

The OECD as a Booster of National School Governance. The case of New Math in Sweden, 1950-1975

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Abstract: New Math was an international reform movement aimed at thorough changes in school mathematics with respect to both content and teaching methods. This movement started to gain influence in the 1950s, and in the 1960s several countries prepared and implemented their own New Math reforms. This movement not only attracted prominent mathematicians and psychologists but also garnered support from the Organization of Economic Co-operation and Development (OECD). The New Math reforms are examples of how OECD supported thorough and broad changes in national systems of education. In most countries, however, the influence of New Math on syllabi began to fade by the 1970s. In this paper, I discuss how the New Math in Sweden reform boosted national governance and changed power relations between the teachers, textbook producers, and the national school administration. I also suggest that OECD continued to support this power structure through the testing enterprises associated with PISA.

Keywords: OECD; New Math; Sweden; Development project; Governance; PISA.

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1. Introduction

A number of my research publications concern studies of governance of Swedish mathematics education in the 20th century (Prytz, 2017, 2018; Prytz and Karlberg, 2016; Prytz and Ringarp, 2020). To varying degrees, these publications also concern the so-called New Math project, the most wide-ranging attempt to change Swedish school mathematics during the 20th century. The New Math project was prepared for eight years in the 1960s and implemented in the early 1970s. The reform was wide-ranging as it targeted all school years from year 1 to 12 and was supposed to radically change both content and teaching methods. New Math was very much a global phenomenon as similar reforms were planned and implemented in several

other countries; however, the fate of these reforms was also quite similar: by the early 1980s, much of the reforms had been abandoned, including in Sweden.

One aspect not discussed in my previous papers is the fact that the New Math was supported by the international organisations such as the Organisation for Economic Co-operation and Development (OECD) and United Nations Educational, Scientific and Cultural Organization (UNESCO). The OECD funded and organised international conferences about New Math and issued reports on the topic. This circumstance might seem uninteresting since New Math in most countries has been considered a failure; it can be seen as an example of when international organisations had little influence on national educational systems. Indeed, some educational researchers have concluded that OECD and other organisations had less influence before the 1990s (see section on previous research below). However, there was more to the New Math reforms than just providing new content and new teaching methods. In Sweden, New Math included a new way of initiating and preparing innovations and reforms, an approach I have reported elsewhere (Prytz, 2017). New Math entailed a new relationship between teachers, textbook authors, and national school authorities.

The purpose of this paper is to elucidate how the OECD supported the reformation of the Swedish educational system between 1950 and 1975. This is done by showing how the New Mathematics project, a development and reform project supported by the OECD, affected the governance of Swedish school mathematics. The analysis focuses on how power relations were shifted during the preparation and implementation of the reform. My basic conclusion is that the New Math project helped increase the influence of the central school authorities (i.e., national school governance) while diminishing the influence of teachers and textbook authors. In the paper, I discuss how this conclusion fits previous research that emphasise the emergence of a global type of educational governance, a process that placed OECD as the central organisation. I also discuss how the OECD today through PISA (Programme for International Student Assessment) in a similar way contributes to increasing the influence of national school governance.

2. Sources, methods, and disposition

The paper is largely based on results and facts presented in several of my previously published papers: three address the Swedish New Math reform for school years 1 to 9 (Prytz, 2017, 2018; Prytz and Karlberg, 2016) and two address Swedish school mathematics before the New Math reform (Prytz, 2007, 2017). Together, the sources for all these papers are textbooks, teacher journals, official reports, and national tests. The official reports concern various aspects of Swedish school mathematics such as textbook production and consumption, the preparations of the New Math reform, and results from national and international tests. Consequently, I am not analysing any new sources but referring to previous studies (i.e., not original sources). This paper's originality stems from how it looks at old facts and results from a new angle. And on the basis of that, I question certain aspects of previous research on international organisation and global governance of education.

My method is comparative. I seek to understand the innovative features of the New Math project and its impact on the governance of Swedish school mathematics by comparing it with the mathematics education the half century preceding the New Math project. To delineate the innovative features, I compare the New Math with previous international trends in mathematics education. This is done in the two sections: Mathematics, education, international cooperation, and the OECD and New Math and a new relation to science. In these sections, I am referring to the works of other researchers. To clarify the impact of New Math on governance of Swedish school mathematics, I first describe, using works by other researchers, in a more general way how the Swedish school system was governed; this is done in the section Governance of the Swedish school system, 1900-1975. Next, I describe how the Swedish school mathematics was reformed in the same period in the section Change and development in Swedish school mathematics before New Math. In the section The influence of New Math and OECD on the Swedish school system, I describe how the New Math project influenced the governance of Swedish school mathematics and how the OECD influenced the school system on a more general level in the 1960s. These two sections are based on results and facts from my previous papers. In the final section – Closing discussion – I discuss how PISA can be seen as a continuation of the New Math project as it also increased the influence of national school governance. I also address how PISA differs from the Swedish New Math project and discuss how my conclusions challenge previous research about global education.

3. Previous research

This section starts by looking at a recently published handbook, *Global Education Policy* (Mundy *et al.*, 2016). This handbook deals extensively with international organisations such as the OECD, the UN, and the World Bank. All created after WWII and with different purposes and agendas, these organisations are identified as key actors in the creation of global education policies. In addition, they all developed sub organisations or divisions focused on education (e.g., the UN organisation for education is UNESCO). These organisations not only created ideas about education or supported development projects, but also executed a sort of global governance of education (cf. Lingard and Sellar, 2016, p. 367; Robertsson, 2016, p. 277). This type of governance is described as quite different from how states govern schools – the former soft, the latter hard. Soft refers to the creation of knowledge. More precisely, soft refers to how ideas, concepts, and categories combined with large amounts of statistics in connection to, for example, international large scale assessments (ILSA), influence national school authorities as well as local actors and teachers; it also makes school policies of different countries more similar (Lingard and Sellar, 2016, p. 359). In contrast, states also govern schools by means of norms and judicial acts.

As to the historical development of this type of global governance of education, researchers describe a process from little to more influence of international organisations. A crucial change in the late 1990s that increased the influence was the more frequent use of ILSA and surveys such as TALIS (Teaching and Learning

International Survey). In that process, OECD stands out as the major player in global governance of education (Lingard and Sellar, 2016, p. 370; Robertsson, 2016, p. 287). However, less seems to be written about the period before 1980. Development projects in the 1960s, such as the New Math project, are not mentioned in Mundy et al.'s handbook (2016).

Education and globalization researchers also conclude that the international organisations have challenged national educational systems (Mundy *et al.*, 2016, p. 4; Robertsson, 2016, p. 287). One type of conclusion concerns the idea that national educational systems seem to adapt to the policies of these organisations rather than developing and pursuing a policy on their own (Carnoy, 2016, pp. 39-40). Similar conclusions can be found concerning the specific case of Sweden (Grek *et al.*, 2009, pp. 18-19; Sundberg and Wahlström, 2012, pp. 352-354; Tahirsylaj and Wahlström, 2019, pp. 498-500; Waldow, 2009, pp. 487-488).

I see no reason to refute these conclusions, but I suggest they should be complemented in two ways. First, there are reasons to believe that international organisations, including the OECD, gained influence well before the 1990s. Tröhler (2013, p. 153; 2014, p. 20) describes how OECD contributed to the establishment of principles of expertocratic and technocratic governance in its member states in the 1960s, which included the use of quantitative and comparative research methods. Principles for educational governance originally developed in the 1950s in the USA. In fact, Tröhler (2014, p. 20) mentions Sweden as an example of where OECD had this type of influence on national school governance. Therefore, it is relevant to consider early OECD development projects and their influence on national educational systems. In this perspective, the Swedish New Math project, which was supported by the OECD, is of interest. My main contribution in this respect is that I show how the New Math project challenged rather than supplemented existing modes of development of Swedish school mathematics. Specifically, an old power structure was challenged: central school authorities gained influence, whereas teachers and textbook authors lost influence regarding mathematics education in Sweden.

This leads to the second way in which previous research should be complemented: OECD and other international organisations can in certain respects increase the influence of national educational authorities. Here I am pursuing the ideas of Fulge *et al.* (2016, p. 451) on how national school authorities have used international organisations and their work to gain influence in the national educational system, which includes strengthening their own position in relation to other national actors.

4. Mathematics, education, international cooperation, and the OECD

To understand how OECD affected the Swedish educational system through New Math it is important to see what trends in mathematics education that were not initiated by New Math. Two such older trends were international co-operation and a close connection between mathematics education and the scientific discipline of mathematics.

Indeed, the New Math can be understood as an international movement aimed at modernisation of school mathematics between 1950 and 1980. National

development projects based on New Math were initiated and implemented in the late 1950s and 1960s. But this was not the first international movement with that aim.

In 1899, the first international journal for mathematics education was started, *L'Enseignement Mathématique* (Mathematical Teaching); a journal that became established and whose content, until the 1960s, concerned mathematics education. The journal was edited by university mathematicians with interest in mathematics education in lower levels (Furinghetti, 2014, pp. 547-549). Thus, the connection to the scientific discipline of mathematics was close. As to the content of *L'Enseignement Mathématique*, it presented both new and traditional mathematical content. In addition, the journal examined psychological aspects of mathematics, including experimental pedagogy and psychology, as well as presenting national systems of education and their mathematical programmes (Furinghetti, 2014, p. 549).

In 1908, the International Commission on the Teaching of Mathematics (ICTM), also known as *Commission Internationale de l'Enseignement Mathématique* (CIEM) or *Internationale Mathematische Unterrichtskommission* (IMUK), was founded as a part of the International Congresses of Mathematicians. This international cooperation occurred in a time when mathematics education was debated and reformed in several countries. The leading people in these processes were mathematicians, some of them very prominent, such as Felix Klein in Germany and Émile Borel in France (Furinghetti, 2014, pp. 549-552). It should be noted that primary and lower secondary levels received little attention (Furinghetti, 2014, p. 553). Nonetheless, the ICTM was responsible for several changes in mathematics education: a network of information and communication; an organizational structure; international meetings; international inquiries that served as catalysts for discussions; and several reports on mathematics teaching in various countries (Furinghetti, 2014, p. 553). This process of internationalisation of mathematics education followed the pattern of how mathematics as a scientific discipline had developed in the 19th century with international journals and organisations (Furinghetti, 2014, pp. 544-546).

By WWI, the ICTM was halted and formally dissolved in 1920 due to difficulties in resuming the work after the war. In 1928, the ICTM's activities were renewed, but with less intensity. After WWII, the work intensified with support from UNESCO and OECD (Furinghetti, 2014, pp. 553-554).

From the late 1950s and well into the 1960s, the OECD's involvement in mathematics education concerned New Math. The role of OECD was to facilitate international cooperation on the development of mathematics education between its member states, and later with non-member states. The ideological nucleus of these development efforts were the so-called New Math, which is briefly described in the next section. In practice, the OECD funded and organised a number of international conferences and issued a number of reports concerning New Math (cf. Kilpatrick, 2012, pp. 563-564). However, the OECD did not initiate the New Math as the movement had started earlier in France and the USA. Therefore, it is more fitting to view OECD as a main contributor to the dissemination of New Math to Sweden as well as many other countries.

To understand the role of OECD in the dissemination of new ideas about mathematics education, it is important to see that the close connection between mathematics education and the scientific discipline of mathematics was established

well before the 1950s. It is also important to bear in mind that research mathematicians had begun driving educational issues that concerned both mathematical and psychological aspects, both on national and international level, well before the 1950s. As Gispert and Schubring (2011, pp. 100-103) show in the case of Germany and France, it was mathematicians who led the reform efforts in the first half of the 20th century. During this time in Sweden, textbook authors, not national school authorities, drove changes in mathematics education (Prytz, 2017, pp. 47-50).

5. New Math and a new relation to science

As said in the previous section, the New Math can be understood as an international movement aimed at modernisation of school mathematics, lead mainly in the 1950s by France and the USA. At first, the main focus was on how secondary education prepared students for university mathematics, science, and engineering studies. The aim was to make mathematics in the secondary schools more up-to-date in relation to the advances in the scientific discipline of mathematics. By the end of the 1950s, when more countries had become involved, the aim had widened to include all school years from year 1 to 12 (Prytz and Karlberg, 2016, p. 72). In 1961, the so-called Royamount report (OECD, 1961) suggested radical changes for a future mathematics curricula for all twelve school years and all topics such as arithmetic, geometry, and algebra. The real title of the report is *New Thinking in School Mathematics*. This report was the result of a two week conference organised by the OECD with mathematicians, school administrators, and educators from each member state. By the time of the conference, Sweden was an OECD member and had representatives at the conference. The conference was held in the Royamount castle outside Paris in 1959.

This widening of the aim included addressing teaching methods and it was here the field of psychology became important. In the 1950s, the influential psychologists Jean Piaget (1896-1980) and Jerome Bruner (1915-2016) were involved in New Math in a direct way. In particular, their theories about the resemblance of mental structures and mathematical structures constituted a basis for how new teaching methods should be developed (Prytz, 2017, p. 53). In fact, the Royamount report referred directly to Piaget's research (OECD, 1961, pp. 63, 120). An important idea was that mathematics teaching should be focused on structures, which should result in better understanding, which should result in better learning. This structure was provided by set theory¹. Another idea was that learning would improve if set theory were used to bridge different topics (Prytz, 2017, p. 53).

However, the relation to science also concerned how New Math reforms should be prepared. The Royamount report identified different types of preparations. First, new types of textbooks had to be produced that were sound from both a mathematical and pedagogical point of view. These textbooks would be produced by a team of mathematicians, professional educators, and qualified teachers. These new textbooks should also be tested and evaluated in an experimental fashion. Second,

¹ Set theory is a part of mathematics that concerns properties of well-defined collections of objects, e.g. numbers or functions.

the report recommended using large-scale, systematic, and scientific research in the classroom and with a focus on mathematics teaching (OECD, pp. 119-120). Thus, preparations of New Math should be carried out in a scientific way. As described below, this route was followed in Sweden.

In summary, as the New Math movement progressed in the 1950s, a new type of curriculum development process emerged. This process involved not only the science linked to the subject matter, but also psychology and social science more generally. The latter refers to how textbooks should be developed through testing and evaluation.

This rational or scientific view of curriculum development was not an isolated phenomenon or something the leading people of New Math invented. Philips (2015, pp. 22, 44) describes how the New Math in the USA developed in a context where leading scientists, politicians, and educators joined in their efforts to develop and improve schools; the use of scientists in the development process was conceived as something positive. Tröhler (2013, pp. 146-151, 157-158) points out that educational planning in the USA was dominated by a belief in science and technology, and a similar belief emerged in OECD and its education division. Thus, the New Math movement can be seen as a part of a transnational movement where a new type of curriculum development was disseminated.

6. Governance of the Swedish school system, 1900-1975

Between 1900 and 1975, the Swedish school system went through drastic changes. The most basic was the increase of students in more advanced programmes in years 7, 8, and 9. Before the 1960s, when Sweden had a parallel school system, the route to such programmes required a transfer from primary school (*Folkskolan*, 1-7) to lower secondary schools (*Realskolan* or *Flickskolan*², 4-9). The increase of students in this old type of lower secondary schools was significant. By 1910, there were 30,743 students in the lower secondary schools (4-9); by 1959, the number was 167,094 (SCB, 1977, p. 174). In the 1960s, the parallel school system was replaced by a comprehensive school system, where all students were obliged to attend one type of school (*Grundskolan*) for nine years. In this context, it is more convenient to talk about primary level (1-6) and lower secondary level (7-9). The comprehensive school reform increased the number of students in years 7, 8, and 9 even more. By 1973, there were 304,053 students in years 7, 8, and 9 (SCB, 1973, p. 310)³. Similarly, students in upper secondary level (10-12) increased, but that process was slower and more protracted. It took until the beginning of the 2000s for more than 90 per cent of youths to be enrolled in upper secondary level; enrolment in upper secondary level is not compulsory in Sweden.

Another fundamental change in the Swedish educational system was the abandonment of a parallel school system for a comprehensive school system. As

² Girl school.

³ It would have been more suitable to present statistics concerning number of students for the same school years. But, due to how the statistics is presented in SCB (1973) and SCB (1977) it is not possible.

noted, there were a number of different school types (*Folkskolan*, *Realskolan*, and *Flickskolan*) that partly overlapped in years 4 to 9. Beginning in 1962 and for a ten year period, these school types were successively replaced by *Grundskolan*, a mandatory school type for years 1-9 (i.e., primary and lower secondary levels). The *Grundskolan* reform was a response to the increasing demand for more advanced education. But there were also aims concerning democracy and equality. The concern for upholding democracy and equality meant that the school system wanted to avoid a situation where mainly the children of upper and middle class families opted for the *Realskolan* and higher education, while the children of the working class families remained in *Folkskolan* (Lindensjö and Lundgren, 2014, pp. 49-53, 56). This aim of equality was one reason for removing the parallel system, but *Grundskolan* was also designed to meet this aim. The school classes in *Grundskolan* were supposed to be heterogeneous with respect to background and academic potential (Lindensjö and Lundgren, 2014, pp. 60-66).

This expansion of the school system also coincided with a shift in educational ideals. In the late 19th century, a classical ideal dominated the secondary schools. Not least due to admission rules to university that required grades in classical languages. In the 1960s, the situation changed. The realistic programmes were now dominating and relatively few students entered a thoroughly classic programme (Prytz, 2007, pp. 27-30).

In Sweden, this expansion of the school system in the 20th century was governed in a way that entailed more centralisation. This was a slow and step-wise process and concerned all types of governance: judicial, economical, and ideological (Skott, 2011, pp. 330-336). As to ideological governance, which to great degree concern governance of school subjects, we can observe a number of changes in this direction. For example, the national curriculum of the primary schools (*Folkskolan*, 1-7) issued in 1919 was firmer as it contained more details about what to teach (Skott, 2011, p. 332). The curricula issued after the Second World War even more so (Ofstedal Telhaug, Mediås and Aasen, 2006, p. 255). Another change was the establishment of a mandatory textbook review in 1938 (Åström Elmersjö, 2017, p. 9). A third change was the introduction of national standardized tests in primary schools (*Folkskolan*), assessments that gained important roles in the governance of the schools from the 1940s (Lundahl, 2006, p. 410). These tests were developed by outside psychologists rather than teachers, further centralizing the governance of the schools. In the 1960s, another type of ideological centralization was introduced. In this decade, the state initiated a number of development projects with the aim of changing content as well as teaching methods (Lindensjö and Lundgren, 2014, pp. 66-68). This included more rigorous procedures for developing the curriculum. For example, the first mathematics curriculum of *Grundskolan*, issued in 1962, was preceded by a major survey concerning the need of mathematics in different sectors in society (Prytz, 2017, p. 50). The New Math project belongs to this type of development projects. Thus, in the Swedish setting, the OECD cannot be considered an initiator or driver of enterprises that involved experts handling of great amount of data where the aim was to control and govern.

Important to note in this context is that even though different tools for central governance were established since the 1910s, they were not used to initiate and

drive changes in school mathematics (Prytz, 2017, pp. 47-50). This changed with the New Math project and the other development projects in the 1960s; they were the first attempts of the central school authorities to achieve radical and broad changes in Swedish school mathematics. I return to this issue in a section below.

For this paper, it is important to notice that the *Grundskolan* reform, after being conceived in a number of official investigations in the 1940s, took several years to prepare in the 1950s. These preparations, when possible, were based on research and included trials with complete schools organised in ways similar to the coming *Grundskolan* school type. The new school type was also compared with the old ones in order to check the efficiency of the former. These trials involved many schools and students (Lindensjö and Lundgren, 2014, pp. 61-64), resulting in a large amount of data. Therefore, once again, it is not possible to consider the OECD as an initiator or driver of enterprises that involved experts handling large amounts of data.

7. Change and development in Swedish school mathematics before New Math

Before I go into the details of the Swedish New Math reform, it is necessary to consider how Swedish school mathematics was governed and reformed before 1950. The comparison with the New Math reform reveals drastic changes.

Between 1905 and 1950, the national school authorities were passive as to driving changes of content, teaching methods, and aims of Swedish school mathematics. The mathematics curricula were quite brief, the formulations about what to learn were general, and they contained no broad or radical changes. Moreover, there were no state driven development projects (Prytz, 2017, pp. 47-48). One could argue that in the late 1930s, as already mentioned, the state established a national textbook review. All textbooks to be used in teaching, in any subject, had to be approved by the review board. This could be viewed as a more active type of governance of school mathematics. However, since the mathematics curricula did not contain any greater changes, the establishment of a textbook review cannot be considered a tool to drive changes of school mathematics.

Nonetheless, this does not mean that changes did not take place. The most significant change was the replacement of traditional versions of Euclid's *Elements* as a textbook in geometry in the lower secondary schools (7-9). By the end of the 19th century, textbooks entitled *Euclid's Elements*, were very common in the schools. These textbooks comprised the first four books of Euclid and adhered closely to the content of the ancient original with respect to definitions, axioms, theorems, proofs, and the order of these things. By the 1930s, this had changed. Alternative textbooks were the most commonly used. These alternative textbooks included, for example, new concepts such as symmetry, new theorems, and new proofs. In some textbooks, theorems concerning symmetry had a central position and replaced some of the traditional Euclidean theorems on congruence (Prytz, 2017, pp. 48-49).

In addition, geometry textbooks for the primary schools (1-6) were changed between 1905 and 1950. New explanations were offered. In the beginning of the period, it was common to include small experiments in textbooks. The authors explained in detail how the experiment was to be carried out and established a

conclusion. Later, the authors took a step back and let the students carry out the experiments on their own. Another change was that more advanced exercises were included in the textbooks (Prytz, 2017, pp. 48-49).

In the lower secondary schools, the textbooks authors clearly stand out as the main drivers of change. They not only did write the textbooks, but also took part in the debates about teaching in the teacher journal about mathematics and science teaching. The importance of textbooks and their design is reflected by the fact the two main debates about geometry instruction between 1905 and 1950 involved textbook authors and a main topic was textbook design (Prytz, 2017, p. 49).

Textbook authors did not take part in debates about mathematics teaching in the journals for primary school teachers. In several articles about mathematics teaching, textbook design was not the explicit topic and there were no debates. However, many of the articles concerned textbooks in an indirect way since they addressed the design of explanations and exercises (i.e., essential parts of textbooks). In some articles, it was underscored that textbooks were important; in even more articles, teachers warned about too much reliance on textbooks, which indicates that textbooks were an important part of the teaching (Prytz, 2017, pp. 49-50).

Since the New Math project to great degree was founded on scientific psychological theories, it is important to consider in what respect such theories were a source of arguments in the debates and articles mentioned above. The articles I have studied reveal two types of arguments. In the journal for secondary school teachers, the authors referred either to teaching experience or scientific principles related to mathematics. In the journal for primary school teachers, the authors referred to teaching experience. Psychological theories, research, or teaching experiments were not, at least in an explicit way, a source for the main arguments (cf. Prytz, 2017, pp. 49-50).

Another aspect to consider is the fact that textbook authors and teachers were operating within a market, which entails a certain relation between producers (publishing companies and authors) and consumers (teachers). It is too early to say how exactly this relationship worked; research is still on-going. However, I think it is fair to assume that textbook authors had to consider more than the formal curriculum or scientific principles. They also had to pay attention to what the teachers thought was a good textbook; otherwise, the textbook would not sell and the publishing company would make no profit.

8. The influence of New Math and OECD on the Swedish school system

Before 1950, the national school authorities rarely, if at all, initiated and drove changes in Swedish school mathematics. This *laissez-faire* attitude had changed by the time the New Math reform appeared. As previously mentioned, in the 1960s, the state initiated a number of development projects aimed at changing subject content as well as methods of teaching (Lindensjö and Lundgren, 2014, pp. 66-68). Thus, the national school authorities were more active in initiating and driving educational change. This section shows that the preparations of the Swedish New Math reform not only concerned new content and new teaching methods but also broke with the previous mode of developing school mathematics. That is, the new mode did not

supplement or augment the previous mode, but challenged it on crucial points. This also entailed that teachers lost some of their influence over school mathematics.

The planning of the Swedish New Math reform for year 1-9 closely followed the suggestions promoted by the Royamount report. But not only that, a lot of time – about eight years – and a great deal of resources were spent on preparing the reform before being implemented⁴.

When the Swedish New Math project was prepared in the 1960s, it was different from how changes of school mathematics had been initiated and driven between 1905 and 1950. One part was to formulate a radically new national curriculum, with many innovations, in order to initiate and drive changes. The national curriculum had not been used in this way before. But the main part of the preparations was textbook development: to author textbooks and then to test and revise the textbooks. It is here we have the clear break with the older way of initiating and driving changes; it was something that challenged the old mode of development since it also was focused on textbooks. The project went straight to the core of the old system – the textbooks, the medium for driving innovations – and set new conditions for how they were produced. I begin by describing very briefly the phases of textbook development.

The first phase was to author textbooks. A team of authors was contracted for this and there was a specific theory about learning mathematics to be pursued when authoring the textbooks, more precisely the theory presented by Bruner and Piaget. The next phase was testing the new curriculum and the textbooks in practice. At first in smaller scale, but at the end 1,310 school classes in the Nordic countries had taken part in the project (Prytz, 2017, p. 52; Prytz and Karlberg, 2016, p. 73). The teachers also sent in standardised reports on how the new curriculum and the new textbooks functioned in teaching. In the final phase there was a more rigorous evaluation with an experimental group and a control group and statistical analysis. This evaluation was considerably less extensive since it involved fewer students (Prytz and Karlberg, 2016, p. 83). These classes had then worked with the new textbook for two to three years. The results should be used for further revisions of the curriculum and the textbooks. An interesting detail is of course that the more rigorous evaluation did not indicate that the New Math curriculum entailed better results, the two groups performed equally well, more or less. The only exception was high performing students, where traditional teaching appeared to give better results (Prytz and Karlberg, 2016, pp. 82-89).

All these phases in the process of developing textbooks demanded a diversity of knowledge:

- An eight year development project with different phases requires knowledge in systematic planning in order to get results.
- In the authoring process, knowledge about *both* mathematical and psychological theory was required. Apart from knowing the traditional content of school mathematics, the authors should be able to understand

⁴ The preparations of the Swedish New Math reform was part of a greater Nordic development project. Sweden, Finland, Norway and Denmark, but not Iceland, cooperated closely in the development of curricula and textbooks.

modern mathematics, such as set theory, and the recent theories of Bruner and Piaget.

- The leading people of the project needed knowledge of how to communicate with a large number of teachers over longer periods of time.
- All the teacher reports and the more rigorous evaluation generated a great amount of data. This required knowledge of how to handle and analyse all data, which include knowledge in quantitative methods.

This need of different types of knowledge was reflected in the composition of the team working with the project. There were university mathematicians, teacher educators, teachers and researchers in psychology and education (Prytz, 2018, p. 200; Prytz and Karlberg, 2016, p. 73). Important to notice is that none of the authors of the Swedish textbooks in the New Math project, except for one, had authored a textbook for year 1 to 9 before they entered the project (Prytz, 2018, p. 200). This indicates that experience of authoring popular textbooks had little value. It was rather the scientific like development process, guided by learning theory and supported by evaluations, which should secure quality.

So, not only did textbook development require a lot of fiscal resources. It also required a new type of intellectual resources.

As I see it, this opened up for other professionals to enter the enterprise of textbook authoring; and at the same time it made it more difficult for teachers to enter it since it was not enough to know traditional school mathematics.

Another thing that changed the teachers' relation to textbook authors was that the market relation between producer and consumer was not there anymore. The development team stood outside the textbook market and its conditions. So rather than monitoring sales figures, the development team could get input from thousands of teacher involved in the project and their reports.

All in all, I say that this new way of developing textbooks and initiating changes lessened the teachers influence over the textbook authoring. And since textbooks, also before the New Math, was an important tool for initiating and driving change in Swedish school mathematics, the teachers' loss of influence was significant. At the same time, the state's influence over school mathematics was strengthened by the New Math and this was not only due to the launch of a radically new curriculum. The New Math project contributed to the creation of new intellectual resources that could be used in the reformation of school mathematics. And these new resources were concentrated to the central school authorities.

As to the implementation of the New Math curriculum in the 1970s, the idea was not to let the state produce all textbooks. However, the plans for how the publishing companies should be governed were very vague in the final report concerning the New Math development project (NKMM, 1967, pp. 94, 217). The idea was that the trials of the textbooks developed in the New Math project should contribute to the diffusion of new ideas and practical experiences. Even though the possible recipients of this information were not specified, it is reasonable to believe that publishing companies should view the textbooks developed in the New Math project as examples of what a textbook should look like. In practice, some of the publishing companies picked up the new ideas of textbook design by hiring people involved in authoring textbooks

for the New Math project. But, the publishing companies were also forced to adapt to the new ideas since there were the mandatory textbook review that controlled that new textbooks followed the new curriculum. This seems to have had impact on the textbook production since more or less all new textbooks in the early 1970s appears to have adhered to the basic ideas of New Math (Prytz, 2018, p. 205).

So, what does this say about the OECD and its influence on the Swedish school system in the 1960s? As I see it, it is not possible to ascribe OECD the role of initiator of a new type of school development or school governance. There were other grand scale development project in Sweden in the 1950s and 60s, project that was not supported by the OECD. As already mentioned, in the 1950s there were a number of extensive trials with the new type of comprehensive school that was to be introduced in the 1960s. As to mathematics, the mathematics curriculum of 1962 was partly developed on the basis on a large survey. Different groups of people (for instance from industry and education) were asked a large amount of questions about what type of mathematics that was necessary in their occupations (Prytz, 2017, p. 50). Important to notice, this was before the New Math project in the late 1950s. Thus, it is more fitting to consider OECD as a booster or amplifier of an existing and progressing centralistic mode of governance.

But, is important to see in what way OECD boosted a centralistic mode of governance. The New Math movement, supported by the OECD, offered the Swedish state yet another centralistic tool to reform a part of the school system, that is school mathematics. The innovative feature of this tool was that it constituted a clear break with how school mathematics had been developed through textbooks in previous decades. We could say that an old type of textbook development was replaced by a new one. Another innovative feature was that this tool of governance reached far into the practice of teaching mathematics. The New Math was not just a matter of adding a new content to teach; it actually prescribed a certain way of teaching: the teaching should be focused on concepts, understanding and structure. The latter should be provided by modern mathematical theory. Thus, the teachers' freedom to choose and develop teaching methods was very much circumscribed.

Possibly, it could be argued that the role of OECD was less important due to the so-called IMU project (*Individualiserad MatematikUndervisning*, Individualised Mathematics Education). This was another Swedish eight year development project in mathematics education, not supported by the OECD, that ran for eight years in the 1960s. It concerned individualisation and programmed learning; and it involved several rounds of development and testing of textbooks as well as a great number of students (Prytz, 2017, pp. 57-58). Thus, the new way of developing Swedish school mathematics could have occurred without the New Math and the OECD. However, the IMU project had clear connections with the New Math project. The person who led the New Math project was also involved in the IMU project and the textbooks developed in the IMU project were based on New Math (Prytz, 2017, p. 57). Moreover, the IMU project had a more experimental character – to see if extreme individualisation through carefully planned textbooks worked (cf. Prytz, 2017, p. 56); whereas the New Math project was intended to produce a radically new national curriculum, including certain principles for teaching and leading examples of textbooks, which all teachers should adapt to. Thus, I think it is fair to conclude

that OECD, by supporting the New Math movement, boosted a centralistic mode of school governance in Sweden.

9. Closing discussion

The New Math reform was implemented in connection to the 1969 curriculum reform. Despite all the preparations, it was soon abandoned. How and why that happened is explained by Prytz (2018); important details were that the central school authorities abstained from driving essential parts of New Math and the textbook review became voluntary. And since the textbook market was very lucrative at the time, there were less economical obstacles for the publishing companies to produce more traditional textbooks. Important to notice is that the results in national exams were relatively poor in the first years of the implementation process, but quite soon they recovered. Thus, just the exam results are not enough for considering the New Math a failure in Sweden (Prytz, 2018, pp. 202-211). This circumstance also makes the actions of the central school authorities difficult to understand since there is not one obvious reason, like a distinct failure, for their change of course.

However, the fate of the New Math reform did not deter the central school authorities from launching new grand scale development projects. For instance, in the early 1970s, a five year development project called PUMP was launched. PUMP stands for *Processanalyser av Undervisning i Matematik/Psykologisk* (Process analysis of Teaching in Mathematics/Psycholinguistics), see Kilborn (1977) for an overview.

This is not the place to go into the details of PUMP, but it shares a number of properties with the New Math project:

1. Generation of a lot of data.
2. A need for knowledge to handle and analyse the data.
3. Involvement of expertise in psychological and educational research.
4. Driven by central school authorities, that is the state.

Thus, the Swedish state continued to initiate and drive changes in mathematics education in ways similar to the New Math project. And as shown above, this way of governing was very different from the time before the 1950s.

In comparison to OECD:s later enterprise of PISA, started in year 2000, there are clear similarities in that PISA also have properties 1 to 3 in the list above (cf. Lingard and Sellar, 2016, pp. 368-369). As to the fourth property, the OECD drives PISA together with national school authorities. As to the Swedish case, the central school authority is very much involved in the properties 1 to 3 of PISA. And in comparison between the state and the teachers I would say the PISA strengthen or boosts the power of the state; it is the state that has the resources to gather and pay experts in psychological and educational research to handle and analyse all the data generated through PISA. Even though much of the PISA data is accessible on-line, teachers and schools do not have the same capacity to processes it.

However, in a governmental perspective there are also clear differences between on one hand the New math project and on the other hand PISA, but also the PUMP

project. As pointed out above, the New Math project reached far into the practice of teaching mathematics as it prescribed a certain way of teaching. And in fact, during a few years in the beginning of the 1970s, before the reform was abandoned and when all the centralistic tools of governance were in action, such as the textbook review, the teachers had no options than to use textbooks based on New Math. There were all the explanations together with exercises which can be an essential part in the communication between teacher and students. In comparison, PISA is by far not that far reaching, if we view PISA as a tool of governance. First of all, PISA does not concern teaching methods or the textbooks and thus it has comparatively little influence on how teachers communicate with the students. Moreover, PISA suggests what it means to know mathematics by the end of year 9. In contrast, a textbook series that covers several years give a much more precise suggestions about what to learn, to what extent, in what order and how concepts, facts and exercises should be taught.

In relation to previous research on OECD and school governance, the results presented in this paper shed new light on the enterprise of OECD in the 1960s and the development of its global influence until now. As mentioned above, researchers often view the historical development of the influence of the international organisations, not least OECD, as changing from little to more in the period of 1960 to the 2010s. PISA is also considered to constitute an important shift in that process. The findings presented in this paper concerning Sweden and the OECD supporting the New Math project in the 1960s suggest that the influence of the OECD can have been greater already in the 1960s. This since the New Math project challenged existing power relations between teachers, textbook authors and the state. And it was the power of latter – the state – that was boosted on the expense of the others. This happened decades before PISA was introduced in year 2000. The New Math project also reached far into the practice of being a mathematics teacher since it aimed at changing ways of communicating mathematics. Actually, it reached much further than PISA in this respect, which is explained above. This makes me doubt narratives about global governance after 1950 where OECD became more and more influential, not least through PISA after year 2000. Looking at the Swedish case in a historical and comparative perspective, an alternative narrative is that OECD through PISA continued to boost the power of the central school authorities as they had done in previous decades, but with relatively little impact on how the actual teaching was performed. The boost of power then concerns the central school authorities' ability to generate and control knowledge about the school system and how it performed.

Of course, this alternative narrative of mine needs development and further studies to be conclusive. International comparison is a possible route to take since the New Math was an international phenomenon; it may be that the type of early influence of the OECD depicted in this paper was not restricted to Sweden. Moreover, there were other development projects supported by OECD in the 1960s that can be studied.

10. References

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