Surveying prospective teachers’ conceptions of GeoGebra when constructing mathematical activities for pupils

Attila Szabo¹, Mirela Vinerean², and Maria Fahlgren²

¹Stockholm University, Department of Mathematics and Science Education, Sweden, attila.szabo@edu.stockholm.se; ²Karlstad University, Department of Mathematics and Computer Science, Sweden, mirela.vinerean@kau.se, maria.fahlgren@kau.se

In this poster, we present an ongoing study about prospective mathematics teachers’ conceptions about the relationship between mathematics, problem solving and GeoGebra. The context of our study is a curriculum reform in Sweden that emphasizes the use of digital tools mathematics education. In that respect, we will investigate prospective upper-secondary teachers’ conceptions when participating in a geometry course at university level. During the course, participants will construct mathematical activities for pupils by using GeoGebra.

Keywords: mathematics teaching and learning, prospective teachers, dynamic geometry software, problem solving.

BACKGROUND

Despite a substantial emphasis on the potential of digital technologies for mathematics education in the last two decades (e.g. Hoyles & Lagrange, 2010), a meaningful implementation of digital tools in the teaching of mathematics is not an unproblematic issue (e.g. Drijvers, 2013). Following the international trend, a relatively recent curriculum reform in Sweden highlights the use of digital technology in mathematics education in upper-secondary school. Importantly, according to the curriculum, digital tools should be used by pupils to develop their competences in problem solving and mathematical modelling.

Mathematical problems and problem solving are considered central to mathematics education. When discerning problems from routine tasks, the relationship between the solver and the proposed task, in combination with the challenge that the solver faces when solving the task, are essential (Carlson & Bloom, 2005). Consequently, to prepare prospective teachers to use digital tools in their teaching, these perspectives should be included in the teacher education programme. Additionally, prospective teachers’ relatively limited experience in working with digital technology in mathematics, should be addressed in the context (Misfeldt, Szabo & Helenius, 2019).

THE STUDY

By focusing the educational programme of prospective teachers, the main goal of the present study is to investigate their conceptions about the relationship between school geometry, problem solving and GeoGebra. Consequently, we designed a survey related to various aspects of and intersections between these subjects. The survey is mainly based on previous studies about mathematics teachers facing challenges related to new
digital technology or to the use of Dynamic Geometry Software (DGS) (e.g. Fahlgren & Brunström, 2014; Misfeldt, Szabo, & Helenius, 2019). Some questions focus prospective teachers’ use of DGS in the perspectives of instrumental distance and professional genesis (Haspekian, 2014). To achieve an appropriate level of reliability and validity of the responses we use a four-alternative Likert scale.

The 22 participants are prospective upper-secondary teachers enrolled in a geometry course at university level. Prior to the course, they had no formal education in and very little experience of DGS. During the course, participants applied GeoGebra to construct activities for pupils that include problem solving. In order to develop participants’ critical reflection, mentioned activities underwent peer assessment and were tested by peers, acting as pupils.

Due to the limitations of this poster, we present only one result from our study. The analysis shows that 95% of participants feel enthusiastic – by stating that DGS is important and meaningful for mathematics education – and 70% feel well-prepared to use DGS in their teaching. On the other hand, 85% of participants think that they will meet pupils who are more skilled in DGS than they are. This indicates that prospective teachers’ conceptions related to DGS should be discussed further in the light of instrumental distance and professional genesis (Haspekian, 2014). That is, it is not unreasonable to assume that, despite feeling optimistic and relatively well-prepared, participants will face challenges when implementing DGS in their teaching.

REFERENCES


