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Inscriptions and Digitalization Initiatives Across Time in the Nation-State of Sweden: The Relevance of Shifts and Continuities in Policy Accounts for Teachers' Work

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1 Introduction

Changes in society are accelerating, and this increases the demands on the citizens to constantly renew and deepen their knowledge. When students enter working life, they shall be prepared to relearn, learn new things and learn more as a dimension of lifelong learning. The roadmap is characterized by knowledge searching and students' active ways of working. Information Technology (IT) is a tool to provide a better education and deeper knowledge. All students must be familiar with modern IT when

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they leave school. The best way to reach this goal is that they have regularly used IT as a tool for their learning (The Government of Sweden, 1998).¹

This quote, from the end of the last century, is taken from the Swedish governmental initiative ITiS, IT i Skolan (Sw: IT in School). The ITiS initiative was extensive. About 60 percent of the Swedish teachers were involved in it (Chaib, Chaib, & Ludvigsson, 2004). After one year with ITiS, the teachers said that they used information technology more than before (ibid.), but the long-term effects of this initiative are more diffuse. Today almost all Swedish secondary school students have access to a computer at home, and more recent estimates suggest that they surf the internet 39 minutes per day at school (OECD, 2015a). The most extensive use of Information and Communication Technology (henceforth ICT) in school is browsing the internet for information, an activity two-thirds of Swedish 15 year olds are reported to be engaged in at least once a week (OECD, 2015b). But only one of every five students are reported as using computers in mathematics (OECD, 2015a), which could be an indication of a lack of more advanced ICT usage in schools. In 2011, the Government of Sweden expressed concerns about the fact that computers in schools were primarily being used for writing, information searches and to some extent for presentations, but not for more advanced purposes (Government Offices of Sweden, 2011).

Twelve years after ITiS, the European Parliament² stated that all member states should

Mainstream eLearning in national policies for the modernisation of education and training, including in curricula, assessment of learning outcomes and the professional development of teachers and trainers. (European Commission, 2010, p. 27)

¹ Original Swedish text: "Förändringarna i samhället sker allt snabbare, vilket ökar medborgarnas behov av att ständigt förnya och fördjupa sina kunskaper. När eleverna går ut i arbetslivet skall de vara rustade för att lära om, lära nytt och lära mer för det livslånga lärandet. Vägen dit karaktäriseras av ett kunskapssökande och elevaktivt arbetssätt. Informationsteknik (IT) är ett redskap att nå en förbättrad utbildning och fördjupade kunskaper. Alla elever måste vara förtroagna med modern IT när de lämnar skolan. Detta uppnås bäst genom att de har fått använda IT som ett verktyg för sin inlärnin". (our translation)

² Sweden is a member of the European Union (EU).

This European Commission document was an important starting point for the Swedish government's latest initiative to reform the school system with the aim of strengthening school students' digital competence.

The study presented in this chapter scrutinizes policy documents, or inscriptions as they are conceptualized in Actor-Network Theory (henceforth ANT), and that lay the foundation for the Swedish Digitalization Initiative (henceforth SDI). A point of departure is the assumption that important political decisions like SDI are not formed in a void but serve societal interests of some kind and are formed by political and ideological concerns. The role of technology in schools has always been a subject that has been debated. Thus, with SDI, the Government of Sweden has taken a stance in favor of digitalization of schools in Sweden. Following Roth and McGinn (1998), we are interested in exploring what driving forces shape an initiative like SDI, and which key political, ideological, moral and ethical goals the initiative is endowed with.

Critical Discourse Analysis (henceforth CDA), concerned with power relations (Scollon & Scollon, 2004), is used as a point of departure here. More specifically, a variant of CDA, Public Consultative Document Analysis (henceforth PCDA) (Scollon, 2008) has been deployed at an overarching level and Nexus Analysis (NA) (e.g. Scollon & Scollon, 2004) is used as an analytical lens. ANT considers humans as well as non-humans as actors in a network. Furthermore, policy documents are—within this framework—considered to be endowed with agency, and they can therefore be considered actors in line with ANT. A salient aim of the present study is to contribute to knowledge about connections across scales, temporal and spatial, large and small, that shape a comprehensive policy decision like SDI.

The next section elaborates further on the multilayered and overlapping tenets of the theoretical frameworks that this study builds upon. It also presents the methodological points of departure and the dataset we have used. The three themes that have emerged in the analysis are presented in Sect. 3. The final discussion section highlights the salient findings of this study.

2 Inscriptions, Languageing, Agency: Nexus Analysis as an Analytical Lens and Inspiration for Methodological Framings

“The task of a sociocultural approach is to explicate the relationships between human *action*, on the one hand, and cultural, institutional, and historical contexts in which this action occurs, on the other” (Wertsch, 1998, p. 24, italics in original). From a sociocultural perspective, policy documents are mediational means, or cultural tools, that in concert with human beings perform a mediated action. Mediational means have affordances that can help an actor to solve a problem (Wertsch, 1998). Documents are examples of artifacts, mediational means that persist across time and space. Drawing upon Burke’s (1945) five key terms of dramatism, that is, act (what was done), scene (when or where was it done), agent (who did it), agency (how was it done) and purpose (why), Wertsch (1998) focuses on the dialectic between agent and instrumentality. This dialectic is summarized in the notion of mediated action. Thus, the digitalization initiative is, from a sociocultural perspective, a mediated action and the policy documents are mediational means. The latter represent different scales across time and space.

Furthermore, policy documents, like governmental commissions, curricula and EU regulations, constitute examples of *inscriptions* and are considered actors within the overlapping framings of ANT and sociocultural perspectives. Inscriptions, for example diagrams, pictures and documents, have a hegemonic dimension in that they are rhetorical and polemical artifacts that empower key actors (Latour, 1987). As products of human interaction, they are inseparable from social action in sociocultural perspectives and have agency (Bagga-Gupta, 2017). In the rest of this study, the term inscription will be reserved for policy documents considered as actors, while policy documents will be used for the artifacts.

NA, a branch of discourse analysis, is seen as being especially well suited for analyzing policies across different scales (Hult, 2015). While discourses can become fixed, *languageing*, that is, “linguistic actions and activities in actual communication and thinking” (Linell, 2009, p. 274),

or the very doing of meaning-making, is fluid. The latter constitutes a key dimension of social interaction where different modal dimensions are significant. For instance, spoken language gets transformed when it is written down (Scollon & Scollon, 2004) and the performatory nature of communication is modality layered and complex (Gynne, 2016; Messina Dahlberg, 2015).

This section begins with a presentation of NA as an analytical lens for analyzing policy documents. A presentation of the methodological framings used in this study and the policy documents scrutinized are presented thereafter.

Circulating Discourses Across Time, Historical Bodies and the Fluidity of Social (Inter)Actions

Taking NA as a point of departure, the analysis presented in Sect. 3 focuses on policy documents *as* social action. Social actions, the unit of analysis in NA, take place at the intersection of historical bodies, the interaction order and the discourses in place (Fig. 2.1). *The historical body*, a term borrowed from Kitaro Nishida (1958), takes into account the experiences of the participating social actors. *The interaction* order is the order in which (inter)action takes place. Inspired by Erving Goffman, NA explicates the interaction order as “any of the many possible social arrangements by which we form relationships” (Scollon & Scollon, 2004, p. 13). Relevant to the interaction order, or relations among actors, are norms of interaction in a specific setting, expectations about social roles/positions, central vs. peripheral participants and modalities. These features are relevant to textual worlds as well as face-to-face meetings. Hult (2015) suggests that the interaction order functions as a bridge between the historical body and the discourses in place, where the former is at the individual scale and the latter at the universal scale. *The discourses in place* are the discourses that circulate in the current scene (or at a specific point in time), or the current/previous action.

From the overlapping analytical framings used in this study, inscriptions can be considered *frozen action* in that they are actions that have taken place in the past.

Fig. 2.1 Social action in the intersection between the historical body, the interaction order and the discourses in place. Source: Scollon and Scollon (2004, p. 20)

Frozen actions are usually higher-level actions which were performed by an individual or a group of people at an earlier time than the real-time moment of the interaction that is being analyzed. These actions are frozen in the material objects themselves and are therefore evident. (Norris, 2004, pp. 13–14; see also Pietikäinen, Lane, Salo, & Laihiala-Kankainen, 2011)

Classical NA is conducted in three steps:

- establishing the nexus of practice,
- navigating the nexus of practice, and
- changing the nexus of practice.

Establishing the nexus of practice includes identifying the social action and its crucial actors, observing the interaction order and determining significant cycles of discourse. The second step—navigating the nexus of practice—constitutes the most extensive phase of NA. Action can here be considered a moment in time and space where the interaction order and the discourses in place intersect. This means that actions have a historical

past that lead to a specific moment and a future that leads from it in trajectories of semiotic cycles.

Our analysis draws upon critical discourse analysis, with the aim of illuminating power dimensions of inscriptions. While Scollon suggests that PCDA “is oriented toward bringing discourse analysis in any relevant form into the process of the making of public policy” (2008, p. 7), he points to the need for organizing document analysis around five analytical features:

1. function of the document,
2. framing,
3. document design,
4. production/reception (writer/reader) positions, and
5. interdiscursivity.

Framing, or contextualizing, is the metacommunication of any document—a message of how to interpret the document. The linguistic form, design and modalities of the document can constitute dimensions of the framing. Framing tells us how to interpret the message, and can be conveyed by layout, but also linguistically (Scollon, 2008), that is, the nature of languaging. The tenets of NA differentiate between *mode* and *modality*, where the latter is reserved for the dimension of languaging, and the “central distinction in modality is between *realis* and *irrealis*” (Scollon, 2008, p. 132). *Realis* is something real, something that can be taken as certain, and *irrealis* is something unknown or unknowable. For instance, the verb “shall” is *realis*, and “should” is *irrealis*. This distinction implies that a bureaucratic language and an extensive usage of the verb “shall” characterizes a policy document with a high degree of agency. Different stances about future actions pertaining to knowledge and agency can be represented schematically (see Fig. 2.2). Thus, a document with high degree of agency is oracular and agentive. “We are certain X will happen, and we will do Y about the consequences of that” (Scollon, 2008, p. 137). Scollon (2008), furthermore, identifies three production positions and four reception positions. The three production positions are conceptualized in terms of (1) a principal, the person or organization responsible for the document, (2) an author, the person who created the words, and (3) the

Fig. 2.2 The knowledge/agency graph. Source: After Scollon (2008, p. 134)

animator, the person or persons who shape the document as an object. The reception positions are constituted by (1) a principal, the person or persons responsible for reading and/or responding to the document, (2) an interpreter, the person or persons who contribute to the meaning of the document, (3) a handler, the agent who supplies the principal and the interpreter with the document, and (4) the bystander, that is, person or persons who can consume the document, but do not directly respond to it.

A further key concept used within NA is interdiscursivity. It is used to describe the blending of discourses in actual use, that is, one discourse is embedded in, or has an embedded relation to, another discourse. This means that a discourse can use another discourse to legitimize itself. For instance, a legislative discourse can blend a scientific discourse interdiscursively by using a scientific reference system and a bibliographic system to strengthen its arguments. Our analysis uses “capital ‘D’” discourses in contrast to “‘little-d’ discourse (language-in-use) [that] is melded integrally with non-language ‘stuff’ to enact specific identities and activities” (Gee, 1999, p. 7).

Given that the analyst takes an active part in the social action under scrutiny, it is inevitable that the research process influences the social

action. Therefore, the third and final step in NA is made up of changing the nexus of practice (Scollon & Scollon, 2004). However, given the frozen character of policy documents, this last step is not applicable to our study.

Methodological Framings and Data

In establishing the nexus, the social issue focused on and the key social actors need to be identified. The scrutinized social issue in our study is concerned with SDI, and the first step in the analysis was related to identifying the key social actors. Both authors discussed the SDI and how the emergence of this central policy initiative could be understood. Given that SDI is a governmental initiative, searches were initially conducted on the web site of the Government of Sweden, and the web site of the Swedish National Agency of Education (Skolverket), which is the executive educational authority. Since SDI is an initiative taken by the Government of Sweden, it is itself a crucial social actor. The Swedish National Agency of Education is responsible for the development of curricula and syllabi in Sweden, and therefore it constitutes another social actor.

Scrutinizing the policy documents that constitute SDI highlighted that it was founded upon earlier documents. This means that there exists a need to read other documents in order to understand any given document. The document that gave rise to the digitalization initiative, and therefore the starting point of the analysis, was the “Commission to suggest national IT strategies for the educational system”³ (The Government of Sweden, 2015). This document can be considered *a key incident* (e.g. Erickson, 1977), that is, a moment where noteworthy discourses intersect (Hult, 2015). It is an incident that, linked to other incidents, makes it possible to see the generic in the particular or the universal in the specific (Erickson, 1977). “Commission to suggest national IT strategies for the educational system” was the document that spurred the Swedish National Agency for Education to revise the curricula and syllabi in accordance with the vision of the Government

³ Original Swedish title: “Uppdrag att föreslå nationella it-strategier för skolväsendet”. (our translation)

of Sweden. In that sense, it led to the development of new documents from The Swedish National Agency for Education, that in themselves were built upon the work presented in earlier documents (see Appendix 1). By tracing references backward, previous relevant policy documents were identified. These too were scrutinized, and if the document was considered a source that made an important contribution to SDI, it became part of the key group of documents that became included in our primary dataset. This primary dataset is presented in Appendix 1. This identification procedure highlights the circulating, n/ethnographic character of the research process. The search for connections and relations between policy documents is what Agar (2008) calls a holistic ethnographic perspective.

The key documents that were first identified and then further scrutinized (see Appendix 1) are presented chronologically, that is, based upon the dates that the documents were issued. The title presented is the original Swedish title, together with our English translation of the title, unless the document has an English language version available. The description gives a short presentation of the document. The provider is the authority responsible for the document. The function gives a short presentation of the purpose of the document. Since all the scrutinized documents are available online, the internet URL available during the analysis process is provided. Framing, document design, and interdiscursivity are dimensions of PCDA, and are scrutinized in the analysis and the discussion presented in Sects. 3 and 4.

As outlined above, navigating the nexus is a key analytical process in NA. The scrutinized documents are analyzed according to the scheme for a PCDA. The five analytical features of a document described earlier (see Sect. 2.1) constitute tools for our analysis, and the policy documents are scrutinized according to these features. While the function of the document and the production principal, that is, the provider, are accounted for in Appendix 1, the framing, document design, other production/reception positions and interdiscursivity constitute dimensions that we account for in Sect. 3.

3 The Nature of Shifts and Continuities

The analysis of the policy documents has included re-readings and our critical discussions against the backdrop of societal changes in Sweden. This process has given rise to three themes that are explicated in this section. One such theme is the chained nature of the policy documents, that is, one document is founded upon another across time. A second theme is the shift across time from a digital competence discourse to a programming discourse. The third and final theme that has emerged in the analysis is the degree of agency and how it expresses document design and different modes.

The Chained Nature of the Policy Documents

All the scrutinized documents refer to one or more earlier policy documents upon which they are founded. They are thus chained across time, but also across spatial scales (Fig. 2.3). The spatial scales are made up of the European Union, the nation-state of Sweden, and regional and local Swedish authorities and schools. The Digitalization Commission has a nation-wide agenda, but it also attempts to establish a regional digital agenda (The Digitalization Commission, 2014). Bureaucratic hierarchy

Fig. 2.3 The chained nature of policy documents across time and scales

in Sweden can be understood in terms of going from the government at the top to the individual teachers who are required to interpret the curricula and syllabi, that is, at the local scale. The temporal scales vary from within a year to several years, that is, what Scollon and Scollon (2004) call a solar biorhythm.

Since the analyzed documents are all based on other documents across time, navigating and establishing the nexus of practice is a circulating process (see e.g. Tapio, 2013). Due to this circulating process, other actors emerge during the analysis process. For instance, in 2006, the European Parliament identified digital literacy as one of eight key competences for lifelong learning, and as a direct consequence of this, the European Commission in 2010 published “A Digital Agenda for Europe” (European Commission, 2010). Sweden, as a member of the European Union (EU), is obliged to follow EU regulations and in 2011, the Government of Sweden published “IT in service of human being—a digital agenda for Sweden” (Government Offices of Sweden, 2011). The agenda from the European Commission is referred to in the Foreword of this Government of Sweden publication. “Commission directive. The Digitalization Commission—a commission for the digital agenda”⁴ (Government Offices of Sweden, 2012) is also a direct outcome of the digital agenda for Sweden (Government Offices of Sweden, 2011). While the Digitalization Commission produced several reports, the most important one for SDI was “A digital agenda in the service of the human being—a brightening future can be ours”⁵ (The Digitalization Commission, 2014). The suggestions made by the Digitalization Commission were transformed into governmental policy in “Commission to suggest national IT strategies for the educational system”⁶ (The Government of Sweden, 2015). This commission led to the emergence of other policy documents at different scales, involving various actors, and led to revised curricula and syllabi produced by the Swedish National

⁴Original Swedish title: “Kommittédirektiv. Digitaliseringskommissionen—en kommission för den digitala agendan”. (our translation)

⁵Original Swedish title: “En digital agenda i människans tjänst—en ljusnande framtid kan bli vår”. (our translation)

⁶Original Swedish title: “Uppdrag att föreslå nationella it-strategier för skolväsendet”. (our translation)

Agency of Education. These revisions can also be considered links in another temporal chain of curricula.

Similarly, there are other chained documents. One curriculum or syllabus is founded on an older one, and in that sense, constitutes a chain of policy documents. But curricula and syllabi are also shaped by laws and regulations, stipulated by the Government of Sweden. School laws, school regulations, curricula and syllabi, thus, together constitute a *web of policy documents* that build upon specific “webs-of-understandings” (Bagga-Gupta, 2012; Bagga-Gupta & Messina Dahlberg, 2018): one influences the other across time. In other words, these document chains are intertwined and intersect one other.

A major policy change like SDI gives rise to changes in other chains involving other documents, which intersect with the policy document linkages. One such intersecting chain is constituted by “The Swedes and Internet”.⁷ The Swedes and Internet is an annually conducted survey about the internet-related habits of citizens in the nation-state of Sweden. The principal producer of The Swedes and Internet is the Internet Foundation of Sweden (IIS⁸),⁹ which, among other things, is the administrator of the Swedish .se domain. The first annual survey was conducted in 2000. These surveys are produced to be accessible for a broader public. They are mainly graphical presentations of the survey results, with charts and textual comments and explanations of the charts. The charts (with the exception of Findahl (2000)) are presented in full color and are integrated in the documents, that is, they are part of the overall layout and design of the annual reports. The surveys are available as booklets, and it is possible to order a hard copy even though they are freely accessible online. The typeface is large sans-serif.

From the first survey in 2000 to the survey in 2012, dedicated questions related to internet usage in school settings were absent. From the survey in 2013, questions on internet usage in schools are accounted for. The educational discourse blends with the digital competence discourse

⁷ Original Swedish title: “Svenskarna och internet”. (our translation)

⁸ Internetstiftelsen i Sverige, <https://www.iis.se>.

⁹ Until 2014, the foundation was called .se. The surveys from 2000 to 2003 were conducted by the World Internet Institute.

in stating that Swedish schools for a long time have had problems with integrating the internet in school work, but that indications regarding an ongoing change can be noted (Findahl, 2013). The surveys of 2013 and 2017 constitute exceptions in that they discuss educational issues explicitly. The survey of 2017 accounts for the new curricula and syllabi in detail (Davidsson & Thoresson, 2017). The texts presented in the other survey reports are made up of an account and explanation of the charts.

Shift from Digital Competence Discourse to Programming Discourse

The second theme that has emerged in the analysis of policy data relates to a shift in discourses across time. The analysis highlights two main digitalization discourses that circulate across time in the policy documents. In the earlier documents, a digital competence discourse dominates, while in the latter, a programming discourse emerges. Both the digital competence discourse and the programming discourses are blended interdiscursively with an economical discourse.

The Digital Competence Discourse

The European Parliament framed digital competence in terms of the following:

Digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet. (European Parliament, 2006, p. 7)

According to the Government of Sweden (2015), digital competence is related to all participants in the educational system: students, teachers and headmasters. Furthermore, digital competence was seen as a means to dampen the effects of the global economic crisis in 2008, of decreasing unemployment and of meeting the demands of an aging population

(Government Offices of Sweden, 2012). This suggests that the digital competence discourse is blended interdiscursively with the economical discourse both at the European and the Swedish national levels. Digital competence is seen as a means for Europe and Sweden to gain competitive power globally, and a means to rebuild the economy after the economic crash of 2008. Digital competence is expressed in the Swedish context in the following terms: “every student shall, after they have completed compulsory school, be able to use modern technology as a tool for searching knowledge, communication, and learning” (The Government Offices of Sweden, 2011, p. 33). In a similar vein, the European Commission stresses that digital competence emanates from the individuals’ needs:

The digital era should be about empowerment and emancipation; background or skills should not be a barrier to accessing this potential [—] the take-up gap [between those who use and those who don’t use the internet] is due to lack of user skills such as digital and media literacy, not only for employability but also for learning, creating, participating and being confident and discerning in the use of digital media. (European Commission, 2010, pp. 24–25, italics in original)

Equality between women and men is another discourse that is blended interdiscursively with the digital competence discourse. It is hoped that a more digitalized school will see girls become more interested in technology, and that they will later on apply for technical education, and that boys, whose results are falling behind girls’ in Sweden, will become more interested in school and improve their grades (The Digitalization Commission, 2014).

A discourse about digital competence has been present in the Swedish curricula since 1994. The 1994 compulsory school curriculum included the following about information technology: “The school is responsible for ensuring that each pupil on completing compulsory school [—] can use information technology as a tool in the search for knowledge and learning”¹⁰ (The Swedish National Agency for Education, 1994a, p. 10).

¹⁰Original Swedish text: “Skolan ansvarar för att varje elev efter genomgången grundskola [—] kan använda informationsteknik som ett verktyg för kunskapssökande och lärande”. (our translation)

The upper secondary school had no such explicit regulations in the 1990s. However, students at upper secondary levels had a mandatory basic ICT course in the curriculum. Formulations become slightly extended in the next national-level curriculum (2011): “The school is responsible for ensuring that each pupil on completing compulsory school [—] can use modern technology as a tool in the search for knowledge, communication, creativity and learning” (The Swedish National Agency for Education, 2016, p. 15f, the English language edition). In the second decade of the twenty-first century Swedish upper secondary schools are thus tasked with the responsibility so “that all individual students [—] can use books, library resources and modern technology as a tool in the search for knowledge, communication, creativity and learning” (The Swedish National Agency for Education, 2011, p. 8f, the English language edition). The earlier mandatory ICT course disappeared in the 2011 curriculum, which perhaps explains why the upper secondary school now includes such a formulation.

New governmental digitalization initiatives led to a thorough revision of the curricula in 2017. All parts of the Swedish school system—from pre-school to upper secondary level—are now responsible for digitalization, including the students’ digital competence. The revised curriculum for upper secondary school now states that “In an increasingly digitalized society the school shall also contribute to the students’ *digital competence*”¹¹ (The Government of Sweden, 2017c, p. 6, italics in original). Similarly, the curriculum for the compulsory school states that “all students shall be given the opportunity to develop their skills in using digital technology”¹² (The Government of Sweden, 2017a, p. 3).

For the compulsory school, the syllabi are a part of the curriculum. The upper secondary school syllabi for the *subjects common* to all upper secondary school programs—Swedish, English, Mathematics, Religion, Civics, Natural Science and Physical Education—are also included in the curriculum. Our study focuses particularly on the syllabi for mathematics since mathematics is most influenced by the digitalization initiative. The mathe-

¹¹ Original Swedish text: “I ett allt mer digitaliserat samhälle ska skolan också bidra till att utveckla elevernas *digitala kompetens*” (our translation, italics in original).

¹² Original Swedish text: “Alla elever ska ges möjlighet att utveckla sin förmåga att använda digital teknik”. (our translation)

matics syllabus for the compulsory school from 1994 highlighted that, “the school shall in its’ teaching in Mathematics strive so that the student [—] can with familiarity and judgement use the possibilities of the electronic calculator and the computer”¹³ (The Swedish National Agency for Education, 1994b, p. 1). The syllabus for the upper secondary school in 1994 mentions computers explicitly, at the third (Mathematics C) of five levels: “After going through the course, the student shall [—] know how computer programs can be used as a support for studies of mathematic models in different applied contexts”¹⁴ (The Swedish National Agency for Education, 1994c, p. 2f). In the next nationally revised curriculum (2011), the only mention of digital tools is in the syllabus for seventh to ninth grades: “Main methods for calculating numbers in fractions and decimals when making approximations, mental arithmetic and also calculations using written methods and digital technology” (The Swedish National Agency for Education, 2016, p. 63, the English language edition). Similarly, in the upper secondary school mathematics syllabus, digital tools are mentioned once: “The education in the course shall treat the following central content: [—] Strategies for mathematical problem solving, including usage of digital media and tools”¹⁵ (The Swedish National Agency for Education, 2011, p. 92f).

The Programming Discourse

A programming discourse emerges after the establishment of a digital competence discourse discussed above. The Government Offices (2011) is the first of the scrutinized Swedish documents that mention programming, or rather the profession of the programmer. Similar to the digital competence discourse, the programming discourse is blended interdiscursively with the economical discourse, wherein a programmer is discussed

¹³ Original Swedish text: “Skolan skall i sin undervisning i matematik sträva efter att eleven [—] kan med förtrogenhet och omdöme utnyttja miniräknarens och datorns möjligheter”. (our translation)

¹⁴ Original Swedish text: “Efter genomgången kurs skall eleven [—] känna till hur dataprogram kan utnyttjas som hjälpmedel vid studier av matematiska modeller i olika tillämpade sammanhang”. (our translation)

¹⁵ Original Swedish text: “Undervisningen i kursen ska behandla följande centrala innehåll: [—] Strategier för matematisk problemlösning inklusive användning av digitala medier och verktyg”. (our translation)

as a desirable profession in both private and public sectors. At the European level, the Digitalization Commission (The Digitalization Commission, 2014) highlights two tracks: a digital competence track that most countries follow, and a track where some countries, notably Great Britain and Estonia, have introduced programming as a subject in compulsory schools (ibid.). Three rationales are presented for introducing programming: programming will help the students control their digital tools, programming will arouse the students' interest in technical issues and programming has the potential to increase the number of students who can enroll into technical educational streams (The Digitalization Commission, 2014). The Digitalization Commission suggests a mix for the Swedish educational system highlighting that the notion "digital competence" should be introduced in the curricula for both compulsory and upper secondary schools, and programming should be a part of already existing subjects, notably mathematics and technology. In the directive to the Swedish National Agency of Education, the Government of Sweden (The Government of Sweden, 2015) emphasizes programming as specific content in compulsory schools. In the latest revisions of the curricula (2017), a focus on programming is predominant, especially in the mathematics syllabi.

The analysis of the policy documents presented so far indicates that a programming discourse is present in the latest revisions of curricula and syllabi. When the Government of Sweden announced these latest changes in curricula and syllabi as a direct result of the digitalization initiative (The Government of Sweden, 2017d), the most prominent change was related to programming: "programming will be introduced as a distinct element in several different subjects in compulsory school, and primarily in the subjects of technology and mathematics"¹⁶ (The Government of Sweden, 2017d, p. 1). In the 2017 revisions of the mathematics syllabi, a clear programming, digitalization discourse can be identified. In the syllabi for compulsory school, programming in various ways is a part of mathematics across all grades: students "shall be given opportunities to develop knowledge for using digital tools and programming to investi-

¹⁶Original Swedish text: "att programmering införs som ett tydligt inslag i flera olika ämnen i grundskolan, framförallt i teknik- och matematikämnen". (our translation)

gate problems and mathematical concepts, do calculations and to present and interpret data”¹⁷ (The Swedish National Agency for Education, 2017a, p. 1). At the upper secondary school level, the intention is that programming will be a part of almost every mathematics course, especially as a tool for solving problems: “Strategies for mathematic problem solving includes modelling of different situations, with as well as without digital tools and programming”¹⁸ (The Swedish National Agency for Education, 2017b, p. 13).

Strength of Agency

The third theme that has emerged in the analysis of policy documents relates to the degree of agency and how it plays out in document design and different modes. Three dimensions of agency are explicated here: meaning potentials of language, of spatial layouts and of modes.

Meaning Potentials of Language

The Government of Sweden (2015) and the Government Offices of Sweden (2012) are examples of two documents with a high degree of agency. In their languaging, they express a *realis* modality, with an extensive usage of the verb “shall”, and in terms of how knowledge and agency play out (see Fig. 2.2) they are *oracular/agentive*. Other documents with a high degree of agency are curricula and syllabi. Due to the nature of receivers, that is, teachers and school management, the language is less bureaucratic, but agency is expressed in the *realis* modality, with an extensive usage of the verb “shall”.

¹⁷Original Swedish text: “eleverna ges förutsättningar att utveckla förtrogenhet med grundläggande matematiska begrepp och metoder och deras användbarhet. Vidare ska eleverna genom undervisningen ges möjligheter att utveckla kunskaper i att använda digitala verktyg och programmering teknik för att kunna undersöka problemställningar och matematiska begrepp, göra beräkningar och för att presentera och tolka data”. (our translation)

¹⁸Original Swedish text: “Strategier för matematisk problemlösning inklusive användningmodellering av olika situationer, såväl med som utan digitala medier och verktyg och programmering”. (our translation)

The nature of languaging is somewhat different in inscriptions which display a lower degree of agency. Someone with a lower degree of agency is positioned toward the fatalistic end of the agency axis (Scollon, 2008), since s/he can't be certain that the suggestions will be realized. The Digitalization Commission builds its reports on extensive research and is positioned in the oracular end of the knowledge axis. But the commission does not have the agency to implement its suggestions and is therefore positioned on the fatalistic end on the agency axis (see Fig. 2.2). This is emphasized in the very title of the document, "A digital agenda in the service of the human being—a brightening future can be ours"¹⁹ (The Digitalization Commission, 2014), where the fatalistic position is expressed with the irrealis modality verb *can*. The Digitalization Commission gives suggestions, which is a fatalistic stance, derived from the irrealis modality verb "to suggest". The report is addressed to the responsible minister, and the chairman of the Commission signs the dedication, which underlines the hierarchical relationship between the Digitalization Commission and the government. At the same time, The Digitalization Commission (2014) is a legislative document. In the bottom right corner, the logotype of the Government of Sweden is printed, together with the text "The governmental official reports. SOU 2014:13". The governmental official reports are considered law text in Sweden, and therefore have considerable degree of agency.

The Government of Sweden is the highest legislative authority in Sweden after the Parliament of Sweden, the Riksdag. But not all governmental documents have the same degree of agency. "IT in service of the human beings—a digital agenda for Sweden"²⁰ (Government Offices of Sweden, 2011) is a declaration of a will from the government and has a lower degree of agency. The language in the digital agenda is less bureaucratic, and the irrealis modality is used.

The objective for "A Digital Agenda for Europe" (European Commission, 2010) is to "chart a course to maximise the social and economic potential of ICT" (European Commission, 2010, p. 3), and the

¹⁹ Original Swedish title: "En digital agenda i människans tjänst—en ljusnande framtid kan bli vår". (our translation)

²⁰ Original Swedish title: "It i människans tjänst—en digital agenda för Sverige". (our translation)

main focus is to provide proposals and guidelines; here the irrealis modality is used. Each problem area is concluded, highlighted with a frame and gray background color, with actions to be taken by the commission, and by the member states. The commissions' obligation are marked with the realis modal verb "will", and the member states' obligation are marked with the irrealis modal verb "should".

Meaning Potentials in Spatial Layout

Policy documents that display a high degree of agency include the Government of Sweden (2015, 2017a, 2017b, 2017d) and the Government offices of Sweden (2012). They are enactments and commissions that other actors, that is, the Digitalization Commission or the Swedish National Agency for Education, are obliged to follow. The documents have a formal layout. They lack illustrations, except a logotype of the Government of Sweden. Bulleted lists that are common features in these policy documents are often summaries of the realis modality expressed in the policy documents, that is, what the recipient is obliged to do. The simple layout is used in other high-agency documents, like European Commission (2010) and the Swedish curricula and syllabi. The curricula are framed as books though, with ISBN numbers and include a cover page.

In contrast, the Digitalization Commission (2014) strengthens the impression of a report based on thorough research by an extensive usage of footnotes and illustrative graphs. "IT in service of the human being—a digital agenda for Sweden" (Government Offices of Sweden, 2011) is a governmental policy document with less agency than the enactments and commissions. This agenda is designed as a brochure and has a color image that covers the front page. The image shows three young people sitting in a summer shrouded park. One woman is talking on her cell phone and one man is sitting working on a laptop. A second woman is sitting next to him, watching the man work. In the bottom right corner is the logotype of the Government of Sweden; the latter frames the document as an official governmental document. Apart from the cover page, the "IT in service of the human being—a digital agenda for Sweden" has one single

illustration, a graphic presentation of the strategic areas for reaching the goals of the agenda. This is the work of an art director and is produced for print purposes.

Meaning Potentials of Mode

Scollon (2008) uses the word mode as it is used in communication, “a semiotic configuration or code in which a meaning is expressed such as writing, speech, gesture, posture, gaze, painting, architecture, interior design, or urban design” (p. 131). In the policy documents, represented modes include written words, illustrations, tables and graphs. The Digitalization Commission (2014) contains written text, graphs and tables. European Commission (2010) contains full-color graphs and a flow chart. In the cover image of “IT in service of the human being—a digital agenda for Sweden” (Government Offices of Sweden, 2011), an emoticon, ;D, is inserted. The ;D emoticon is present on every page of the document. Emoticons represent a mode between spoken and written language. The preface is personally signed by the responsible minister.²¹ The signature represents a new mode, the hand-written text, which together with the front page frames the document as more personal and publicly accessible. Scollon (2008) emphasizes another feature of the signature, in that it “tells us that this real-world, identifiable historical body took an action with his own hand for which he claims and accepts the responsibility within his official government authority” (p. 129).

The three overarching themes that emerge in the analysis indicate that the scrutinized documents are chained, that is, one document is linked with one or more others. Notable discourses that emerge are the digital competence discourse, the programming discourse and the economical discourse. The documents also represent different degrees of agency, which means that they can be considered actors, or inscriptions. Implications of these themes are discussed in the final section of this chapter.

²¹ Anna-Karin Hatt.

4 Discussion and Reflections

Social actions take place in the intersection between the historical body, the interaction order and the discourses in place. Features of the historical body, or the individual scale, include beliefs about language, social status or position, skills and habits related to policymaking and/or implementation. The historical body “invokes the role of agency and the potential for individual influence on society” (Hult, 2017, p. 94). In the historical body, the actor’s place in relation to earlier generations is relevant. Inscriptions are actors in that they have agency and influence other actors, both human and non-human (e.g. other documents) (Latour, 1987). Inscriptions could thus be considered actors, with a historical body. The chained character of the inscriptions is a consequence of their historical bodies. Existing documents become a part of the nature of forthcoming documents, their roles and agency. Inscriptions have different social status and positions, manifested in their strength or degree of agency. Depending on their degree of agency, different inscriptions have different possibilities of evoking new inscriptions in the chain, in which the original inscriptions become a part of the historical bodies of the new inscriptions. In the interaction between human and non-human actors, inscriptions can become part of the historical body of human actors. Curricula and syllabi, for instance, shape teachers historical bodies in different ways.

Sociocultural framings highlight relevant features of the interaction order, or the relations among actors, and constitute the norms of the interactional setting, expectations about actors’ social roles or positions and central versus peripheral participants. In a frozen action, these features are inherent in that they are imprinted in previous social actions. Policy documents have a relation to other policy documents in the chain of documents, and there is an interaction order among the policy documents where inscriptions with a higher degree of agency can evoke new documents. Degree of agency is expressed both in layout and the nature of languaging. Inscriptions with a higher degree of agency have a more formal layout and a more bureaucratic language. Part of the interaction order displayed here can be understood in terms of modalities, where inscriptions with a lower degree of agency exhibit a larger variety of

modalities. In documents with a lower degree of agency, graphs, tables, flow charts and so on are more commonly present. These illustrations are in themselves inscriptions, with a rhetorical agenda (Latour, 1987). Inscriptions, for example policy documents, with a lower degree of agency use different modalities as arguments to convince the principal receiver to implement the given suggestions. One mode represented in the policy documents is the signature. Rhetorically the signature can be considered the sender's ethos, that is, the personal character used as an argument. Inscriptions with a lower degree of agency need stronger arguments in order to make their case. These arguments could be illustrations, graphs or tables, but they could also be a scientific discourse, where arguments are founded on external references, footnotes and bibliographies.

"The great amount of work of accumulating, collating, moving, and summarizing inscriptions contributes to their power and rhetorical force" (Roth & McGinn, 1998, p. 403). This could be taken as a paradoxical statement, since the results of our study highlight that policy documents with a higher degree of agency are often shorter than documents with a lower degree of agency. Documents with a high degree of agency also have fewer modes, that is, inscriptions-in-inscriptions. But policy documents, or inscriptions, with a high degree of agency have the power to evoke documents with a lower degree of agency. The principal producers of the policy documents have different degrees of agency, and their strength reflects the possibilities to produce high-degree-agency documents. In the multi-vocal dialogue between policy documents across time and space, some voices have more affordances than others. The Government of Sweden can produce high-degree-agency inscriptions, with the power to evoke a chain of documents from other actors. The Digitalization Commission produces inscriptions that have agency in that they can influence the government's decisions, but these inscriptions don't evoke new inscriptions. The Swedish National Agency for Education has a lower degree of agency than the Government of Sweden, but curricula and syllabi evoke new chains of documents when teachers interpret and implement them.

There are many discourses circulating in the policy documents. The results of the present study highlight that the most important discourses include the governmental discourse, the digital competence discourse,

the programming discourse and the economical discourse. A part of NA is to analyze which discourses are important and fore-grounded, that is, identify the discourses in place. The governmental discourse is common to all the other discourses as several policy documents are legislative in nature. In the policy documents that formed the digitalization initiative in Sweden, two discourses that emerge are important, the digital competence discourse and the programming discourse. Blended interdiscursively with both these discourses is a third though, an economical discourse. In European Commission (2010), the digital competence discourse is blended interdiscursively with an economical discourse: ICT is considered a mediating means to lift Europe from the economic crisis.

The crisis has wiped out years of economic and social progress and exposed structural weaknesses in Europe's economy [—] The objective of this Agenda is to chart a course to maximise the social and economic potential of ICT, most notably the internet, a vital medium of economic and societal activity. (European Commission, 2010, p. 3)

The Digitalization Commission stresses that

The background to the question of competence is considered appropriate in that most countries experience that the basic skills that schools have focused on so far are necessary, but not enough, to meet the extensive demands that are made in the current global economy, with continuously increasing competition.²² (The Digitalization Commission, 2014, p. 139)

The Digitalization Commission (2014) is the first instance that mentions programming in the scrutinized policy documents. Government Offices of Sweden (2011) mentions the profession “programmer” twice: in a footnote and as a desirable profession in both private and public sectors. The programming competence thus is related to the economic life of the labor market. Economic liberalism could be seen as a political and

²²Original Swedish text: “Bakgrunden till att kompetensfrågan anses aktuell är att de flesta länder uppfattar att de grundläggande kunskaperna som skolan hittills koncentrerat sig på är nödvändiga men inte tillräckliga för att möta de omfattande krav som ställs i dagens globala ekonomi med ständigt ökande konkurrens”. (our translation)

ideological driving force behind SDI. SDI thus becomes a mediational means for the market, especially the labor market. The supply of a skilled labor force and the demands of a Swedish labor force are supposed to increase with SDI. The interdiscursive blending of digital competence discourse and economical discourse has a long history. For instance, the first sentence in the official letter that presents the ITiS project highlights this relationship: “The Swedish society has gone through big changes, not least in the labor market”²³ (The Government of Sweden, 1998).

Morally and ethically, SDI could decrease the diversity in digitalization between schools in the nation-state of Sweden. In Sweden, the municipality is responsible for the school administration, and the schools are to a large extent financed by the local taxpayers who live in the municipality. This arrangement has resulted in a diversity between the Swedish schools regarding digitalization, something that the government-initiated Digitalization Commission also recognizes (The Digitalization Commission, 2013). But this is not an expressed driving force in the scrutinized policy documents. There is one important ethical/moral argument expressed in the policy documents: equality between women and men. Here digitalization is considered a mediational means to make girls more interested in technical education and to promote the school results of boys (e.g. The Digitalization Commission, 2014). Here the equality discourse is blended with the economical discourse though: “In an extension [girls increased interest in IT] can reduce the skewed gender distribution in the IT sector”²⁴ (The Digitalization Commission, 2014, p. 17). Equality is seen as a mediational means to increase the supply of skilled employers in the IT sector. In 1998, the digitalization of schools was considered a mediational means to compensate socioeconomically disadvantaged children, who didn’t have access to computers at home (The Government of Sweden, 1998). This argument isn’t raised in the subsequent documents that are part of our dataset.

In this study, NA and ANT constitute theoretical points of departure for scrutinizing policy documents across temporal and spatial scales. In

²³Original Swedish text: “Det svenska samhället har genomgått stora förändringar inte minst på arbetsmarknaden”. (our translation)

²⁴Original Swedish text: “I förlängningen kan [flickors ökade intresse för IT] bidra till att minska den skeva könsfördelningen inom it-branschen”. (our translation)

NA, the social action is the unit of analysis, and policy documents can be considered frozen (social) actions. A traditional NA concludes with a third step after establishing and navigating the nexus of practice: changing the nexus of practice. The rationale for this is that the nexus analyst always interacts, and therefore intervenes, with the nexus of practice. Considering the frozen character of the scrutinized documents, there is no interaction, or intervention, with the nexus of practice. They are what Latour (1987), with a synonym to inscriptions, calls *immutable mobiles*. They are mobile in the network, and influence other actors, but they are in themselves immutable. The frozen, or immutable, character of the policy documents also has implications for temporal scales. These tend to be longer. The semiotic processes related to the production of policy documents fall into what Scollon and Scollon (2004) call a solar biorhythm, with a duration of several years, which strengthens the rhetorical character of the policy documents. The analysis presented in this chapter has illuminated the relevance of shifts and continuities regarding the importance of digitalization in the work done by actors and institutions across time and scales.

Abbreviations

ANT	Actor-Network Theory
CDA	Critical Discourse Analysis
ICT	Information and Communication Technology
ITiS	IT i Skolan (IT in School)
NA	Nexus Analysis
PCDA	Public Consultative Discourse Analysis
SDI	Swedish Digitalization Initiative

Appendix 1

Table 2.1 Policy documents 1994–2016 that make up the dataset

1994, July	<ul style="list-style-type: none"> • <i>Title:</i> Matematik, Lpf 94 (Mathematics, Lpf 94) • <i>Description:</i> Mathematics syllabus for upper secondary school • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Syllabus • <i>Document url:</i> http://ncm.gu.se/media/kursplaner/gym/kursplangymA-E94.pdf
1994, July	<ul style="list-style-type: none"> • <i>Title:</i> Matematik, Lpo 94 (Mathematics, Lpo 94) • <i>Description:</i> Mathematics syllabus for the compulsory school • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Syllabus • <i>Document url:</i> http://ncm.gu.se/media/kursplaner/grund/grund1994.pdf
2006	<ul style="list-style-type: none"> • <i>Title:</i> Läroplan för de frivilliga skolformerna Lpf 94 (Curriculum for the non-compulsory school system Lpf 94) • <i>Description:</i> Curriculum for upper secondary school • <i>Provider:</i> Skolverket • <i>Function:</i> Curriculum • <i>Document url:</i> http://hdl.handle.net/2077/31115 • <i>Title:</i> Läroplan för det obligatoriska skolväsendet, förskoleklassen, och fritidshemmet Lpo 94 (Curriculum for the compulsory school, preschool class and the recreation centre Lpo 94) • <i>Description:</i> Curriculum for the compulsory school, preschool class and the recreation centre • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Curriculum • <i>Document url:</i> http://hdl.handle.net/2077/30848

(continued)

Table 2.1 (continued)

2006, December 30	<ul style="list-style-type: none"> • <i>Title:</i> EUROPAPARLAMENTETS OCH RÅDETS REKOMMENDATION av den 18 december 2006 om nyckelkompetenser för livslångt lärande (RECOMMENDATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 on key competences for lifelong learning) • <i>Description:</i> An identification and definition of eight key competences for lifelong learning • <i>Provider:</i> The European Parliament and the Council of the European Union • <i>Function:</i> Recommendation
2010, May 19	<ul style="list-style-type: none"> • <i>Document url:</i> http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006H0962&from=SV • <i>Title:</i> En digital agenda för Europa (A Digital Agenda for Europe) • <i>Description:</i> An agenda to deliver economic and social benefits from a digital single market based on fast and ultra fast internet and interoperable applications • <i>Provider:</i> The European Commission • <i>Function:</i> European Union Legislation
2011	<ul style="list-style-type: none"> • <i>Document url:</i> http://eur-lex.europa.eu/legal-content/SV/TXT/PDF/?uri=CELEX:52010DC0245&from=EN • <i>Title:</i> Gymnasieskola 2011 (Gy11) (Upper Secondary School 2011 (Gy11)) • <i>Description:</i> Curriculum for upper secondary school • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Curriculum • <i>Document url:</i> https://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?url=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Ftrycksak%2Fblob%2Fpdf2597.pdf%3F%3D2597
2011, September 29	<ul style="list-style-type: none"> • <i>Title:</i> It i människans tjänst—en digital agenda för Sverige (IT in human service—a digital agenda for Sweden) • <i>Description:</i> An agenda for taking advantage of the possibilities of digitalization. States that the Government of Sweden will establish a Digitalization Commission. This agenda is the Swedish answer to the digital agenda of Europe • <i>Provider:</i> The Government of Sweden • <i>Function:</i> Governmental decision • <i>Document url:</i> http://www.regeringen.se/49bbbc/contentassets/6136dab3982543bea4adc18420087a03/it-i-manniskans-tjanst%2D%2D-en-digital-agenda-for-sverige-n2011.12

(continued)

Table 2.1 (continued)

2012, June 7	<ul style="list-style-type: none"> • <i>Title:</i> Digitaliseringskommissionen—en kommission för den digitala agendan (The digitalization commission—a commission for the digital agenda) • <i>Description:</i> A directive for the establishment and work of the Digitalization Commission • <i>Provider:</i> The Government of Sweden • <i>Function:</i> Directive for a commission • <i>Document url:</i> http://www.regeringen.se/49bba8/contentassets/538820854ece4bf2842e139f84b4b723/digitaliseringskommissionen%2D%2D-en-kommission-for-den-digitala-agendan-dir-201261
2013, October 1	<ul style="list-style-type: none"> • <i>Title:</i> Programmering är framtidens språk (Programming is the language of the future) • <i>Description:</i> An op-ed article published in Svenska Dagbladet, one of the biggest daily newspaper in Sweden. Arguments for the thesis that programming should be a school subject in compulsory school. Written by the director of a private upper secondary school • <i>Provider:</i> Christine Johnsson, director, IT-gymnasiet • <i>Function:</i> Op-ed article • <i>Document url:</i> https://www.svd.se/programmering-ar-framtidens-sprak
2014	<ul style="list-style-type: none"> • <i>Title:</i> En digital agenda i människans tjänst—en ljusnande framtid kan bli vår (A digital agenda in the service of humanity—a brightening future can be ours) • <i>Description:</i> An interim report from the Digitalization Commission to the Government of Sweden. The commission accounts for its' work so far. Among other things, the commission argues that digitalization needs attention in school • <i>Provider:</i> The Digitalization Commission (Digitaliseringskommissionen) • <i>Function:</i> Interim report • <i>Document url:</i> http://www.regeringen.se/49bbaa/contentassets/99c1e965d6ff46b6a8f81e6b508c203a/en-digital-agenda-i-manniskans-tjanst%2D%2D-en-ljusnande-framtid-kan-bli-var-sou-201413-del-1-av-2 (Part 1) http://www.regeringen.se/49bbaa/contentassets/99c1e965d6ff46b6a8f81e6b508c203a/en-digital-agenda-i-manniskans-tjanst%2D%2D-en-ljusnande-framtid-kan-bli-var-sou-201413-del-2-av-2 (Part 2)

(continued)

Table 2.1 (continued)

2015, September 24	<ul style="list-style-type: none"> • <i>Title:</i> Uppdrag att föreslå nationella it-strategier för skolväsendet (Commission to suggest national IT strategies for the educational system) • <i>Description:</i> A commission from the Government of Sweden to the Swedish National Agency for Education to suggest national IT strategies for the educational system. Among other things, the Government gives the commission to elaborate new curricula and syllabi • <i>Provider:</i> The Government of Sweden • <i>Function:</i> Governmental Commission • <i>Document url:</i> http://www.regeringen.se/4a80e6/contentassets/a22b7decc51047a790f68d63c64920cb/uppdag-till-skolverket-att-foresla-nationella-it-strategier-for-skolvaset.pdf
2016	<ul style="list-style-type: none"> • <i>Title:</i> Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011. (Lgr11) Reviderad 2016 (Curriculum for the compulsory school, preschool class and the recreation centre 2011. (Lgr11) Revised 2016) • <i>Description:</i> Curriculum for the compulsory school, preschool class and the recreation centre. • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Curriculum • <i>Document url:</i> https://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?_xurl_=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Ftrycksak%2FBIob%2Fpdf2575.pdf%3Fk%3D2575
2016, June 15	<ul style="list-style-type: none"> • <i>Title:</i> Redovisning av uppdraget om att föreslå nationella IT-strategier för skolväsendet—förändringar i läroplaner, ämnesplaner och examensmål (Accountance for the commission to suggest national IT strategies for the educational system—changes in curricula, syllabi and diploma objectives) • <i>Description:</i> An accountability from the Swedish National Agency for Education to the Government of Sweden. The accountability gives suggestions for new curricula and syllabi • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Account of governmental commission • <i>Document url:</i> https://www.skolverket.se/om-skolverket/publikationer/visa-enskild-publikation?_xurl_=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Ftrycksak%2FBIob%2Fpdf3668.pdf%3Fk%3D3668

(continued)

Table 2.1 (continued)

2016, June 15	<ul style="list-style-type: none"> • <i>Title:</i> Bilaga 3: Läroplan för grundskolan, förskoleklassen och fritidshemmet. Skolverkets förslag till förändringar—Nationella it-strategier (U2015/04666/S) (Appendix 3: Curriculum for compulsory school, preschool class and recreation centre. Skolverket's suggestions for changes—National IT strategies (U2015/04666/S)) • <i>Description:</i> Suggestions for changes in curricula and syllabi for compulsory school, preschool class and recreation centre • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Suggestion of new curriculum • <i>Document url:</i> https://www.skolverket.se/om-skolverket/publikationer/it-i-skolan?_xurl=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Fbilaga%2FBIlob%2Fpdf539.pdf%3Fk%3D539
2016, June 15	<ul style="list-style-type: none"> • <i>Title:</i> Bilaga 7: Läroplan för gymnasieskolan. Skolverkets förslag till förändringar—Nationella it-strategier (U2015/04666/S) (Appendix 7: Curriculum for upper secondary school. Skolverket's suggestions for changes—National IT strategies (U2015/04666/S)) • <i>Description:</i> Suggestions for changes in curricula and syllabi for upper secondary school • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Suggestion of new curriculum • <i>Document url:</i> https://www.skolverket.se/om-skolverket/publikationer/it-i-skolan?_xurl=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Fbilaga%2FBIlob%2Fpdf543.pdf%3Fk%3D543
2016, June 15	<ul style="list-style-type: none"> • <i>Title:</i> Bilaga 12: Ämnesplan—matematik. Skolverkets förslag till förändringar—nationella it-strategier (U2015/04666/S) (Appendix 12: Subject plan—mathematics. Skolverket's suggestions for change—National IT strategies (U2015/04666/S)) • <i>Description:</i> Suggestions for changes in the syllabi for mathematics • <i>Provider:</i> The Swedish National Agency for Education (Skolverket) • <i>Function:</i> Suggestion of new syllabus for mathematics • <i>Document url:</i> https://www.skolverket.se/om-skolverket/publikationer/it-i-skolan?_xurl=http%3A%2F%2Fwww5.skolverket.se%2Fwtpub%2Fws%2Fskolbok%2Fwpubext%2Fbilaga%2FBIlob%2Fpdf549.pdf%3Fk%3D549

References

- Agar, M. H. (2008). *The Professional Stranger. An Informal Introduction to Ethnography* (2nd ed.). Bingley: Emerald Group.
- Bagga-Gupta, S. (2012). Challenging Understandings of Bilingualism in the Language Sciences from the Lens of Research that Focuses Social Practices. In E. Hjärne, G. van der Aalsvoort, & G. de Abreu (Eds.), *Learning, Social Interaction and Diversity: Exploring School Practices* (pp. 85–102). Rotterdam: Sense Publishers.
- Bagga-Gupta, S. (2017). Going Beyond Oral-Written-Signed-Irl-Virtual Divides. Theorizing Languageing from *Mind-as-Action* Perspectives. *Writing & Pedagogy*, 9(1), 49–75. <https://doi.org/10.1558/wap.27046>
- Bagga-Gupta, S., & Messina Dahlberg, G. (2018). Meaning-Making or Heterogeneity in the Areas of Language and Identity? The Case of Translanguaging and Nyanlända (Newly-Arrived) Across Time and Space. *International Journal of Multilingualism*, 1–28. <https://doi.org/10.1080/14790718.2018.1468446>
- Burke, K. (1945). *A Grammar of Motives*. New York: Prentice-Hall.
- Chaib, C., Chaib, M., & Ludvigsson, A. (2004). *Leva med IT i S. Nationell utvärdering av IT i Skolan*. Retrieved from DiVA website: <http://urn.kb.se/resolve?urn=urn%3Anbn%3Ase%3Ahj%3Adiva-654>
- Davidsson, P., & Thoreson, A. (2017). *Svenskarna och internet 2017. Undersökning om svenskarnas internetvanor*. Retrieved from https://www.iis.se/docs/Svenskarna_och_internet_2017.pdf
- Erickson, F. (1977). Some Approaches to Inquiry in School-Community Ethnography. *Anthropology & Education Quarterly*, 8(2), 58–69.
- European Commission. (2010). *A Digital Agenda for Europe*. Brussels: European Commission. Retrieved from <http://eur-lex.europa.eu/legal-content/SV/TXT/PDF/?uri=CELEX:52010DC0245&from=EN#page=1&zoom=auto,-274,76>
- European Parliament. (2006). *Recommendation of the European Parliament and of the Council of 18 December 2006 on Key Competences for Lifelong Learning* (2006/962/EC). European Parliament.
- Findahl, O. (2000). *Svenskarna och Internet År 2000*. Retrieved from <https://www.iis.se/docs/SOI2000.pdf>
- Findahl, O. (2013). *Svenskarna och internet 2013*. Retrieved from <https://www.iis.se/docs/SOI2013.pdf>

- Gee, J. P. (1999). *An Introduction to Discourse Analysis. Theory and Method*. London and New York: Routledge.
- Government Offices of Sweden. (2011). *It i människans tjänst. En digital agenda för Sverige*. Retrieved from <http://www.regeringen.se/49bbbc/contentassets/6136dab3982543bea4adc18420087a03/it-i-manniskans-tjanst%2D%2D-en-digital-agenda-for-sverige-n2011.12>
- Government Offices of Sweden. (2012). *The Digitalization Commission – en kommission för den digitala agendan*. Stockholm. Retrieved from <http://www.regeringen.se/49bba8/contentassets/538820854ece4bf2842e139f84b4b723/The-Digitalization-Commission%2D%2D-en-kommission-for-den-digitala-agendan-dir.-201261>.
- Gynne, A. (2016). *Languaging and Social Positioning in Multilingual School Practices. Studies of Sweden Finnish Middle School Years*. Doctoral Dissertation. Västerås: Mälardalen University. Retrieved from <http://urn.kb.se/resolve?urn=urn:nbn:se:mdh:diva-31774>
- Hult, F. M. (2015). Making Policy Connections Across Scales Using Nexus Analysis. In F. M. Hult & D. Cassels Johnson (Eds.), *Research Methods in Language Policy and Planning: A Practical Guide* (1st ed.). Wiley.
- Hult, F. M. (2017). More than a Lingua Franca: Functions of English in a Globalised Educational Language Policy. *Language, Culture and Curriculum*, *In Press*. <https://doi.org/10.1080/07908318.2017.1321008>
- Latour, B. (1987). *Science in Action*. Cambridge, MA: Harvard University Press.
- Linell, P. (2009). *Rethinking Language, Mind, and World Dialogically. Interactional and Contextual Theories of Human Sense-Making*. Charlotte, NC: Information Age Publishing.
- Messina Dahlberg, G. (2015). *Languaging in Virtual Learning Sites. Studies of Online Encounters in the Language-Focused Classroom*. Doctoral Dissertation. Örebro: Örebro University. Retrieved from <http://urn.kb.se/resolve?urn=urn:nbn:se:du-20590>
- Nishida, K. (1958). *Intelligibility and the Philosophy of Nothingness. Three Philosophical Essays* (R. Schinzing, Trans.). Honolulu: East-West Center Press.
- Norris, S. (2004). *Analyzing Multimodal Interaction. A Methodological Framework*. New York and London: Routledge.
- OECD. (2015a). *Students, Computers and Learning: Making the Connection: Making the Connection*. PISA, OECD Publishing. Retrieved from <https://doi.org/10.1787/9789264239555-en>

- OECD. (2015b). Students, Computers, Learning – ICT in Education. *OECD Education Statistics (Database)*. <https://doi.org/10.1787/6ceaedf7-en>
- Pietikäinen, S., Lane, P., Salo, H., & Laihiala-Kankainen, S. (2011). Frozen Actions in the Arctic Linguistic Landscape: A Nexus Analysis of Language Processes in Visual Space. *International Journal of Multilingualism*, 8(4), 277–298. <https://doi.org/10.1080/14790718.2011.555553>
- Roth, W.-M., & McGinn, M. K. (1998). >unDELETE science education:/lives/work/voices. *Journal of Research in Science Teaching*, 35(4), 399–421. [https://doi.org/10.1002/\(SICI\)1098-2736\(199804\)35:4<399::AID-TEA10>3.0.CO;2-5](https://doi.org/10.1002/(SICI)1098-2736(199804)35:4<399::AID-TEA10>3.0.CO;2-5)
- Scollon, R. (2008). *Analyzing Public Discourse. Discourse Analysis in the Making of Public Policy*. London and New York: Routledge.
- Scollon, R., & Scollon, S. W. (2004). *Nexus Analysis. Discourse and the Emerging Internet*. New York: Routledge.
- Tapio, E. (2013). *A Nexus Analysis of English in the Everyday Life of FinSL Signers: A Multimodal View on Interaction*. Jyväskylä: University of Oulo.
- The Digitalization Commission. (2013). *En digital agenda i människans tjänst – Sveriges digitala ekosystem, dess aktörer och drivkrafter*. Stockholm: Fritzes.
- The Digitalization Commission. (2014). *En digital agenda i människans tjänst – en ljusnande framtid kan bli vår*. Stockholm: Fritzes.
- The Government of Sweden. (1998). *Lärandets verktyg nationellt program för IT i skolan*. Stockholm: Sveriges Riksdag. Retrieved from <http://riksdagen.se/sv/dokument-lagar/dokument/skrivelse/landets-verktyg-nationellt-program-for-it-i-gl03176>
- The Government of Sweden. (2015). *Uppdrag att föreslå nationella it-strategier för skolväsendet*. Stockholm.
- The Government of Sweden. (2017a). *Förordning om ändring i förordningen (SKOLFS 2010:37) om läroplan för grundskolan, förskoleklassen och fritidshemmet*. Stockholm. Retrieved from https://www.skolverket.se/polopoly_fs/1.260517!/LaroplanGrundskolaForskoleklassFritidshem.pdf
- The Government of Sweden. (2017b). *Förordning om ändring i förordningen (SKOLFS 2010:261) om ämnesplaner för de gymnasiegemensamma ämnena*. Stockholm. Retrieved from https://www.skolverket.se/polopoly_fs/1.260522!/AmnesplanerGymnasiegemensammaAmnen.pdf
- The Government of Sweden. (2017c). *Förordning om ändring i förordningen (SKOLFS 2011:144) om läroplan för gymnasieskolan*. Stockholm. Retrieved from https://www.skolverket.se/polopoly_fs/1.260521!/LaroplanGymnasieskolan.pdf

- The Government of Sweden. (2017d). *Stärkt digital kompetens i skolans styrdokument*. Retrieved from <http://www.regeringen.se/493c41/contentassets/acd9a3987a8e4619bd6ed95c26ada236/informationsmaterial-starkt-digital-kompetens-i-skolans-styrdokument.pdf>
- The Government Offices. (2011). *It i människans tjänst. En digital agenda för Sverige*. Retrieved from <http://www.regeringen.se/49bbbc/contentassets/6136dab3982543bea4adc18420087a03/it-i-manniskans-tjanst%2D%2D-en-digital-agenda-for-sverige-n2011.12>
- The Swedish National Agency for Education. (1994a). *Läroplan för det obligatoriska skolväsendet, förskoleklassen och fritidshemmet Lpo 94*. Stockholm: Fritzes.
- The Swedish National Agency for Education. (1994b). *Matematik*. Stockholm: Fritzes.
- The Swedish National Agency for Education. (1994c). *Upper Secondary School Mathematics Curriculum*.
- The Swedish National Agency for Education. (2011). *Läroplan, examensmål och gymnasiegemensamma ämnen för gymnasieskola 2011*. Stockholm: Fritzes.
- The Swedish National Agency for Education. (2016). *Läroplan för grundskolan, förskoleklassen och fritidshemmet 2011. Reviderad 2016*. Stockholm: Fritzes.
- The Swedish National Agency for Education. (2017a). *Matematik, Lpo 11, revision 1 september 2017*.
- The Swedish National Agency for Education. (2017b). *Matematik, Lpf 11, revision 1 september 2017*.
- Wertsch, J. V. (1998). *Mind as Action*. New York: Oxford University Press.

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