Method of Interactive Geometry Visualization for Constructive Learning

Eglė Jasute, egle.jasute@gmail.com
Vilnius University Institute of Mathematics and Informatics, 3th years PhD student

Research questions:
1. How to make easier for teachers to use dynamic geometry programs?
2. What technological and methodological criteria interactive images have to implement to improve students’ abilities and teachers usage of dynamic geometry program?

An identification of the significant problems in the field of research:
How to help teachers of secondary school to use dynamic geometry in their lessons?

An outline of the current knowledge of the problem domain, as well as the state of existing solutions:
Constructionist ideas can be effectively realized in mathematics lessons. However, teaching mathematics is mostly based on an academic approach – it is intended for the national school – leaving mathematics exam obligatory for almost every higher school. In view of that, the majority of our mathematics teachers can be considered as traditional teachers. Some reasons, why mathematics teachers do not use constructionist learning tools, i.e. dynamic geometry in their lessons, have been found by analyzing literature (Hohenwarter et al., 2011, Stols, Kriek, 2011). The research question arises from the field of these analysis.

A presentation of any preliminary ideas, the proposed approach and achieved results:
1. Baytak (2011) model for constructionist learning was extended and adapted for learning geometry with dynamic geometry (Figure 1a).
2. In order to help the teachers to use the dynamic geometry and other information technologies the informatics engineering solution is founded: developed an interactive geometry visualization method (Figure 1b).
3. The principles of the interactive geometry visualization using dynamic geometry have been chosen.
4. Pedagogical experiment was done to explore, if interactive images created by the above mentioned method and used for geometry teaching, have any effects for students’ geometric skills, what changes the interactive images have for students’ geometric skills, what abilities are improved when interactive images are used for teaching-learning. The results of experiment were presented.

A sketch of the applied research methodology (data collection and analysing methods):
1. Systematization and a comparative analysis for analytic part.
2. The construction method for model investigation.
3. Pedagogical experiment. The obtained results of experiment were processed using the statistical package SPSS and descriptive statistics.

4. Approaches and methods proposed by Multiple Criteria Decision Analysis, in particular, modeling, the Goal/Question/Metric framework and the expert evaluation, Value measurement theory are expected to be applied in the creation of the evaluation scheme for model.

![Diagram](image)

**Figure 1:** a) Model for constructionist learning; b) Method of interactive visualization

**Questions related to the:**
Approaches and methods proposed by Multiple Criteria Decision Analysis, in particular, modeling, the Goal/Question/Metric framework and the expert evaluation, value measurement theory are expected to be applied in the creation of the evaluation scheme for model. But we have evaluation tool created on Multiple Criteria Decision Analysis for digital learning tools which is constructed for expert evaluation. If it enough to use this tool for evaluation method in informatics engineering domain? Or can it be done in other way in the field of informatics engineering?
References

Biography
Egle Jasute works at the Vilnius Jesuit gymnasium from 1997 till now. She is a teacher of mathematics and informatics. She is also PhD student at Vilnius University Institute of Mathematics and Informatics in Informatics Engineering. E. Jasute assists in localization of software for schools; uses those and others software in her lessons at school; wrote some papers and books about use of software; made two educational CD for mathematics: “Mathematics 9 with Geometer’s Sketchpad” and “Mathematics 10 with Geometer’s Sketchpad” with join authors. She read some courses for teachers about use of the Informatics Technologies in mathematic.

Copyright
This work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported License. To view a copy of this licence, visit http://creativecommons.org/licenses/by-nc-nd/3.0/