



Towards a New Understanding of Swedish School Reforms: A Sociological Analysis of Textbooks' Role in Reforms of School Mathematics, 1919–1970

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Abstract • This article sheds new light on the Swedish comprehensive school reform implemented in the 1960s (the Grundskolan reform) and the four decades preceding the reform. This reform was typical for the Nordic countries. The presented study concerns reforms in mathematics education and how change was initiated and driven before and during the comprehensive school reform. The analysis has a focus on the role of textbooks in educational governance. The analysis is based on Bourdieu's field theory and concerns how a new way of preparing and driving reforms of school subjects restructured relationships between the state, textbook producers, and teachers. This article is mainly a synthesis of results from several previous studies on governance of Swedish mathematics education. The analysis reveals not only a new characteristic of the comprehensive school reform (swift and radical rather than slow and successive), but also a bottom-up movement in the school system, which has been commonly understood as top-down, very centralised, and slow moving. The results of the analysis help explain why the Swedish comprehensive school reform gained early acceptance and momentum. Another contribution of this article concerns historical textbook research, particularly regarding how fundamental changes in authorship of textbooks (from visible individual authors to anonymous collectives) can be related to educational governance and changes in power structures.

Keywords • curriculum reform, mathematics education, governance, textbooks, comprehensive school, sociological analysis, Bourdieu

Introduction

The introduction of comprehensive schooling (school years 1–9) in the 1960s is often considered one of the most ambitious Swedish school reforms, not least as it aimed to create a more equal and democratic society. This aim is reflected not only in the curriculum documents but also in the organisation with one compulsory school type (*Grundskolan*) rather than several parallel school types (e.g., *Folkskolan* and *Realskolan*).¹

Along with the Swedish comprehensive school reform (the *Grundskolan* reform) came a new way of preparing and driving reforms. The implementation of the reform began in 1962, but its preparation had been conducted since 1950. This new type of school was developed, tested, and evaluated in accordance with science-like

1 By the time of the *Grundskolan* reform (1–9), a system of parallel school types was replaced by one comprehensive school type. In brief, the old system consisted of a mandatory primary school in years 1–7, *Folkskolan*. In year 4, students could transfer to lower secondary school – *Realskolan* (4–9). This school type was the main school type preparing students for theoretical upper secondary school and university studies, but it should also prepare students who intended to receive practical and vocational educations. The only exception to *Realskolan* was the all-female version called *Flickskolan* (Girl school). Both *Folkskolan* and *Realskolan* were open for boys and girls.

principles before the reform, but also after in different development projects.² It is commonly understood this rigorous way of doing reforms was part of a successive change of Swedish school governance in the 20th century: from decentralisation to centralisation. This process peaked in the 1960s and early 70s and was followed by a successive change in the other direction in the subsequent decades.³

The aim of this synthesis article is to deepen our understanding of how this new way of initiating and driving reforms affected the relationships between the state and teachers. Specifically, this study focuses on textbook production by asking the following question: How did the relationship between textbook producers, teachers, and the state change in connection to the comprehensive school reform? In order to answer the question, the analysis concerns two major development and reform projects – the New Math project and the Individualised Mathematics Teaching project (IMU) – launched in the 1960s, which both were part of the comprehensive school reform.⁴ As with the preparations of the new type of school, the New Math and IMU projects contained science-like trials and evaluations.

To better understand these two projects, this study examines the situation before the projects. My previous research has shown that textbook development was an essential part of the two projects, but also that textbooks were an essential element in reforms of school mathematics before 1950.⁵ The essential difference is that before 1950 textbook authors initiated and drove changes. This suggests the relationships between the state, textbook producers, and teachers changed around 1950. However, these relationships have never been studied from a sociological point of view.

As to the disposition of the article, the first section, after this introduction, reviews broadly previous research. The next section, *Method of analysis*, addresses theory and method issues. Two analytical sections then follow: *The era of textbook authors, 1919–1950* and *The era of grand development projects, 1950–1970*. Both these sections have the same structure. First, relevant results from my previous studies are presented and then a sociological analysis of the relationships between the state, textbook producers, and teachers is presented. In the final section, conclusions are presented and they are put in relation to previous research.

Previous research

The Swedish comprehensive school reform was typical for the Nordic countries during the 1950s and 1960s.⁶ In all five Nordic countries, similar reforms were launched and implemented. In fact, they were so similar it is possible to view them as one Nordic educational model. According to Oftedal Telhaug et al., the main char-

2 Bo Lindensjö and Ulf P. Lundgren, *Utbildningsreformer och politisk styrning* (Stockholm: Liber, 2014), 61–63. Sixten Marklund, *Skolsverige 1950–1975 D. 2 Försöksverksamheten* (Stockholm: Liber/Utbildningsförl., 1982) describes in several chapters the various experimental activities preceding the comprehensive school reform launched in 1962. For a detailed overview regarding state sponsored development projects from 1960 and onwards and their ties to educational research, see Sixten Marklund, *Skolsverige 1950–1975 D. 6 Rullande reform*. 1. uppl. (Stockholm: Liber/Utbildningsförl., 1989), 339–410.

3 For references and further details, see section *Previous research* in this article.

4 IMU: *Individualiserad MatematikUndervisning* (Individualised Mathematics Teaching).

5 See section *Previous research*.

6 The Nordic countries are Sweden, Norway, Denmark, Finland, and Iceland.

acteristics of this Nordic model were strong confidence in science, a strong state, and a view of the school, in particular a comprehensive school, as a tool for the state to provide all citizens equal opportunities. In the Nordic context, Sweden was the leading country.⁷

As to education, strong Nordic states meant that preparations and implementation of the reforms were centralised. That is, national politicians and school authorities rather than local authorities made the key decisions regarding legal, financial, and ideational matters. Centralisation, however, was stronger in Sweden and Norway than in Denmark, Iceland, and Finland.⁸ The resistance against the comprehensive school reform was also greater in Denmark, Iceland, and Finland, in part, because of a perceived threat to the teacher profession.⁹

As to centralisation in Sweden, a common view in the literature is that Swedish school governance was slowly and successively centralised between 1900 and 1975, and then successively decentralised, especially after 1980.¹⁰ To certain degree, the governance of school mathematics followed this trend of successive centralisation. For example, national syllabi of *Folkskolan* became more extensive in 1919.¹¹ A national textbook review was established in the 1930s.¹² Another example is the introduction of national standardised tests in *Folkskolan* in the 1940s.¹³ After WWII, national curricula and syllabi in general became even more extensive.¹⁴ By the 1960s, major state-run development projects – for example, the New Math and the IMU projects – were started.¹⁵ These projects were also part of the comprehensive school reform.

As indicated by Oftedal Telhaug et al., increased centralisation can be viewed as a threat to the teacher profession. Persson concludes, in a sociological study on the teacher profession in Sweden between 1800 and 2000, that teachers lost much of their influence over professional knowledge production due to centralisation and the involvement of science-like methods in the comprehensive school reform. Persson more briefly mentions development of teaching materials, which includes textbooks, in connection to professional knowledge production.¹⁶

7 Alfred Oftedal Telhaug, Odd Asbjørn Mediås, and Peeter Aasen, “The Nordic Model in Education: Education as Part of the Political System in the Last 50 years,” *Scandinavian Journal of Education* 50, no. 3 (2006), 248–50; Lindensjö and Lundgren (2014), 250–52.

8 Oftedal Telhaug, Mediås, and Aasen (2006), 250.

9 Ibid., 252.

10 For example, Lindensjö and Lundgren (2014), 81–83, 93–97.

Christian Lundahl, *Viljan att veta vad andra vet: Kunskapsbedömning i tidigmodern, modern och senmodern skola* (PhD diss., Uppsala universitet, 2006), 254, 277–83; Pia Skott, “Utbildningspolitik och läroplanshistoria,” in *Utbildningshistoria: En introduktion*, ed. Esbjörn Larsson and Johannes Westberg (Lund: Studentlitteratur, 2011), 330–36.

11 Skott (2011), 332. *Folkskolan* received a new curriculum, and thus also a new mathematics syllabus, in 1900, 1919 and 1955. For *Realskolan* the corresponding years were 1905, 1928, 1933 and 1955. For *Grundskolan* it was 1962 and 1969.

12 Anna Johnsson Harrie, *Staten och läromedlen: En studie av den svenska statliga förhandsgranskningen av läromedel 1938–1991* (PhD diss., Linköpings universitet, 2009), 12.

13 Lundahl (2006), 410.

14 Oftedal Telhaug, Mediås, and Aasen (2006), 255.

15 Lindensjö and Lundgren (2014), 66–68.

16 Sofia Persson, *Lärarkyrkans uppkomst och förändring: En sociologisk studie av lärarens villkor, organisering och yrkesprojekt inom den grundläggande utbildningen i Sverige ca. 1800–2000* (PhD diss., Göteborgs universitet, 2008), 292–93, 300.

Persson also notes, however, that teachers gained from the comprehensive school reform as they became more organised and involved in many state investigations leading to the reform. The gains concerned better economic conditions and higher status (typical union issues) as well as curriculum ethics related to education and equality.¹⁷ Persson's analysis mainly concerns primary school teachers with a background in *Folkskolan*, but she indicates secondary school teachers appear to have gained less from the reform.

This article confirms, in certain respects, the conclusion teachers lost influence over their professional knowledge in connection to the comprehensive school reform in the 1960s. But, I also argue that the same reform opened new ways for teachers to gain influence over mathematics teaching, which is about professional knowledge. Gains that could attract teachers both in primary and lower secondary schools, not just the former. As these new ways were made possible by the state, it can, however, be viewed as a loss of autonomy.

These conclusions of mine may have relevance for the other Nordic countries given that fact the New Math project was a co-operation project involving Sweden, Denmark, Norway, and Finland. And these countries had similar comprehensive school reforms. By relevance I mean that there is reason to believe what happened in Sweden also may have happened in the other Nordic countries, which of course require empirical studies to be verified.

My ambition of this article is also to contribute to how we understand and study Swedish school reforms, in other words a theoretical and methodological contribution. This contribution concerns a focus on the role of textbooks and textbooks producers in school governance; their role as a link between the state and teachers. This is a rare approach in a Swedish context and research seldom addresses the connections between school subjects, textbooks, and governance processes. For instance, the issue is not addressed in a fairly recent overview article of Swedish curriculum theory research, a field where governance and historical perspectives are common themes.¹⁸ But there are of course several studies of school subjects and reforms in Sweden in the twentieth century where textbooks and syllabi constitute an essential part of the material.¹⁹ However, these studies predominantly focus on ideational aspects rather than processes of governance and ignore the role of text-

17 Ibid., 296–97.

18 Eva Forsberg et al., “Curriculum Code, Arena, and Context: Curriculum and Leadership Research in Sweden,” *Leadership and Policy in Schools* 16, no. 2 (2017), 357–82.

19 Examples in the Sciences: Magnus Hultén, *Naturens kanon: Formering och förändring av innehållet i folkskolans och grundskolans naturvetenskap 1842–2007* (PhD diss., Stockholms universitet, 2008); Leif Östman, *Socialisation och mening: No-utbildning som politiskt och miljömoraliskt problem* (PhD diss., Uppsala universitet, 1995). Examples in Social Sciences: Agneta Bronäs, *Demokratis ansikte: En jämförande studie av demokratibilder i tyska och svenska samhällskunskapsböcker för gymnasiet* (Stockholm: HLS förlag, 2000); Jonas Nordmark, *Med en framtida demokrat som adressat: Föreställningar om framtid i svenska samhällskunskapsböcker 1992–2010* (PhD diss., Mälardalens högskola, 2015). Examples of such studies in history are Fredrik Alvé, *Tänka rätt och tycka lämpligt: Historieämnet i skärningspunkten mellan att fostra kulturbärare och förbereda kulturbyggare* (PhD diss., Malmö högskola, 2017); Jörgen Gustafsson, *Historielärobokens föreställningar: Påbjuden identifikation och genreförändringar i den obligatoriska skolan 1870–2000* (PhD diss., Uppsala universitet, 2017). The subjects of history and social science have been studied by Tomas Englund, *Samhällsorientering och medborgarfostran i svensk skola under 1900-talet* (Uppsala: Pedagogiska institutionen, Uppsala universitet, 1986).

books in those processes. Only a few studies concern textbooks and governance. Johnsson Harrie investigates the operations of the national textbook review board in the area of social sciences, and Åström Elmersjö does the same for history.²⁰ This state institution was active from 1938 to 1991. But none of them considers, from a sociological point of view, how and when the textbook review board, which was a state intervention, shifted power relations in the school system. In another study, Åström Elmersjö investigates the so-called Norden Associations between 1919 and 1970 and their efforts to change history education. These associations aimed for Nordic co-operation and mutual understanding between the Nordic peoples to avoid aggressive national chauvinism and militarism by reviewing textbooks.²¹ As the associations were NGOs, they are examples of a reform movement, not driven by the state, focused on textbooks. It is reminiscent of how changes in Swedish school mathematics were driven before 1950, which becomes clear in this article. However, Åström Elmersjö does not analyse how the major reforms in the 1960s affected the Norden Association.

As to research on school reforms in other countries, it is more common to consider textbooks and textbook production as essential parts in ideational governance.²² However, some aspects of school reforms and textbooks have not been studied. According to a recent international overview on textbook research covering historical and contemporary studies, issues about forms of authorship and author function are described as a “veritable blind spot of textbook and educational media research.”²³ The concepts forms of authorship and author function involve a number of aspects. The overview highlights a historical process where the role of textbook authors changed from visible persons in society to invisible persons, both at an institutional and a discursive level; the former refers to the organisations or institutions the authors were active in, the latter refers to the texts the authors produced. Being visible as an author was a matter of a single author, with certain merits, giving authority to the content of a textbook. This historical process began in the eighteenth century and accelerated in the twentieth century. And it included moving to more collective forms of authorship, for instance, teams of authors rather than a single author.²⁴ However, little is known about this process, not least how it was related to

20 Johnsson Harrie (2009); Henrik Åström Elmersjö, *En av staten godkänd historia: Förhandsgranskning av svenska läromedel och omförhandling av historieämnet 1938–1991* (Lund: Nordic Academic Press, 2017)

21 Henrik Åström Elmersjö, “The Norden Associations and International Efforts to Change History Education, 1919–1970: International Organisations, Education, and Hegemonic Nationalism,” *Paedagogica Historica* 51, no. 6 (2015), 727–29.

22 For example, Michael W. Apple has studied the role of textbook production in reform processes in USA and elsewhere. For an overview on Apple’s research on this topic, see Michael W. Apple and Petter Aasen, *The State and the Politics of Knowledge* (New York: Routledge Falmer, 2003). For a broader overview, see Thomas Höhne, “Educational Media, Reproduction, and Technology: Towards a Critical Political Economy of Educational Media,” in *The Palgrave Handbook of Textbook Studies*, ed. Eckhardt Fuchs and Anne-Katrin Bock (New York, NY: Palgrave Macmillan, 2018), 115–25.

23 Marcus Otto, “Textbook Authors, Authorship, and Author Function,” in *The Palgrave Handbook of Textbook Studies*, ed. Eckhardt Fuchs and Anne-Katrin Bock (New York, NY: Palgrave Macmillan, 2018), 95.

24 *Ibid.*, 96.

changes in national governance policies.²⁵ This article reveals that the New Math and IMU projects, which were driven by the state, were decisive steps in pushing collective authorship of textbooks, at least in part, since textbook authoring became a science-like process involving several people. Moreover, the science-like process, rather than single authors, can also be seen as a way of giving authority to the textbooks. Important to notice, the New Math project was not unique to Sweden. Similar reforms were initiated in most western countries in the 1960s, including in the other Nordic countries, USA, France, and West Germany.²⁶

As mentioned, this article is based on my previous studies on governance of Swedish school mathematics in the twentieth century. Many of these studies focus on the comprehensive school reform and the New Math and IMU projects in the 1960s. One of the more extensive articles describes the failures and successes of the Swedish New Math reform in the 1960s and 1970s, and explains why the reform ultimately was far from the success its proponents had envisioned.²⁷ A second more extensive article, which covers the 1960s as well as some time before the 1960s, describes two modes of governance of school mathematics: a decentralised mode (1910–1950) and a centralised mode (1950–1975).²⁸ However, the analyses in these articles do not focus on sociological aspects of textbook production and reforms, which is done in this study.

Aside from these two more extensive studies, there is a major study on geometry instruction in *Folkskolan* and *Realskolan* (4–9) between 1905 and 1962.²⁹ As with the other studies, the material comprises teacher journals, textbooks, syllabi, exams, and teaching literature. The analysis is descriptive and mainly focuses on ideational aspects of the material. On the basis of the investigated material in the geometry study, a sociological study has been made that investigates the authors of the geometry textbooks for secondary schools between 1917 and 1940.³⁰ This is the only of my previous studies which applies Bourdieu's theory on field and capital. Apart from these studies, there are a couple of minor studies, mainly descriptive, that have been referred to in the studies mentioned above.³¹

25 Cf. *ibid.*, 96–101.

26 For example, Christopher J. Phillips, *The New Math: A Political History* (Chicago: The University of Chicago Press, 2015); H el ene Gispert and Gert Schubring, "Societal, Structural, and Conceptual Changes in Mathematics Teaching: Reform Processes in France and Germany over the Twentieth Century and the International Dynamics," *Science in Context* 24 (2011), 73–106; Jeremy Kilpatrick, "The New Math as an International Phenomenon," *ZDM: The International Journal on Mathematics Education* 44, no. 4 (2012), 563–71; Dirk De Bock, ed., *Modern Mathematics: An International Movement?* (Cham: Springer, 2023).

27 Johan Prytz, "The New Math and School Governance: An Explanation of the Decline of the New Math in Sweden," in *Researching the History of Mathematics Education. ICME-13 Monographs*, ed. Fulvia Furinghetti and Alexander Karp (Cham: Springer, 2018).

28 Johan Prytz, "Governance of Swedish School Mathematics – Where and How did it Happen? A Study of Different Modes of Governance in Swedish School Mathematics, 1910–1980," *Espacio, Tiempo y Educaci n* 4, no. 2 (2017a), 43–72.

29 Johan Prytz, *Speaking of Geometry – a Study of Geometry Textbooks and Literature on Geometry Instruction for Elementary and Lower Secondary Levels in Sweden, 1905–1962, with a Special Focus on Professional Debates* (PhD diss., Uppsala University, 2007).

30 Johan Prytz, "Professional Debate and Social Structure in Swedish Mathematics Education, 1905–1962: The Case of Geometry Instruction at the Lower Secondary Level," in "Dig where you stand": *Proceedings of a Conference on On-going Research in the History of Mathematics Education*, ed. Kirst n Bjarnad ttir, Fulvia Furinghetti, and Gert Schubring (Reykjavik: University of Iceland, School of Education, 2009).

31 Johan Prytz and Martin Karlberg, "Nordic School Mathematics Revisited: On the Introduction and

In relation to my previous studies, the contribution of this article is the synthesis of findings and results from my previous studies. Not only does the synthesis provide a better overview of the whole period 1910 to 1975, but also new insights concerning the comprehensive school reform in the 1960s.

Method of analysis

Since this is a synthesis study, the analysis only involves facts and results originally presented in other peer reviewed publications. Only with some few exceptions (see below) no new sources have been analysed. This means that this article mainly contains references to my previous publications where facts and results are presented and not to original sources.

The analysis focuses on the role of textbooks in two modes of governing Swedish school mathematics: decentralised (1919–1950) and centralised (1950–1970). These modes are described in one of my previous studies.³² Essential to both modes was the role of textbooks to initiate and drive changes, but there were important differences. In brief, before 1950, it was textbook authors who initiated and drove changes; the state institutions were passive even though they had centralised tools of governance at hand. After 1950, the state started to use the centralised tools of governance more and more actively in order to initiate and drive changes, which peaked in the 1960s with the New Math and IMU projects. Thus, the year 1950 should not be understood as a definitive breaking point.

In order to discover and study these two modes of governance, in my previous studies, the same types of sources could not be used for both modes, which is also the case for this synthesis study. I denote it an asymmetrical selection of sources. The background is this. When the state was in charge of development projects, it entailed thorough descriptive documentation of the projects, including the work of developing textbooks and other teaching materials. Thus, there are a number of reports about the projects, some published as official reports, while some ended up in official archives. These reports have been a rich source for my studies. When it comes to textbook authors working outside state projects, the situation is different. I have not been able to find a corresponding type of thorough documentation about the authoring process. And I do not believe it exist since I cannot see why textbooks authors should have produced that type of documentation. Instead I have used teacher journal as a source. These contain articles or pieces that concern textbooks. In some cases, it was textbooks authors writing about textbooks; in other cases, it was teachers writing about textbooks. In this material, it is possible to discern principles for textbook designs and arguments for having a certain design, but also the writers' opinions and positions in these matters. Notice that the choice of time periods (1919–1950, 1950–1970) reflects in which years my sources were published.

The analyses of the period 1919–1950 focuses on how textbook authors, teachers, and other people acted as writers in teacher journals, for instance in debates. As to

Functionality of New Math,” *Nordic Studies in Mathematics Education* 21, no. 1, (2016), 71–93.
 Johan Prytz, “The Production of Textbooks in Mathematics in Sweden, 1930–1980,” in “*Dig where you stand*” 4: *Proceedings of the Fourth International Conference on the History of Mathematics Education*, ed. Kristín Bjarnadóttir, Martha Menghini, Fulvia Furinghetti, Johan Prytz, and Gert Schubring (Rome: Edizioni Nuova Cultura, 2017b).

32 Prytz (2017a), 43–72.

the lower secondary level (*Realskolan*), the material consists of 16 articles from in total 6 authors, mainly published in *Elementa*³³, a journal specialised in mathematics and science teaching. It is a small selection, but in the period 1919–1950, these were the articles where textbooks were debated in a thorough manner. As to the primary school level (*Folkskolan*), the material consists of 38 articles from in total 22 authors in the journal *Folkskollärarnas tidning* (~*The journal of primary school teachers*). This journal concerned all sorts of pedagogical topics, which means that mathematics was not a very common topic. My selection constitutes the lengthier pieces about mathematic teaching from the period 1919–1956, yet not as comprehensive as many of the selected *Elementa* articles.

The analyses of 1950–1970 mainly concern the role of textbook authors in the New Math and IMU, projects that were ongoing in the 1960s. The main sources are comprehensive reports about these development projects, which contain detailed descriptions of how textbooks were authored and developed, but also which people were involved and what role they had.

In addition, the analysis of both periods involves background facts of the people involved in textbook authoring. It is matter of simple facts concerning for instance people's educations and positions in the educational system. These facts were collected from various types of sources, for instance from the Swedish state calendar (*Statskalendern*) and various encyclopaedias, but also from reports and teacher journal articles when such facts were mentioned. Some of these facts are new and the original sources are referred to.

The analysis concerning the period 1919–1950 also involves facts about textbooks, more precisely the supply of textbooks and what were the more popular textbooks. Facts concerning supply originate from a database of all Swedish textbooks in mathematics from 1930 and onwards. This database gathers data from LIBRIS (the joint catalogue of the Swedish academic and research libraries) and reports from the national textbook review board (*Statens läroboksnämnd*) concerning approved textbooks to be used in teaching. The database contains data from before 1930, but that data is not as reliable and therefore not used in this study.³⁴ Facts about popularity of textbooks are based on official national reports about textbooks which contain statistics about how many schools used certain textbooks.

The analysis of the material is based on Bourdieu's theory of capital and field and Broady's suggestions about how it can be used.³⁵ My understanding of the concepts of *capital* and *field* in the context of textbooks and schooling are described below.³⁶

33 Before 1938, the name of the journal was *Tidskrift för elementär matematik, fysik och kemi* (*Journal of Elementary Mathematics, Physics, and Chemistry*).

34 For further details about the database, see Johan Prytz, *The Construction of a Database Regarding Swedish Historical Textbooks in Mathematics (Grades 1–9), 1900–2015: A Technical Description* (Uppsala: Uppsala universitet; 2016). <https://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-305433>.

35 Pierre Bourdieu, *Konstens regler: Det litterära fältets uppkomst och struktur* (Stockholm: B Östling publishing house, 2000). Translation of: Pierre Bourdieu, *Les règles de l'art. Genèse et structure du champ littéraire* (Paris: Seuil, 1992); Donald Broady, *Sociologi och epistemologi: Om Pierre Bourdieus författarskap och den historiska epistemologin* (Stockholm: LHS förlag, 1991); Donald Broady, "Nätverk och fält," in *Sociala nätverk och fält*, ed. Håkan Gunneriusson (Uppsala: Uppsala universitet, 2002), 49–72.

36 The following four paragraphs are similar to paragraphs in Prytz (2009), 152–54. The reason for this is that the analysis in this article is a repetition and extension of the analysis in that article.

Capital is something that is valued by a group of people. It can be a formally organised group or an informal set of people. There is no restriction concerning what this something can be. Capital can be money, physical objects, actions, arguments, abilities, educations, cultural habits, or social relations. And a person can have many capitals and each capital can be valued differently in different contexts. In an educational context, certain aspects pertaining to textbooks can be a capital, for instance, the ability to author a textbook. A teaching method or rather the ability to teach according to a method can also be a capital. The type of capital related to objects, skills, or habits used in educational contexts I refer to as pedagogical capital.

A *field* exists when a group of people, often specialists of some kind, struggle over something they find important such as mathematics teaching or textbooks. A crucial aspect is the struggle about what should be a capital. A field consists of the relationships between the combatants' capital, the positions they occupy, and their actions.

There are two types of *fields*: field of production and field of consumption. The people active in a field of production produce standpoints, arguments and values that other people take into account. The people in a field of consumption use the things produced in the field of production. In the context of mathematics teaching, textbook authors and debaters in teacher journals could constitute a field of production. And mathematics teachers could constitute a field of consumption (notice the word "could").

Just because people struggle over something they consider important does not mean they constitute a field of production. The important property of this type of field is *autonomy*, which presupposes the existence of a *specific capital*. That is, people in the field value certain capitals. This also means that people act and achieve recognition according to a certain logic connected to the specific capital. For example, having large assets of the specific capital renders a person a high position and vice versa. An important aspect of this logic is that the specific capital is appreciated more than other types of capital, for example, financial assets, administrative skills, or political opinions. Moreover, this logic is manifest in people's actions, which include standpoints and argumentation. People with large assets of specific capital build their standpoints on assumptions, arguments, and facts related to that specific capital. They refrain from using arguments that are valued in other fields of production such as the political or economic field. For example, imagine there is a field of mathematics teaching, autonomous in relation to the political field. Then the people active in this field do not use party-political views to support their standpoints. For instance, if a textbook receives a positive review in a teacher journal, it is then valued on the basis of teaching qualities, not the amount of correct political references. Similarly, when a person gets the position as editor or columnist of a teacher journal, the chief editor justifies the appointment by referring exclusively to qualifications such as one's education and knowledge about mathematics teaching. Note that autonomy involves the relation to the state and the central school authorities.

Fields of consumption can share characteristics of a field of production although in fields of consumption autonomy is not necessary. Take for example mathematics teachers in schools as consumers. They share the special capital of the field of production and it is manifested in their argumentation and other actions concerning mathematics teaching. However, they also have to consider other capitals to func-

tion efficiently as mathematics teachers such as local knowledge about the school (its students, administrative routines, moral codes, and traditions). The essential property of the field of consumption is then the struggle among specialists (teachers) concerning the specific capital of the production field.

The analysis of the relationship between textbook authors and teachers is based on assumptions about teachers' involvement in the creation of a specific capital as they are the ones who buy and discuss textbooks. That is, their choice to purchase a textbook gives the capital of being skilled to the author of that textbook; and if teachers stop purchasing a textbook by a certain author, they remove capital from that author. Similarly, a positive review of a textbook in a journal gives capital and a negative review in a journal removes capital.³⁷

On the basis of these considerations of capital and field, the following empirical questions are addressed:

- 1) In what respect have textbook authoring in mathematics been a part of a field of production in 1919–1950 and 1950–1970?
- 2) What was the relationship between textbook authors and the teachers – that is, the consumers of textbooks – during these two periods?

The answers to these empirical questions will put me in a position to answer the main question of this article: How did the relationship between textbook producers, teachers, and the state change in connection to the comprehensive school reform? The first empirical question involves the concept of field. And an important property of a field is autonomy. So, in what respect textbook authoring was part of a field of production, or not, will say something about the relationship between textbook producers and the state. The second empirical question is about the relationship between textbook authors and teachers, which have a clear connection to the part of the main questions concerning textbook producers and teachers. Producers of textbooks and textbook authors are, however, not exactly the same thing. Producers of textbooks also includes the publishing companies. In the analysis, I therefore distinguish between the relationships between on one hand authors and teachers and on the other hand publishing companies and teachers.

Finally, some words about limitations of my choice of method, in particular the asymmetrical selection of sources, which could have been less asymmetrical. I could, for example, have analysed teacher journals from the period 1960–1970 to see in what respect the observed patterns in the professional journals from the period 1919–1950 continued or not; or if the professional debate was affected by the major development projects or not. This means that I cannot conclude the development projects terminated something, but rather challenged or interfered in the sense they created new parallel structures. I return to these issues further down.

The era of textbook authors, 1919–1950

As mentioned earlier, a common view is that Swedish school governance in the 20th century was gradually centralised up to about 1975; and if we just consider the tools of governance per se, this was also the case for school subjects.³⁸

³⁷ These assumptions are my own and they are my interpretation of the relation between a field of production and a field of consumption in the context of textbooks.

³⁸ See the first paragraph in section *Previous research*.

But, if we consider the attempts to use these centralistic tools to change the content and teaching methods of school mathematics, they were few and not extensive.³⁹ The national syllabi contained few innovations, which meant that the textbook review could not be used to drive changes. In addition, the national syllabus and textbook review did not have a conservative function since the content and guidelines in the syllabi before 1960 were brief and general.⁴⁰ One of the explicit aims of the national textbook review board was to check compliance with the syllabus.⁴¹

This does not mean there were no changes in school mathematics during this period. The textbooks reveal changes with respect to content as well as teaching methods. In some cases, these changes were innovative and radical. The most innovative and radical changes concerned geometry in *Realskolan* (7–9). Throughout the nineteenth century, geometry textbooks for those courses were based on Euclid's *Elements* (~300 BC). Between 1900 and 1950, several textbooks were published that deviated from traditional editions of Euclid's *Elements* with respect to concepts, proofs, and explanations. These innovative textbooks became popular. A survey published in 1930 showed that the new textbooks were used in 70 per cent of the schools. The fact that the new textbooks were published in several editions over longer periods also indicates their popularity.⁴²

Changes in geometry textbooks used by *Folkskolan* (4–6) were more moderate, including the introduction of new concepts by means of experimental exercises. In the beginning of the period, the exercises explicitly guided the students through the experiment from question to answer. This changed later as students were expected to finish the experiment on their own. In addition, after 1925, a few more demanding exercises were added; these exercises were not just a question of plugging in numbers in a formula and executing computations.⁴³

The importance of textbooks is visible in the teacher journals. *Elementa*, the journal for mathematics and science teaching in the secondary schools, presented two major debates on geometry teaching in the early 1920s and the late 1930s, which to great degree concerned textbooks. Both debates were initiated by authors or editors of textbooks and they criticised other textbook authors, who in turn supplied rebuttals. The first debate involved four debaters and the second debate involved three debaters. The debates consisted of several lengthy articles and concerned pedagogic as well as scientific qualities of textbooks, but also mathematics teaching in general.⁴⁴

The journals for the teachers of *Folkskolan* did not narrowly focus on school topics, but mathematics teaching was discussed.⁴⁵ My study of the articles on mathematics in one of those journals – *Folkskollärarnas tidning* – gives an example of a type of discussion other than those found in *Elementa*. These articles did not present major debates about textbooks, which involved several textbook authors. In fact, textbooks were sel-

39 Prytz (2017a), 47.

40 Ibid., 47–50.

41 Johnsson Harrie (2009), 115–16.

42 For further details, see Prytz (2007), 125–61.

43 For further details, see *ibid.*, 107–24.

44 For further details, see Prytz (2009), 157–160.

45 This reflects the organisation of the teaching as well as the education of the *Folkskolan* teachers. The teachers taught all subjects and accordingly their teacher education comprised all subjects.

dom (eight articles of 38) the main issue and textbook authors seldom wrote articles (only three articles of 38).⁴⁶ Nevertheless, textbooks were often discussed in an indirect way since the issues were related to textbook design, for example, which algorithms should be used and how they should be introduced, how different types of numbers (e.g., fractions and decimal numbers) should be introduced and explained, how symbols and expressions should be used, or how many exercises the students should be required to complete.⁴⁷ Importantly, these issues mainly concerned pedagogy and the optimal way of teaching; scientific mathematical issues were not the main issue.

I now proceed to the sociological analysis of the relationships between the textbook authors, the teachers, and the state. Important to remember is that textbooks authors rather than the state initiated and drove changes in school mathematics between 1910 and 1950.

When the theory of field and capital is applied to textbook authors and the debate in *Elementa* (the journal for secondary school teachers), this group of people shows many of the characteristics of a field of production. First, there was a struggle about mathematics teaching, in particular geometry textbooks. The debaters' way of argumentation was also typical of a field of production. Their arguments concerning textbooks and teaching were based only on scientific or pedagogical standpoints. In this case, scientific standpoints came from the scientific discipline of mathematics and the pedagogical standpoints were of a practical common-sense character.⁴⁸ This way of argumentation corresponds with the debaters' backgrounds. All debaters had a PhD in mathematics and teacher education along with teaching experience and, of course, textbook authorship experience.

This correspondence between education and professional experience, on the one hand, and arguments, on the other, is typical of a field of production. And I identify two types of specific capital of this field: scientific and pedagogical.

Being a skilled textbook author was an essential part of the pedagogical capital. All the debaters had authored and published textbooks, so they had been recognised as skilled in this respect by a publishing company. The fact that textbooks and their quality were major issues in the debates emphasised that this was a struggle about a specific capital.

However, a field of production requires a certain logic involving people's positions, their possessions of the specific capital, and their actions (in this case argumentation). Such logic can be observed. The debaters who reached leading positions also amassed greater amounts of the pedagogical capital. These positions were editor of *Elementa*, involvement in teacher education, and school mathematics advisors in the central school administration. In addition, the debaters who reached these positions were also authors of the most popular geometry textbooks. Being a well-recognised textbook author means having greater pedagogical capital. However, it was not necessary to have large scientific capital (e.g., many scientific publications) to reach leading positions in school mathematics. Moreover, none of the people in

46 I have compared the names of the article authors with the names of authors in a database with mathematics textbooks published in the twentieth century. In total, two of 22 unique article authors were textbook authors.

47 Prytz (2017a), 50.

48 Prytz (2009), 160–62.

leading positions had a research career in mathematics after receiving their PhD. Their possessions of specific capitals were also manifested in their argumentation. These people clearly distinguished between scientific and pedagogical standpoints and they viewed the latter as superior. Naturally, they viewed both as important. But, when they conflicted, the pedagogical standpoints were superior.⁴⁹

If we consider the debaters who were not in leading positions in school mathematics, we find pretty much the opposite of what is mentioned in the previous paragraph, which is also typical of a field of production. One debater had a scientific career with university positions, but only a few publications. These debaters authored the least popular textbooks and they did not make a clear distinction between scientific and pedagogical standpoints. In fact, their main critique of the popular textbooks was mainly scientific – that is, they argued that the insufficiencies in these respects made the textbooks less suitable for teaching.⁵⁰

Therefore, there was a clear division with respect to positions, capital, and basic standpoints among the people involved in the debates on geometry in *Elementa*. This type of division is typical of a field, which theoretically implies autonomy. And there are indications of autonomy since the debaters based their arguments exclusively on scientific and educational values. None of the authors made use of administrative arguments; for example, they did not reference syllabi or other governmental documents.⁵¹ The opposite could in fact be expected since some of the popular authors made a career in school administration and therefore had recognised administrative skills, a kind of administrative capital. These circumstances seem to support the conclusion of textbook authors constituted a field autonomous in relation to the state.

As to the discussions on mathematics teaching in the journal for the *Folkskolan* teachers – *Folkskollärarnas tidning* – there was a struggle, the basic feature of a field, but less intense. Many articles concerned the optimal way of teaching mathematics even though there were no debates between two sides. But if something is optimal, then something else must be less optimal. Another example of struggle is that quite many articles (13 of 38) were critical about textbooks as they were supposed to affect learning negatively.⁵² These articles can be viewed as an attempt to fight the current textbooks. Interestingly, none of the textbook authors responded to the critique. Perhaps this sceptical attitude was related to the fact that only two of 22 unique article authors were textbook authors. In addition, the article authors did not have a PhD in mathematics, which reflects the fact that scientific mathematical issues were not a common topic. Thus, only a pedagogical capital constituted the specific capital.

However, it is not possible to consider the group of article authors in *Folkskollärarnas tidning* a field of production. The basic argument is that it is not possible to discern two groups of people and a logic between positions, the level of specific capital, and arguments that are observable among the debaters in *Elementa*. Consequently, the discussion in the *Folkskolan* journal resembles a field of consumption rather than a field of production.

49 Ibid.

50 Ibid.

51 Ibid.

52 Prytz (2017a), 50.

I will now deepen the sociological analysis and include the great mass of regular teachers and their relationship to textbook authors and publishers. This is done by elaborating on how people can receive or lose a specific capital, in this case, the pedagogical capital that concerns textbook authorship. The analysis assumes that a positive review in a teacher journal gives capital as this recognition is seen by many colleagues, and a negative review is equivalent to losing capital. However, receiving and losing the pedagogical capital of being a skilled textbook author also involves regular teachers. By purchasing and using a textbook, teachers give recognition to the producers of that textbook, that is, they give pedagogical capital. Changing textbooks, however, is the equivalent of devaluing the textbook previously used. A basic problem here is to separate publishers from authors: Which one of these two types of actors do the teachers have a relationship with and what does this relationship look like? To answer these questions, two logics are considered: an economic and a social. When teachers buy a textbook, they transfer both an economic capital and social capital – money in the former case and recognition of quality in the latter case. In this perspective, there is a difference between the two actors in their relationship with the teachers. The difference is about risk taking. The publisher took an economic risk while the authors took a social risk associated with the ideational aspects of a textbook. An author's textbook could result in a negative or positive critique by fellow authors or teachers, judgements available to all readers of the journals. We find examples of this in the teacher journals discussed above. That is, an author could receive or lose capital of being a skilled textbook author each time a new textbook is published. The publisher is less exposed to this type of risk since they have the option to replace authors whose textbooks receive negative reviews. Therefore, the publisher's risk is mainly an economic risk.

The above observations suggest that between 1919 and 1950 there was a reciprocal dependence between textbook authors and most teachers, a dependence that concerned the pedagogical capital of being recognised as a skilled textbook author.

There are reasons to believe that this socio-ideational relationship existed in the sense that it affected textbook production. The argumentation starts with some observations about the influx of students and publications of new textbooks in *Folkskolan* and *Realskolan* and corresponding school types. The crucial comparison is that increasing or decreasing numbers of students did not correlate with the influx of new textbooks. Despite a clear decrease in the number of students in *Folkskolan* between 1930 and 1940, new textbooks in arithmetic were being published relatively often (Table 1; Diagrams 1–3). In contrast, the number of students in *Realskolan* increased between 1930 and 1950 (Table 2); however, in the same period, very few new algebra textbooks in Algebra for *Realskolan* were published (Diagram 5). In fact, not many new textbooks in geometry were published either (Diagram 4).⁵³

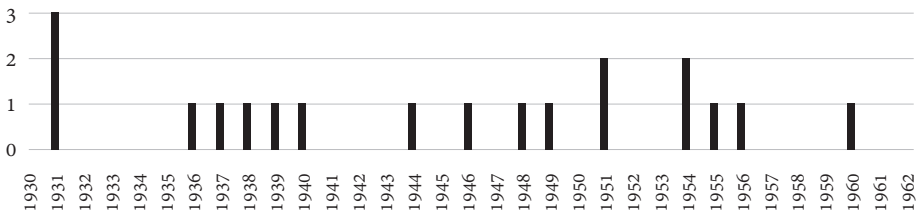
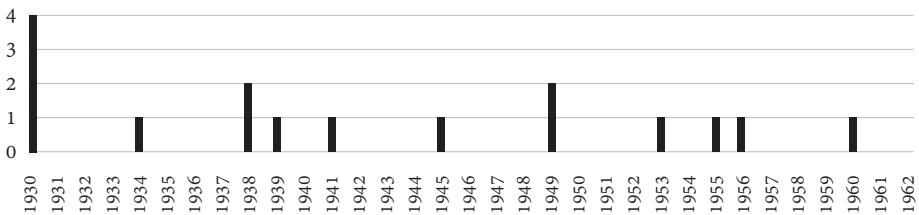
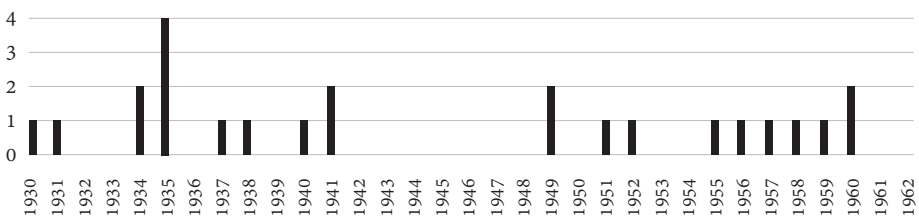
53 All diagrams originally accounted for in Prytz (2017b), 314–15.

Table 1. Number of students in *Folkskolan*⁵⁴

Year	1930	1940	1950	1960
Number of students	672,823	548,792	612,158	843,110

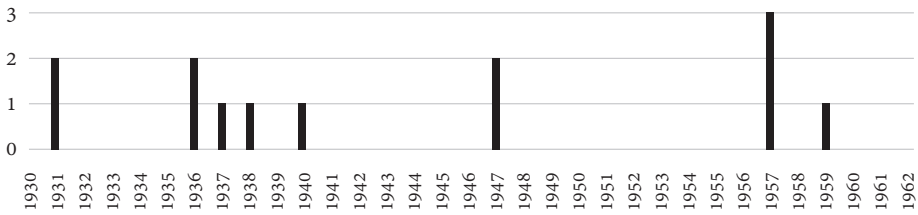
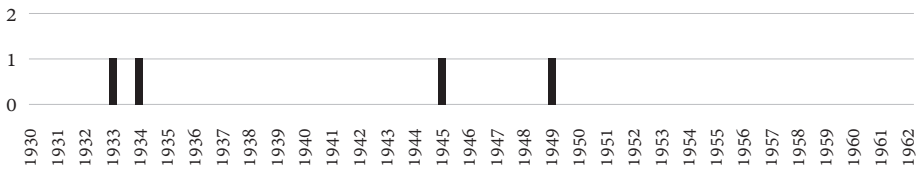
Table 2. Number of students in *Realskolan* and corresponding school types⁵⁵

Year	1930	1940	1950	1959
Number of students	61,551	74,922	114,747	167,094

Diagram 1. *Folkskolan* (1–2) Numbers of new series in ArithmeticDiagram 2. *Folkskolan* (3–6). Numbers of new series in ArithmeticDiagram 3. *Folkskolan* (7–9). Numbers of new series in Arithmetic

54 Statistiska centralbyrån, *Elever i obligatoriska skolor 1847–1962* (Stockholm: Statistiska centralbyrån, 1974), 63.

55 Statistiska centralbyrån, *Elever i icke-obligatoriska skolor 1864–1970*, (Stockholm: Statistiska centralbyrån, 1977), 174.

Diagram 4. *Realskolan*, Geometry (4–9), Number of new textbooksDiagram 5. *Realskolan* Algebra (4–9), Number of new textbooks

The syllabus and textbook review cannot explain the low influx of *Realskolan* textbooks. The syllabus was brief and general, which excludes a more restrictive function of the textbook review, which is discussed above. Moreover, innovative textbooks in geometry were also accepted, which contradicts claims about a restrictive syllabus or textbook review. Obviously, something else held back the production of new textbooks in algebra.

It seems this something is related to authors' social risks of losing pedagogical capital. Authoring a textbook that receives positive reviews requires a significant amount of work. This work may have slowed the production of new textbooks in *Realskolan*. Indeed, the debates about textbooks were more intense in the journal for the *Realskolan* teachers. A competing explanation could be that the teachers were satisfied with the existing textbooks, but the overall results on the *Realskolan* national exams in year 9 decreased between 1928 and 1950 while number of students increased continuously.⁵⁶ Thus, publishing companies had clear incentives to try to publish new textbooks.

We now turn to the period 1950–1970, when the central school authorities took command and initiated radical changes of school mathematics. These changes concerned one type of objects in particular: textbooks.

The era of grand development projects, 1950–1970

In connection to the preparations of the comprehensive school reform (the *Grundskolan* reform) in the 1950s and later during its introduction in the 1960s, the central school authorities tried to take a more active role in the reformation of school mathematics. As the very first mathematics syllabus of *Grundskolan*, issued in 1962, was prepared in the 1950s, an extensive survey of the need of mathematics in society was conducted; the survey included representatives from universities, the school system, and trade and industry, as well as the general public. The procedure met

⁵⁶ Prytz (2007), 165.

scientific standards as the final report also was a doctoral dissertation in education.⁵⁷

However, the changes in the first mathematics syllabus of *Grundskolan* were quite moderate. The most radical change was the reduction of geometry in years 7–9, in particular the theoretical type of geometry based on the axiomatic-deductive method, which had a prominent place in *Realskolan*. In fact, this was a direct result of the survey mentioned above. As to teaching methods, however, the new syllabus was mainly a confirmation of already established teaching principles.⁵⁸

Another new tool of centralistic governance was the use of major projects aimed to develop both a radically new syllabus and new teaching methods adapted to the syllabus. One such project was the New Math project, which lasted for about eight years (1960–1968) and involved several researchers and experts and thousands of teachers and students. The purpose of the New Math project was to prepare *Grundskolan's* second mathematics syllabus to be launched in 1969. The project was radical in many respects as it aimed at changing the content of the syllabus in all nine years of *Grundskolan*. In year 7–9, new topics such as trigonometry and vectors were to be introduced. In years 1–3, topics that before only appeared in years 7–9 (e.g., algebra) were to be introduced. However, the New Math reform was not just about content; teaching methods were even more essential. In this context, set theory was important, not as a separate topic but as a pedagogical foundation for the other topics. When new ideas or concepts in the other topics were introduced and explained, concepts and notations as well as concrete materials and diagrams related to set theory were to be used, already in year 1. This strategy would also bridge different topics. These pedagogical innovations were based on ideas developed by Jean Piaget (1896–1980) and Jerome Bruner (1915–2016). In brief, these psychologists maintained that there are similarities between mental and mathematical structures and that this circumstance should be used better in teaching: if the teaching was more focused on structures, it should facilitate understanding and eventually learning.⁵⁹

The major challenge of the New Math project was not to formulate a new syllabus but to develop teaching methods and teaching materials that suited the new syllabus. In fact, much of the resources were spent on developing textbooks that were in line with the pedagogical ideas described in the previous paragraph. This work included trials of teaching methods and textbooks in hundreds of classes. In total (in Sweden, Denmark, Norway, and Finland), 540 school classes in year 1–9 were involved in the trials. The teachers also submitted reports about teaching with the new textbooks. By the end of the project, the functionality of the new textbooks was investigated in a more rigorous way by comparing experimental classes with control classes. The experimental classes used the books for two or three years.⁶⁰

The New Math project was not the only major development project concerning school mathematics. During roughly the same period, the IMU project was running, which also prioritised textbooks. The IMU project aimed to develop a programmed and self-instructional teaching material. By taking short diagnostic tests after com-

57 Prytz (2017a), 50–51. As for the doctoral dissertation, this was the dissertation of Urban Dahllöf, who was in charge of the survey.

58 Ibid.

59 Ibid., 52–54.

60 Prytz (2018), 200.

pleting a section of the material, the students were directed to a new section optimised for their needs. The new teaching material was meant to change the role of the teacher – that is, rather than giving the whole class the same lessons, teachers helped the students individually according to their specific needs. Moreover, the teachers to some degree could be replaced by assistants who administered the material and the diagnostic tests, giving the teachers more time to spend on planning and discussions with colleagues. Content wise, the IMU material was to great degree based on the content of the New Math material. The IMU project was also led by the same people in charge of the New Math project.⁶¹

Important to note is that the central school authorities had the means to enforce the changes prepared within the two projects. A detailed syllabus specified what to teach and what methods to use, and the syllabus clearly relied on the pedagogical ideas of New Math.⁶² Moreover, the mandatory textbook review ensured that textbooks matched the syllabus. An extensive textbook analysis show that the publishing companies adapted to the new syllabus that took effect in 1970.⁶³

However, despite the extensive preparations of the New Math and IMU projects, they were abandoned in the 1970s. The central school authorities opened up for other teaching methods and the importance of New Math was downplayed. This was not done without a cause; as there were indications of low results and dissatisfaction among the teachers, in particular in years 7–9. Moreover, in 1974 the textbook review became mandatory for mathematics and some other subjects, which allowed for the use of more traditional textbooks. Indeed, these types of textbooks were soon published.⁶⁴ Thus, the centralised governance lasted for only a few years.

But, from a sociological perspective, it is reasonable to say that the development projects took effect earlier than 1969, and from the start they constituted something different than the social logic that previously characterised changes in school mathematics pedagogy and content.

A shift in pedagogical capital is evident in terms of the domains of knowledge valued in connection to textbook production. Social science, particularly psychology, was emphasised as a new and important domain of knowledge. The basic assumptions about structure and understanding and design of introductions and explanations of new concepts mainly came from the psychology theories developed by Piaget and Bruner. The more rigorous procedure of testing and evaluating the textbooks came from social science. As to the scientific discipline of mathematics, it retained its value; a basic idea of New Math was to update school mathematics against the scientific discipline. Moreover, some parts of modern mathematics, especially set theory, were also viewed as valuable from psychological and pedagogical points of view. In contrast, practical experience of authoring textbooks was deemphasised as well as the content and teaching methods of traditional school mathematics.

This shift in capital is also seen in the backgrounds of the people involved in the New Math project. About 30 people from all four participating countries were involved in designing and authoring syllabi and experimental textbook material.

61 Prytz (2017a), 55–58.

62 Prytz (2018), 201.

63 *Ibid.*, 205.

64 *Ibid.*, 205–6.

Among those were mathematicians, school teachers, headmasters, and teacher educators. Only one of those had authored a textbook for year 1–9 before the project started. Apart from these people, there were five experts in psychology and education (the academic disciplines) involved in planning and executing surveys and large-scale teaching experiments.⁶⁵ Consequently, being an experienced and skilled textbook author was not necessary to enter this major project, a project which to large degree concerned textbook development. Quality of the New Math textbook material was instead secured through science-like trials. In other words, being an experienced and skilled textbook author was not a pedagogical capital.

As to the field concept, the group of people involved in the New Math project cannot be considered a field of production, although there is some resemblance. The important theories and methods applied within the New Math project corresponds well with the educations and domains of expertise of many of the people who took part in the project. However, the key element of a field was missing as there was no fundamental struggle about the best way to teach mathematics. The main principles for textbook design, but also teaching, were already laid out.

Another difference to the period 1910–1950 concerns the generation of pedagogical capital and the relation between textbook authors, teachers, and the state. In the New Math and the IMU projects, this capital was not received through positive critiques from fellow authors or teachers, or by teachers through choice of textbook. This capital was produced through scientific procedures and rigorous testing procedures that showed the quality of the textbooks. Moreover, the social risks of the New Math authors were minimised. They ran no risk of being criticised by other authors or teachers sceptical about the New Math reform. That is, they were not swayed by a desire to be accepted by the teachers. Consequently, the reciprocal dependence between textbook authors and teachers did not exist within the projects. However, new dependences were created when the New Math and IMU projects started. In these projects, the appointments of experts and textbook authors can be considered a way of giving pedagogical capital because an appointment was recognition of competence. Thus, the people involved in textbook production depended on the state and the central school authorities rather than other textbook authors and regular teachers outside the projects.

It may be tempting to view the New Math and IMU projects as a pure top-down processes where the state tried to take control of school mathematics. However, there was also a bottom-up process in the sense that academics, teachers, and other people without the old pedagogical capital of being a skilled textbook author could influence and drive changes in school mathematics. The leading people behind the New Math and IMU projects had high academic degrees in mathematics as well as teaching experience, although often quite brief experience.⁶⁶ Moreover, several of the people recruited as textbook authors had a similar background; several but not all

65 Ibid., 200. Nordiska kommittén för modernisering av matematikundervisningen, *Nordisk skolmatematik* (Stockholm: Nordiska rådet, 1967), 221–22. I have compared the list of Swedish authors in the New Math project with a database with historical textbooks in mathematics.

66 Lennart Sandgren (1926–2009) who was the chairman of the New Math project had a PhD in mathematics and had a background as university teacher and author of elementary university textbooks. Matts Håstad (1931–2019), who was the executive officer in both the New Math project and the IMU project, had a PhD in mathematics and a background as secondary school teacher.

had PhDs in mathematics, some were university teachers, others were school teachers, and some were teachers in teacher education – that is, most had some teaching experience in mathematics.⁶⁷ This use of the state to gain influence could mean that the struggles over school mathematics moved away from textbook authoring and discussions in teacher journals and became a struggle over positions in the state. However, as indicated already in the section *Method of analysis*, that type of conclusion requires further studies of teacher journal from the 1960s.

Conclusions

The aim of this synthesis article concerns the relationship between textbook producers, teachers, and the state changed in connection to the Swedish comprehensive school reform launched in the 1960s. The analysis of this relationship is based on Bourdieu's theory of field and capital.

In a previous article, also based on Bourdieu's theory, I have reported an analysis which indicates textbook authors functioned as a field of production before the comprehensive school reform. This concerned the lower secondary level (*Realskolan*) and geometry. An important property of a field of production is autonomy, which in this case includes autonomy in relation to the state. This goes well together with other previous research of mine which indicate that state governance of school mathematics in years 1–9 was passive between 1910 and 1950 when it came to initiating and driving change.⁶⁸ The analysis does not reveal if the same was true for the primary school level (*Folkskolan*).

In this synthesis article, I have expanded and deepened the sociological analysis concerning the period before the comprehensive school reform. Expanded in the sense it now comprises results and findings from previous studies where Bourdieu's theory was not used. Deepened in the sense that it is now about the relation between the field of production and the field of consumption.

This new analysis of previous findings and results indicates a reciprocal dependence between textbook authors and teachers between 1919 and 1950 for both the primary and lower secondary school levels (*Folkskolan* and *Realskolan*). Essential for this reciprocal dependence was the pedagogical capital of being a skilled textbook author. This capital was given when regular teachers chose a textbook and when fellow authors gave a positive review of a textbook in a teacher journal. However, there was also a risk of losing this capital; regular teachers could abandon a textbook for

67 The authors of the textbooks developed in the New Math project are listed in Nordiska kommittén för modernisering av matematikundervisningen, *Nordisk skolmatematik*, 221. Further information about the authors' educations and positions are collected from various sources: The Swedish state calendar: *Sveriges statskalender* (Stockholm: Fritzes offentliga publikationer; 1876–). I have used the calendars published in 1963 and 1964. They are available on-line via the Runeberg Project, <http://runeberg.org/statskal/>. The Swedish biographical reference book *Vem är vem* [Who is who] published in the 1960s; *Vem är vem? 1 Stor-Stockholm*, 2nd ed., ed. Paul Harnesk (Stockholm: Vem är vem, 1962); *Vem är vem? 2 Svealand utom Stor-Stockholm*, 2nd ed., ed. Paul Harnesk (Stockholm: Vem är vem, 1964); *Vem är vem? 3 Götaland, utom Skåne, Halland, Blekinge*, 2nd ed., ed. Paul Harnesk (Stockholm: Vem är vem, 1965); *Vem är vem? 4 Skåne, Halland, Blekinge*, 2nd ed., ed. Åke Davidsson (Stockholm: Vem är vem, 1966); *Vem är vem? 5 Norrland, supplement register*, 2nd ed., ed. Åke Davidsson (Stockholm: Vem är vem, 1968). The *Vem är vem?* volumes are available on-line via the Runeberg project, <http://runeberg.org/vemarvem/>. I have also used obituaries in newspapers, found via google search engine.

68 See section *Previous research*.

a new one, and, probably more importantly, teachers and fellow authors could give negative judgements or reviews of a textbook in a teacher journal.

As to my previous studies of the period after 1960, when the comprehensive school reform was implemented, sociological analyses based on Bourdieu's theory were not applied.

The re-analysis, presented in this article, of my previous findings and results concerning the major state-driven development projects in school mathematics (New Math and IMU) launched in the 1960s indicates a radical change in relations between the state, textbook authors, and teachers. These projects largely concerned textbooks and by developing textbooks in a science-like process they severely reduced teachers' influence over textbook production. The projects challenged and interfered with the established social order within school mathematics, more precisely, the reciprocal dependence between regular teachers and textbook authors.

All this happened over a relatively short period. This is in clear contrast to how other researchers have depicted changes in Swedish school governance – that is, slow and successive.⁶⁹

The analysis of the development projects also reveals that they were not merely examples of top-down governance where the state tried to seize control over teachers and textbook production. In the New Math and IMU projects, there was a bottom-up movement; they offered opportunities for people with teaching background without the established capital of being a skilled textbook author to reach influential positions at different levels within school mathematics. This transfer of influence applies in particular to people who were knowledgeable in modern psychology and social science, which were the new types of capital within these projects. In addition, the New Math and IMU projects offered new opportunities of influence for teachers as the trials of textbooks and teaching methods were an important part of the projects and they involved hundreds of teachers. Before these projects, the influence many teachers had was their role as a consumer when choosing a textbook. By taking part in the development projects, they were given new opportunities to influence the way school mathematics was taught.

These conclusions are in contrast to other researchers who concludes teachers lost influence over professional knowledge as the Swedish comprehensive school reform was implemented.⁷⁰ That is, New Math and IMU projects included elements that encouraged teachers to embrace the changes in professional knowledge rather than merely accepting the changes as a requirement of their employment. However, this encouragement was more than embracing new and promising ideas; it was also a matter of power and new possibilities of influence or perhaps a matter of escaping an old power structure.

In summary, my study indicates the state contributed to a swift creation of new types of capital that could be used to gain new influential positions in the state apparatus. At the same time, an older type of capital became less valuable.

The analysis presented in this article also adds new insight about how and why the Swedish comprehensive school reform in general in the 1950s and 1960s gained acceptance and momentum among teachers. The implementation of the reform

69 Ibid.

70 Ibid.

began in 1962, but it had been prepared during the previous decade. This new type of school was tried and evaluated in a science-like manner that included the help of several thousands of teachers and students. In addition, new syllabi and teaching methods were developed in large scale projects based on scientific principles. My results suggest these types of extensive enterprises could attract teachers at various levels and gain acceptance and momentum. Previous research has touched on such attracting factors, but they concern economic conditions, the status of teachers, and curriculum ethics about equality, and then often just for primary school teachers.⁷¹

Although my analysis concerns the Swedish school system, the insights could apply to the comprehensive school reforms in the other Nordic countries as the reforms in the Nordic countries were very similar and the New Math project involved not only Sweden but also Denmark, Norway, and Finland. This article also highlights the importance of textbooks in reform processes, a finding that calls for further sociological studies on textbook production and school reforms, a topic not well researched in Sweden.⁷²

In an international perspective, the role of textbooks in reform processes is a more common research topic, but gaps still need to be filled. One of these concerns forms of authorship and how authorship has changed in the twentieth century. Textbook authors changed from visible persons in society to invisible persons, both at an institutional and discursive level, but the details of how and why this change took place are not readily available. One aspect of the process is the move from single authors to teams of authors, as was the case in the New Math and IMU projects.⁷³ This article adds to knowledge about how changes in forms of authorship in Sweden were closely related to changes in national governance policies – more precisely, the decision to use major science-like development projects to achieve change in a school subject. This study also shows how changing forms of authorship in Sweden were related to a shift in power over a school subject. To date, only a few studies have addressed forms of authorship and changes in national governance policies, an avenue of investigation this study hopes to encourage.

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71 Ibid.

72 Ibid.

73 Ibid.

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