Mathematics Education in Iceland: Explaining the Non-homogeneity in a Homogenous System

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Abstract:
In this opening salvo to the Icelandic section, we synthesize some of the themes present in the different chapters and address aspects that the reader may not realize about Icelandic mathematics education. We briefly outline distinct features and anomalies within mathematics education in Iceland, which in spite of the homogeneity of the system reveals many threads of thought in terms of reform and implementation of new ideas.

Keywords: mathematics education in Iceland

Bjarnadottir in her opening chapter outlines the history of mathematics education in Iceland by examining mathematics textbooks and bureaucratic/political decisions from different periods on the textbooks sanctioned by the state for use in schools. In her chapter the influence of Danish regulations and universities on Icelandic syllabi is explained in addition to the effects of New Math. Bjarnadottir ends the chapter with the lament that achievement of Icelandic pupils is lacking and there is considerable room for improvement in spite of recent advances in the areas of curriculum development and mathematics education policy.

Mathematics education in Iceland is subject to detailed plans from the Central government and the curriculum guidelines are typically authorless, i.e., the documents do not include the names of authors like documents from North America often do. In the compulsory school there is mainly one book series to teach from, which limits options that teachers might seek. As reported by Gunnarsdóttir & Pálsdóttir in their chapter, in the last ten years a new series is being implemented, but teachers can choose from the materials and put an emphasis on what they consider important. The assessment assignments included in the materials have for example not

been widely used. However, even though a new curriculum is in place, new fads often find a place and even get implemented . For example -Global Education Model of Schooling (GEMS) [Visit http://www.gemsedu.org/]. This particular model is old news now but it reveals the tension in the system between individualized teaching and whole class teaching which is what teaching materials typically suggests and provides guidelines for teachers.

In his doctoral dissertation and ensuing writings Savola reports that the Icelandic educational system is in transition and the upheavals in the system from societal and institutional forces. In his video-based study comparing Finnish and Icelandic primary schools he studied the connections between pedagogical theory and actual classroom practices in these two countries. Among his findings was the trend of Learner-based instructional strategies becoming the norm in most Icelandic schools at the expense of content-related public discourse, namely sacrificing whole-class discussions to attend to individual needs. Savola points that Tomlinson's (1999) ideas about *differentiated instruction* became popular in Iceland but not implemented the way the model was intended, namely teachers attending to dissimilar learning styles, with tiered activities and materials accommodating the diverse learning needs of the students. Instead he found that students were taught using the same instruction methods and learning materials and differentiation translated to students moving ahead in the same book at a different pace.

In spite of these anomalies, there are no large tensions per se – that is to say, between the teacher education universities, teaching materials and the curricular guide from the authorities. The development for teaching of children up to 16 years and their teachers have mostly been influenced by the teacher educators in Reykjavik and Akureyri. As reported in many of the chapters in this section, practicing teachers are trying to learn about new ideas and implement them. Another salient point in the system is that reform is more or less tried uniform, i.e., everyone goes with the flow. Teachers are willing to and interested in trying out new things but that doesn´t necessarily mean big changes in what content has highest priority or which approach and thinking is valued. But teaching methods get attention, hands on activities, and games and calculators are the trend. There is also an emphasis in the importance of children being able to explain their thinking and solutions and problem solving.

Other major influences to mathematics education in Iceland have been the National tests – Námsmatsstofnun, psychometricians in charge of large scale testing and reporting on them,

and last but not least the teachers themselves. Námsmatsstofnun is responsible for PISA which briefly brought Iceland into the spotlight because of the achievement levels of girls in relation to boys (Halldorsson & Olafsson, 2009; Palsdottir & Sriraman, 2010; Steinthorsdottir & Sriraman, 2008). Such reports have supported the need for change and pointed out the need to challenge good students more and that rote-learning and exercises won´t help. However the national tests in Iceland place a lot of emphasis on procedural knowledge, the criticism of which is dealt with by claiming that it is difficult to test all areas. In general PISA problems have though had some influence on the problems on the standardized tests for the 10^{th} grade.

Another distinct feature of the Icelandic system is that there is no tension between teacher education and curriculum. This can be considered a negative thing for the following reasons.
Teacher educators have been in the leading role in making the teacher education both in service and pre service, making the curricula. Their professional knowledge and development has had its way. The people at the top or those responsible are few in number and they have similar ideology and view on mathematics-learning, though they sometimes disagree. It is negative in the sense that few people with little resources get to decide and newer people that come into the field are either trained by or encouraged by the very same people. This prevents a heterogeneity of thought or perspectives in mathematics education. In general, choices are restricted – Since Icelandic society is small, it is not possible to have many choices and with the teachers having more education, they should be able to search outside the country for opportunities. Teacher educators try to give teachers access to research and ideas so they can be more independent and make justifiable choices. The system is by and large vulnerable since it is not grounded in research in Iceland itself but based on teachers practice and trends from the USA and other Nordic countries.
The few teacher educators in the country are not in conflict and try to follow what goes on in the outside world and applying what they think is relevant for society in general. Differences do not get discussed to the extent they should but work gets accomplished together. Unlike other Nordic countries and elsewhere, in Iceland, choices at the policy level are made by teacher educators.

Since mathematics education research in Iceland is relatively new, reporting of existing teaching/research is lacking. University teacher educator's identities are still being shaped from being practitioners and field experiences with other researchers in mathematics education, which explains the lack of citations to prior studies done within Iceland in many of the chapters in this section. Mathematics education research is limited because of few people at the university level and the multiple duties heaped on them which curtails time for research. Recently the number of researchers is growing in terms of faculty and graduate students at the Masters´ and doctoral level. Also the university has started to exert more pressure on faculty to publish their research which is changing the culture towards research in mathematics education. However university teacher educators have engaged in plenty of curriculum development, field testing, self study without the necessity for reporting to the outside. Also professional development and in service training are slowly being reported in lectures and presentations at conferences or teachers´ meetings.

In May 2008 there was a Nordic Teacher Education Conference in Iceland in which several authors from this section (Palsdottir; Gunnarsdottir, Kristinsdottir) presented their self analysis of professional development as teacher educators. So far in mathematics education there have been 3 PhD recipients in the history of the country, currently one of the university mathematics educators is enrolled as a PhD student, and there are approximately a dozen Master's holders of mathematics education. This explains the lack of research in mathematics education in Iceland.

We conclude this section highlighting the common threads in the chapters comprising mathematics education in Iceland. These threads are:

- Focus on teachers and focus on own teaching
- Self-analysis of many years of teaching practices
- Teacher education under development with researchers self examining their role as teacher educator
- Relating existing research to research in other countries research – this suggests that development is not occurring out of the blue but building on existing traditions elsewhere.

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Section III

Icelandic Research in Mathematics Education

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