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# **On the efficiency of a professional development program for mathematics teachers in upper-secondary schools in Iceland**

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*Keywords: Out-of-field teachers, upper secondary school, ICT, professional development*

## **Introduction**

The poster is about an ongoing study on the efficiency of a two year long in-service program for 25 mathematics teachers at the University of Iceland.

In 2014 a report was published by the ministry of Education in Iceland on the teaching of mathematics in upper secondary school in Iceland (Jónsdóttir et al. 2014). The report states that among other issues there are relatively many out of field teachers teaching mathematics, there is very little use of tasks that promote creative reasoning and use of ICT in the teaching of mathematics in upper secondary school is not very common. There is a shortage of educated mathematics teachers in the country and the Icelandic mathematics curriculum is rather vague on the use of ICT in mathematics so teachers in general do not feel required to use it. Many of the teachers interviewed expressed the need for more professional development which they felt was inadequate in Iceland.

After the report was published the University of Iceland started a two year long in-service program in the fall of 2015 for 25 mathematics teachers at the University of Iceland. The number of upper-secondary mathematics teachers in Iceland is about 150 so this was about one sixth of the total number of teachers. The aim of the program was to educate out-of-field teachers on various aspects of mathematics and mathematics education as well as to increase their use of ICT in the teaching of mathematics. The first course in the program was an intensive ICT course covering GeoGebra, LaTeX, software for screencasts etc. The teachers were taught basic use of the software and given assignments to do in their own teaching. This was followed by courses in combinatorics, statistics, mathematics education, calculus, number theory, geometry and mathematical modelling.

## **Surveys**

During the 2 years the participants filled in 3 surveys where they were asked about: their expectations, organization of the program, usefulness of individual courses, the program as a whole and if and how it had affected their teaching and more.

## **Use of ICT**

At the end of the first course (September 2015) the teachers filled out a survey (partially based on Goos & Bennison, 2008) on their knowledge and views on several types of software as well as the likelihood of using them in their future teaching. Their view was generally positive, they had learned a lot, they viewed ICT as something that could be used to help students understand mathematics and had plans to use ICT in their teaching. At the end of the program (June 2017) the actual use of ICT had been a little less than they had planned.

## **Expectations and reasons for participating in the program**

The main reason the participants stated was that they wanted to learn more mathematics and they were interested in the content of the program in general. They expressed (in answers to open questions) that they wanted to be better at teaching and believed that learning more mathematics would make them more secure in their teaching. The next most popular reason was learning to use ICT. The possibility to meet other teachers and collaborate with them was not rated very highly as a reason to join but turned out to be a valuable experience.

## **Program as a whole**

When asked to evaluate the program as a whole (in June 2017) the answers were generally positive but some disappointment was expressed such as “there should have been more practical didactics teaching us how to teach certain material”.

## **Long term usefulness of the program**

Teachers decide in general to participate in a PD program because they have some expectations about a positive outcome. Sometimes these expectations are unrealistic and sometimes there is a clash between these expectations and the plans of the PD organizers and teachers (see e.g. Nipper et. al. 2011 and Liljedahl 2014). It is important that PD organizers are aware of this and try to address this in their work. In the organization of the PD program mentioned above the ambition was to improve mathematics teaching in upper secondary schools in Iceland so it is therefore of great interest to examine further the long-term usefulness of the program. In an ongoing investigation selected participant are being interviewed about their overall view about the program, how they handled the differences between expectations and reality and if and how the program has resulted in changes in their teaching. It is also of interest to see what obstacles they have come across when they wanted to make a change in their teaching.

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