexity) of quality of AGLO? Is the introduction of novel models such as multi-staged GLO appropriate for managing complexity and avoiding consequences of over-generalization problem?

References

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Biography



Renata Burbaitė is an informatics teacher in Panevėžys Juozas Balčikonis gymnasium and PhD student at Kaunas University of Technology, Lithuania. Her research interests include e-learning, learning objects, generative learning objects, meta-programming, and programming teaching and learning. She is a co-author of several programming textbooks for secondary school and e-books for teachers.

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